



VFDB Series Braking Modules Instruction Sheet

VFDB2015, VFDB2022, VFDB4030, VFDB4045, VFDB5055

1. Preface

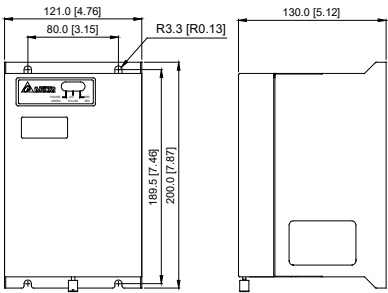
VFDB braking units are applied to absorb the motor regeneration energy when the three-phase induction motor stops by deceleration. With VFDB braking unit, the regeneration energy will be dissipated in dedicated braking resistors. To prevent mechanical or human injury, please refer to this instruction sheet before wiring. VFDB braking units are suitable for DELTA AC Motor Drives VFD Series 230V/460V/575V. VFDB braking units need to be used in conjunction with BR series braking resistors to provide the optimum braking characteristics. VFDB braking units (2015, 2022, 4030, 4045 and 5055) are approved by Underwriters Laboratories, Inc. (UL) and Canadian Underwriters Laboratories (cUL). The content of this instruction sheet may be revised without prior notice. Please consult our distributors or download the most updated version at http://www.deltaww.com/download_acmotordrive.

2. Specifications

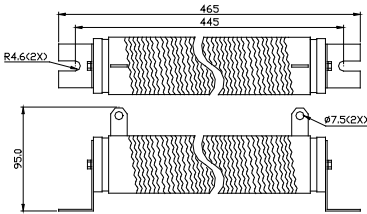
VFDB Braking Units					Braking Resistors	
Specification	230V Series		460V Series		575V Series	
Model VFDB□□□□	2015	2022	4030	4045	5055	
Max. Motor Capacity (KW)	15	22	30	45	55	
Max. Discharge Current (A) 10%ED	40	60	40	60	60	
Continuous Discharge Current (A)	15	20	15	18	20	
Braking Start-up Voltage (DC)	330/345/360/380/400/415 ± 3V		660/690/720/760/800/830 ± 6V		950 ± 8V	
Input Rating	DC Voltage 200~400V _{DC}		400~800V _{DC}		607~1000V _{DC}	
Min. Equivalent Resistor for Each Braking Unit	10Ω	6.8Ω	20Ω	13.6Ω	15.8Ω	
Protection	Heat Sink Overheat Alarm Output Power Charge Display Installation Location Operating Temperature Storage Temperature Humidity Vibration					Temperature over +95°C (203°F) Relay contact 5A120V _{AC} / 28V _{DC} (RA, RB, RC) Blackout until bus (+ -) voltage is below 50V _{DC} Indoor (no corrosive gases, metallic dust) -10°C~+50°C (14°F~122°F) -20°C~+60°C (-4°F~140°F) 90% Non-condensing 9.8m/s ² (1G) under 20Hz 2m/s ² (0.2G) at 20~50Hz
Mechanical Configuration	Wall-mounted enclosed type IP50					

3. Dimensions and Mounting Clearance

VFDB Braking Units

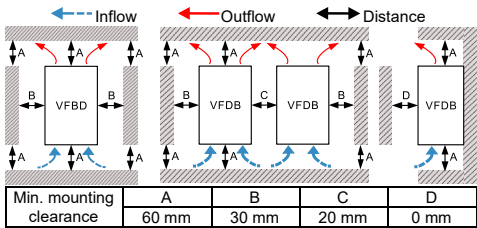


Braking Resistors

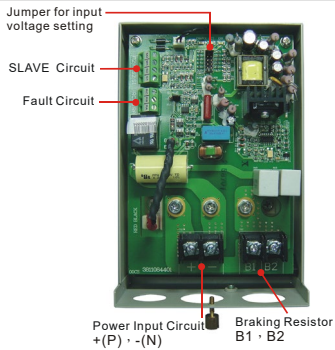


Mounting Clearance

Install the brake unit in an upright position and leave appropriate space for heat dissipation.



