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# ***CDBR-B***

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## Dynamic Braking Unit

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# **Instruction Manual**



**MAGNETEK**  
MATERIAL HANDLING

April 2009  
Part Number: 146-10001-R1  
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## 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. It may take as long as 10 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-B 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 Electromotive Systems 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

## Receiving

All equipment is tested against defect 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 you Electromotive Systems 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 +40°C
- Protected from rain and moisture
- Free from corrosive gases or liquids
- Free from dust or metal particles
- Clean and dry
- Free from excessive vibration

# 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. (30mm) on either side and 3.94 in. (100mm) 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 (5m), and the distance between the braking unit and the braking resistor is **less than** 32.8 feet (10m).
5. Make connections between the drive, braking unit(s), and braking resistor(s) according to Figure 1 (single units) or Figure 2 (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 a grounding lead conforming to your National Electric code.

## Adjustments

9.
  - 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 3 or 4 and set the jumper to the nominal three phase supply voltage. Table 1 indicates the DC voltage level that the braking unit will turn on for different jumper settings. Failure to set the jumper 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 1 or 2 (depending on number of braking modules). If only one braking unit is applied, verify that the jumper 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 xx1x, which disables stall prevention during deceleration.
  - b) For an IMPULSE•G+: Program Sn-07 to xx1x, which disables stall prevention during deceleration.
  - c) For an IMPULSE•G+ Series 2: Program L3-04 to 0, which disables stall prevention during deceleration.
  - d) For an IMPULSE•VG+ Series 2: Program L3-04 to 0, which disables stall prevention during deceleration.

## Installation

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

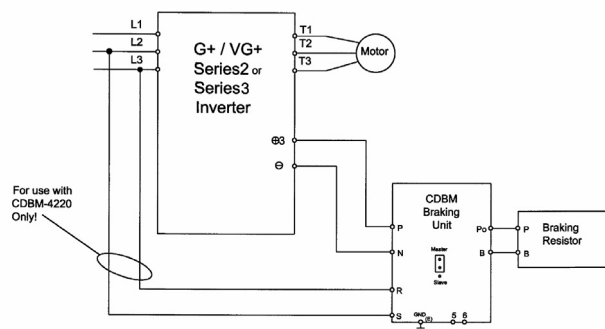
- Provide at least 3.94 in. (100mm) above and below the CDBR-B.
- Provide at least 1.18 in (30mm) on either side of the CDBR-B.
- Provide sufficient space between other components that generate heat or do not tolerate heat.
- Free from drops of water and corrosive gases.
- Free of dirt and dust.
- Free of physical shock and vibration.

## Operational Verification

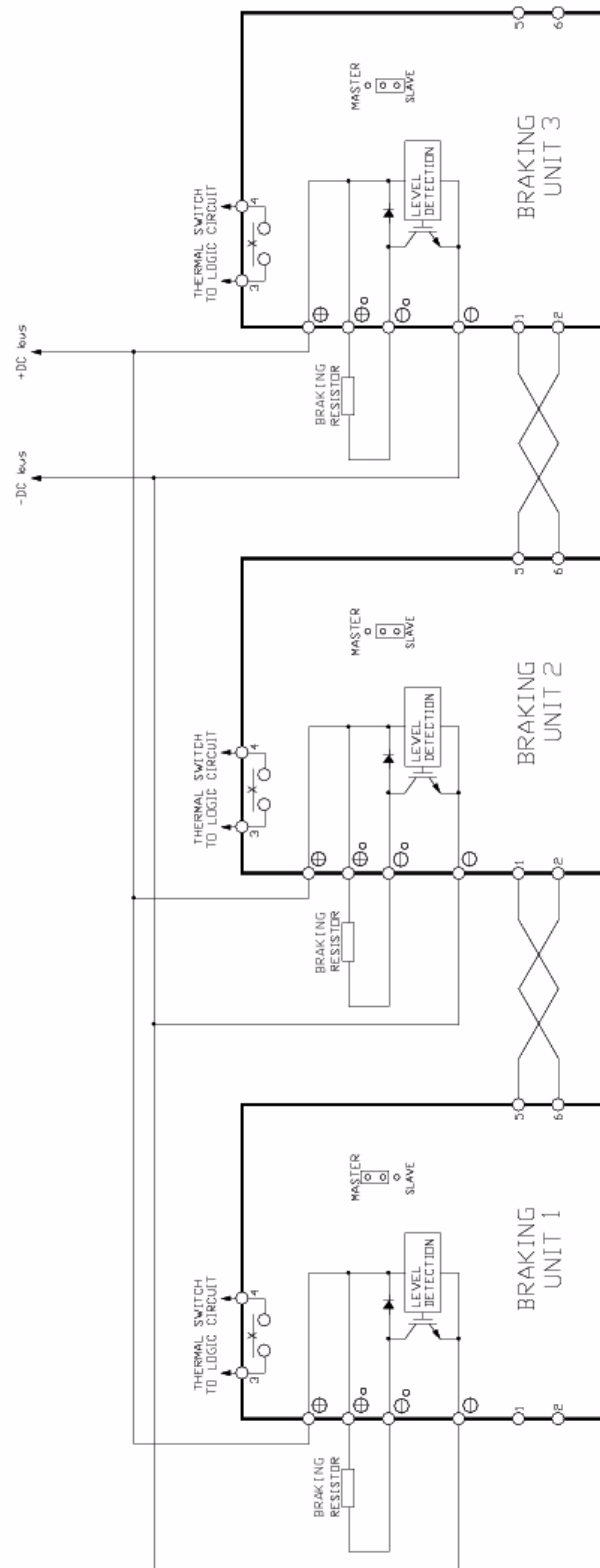
11. During dynamic braking operations, make sure that the required deceleration characteristic is obtained. The operation indicator (“BRAKE”) lamp in the braking unit lights.
12. Reinstall and secure front covers on the drive and braking units(s).

