

VFDB Series Braking Modules Instruction Sheet

1 Preface

Thank you for choosing DELTA's braking module. 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.delta.com.tw/industrialautomation>.

2 Specifications

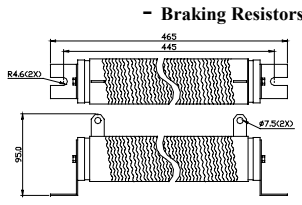
VFDB Braking Units

Specification	230V Series		460V Series		575V Series	
	2015	2022	4030	4045	5055	
Model VFDB-	2015	2022	4030	4045	5055	
Max. Motor Capacity (KW)	15	22	30	45	55	
Output Rating	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	200-400VDC	400-800VDC	607-1000VDC		
	Min. Equivalent Resistor for Each Braking Unit	10Ω	6.8Ω	20Ω	13.6Ω	15.8Ω
Protection	Heat Sink Overheat	Temperature over +95°C (203°F)				
	Alarm Output	Relay contact 5A120VAC/28VDC (RA, RB, RC)				
	Power Charge Display	Blackout until bus (→) voltage is below 50VDC				
Environment	Installation Location	Indoor (no corrosive gases, metallic dust)				
	Operating Temperature	-10°C ~ +50°C (-14°F to 122°F)				
	Storage Temperature	-20°C ~ +60°C (-4°F to 140°F)				
	Humidity	90% Non-condensing				
Mechanical Configuration	Vibration	9.8m/s ² (1G) under 20Hz 2m/s ² (0.2G) at 20-50Hz				
		Wall-mounted enclosed type IP50				

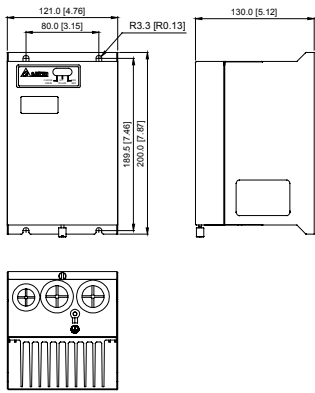
Braking Resistors

Model no.	Specification
BR1K5W005	1500W 5.0Ω
BR1K2W6P8	1200W 6.8Ω
BR1K2W008	1200W 8.0Ω
BR1K5W040	1500W 40Ω
BR1K0W050	1000W 50Ω
BR1K0W075	1000W 75Ω

3 Dimensions



3 Dimensions - VFDB Braking Units

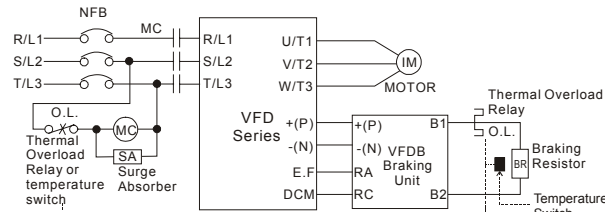


Terminal Wire Gauge

Circuit	Terminal Mark	Wire Gauge AWG (mm ²)	Screw	Torque
Power Input Circuit	+(P), -(N)	10-12AWG (3.5-5.5mm ²)	M4	18 kgf-cm (15.6 in-lbf)
Braking Resistor	B1, B2	10-12AWG (3.5-5.5mm ²)	M4	18 kgf-cm (15.6 in-lbf)
SLAVE Circuit	Output M1, M2 Input S1, S2	20-18AWG (0.25-0.75mm ²) (with shielded wires)	M2	4 kgf-cm (3 in-lbf)
Fault Circuit	RA, RB, RC	20-18AWG (0.25-0.75mm ²)	M2	4 kgf-cm (3 in-lbf)

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.

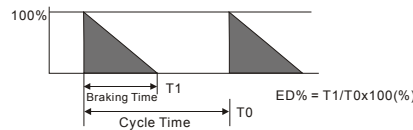


Note1: When using the AC drive with DC reactor, please refer to wiring diagram in the AC drive user manual for the wiring of terminal +(P) of Braking unit.
Note2: Do NOT wire terminal -(N) to the neutral point of power system.

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.
 - 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.
- 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 lest users be damaged by extreme dangerous DC high voltage.

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.

8 The Voltage Settings

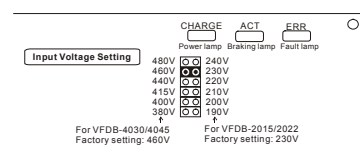
- Regulation of power voltage: the power source of the braking unit is DC voltage from +(P), -(N) terminals of the AC motor drive. It is very important to set the power voltage of the braking unit based on the input power of the AC motor drive before operation. The setting has a great influence on the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