4. Individual Parts and Function

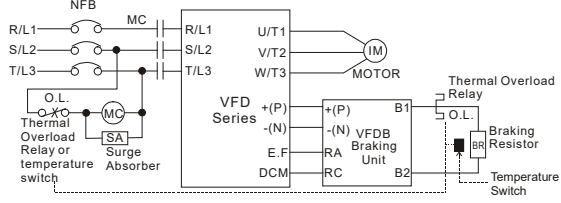


5. Basic Wiring Diagram

Operation Explanation:

- For safety consideration, install an overload relay between the braking unit and the braking resistor. In conjunction with the magnetic contactor (MC) prior to the drive, it can perform complete protection against abnormality. The purpose of installing the thermal overload relay is to protect the braking resistor from damage due to frequent braking, or due to braking unit keeping operating resulted from unusual high input voltage. Under such circumstance, just turn off the power to prevent damaging the braking resistor.
- Please refer to the specification of the thermal overload relay.
- The alarm output terminals (RC, RA, RB) of the braking unit will be activated when the temperature of the heat sink exceeds 95°C. It means that the temperature of the installation environment may exceed 50°C, or the braking %ED may exceed 10%ED. With this kind of alarm, please install a fan to force air-cooling or reduce the environment temperature. If the condition not due to the temperature, the control circuit or the temperature sensor may have been damaged. At this time, please send the braking unit back to the manufacturer or agency for repair.

- The AC Motor Drive and braking unit will be electrified at the same time while turning on the NFB (No-fuse breaker). For the operation / stop method of the motor, please refer to the user manual of the AC Motor Drives VFD Series. The braking unit will detect the inner DC voltage of the AC motor drive when it stops the motor by deceleration. The extra regeneration will be dissipated away rapidly by the braking resistor in the form of heat. It can ensure the stable deceleration characteristic.

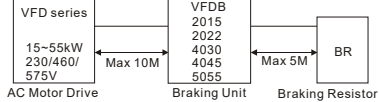


Note1: When using the AC drive with DC reactor, please refer to wiring diagram in the AC drive user manual for the wiring of terminal +(P) of Braking unit.
Note2: Do NOT wire terminal -(N) to the neutral point of power system.

- Besides using thermal overload relay to be the protection system and braking resistor, temperature switch can be installed on braking resistor side as the protection. The temperature switch must comply with the braking resistor specification or contact your dealer.

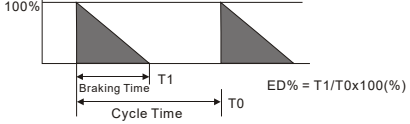
6. Wiring Notice

- Do not proceed with wiring while power is applied to the circuit.
- The wiring gauge and distance must comply with the electrical code.
- The +(P), -(N) terminals of the AC motor drive (VFD Series), connected to the braking unit (VFDB), must be confirmed for correct polarity lest the drive and the braking unit be damaged when power on.
- When the braking unit performs braking, the wires connected to +(P), -(N), B1 and B2 would generate a powerful electromagnetic field for a moment due to high current passing through. These wires should be wired separately from other low voltage control circuits lest they make interference or mis-operation.
- Wiring distance



- To prevent personal injury, do not connect/disconnect wires or regulate the setting of the braking unit while power on. Do not touch the terminals of related wiring and any component on PCB lets users be damaged by extreme dangerous DC high voltage.
- Inflammable solids, gases or liquids must be avoided at the location where the braking resistor is installed. The braking resistor had better be installed in individual metallic box with forced air-cooling.
- Connect the ground terminal to the Earth Ground. The ground lead must be at least the same gauge wire as leads +(P), -(N).
- Please install the braking resistor with forced air-cooling or the equivalent when frequent deceleration braking is performed (over 10%ED).
- The ring terminals are suggested to be used for main circuit wiring. Make sure the terminals are fastened before power on.

7. Definition for Braking Usage ED%



Explanation:
The definition of the braking usage ED (%) is for assurance of enough time for the braking unit and braking resistor to dissipate away heat generated by braking. When the braking resistor heats up, the resistance would increase with temperature, and braking torque would decrease accordingly.