**Table 1: Minimum Resistance Values for Braking Resistors**

Supply Voltage	Turn On Voltage	Minimum Resistance ( $\Omega$ )						
		CDBR-2022B	CDBR-2045-B	CDBR-2110B	CDBR-4045B	CDBR-4090B	CDBR-4220B	CDBR-5037B
200VAC	330VDC	5.5	3.3	1.4	–	–	–	–
208VAC	345VDC	5.8	3.5	1.4	–	–	–	–
220VAC	365VDC	6.1	3.7	1.5	–	–	–	–
230VAC	380VDC	6.4	3.8	1.6	–	–	–	–
380VAC	630VDC	–	–	–	10.5	6.3	2.6	–
400VAC	660VDC	–	–	–	11.0	6.6	2.7	–
415VAC	690VDC	–	–	–	11.5	6.9	2.8	–
440VAC	730VDC	–	–	–	12.2	7.3	3.0	–
460VAC	760VDC	–	–	–	12.8	7.6	3.2	–
500VAC	825VDC	–	–	–	–	–	–	20.7
575VAC	950VDC	–	–	–	–	–	–	23.8



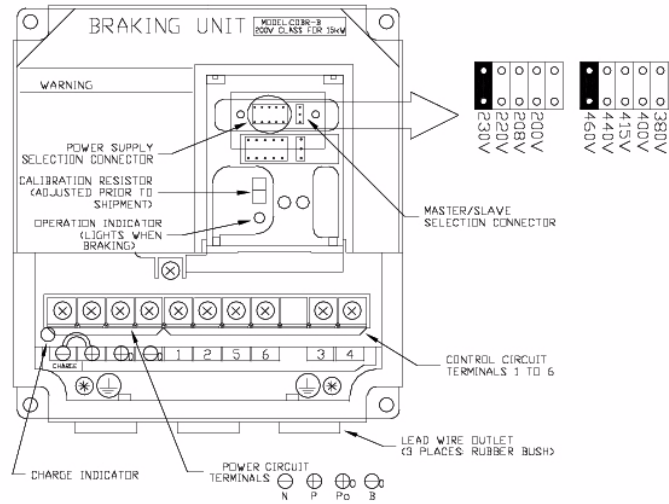
**Figure 1: Single Unit Wiring Diagram**



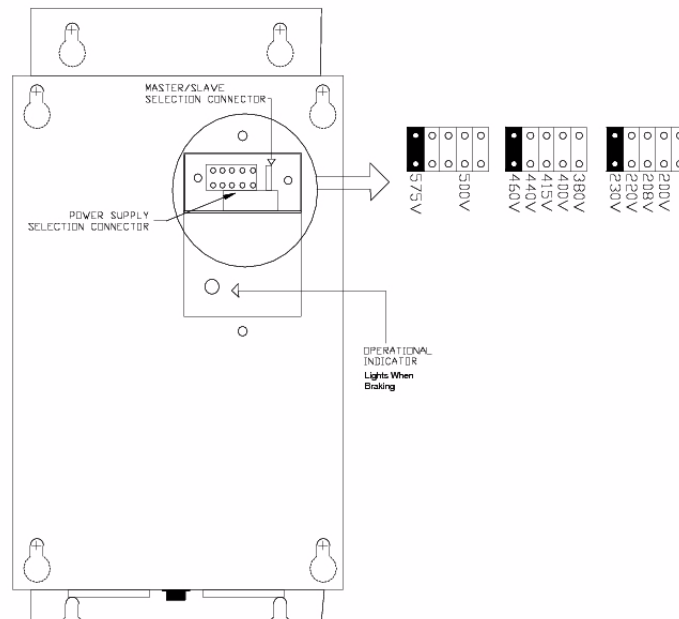
**Figure 2: CDBR-B Parallel connection of Braking Unit**

