

Appendix B: Accessories

B.1 All Brake Resistors & Brake Units Used in AC Motor Drives

Note: Please only use DELTA resistors and recommended values. Other resistors and values will void Delta's warranty. Please contact your nearest Delta representative for use of special resistors. The brake unit should be at least 10 cm away from AC motor drive to avoid possible interference. Refer to the "Brake unit Module User Manual" for further details.

110V Series									
Applicable Motor HP [kW]	Ac Drive Part No.	125% Braking Torque 10%ED*				Max. Brake Torque**			
		Full Load Torque KG-M***	Brake Unit [VFDB]	Resistor or Value spec. for each Ac motor Drive	Braking Resistor series for each Brake Unit ****	total Braking current (A)	Min. resistor value (Ω)	Max.Total Braking current (A)	Peak Power (kW)
0.25 [0.2]	VFD002E11A	0.14	20015*1	80W 200Ω	BR080W200*1	1.9	105.6	3.6	1.4
	VFD002E11C								
	VFD002E11P								
0.5 [0.4]	VFD004E11A	0.27	20015*1	80W 200Ω	BR080W200*1	1.9	105.6	3.6	1.4
	VFD004E11C								
	VFD004E11P								
1 [0.75]	VFD007E11A	0.51		80W 200Ω	BR080W200*1	1.9	105.6	3.6	1.4
	VFD007E11C								
	VFD007E11P								

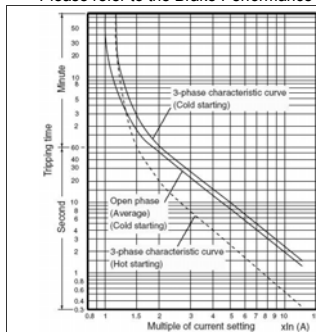
230V Series										
Applicable Motor HP [kW]	Ac Drive Part No.	125% Braking Torque 10%ED*				Max. Brake Torque**				
		Full Load Torque KG-M***	Brake Unit [VFDB]	Resistor or Value spec. for each Ac motor Drive	Braking Resistor series for each Brake Unit ****	total Braking current (A)	Min. resistor value (Ω)	Max.Total Braking current (A)	Peak Power (kW)	
0.25 [0.2]	VFD002E21A	0.14	20015*1	80W 200Ω	BR080W200*1	1.9	105.6	3.6	1.4	
	VFD002E21C									
	VFD002E21P									
	VFD002E23A									
	VFD002E23C									
	VFD002E23P									
0.5 [0.4]	VFD004E21A	0.27	20015*1	80W 200Ω	BR080W200*1	1.9	105.6	3.6	1.4	
	VFD004E21C									
	VFD004E21P									
	VFD004E23A									
	VFD004E23C									
	VFD004E23P									
1 [0.75]	VFD007E21A	0.51	20015*1	80W 200Ω	BR080W200*1	1.9	105.6	3.6	1.4	
	VFD007E21C									
	VFD007E21P									
	VFD007E23A									
	VFD007E23C									
	VFD007E23P									
2 [1.5]	VFD015E21A	1.02	20015*1	300W110Ω	BR300W110	3.5	105.6	3.6	1.4	
	VFD015E21C									
	VFD015E21P									
	VFD015E23A									
3 [2.2]	VFD022E21A	1.49		300W110Ω	BR300W110	3.5	105.6	3.6	1.4	
	VFD022E21C									
	VFD022E23A									
5 [3.7]	VFD037E23A	2.50		600W50Ω	BR300W025*2	2 series	7.6	47.5	8	3.0
	VFD037E23C									