- NOTE:
- Before regulating the power voltage, make sure the power has been turned off. Please set power voltage as the possible highest voltage for unstable power system. Take 380V_{AC} power system for example. If the voltage may be up to 410V_{AC}, 415V_{AC} should be regulated.
 - For DELTA's AC motor drive VFD Series, please set parameter (Over Voltage Stall Prevention) as "close" to disable over-voltage stall prevention, to ensure stable deceleration characteristic. For VFDB-5055, the jumper can only be put on the position as shown in the following figure. Do NOT remove the jumper to another place.

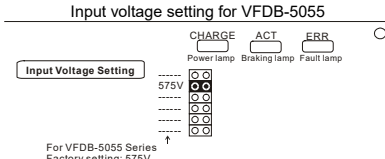
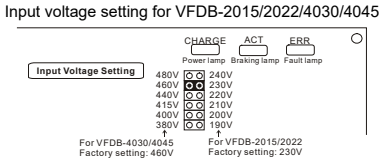
8. The Voltage Settings

- Regulation of power voltage: the power source of the braking unit is DC voltage from +(P), -(N) terminals of the AC motor drive. It is very important to set the power voltage of the braking unit based on the input power of the AC motor drive before operation. The setting has a great influence on the potential of the operation voltage for the braking unit. Please refer to the table below.

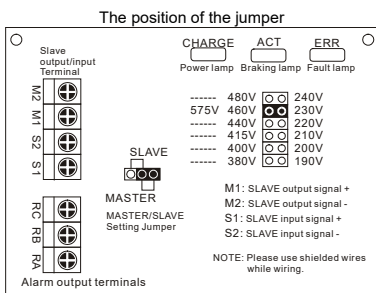
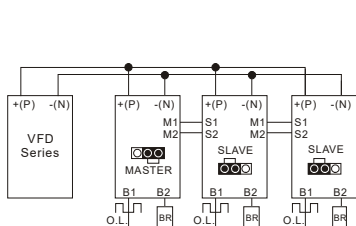
The Selection of Power Voltage and Operation Potential of PN DC Voltage:

230V Model AC Power Voltage	Braking Start-up voltage DC Bus +(P), -(N)) Voltage	460V Model AC Power Voltage	Braking Start-up voltage DC Bus +(P), -(N)) Voltage	575V Model AC Power Voltage	Braking Start-up voltage DC Bus +(P), -(N)) Voltage
190 V _{AC}	330 V _{DC}	380 V _{AC}	660 V _{DC}	575 V _{AC}	950 V _{DC}
200 V _{AC}	345 V _{DC}	400 V _{AC}	690 V _{DC}	-	-
210 V _{AC}	360 V _{DC}	415 V _{AC}	720 V _{DC}	-	-
220 V _{AC}	380 V _{DC}	440 V _{AC}	760 V _{DC}	-	-
230 V _{AC}	400 V _{DC}	460 V _{AC}	800 V _{DC}	-	-
240 V _{AC}	415 V _{DC}	480 V _{AC}	830 V _{DC}	-	-

NOTE: Input Power With Tolerance ±10%



- MASTER / SLAVE setting: The MASTER / SLAVE jumper is set "MASTER" as factory setting. The "SLAVE" setting is applied to two or more braking units in parallel, making these braking units be enabled / disabled synchronously. Then the power dissipation of each unit will be equivalent so that they can perform the braking function completely. The SLAVE braking application of three braking units is shown as below on the left. After wiring, the jumper of first unit shall be set as "MASTER" and that of others must be set as "SLAVE" to complete the system installation.