## CDBR-B Parallel Connection Notes

- Braking units have a MASTER/SLAVE selection jumper (See Figure 2). Select “MASTER” for Braking Unit 1 and “SLAVE” for all subsequent braking units.
- Connect thermal protectors on the parallel CDBR-Bs in parallel to the drive’s multi-function input.
- Use twisted pair wire, 20 or 22 AWG with ferrules, for connections between terminals 5, 6 and 1, 2 of the CDBR-Bs.



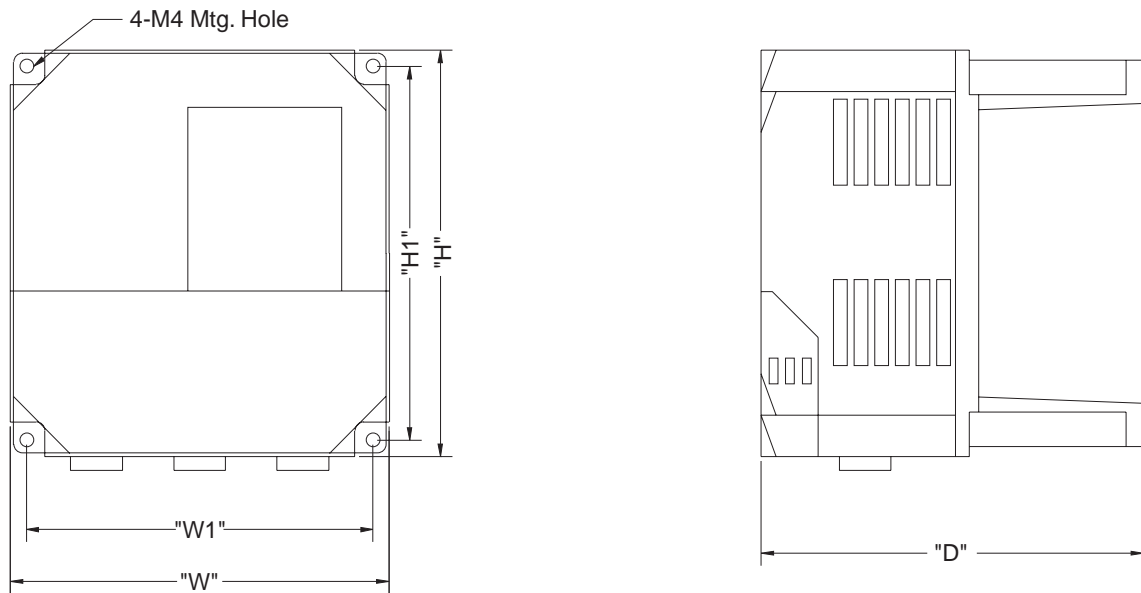
**Figure 3: CDBR 2022B, 4045B (Terminal Cover and Indicating Cover Removed)**