Table 1: The Selection of Power Voltage and Operation Potential of PN DC Voltage

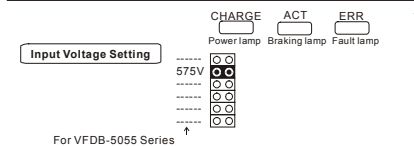
230V Model AC Power Voltage	Braking Start-up voltage DC Bus (+(P), -(N)) Voltage	460V Model AC Power Voltage	Braking Start-up voltage DC Bus (+(P), -(N)) Voltage	575V Model AC Power Voltage	Braking Start-up voltage DC Bus (+(P), -(N)) Voltage
190Vac	330Vdc	380Vac	660Vdc	575Vac	950Vdc
200Vac	345Vdc	400Vac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

NOTE: Input Power With Tolerance ±10%

Input voltage setting for VFDB-2015/2022/4030/4045

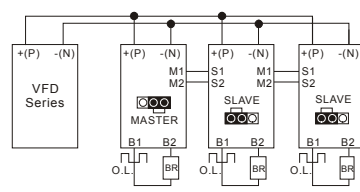


Input voltage setting for VFDB-5055

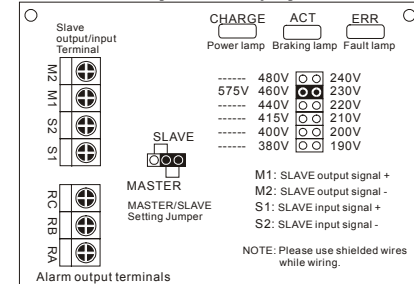


- MASTER/SLAVE setting: The MASTER/SLAVE jumper is set "MASTER" as factory setting. The "SLAVE" setting is applied to two or more braking units in parallel, making these braking units be enabled/disabled synchronously. Then the power dissipation of each unit will be equivalent so that they can perform the braking function completely.

The SLAVE braking application of three braking units is shown as the above diagram. 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.



The position of the jumper



5. 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.

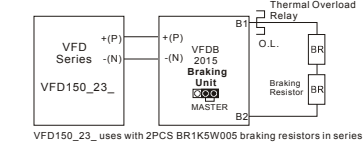
9 All Braking Resistors & Braking Units Use in the AC Drives

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
575V	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
	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
575V	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	

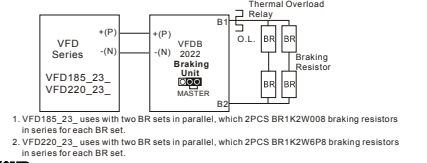
10 Wiring Examples of Braking Resistors

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.

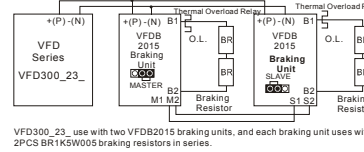
230V 20HP



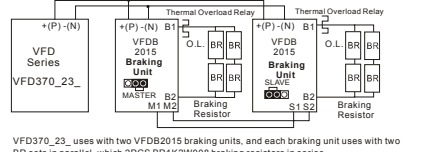
230V 25HP/30HP



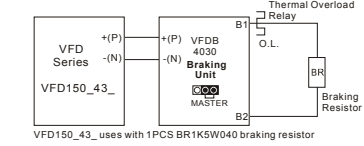
230V 40HP



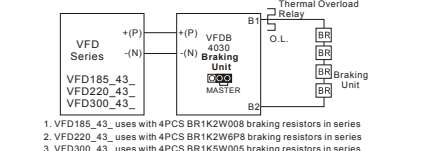
230V 50HP



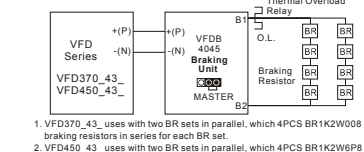
460V 20HP



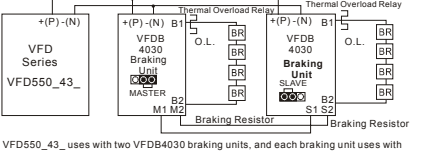
460V 25HP/30HP/40HP



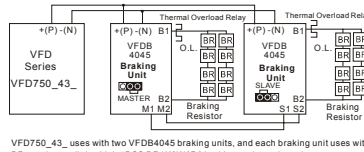
460V 50HP/60HP



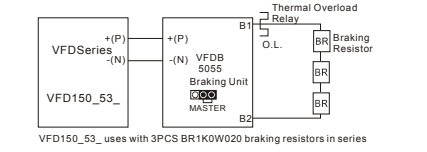
460V 75HP



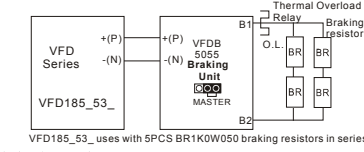
460V 100HP



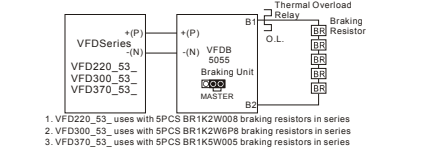
575V 20HP



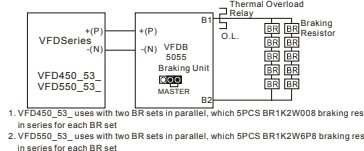
575V 25HP



575V 30HP/40HP/50HP



575V 60HP/75HP



575V 100HP