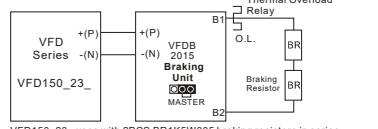
9. All Braking Resistors & Braking Units Use in the AC Drives

Voltage	Applicable Motor		Full-load Torque kg-M	Resistor Value Spec for Each AC Motor Drive	Braking Unit Model VFDB No. of Units Used		Braking Resistors Model and No. of Units Used	Braking Torque 10%ED	Min. Equivalent Resistor Value for Each AC Motor Drive	Typical Thermal Overload Relay Value	
	HP	kW									
230V	20	15	8.248	3000W 10Ω	2015	1	BR1K5W005	2	125	10Ω	30
	25	18.5	10.281	4800W 8Ω	2022	1	BR1K2W008	4	125	8Ω	35
	30	22	12.338	4800W 6.8Ω	2022	1	BR1K2W6P8	4	125	6.8Ω	40
	40	30	16.497	6000W 5Ω	2015	2	BR1K5W005	4	125	5Ω	30
	50	37	20.6	9600W 4Ω	2015	2	BR1K2W008	8	125	4Ω	30
460V	20	15	8.248	1500W 40Ω	4030	1	BR1K5W040	1	125	40Ω	15
	25	18.5	10.281	4800W 32Ω	4030	1	BR1K2W008	4	125	32Ω	15
	30	22	12.338	4800W 27.2Ω	4030	1	BR1K2W6P8	4	125	27.2Ω	20
	40	30	16.497	6000W 20Ω	4030	1	BR1K5W005	4	125	20Ω	30
	50	37	20.6	9600W 16Ω	4045	1	BR1K2W008	8	125	16Ω	40
	60	45	24.745	9600W 13.6Ω	4045	1	BR1K2W6P8	8	125	13.6Ω	50
	75	55	31.11	12000W 10Ω	4030	2	BR1K5W005	8	125	10Ω	30
	100	75	42.7	19200W 6.8Ω	4045	2	BR1K2W6P8	16	125	6.8Ω	50
575V	20	15	8.248	3000W 60Ω	5055	1	BR1K0W020	3	125	60Ω	15
	25	18.5	10.281	4000W 50Ω	5055	1	BR1K0W050	4	125	50Ω	15
	30	22	12.338	6000W 40Ω	5055	1	BR1K2W008	5	125	40Ω	20
	40	30	16.497	6000W 34Ω	5055	1	BR1K2W6P8	5	125	34Ω	25
	50	37	20.6	7500W 25Ω	5055	1	BR1K5W005	5	125	25Ω	30
	60	45	24.745	12000W 20Ω	5055	1	BR1K2W008	10	125	20Ω	35
	75	55	31.11	12000W 17Ω	5055	1	BR1K2W6P8	10	125	17Ω	45
	100	75	42.7	15000W 12.5Ω	5055	2	BR1K5W005	10	125	12.5Ω	45

10. Wiring Examples of Braking Resistors

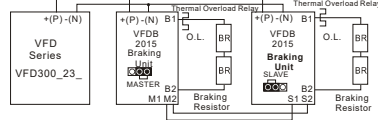
NOTE: Before wiring, please notice equivalent resistors value shown in the column "Equivalent resistors specification for each braking unit" in the above table to prevent damage.

- 230V 20HP



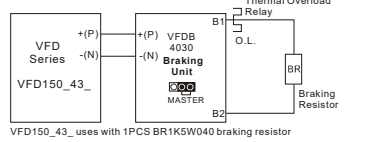
VFDB150_23_ uses with 2PCS BR1K5W005 braking resistors in series

- 230V 40HP



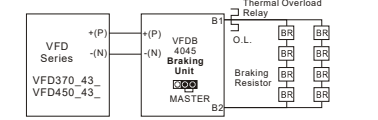
VFDB300_23_ uses with two VFDB2015 braking units, and each braking unit uses with 2PCS BR1K5W005 braking resistors in series.

- 460V 20HP



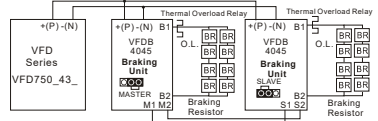
VFDB150_43_ uses with 1PCS BR1K5W040 braking resistor

- 460V 50HP/60HP



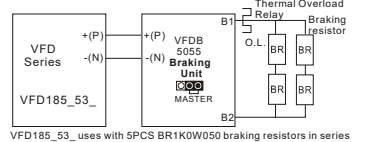
VFDB370_43_ uses with two BR sets in parallel, which 4PCS BR1K2W008 braking resistors in series for each BR set.
VFDB450_43_ uses with two BR sets in parallel, which 4PCS BR1K2W6P8 braking resistors in series for each BR set.