**Figure 4: CDBR-2045B, 2110B, 4090B, 4220B, 5037B (Indicating Cover Removed)**



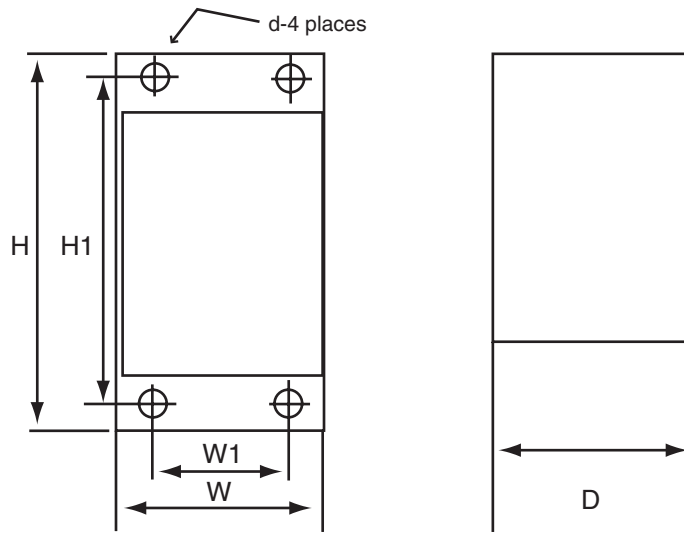
## CDBR-B Braking Unit Dimensions



*Figure 5: CDBR-B Drawing*

**Table 2: CDBR-B Dimensions**

Model Number	Dimensions in inches (mm)						Wt. in lbs. (kg)
	Overall			Mounting			
	W	H	D	W1	H1	d	
CDBR-2022B	5.51 (140)	5.91 (150)	5.45 (138.5)	5.04 (128)	5.43 (138)	.16 (4)	4.56 (2.07)
CDBR-4045B	5.51 (140)	5.91 (150)	5.45 (138.5)	5.04 (128)	5.43 (138)	.16 (4)	4.82 (2.19)



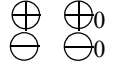
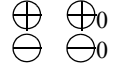
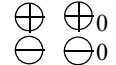
**Figure 6: CDBR-B Drawing**

**Table 3: CDBR-B Dimensions**

Model Number	Dimensions in inches (mm)						Wt. in lbs. (kg)
	Overall			Mounting			
	W	H	D	W1	H1	d	
CDBR-2045B	7.09 (180)	14.57 (370)	7.87 (200)	5.51 (140)	13.78 (350)	0.24 (6)	23.16 (10.51)
CDBR-2110B	7.09 (180)	14.57 (370)	7.87 (200)	5.51 (140)	13.78 (350)	0.24 (6)	25.60 (11.61)
CDBR-4090B	8.66 (220)	14.76 (375)	7.87 (200)	7.09 (180)	13.98 (355)	0.24 (6)	27.46 (12.46)
CDBR-4220B	9.84 (250)	14.76 (375)	7.87 (200)	8.27 (210)	13.98 (355)	0.24 (6)	30.08 (13.64)
CDBR-5037B	5.51 (140)	11.02 (280)	6.29 (160)	3.94 (100)	10.23 (260)	0.24 (6)	11.80 (5.3)

## Circuits and Wiring Specifications

**Table 4: Circuits and Wiring Specifications**

Model Number	Circuit	Terminals	Wire Size AWG	Wire Type	Terminal Screw	Max. Torque lb. in.
CDBR-2022B, 4045B, 5037B	Main		12-10	600V vinyl sheathed	M4	13.3
	Control	1 2 3 4 5 6	18-14	wire or equivalent		
CDBR-2045B, 4090B	Main		10-8	600V vinyl sheathed	M5	21.7
	Control	1 2 3 4 5 6	18-14	wire or equivalent	M4	15.6
CDBR-4220B	Main		4 8-6	600 V vinyl sheathed	M6	43.4
	Control	1 2 3 4 5 6	18-14	wire or equivalent	M4	15.6

## Braking Unit Specification

**Table 5: Braking Unit Specifications**

Braking Unit Model CDBR-		200V to 300V			380V to 460V			500V to 575V
		2022-B	2045-B	2110-B	4045-B	4090-B	4220-B	5037-B
Output Character- istics	Max. Discharge Current (A) (peak value)*	60	100	250	60	100	250	40
	Rated Discharge Current (A)	20	30	80	18	30	80	15
	Braking Start Voltage	330/345/365/380V ±3V			630/660/690/730/760V ±6V			825/950 V ±8V
	Max. Hysteresis Error	Approx. 8V			Approx. 16V			Approx. 20V
Power Supply	VDC	243 (1.35x200x0.9) to 400V Peak			460 (1.35x380x0.9) to 800V Peak			607 (1.35x500x0.9) to 1000v
Protective Functions	Fin Overheat	Thermostat						
	Power Charge Indication	Charge lamp stays ON until bus voltage drops below 50V						
Environ- mental Conditions	Location	Indoor (protected from corrosive gases and dust)						
	Ambient Temperature	+14 to 104°F (-10 to +40°C) (not frozen)						
	Storage Temperature	-4 to 140°F (-20 to +60°C)						
	Humidity	90% RH (non-condensing)						
	Vibration	1G at 10 to less than 20Hz, up to 0.2G at 20 to 50Hz						
Protective Configuration		Wall-mounted enclosed type						
Heat Loss (W)		38	62	129	59	94	135	70

\* Loading time rate can be used below 10% ED (max. 10 min.)