- 460V 100HP



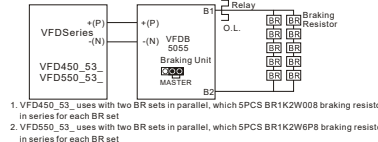
VFDB750_43_ uses with two VFDB4045 braking units, and each braking unit uses with two BR sets in parallel, which 4PCS BR1K2W6P8 braking resistors in series.

- 575V 25HP



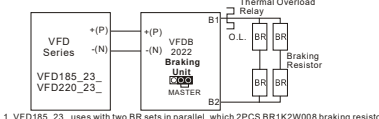
VFDB185_53_ uses with 5PCS BR1K0W050 braking resistors in series

- 575V 60HP/75HP



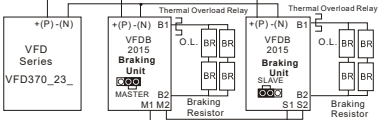
VFDB450_53_ uses with two BR sets in parallel, which 5PCS BR1K2W008 braking resistors in series for each BR set.
VFDB550_53_ uses with two BR sets in parallel, which 5PCS BR1K2W6P8 braking resistors in series for each BR set.

- 230V 25HP/30HP



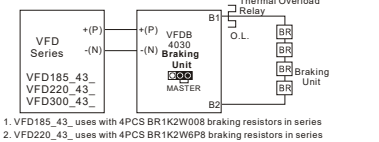
VFDB185_23_ uses with two BR sets in parallel, which 2PCS BR1K2W008 braking resistors in series for each BR set.
VFDB220_23_ uses with two BR sets in parallel, which 2PCS BR1K2W6P8 braking resistors in series for each BR set.

- 230V 50HP



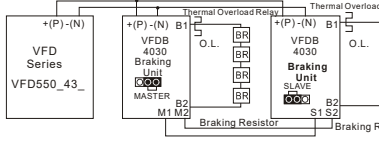
VFDB370_23_ uses with two VFDB2015 braking units, and each braking unit uses with two BR sets in parallel, which 2PCS BR1K2W008 braking resistors in series.

- 460V 25HP/30HP/40HP



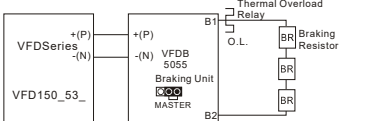
VFDB185_43_ uses with 4PCS BR1K2W008 braking resistors in series
VFDB220_43_ uses with 4PCS BR1K2W6P8 braking resistors in series
VFDB300_43_ uses with 4PCS BR1K5W005 braking resistors in series

- 460V 75HP



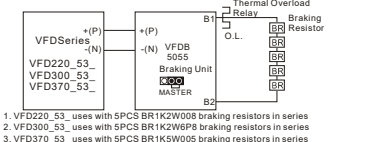
VFDB550_43_ uses with two VFDB4030 braking units, and each braking unit uses with 4PCS BR1K5W005 braking resistors in series.

- 575V 20HP



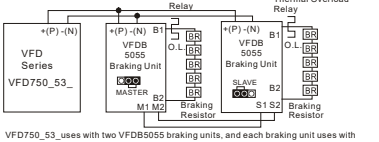
VFDB150_53_ uses with 3PCS BR1K0W020 braking resistors in series

- 575V 30HP/40HP/50HP



VFDB220_53_ uses with 5PCS BR1K2W008 braking resistors in series
VFDB300_53_ uses with 5PCS BR1K2W6P8 braking resistors in series
VFDB370_53_ uses with 5PCS BR1K5W005 braking resistors in series

- 575V 100HP



VFDB750_53_ uses with two VFDB5055 braking units, and each braking unit uses with 5PCS BR1K5W005 braking resistors in series.