## Troubleshooting

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

<b>Fault Status</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
Drive trips at overvoltage (OV)	<ul style="list-style-type: none"><li>• Insufficient braking unit capacity</li><li>• Insufficient resistor capacity</li><li>• Improper wiring</li><li>• Deceleration time too short</li><li>• Braking unit fault</li></ul>	<ul style="list-style-type: none"><li>• Verify CDBR-B capacity</li><li>• Verify resistor capacity</li><li>• Verify wiring is correct</li><li>• Lengthen deceleration time</li><li>• Replace the braking unit</li></ul>
Braking Unit Thermal Overload trips when not decelerating	<ul style="list-style-type: none"><li>• Improper braking unit power supply voltage selection setting</li><li>• Incoming (line) voltage too high</li><li>• Discharge transistor shorted</li></ul>	<ul style="list-style-type: none"><li>• Verify jumper setting</li><li>• Correct line voltage</li><li>• Replace the braking unit</li></ul>
Braking Unit trips by heatsink overheat	<ul style="list-style-type: none"><li>• Excessive load inertia</li><li>• Improper combination of braking unit and resistor</li><li>• Ambient Temperature &gt;104°F (40°C)</li></ul>	<ul style="list-style-type: none"><li>• Reduce load</li><li>• Verify proper braking unit/resistor</li><li>• Install air conditioner</li></ul>

## 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. It may take as long as 10 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.

1. Remove the cover and check IPCB for physical damage.
2. Using a Digital Multimeter, set the Diode Check function, perform static checks on the main transistor module, ITRM.

For CDBR-2045B, 2110B, 4090B, 4220B, check the following:

- Place the positive lead on terminal (-) and the negative lead on terminal (-O). This will check the collector to emitter junction for a short circuit. A reading of between 0.200V and 0.250V indicates a good reading.
- Place the positive lead on terminal (-O) and the negative lead on terminal (+O). This will check the diode connected to the collector for a short circuit. A reading of between 0.200V and 0.375V indicates a good reading.

For CDBR-2015B, 2022B, 4030B, 4045B, check the following:

- Place the positive lead on terminal (-) and the negative on terminal (-O). This will check the collector to emitter junction for a short circuit. A reading of “OL” indicates a good reading.

- Place the positive lead on terminal (-O) and the negative lead on terminal (+O). This will check the diode connected to the collector for a short circuit. A reading of approximately 0.5V indicates a good reading.
3. Remove connector 3CN on 1PCB and place the ohmmeter leads on terminals 1 and 2 of the connector. The meter should read infinite Ohms. (Normally Open Thermal Relay (ITHG)). Replace connector 3CN.
  4. Place the 4CN jumper on 1PCB to the “Master” position.

5. **200V Models**

Verify that the Power Supply Voltage Selection Jumper is set to 230V.

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 50V, at which time the Charge LED on 1PCB should illuminate. With a DC Voltmeter, monitor terminals (+O) and (-O), and continue to increase the DC voltage to 380 VDC, at which time you should see the DC Voltmeter turn on to read the 380 VDC applied voltage, and the Brake LED on 1PCB should illuminate. At this same time, you should also read 15 VDC across terminals 5(+) and 6(-), which indicates that the output, to activate a slave CDBR, has turned on.

**400V Models**

Verify that the Power Supply Voltage Selection Jumper is set to 460V.

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 50V, at which time the Charge LED on 1PCB should illuminate. With a DC Voltmeter, monitor terminals (+O) and (-O), and continue to increase the DC voltage to 780 VDC, at which time you should see the DC Voltmeter turn on to read the 780 VDC applied voltage, and the Brake LED on 1PCB should illuminate. At this same time you should also read 15 VDC across terminals 5(+) and 6(-), which indicates that the output, to active a slave CDBR, has turned on.

6. Remove power from terminals (+) and (-).
7. Place the jumper on 4CN on 1PCB to the “Slave” position.
8. Apply power (325 VDC for 200V models and 650 VDC for 400V models) to terminals (+) and (-). Using a separate DC power supply, apply 7 VDC to terminals 1(+) and 2(-) on 1PCB. This 7 VDC signal should cause the main transistor ITRM to turn on and you should read the applied DC Bus Voltage across terminals (+O) and (-O), and the Brake LED on 1PCB should illuminate.
9. With power still applied to terminals (+) and (-), monitor terminals 3 and 4 on 1PCB with an Ohmmeter. This meter should read Infinite Ohms. Place a jumper across the terminal switch (pins 1 and 2 on 3CN), which should cause the Fault Relay to change state, and 0 Ohms should read on the Ohmmeter.
10. Remove the terminals (+) and (-) and return the 4CN jumper on 1PCB back to the “Master” position.

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