230V Series									
Applicable Motor HP [kW]	Ac Drive Part No.	125% Braking Torque 10%ED*				Max. Brake Torque**			
		Full Load Torque KG-M***	Brake Unit [V/FB]	Resistor or Value spec. for each Ac motor Drive	Braking Resistor series for each Brake Unit ****	total Braking current (A)	Min. resistor value (Ω)	Max.Total Braking current (A)	Peak Power (kW)
7.5 [5.5]	VFD055E23A VFD055E23C	3.72		750W33Ω	BR750W033*1	15.2	25.3	15	5.7
10 [7.5]	VFD075E23A VFD075E23C	5.08		1000W20Ω	BR1K0W020*1	20.7	16.5	23	8.7
15 [11]	VFD110E23A VFD110E23C	7.45		1500W13Ω	BR1K5W013*1	30.3	11.5	33	12.5
20 [15]	VFD150E23A VFD150E23C	10.16		2000W10Ω	BR1K0W020*2 2 parallel	41.5	7.6	50	19.0

460V Series									
Applicable Motor HP [kW]	Ac Drive Part No.	125% Braking Torque 10%ED*				Max. Brake Torque**			
		Full Load Torque KG-M***	Brake Unit [V/FB]	Resistor or Value spec. for each Ac motor Drive	Braking Resistor series for each Brake Unit ****	total Braking current (A)	Min. resistor value (Ω)	Max.Total Braking current (A)	Peak Power (kW)
0.5 [0.4]	VFD004E43A VFD004E43P	0.27	40015*1	80W750Ω	BR080W750*1	1.1	422.2	1.8	1.4
	VFD004E43T								
1 [0.75]	VFD007E43A VFD007E43C VFD007E43P	0.51	40015*1	80W750Ω	BR080W750*1	1.1	422.2	1.8	1.4
	VFD007E43T								
2 [1.5]	VFD015E43A VFD015E43C VFD015E43P	1.02	40037*1	200W360Ω	BR200W360	2.2	95.0	8	6.1
	VFD015E43T								
3 [2.2]	VFD022E43A VFD022E43C	1.49		300W250Ω	BR300W250	3.2	84.4	9	6.8
5 [3.7]	VFD037E43A VFD037E43C	2.50		600W140Ω	BR300W070*2 2 series	5.4	84.4	9	6.8
7.5 [5.5]	VFD055E43A VFD055E43C	3.72		1000W75Ω	BR1K0W075*1	10.4	63.3	12	9.1
10 [7.5]	VFD075E43A VFD075E43C	5.08		1000W75Ω	BR1K0W075*1	10.4	42.2	18	13.7
15 [11]	VFD110E43A VFD110E43C	7.45		1500W43Ω	BR1K5W043*1	17.7	42.2	18	13.7
20 [15]	VFD150E43A VFD150E43C	10.16		2000W40Ω	BR1K0W020*2 2 series	20.7	21.1	36	27.4
25 [18.5]	VFD185E43A VFD185E43C	12.52		2400W30Ω	BR1K2W015*2 2 series	25.5	17.7	43	32.7
30 [22]	VFD220E43A VFD220E43C	14.89		3000W26Ω	BR1K5W013*2 2 series	25.5	17.7	43	32.7

NOTE

- * Calculation for 125% brake torque: $(kw) \cdot 125\% \cdot 0.8$; where 0.8 is motor efficiency. Because there is a resistor limit of power consumption, the longest operation time for 10%ED is 10sec (on: 10sec/off: 90sec).
- ** Please refer to the Brake Performance Curve for "Operation Duration & ED" vs. "Braking Current".



Thermal Relay:

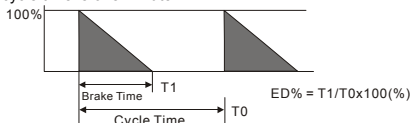
Thermal relay selection is based on its overload capability. A standard braking capacity for VFD-E is 10%ED (Tripping time=10s). The figure below is an example of 460V, 22kW AC motor drive. It requires the thermal relay to take 260% overload capacity in 10s (Hot starting) and the braking current is 30.3A. In this case, user should select a rated 12A thermal relay. The property of each thermal relay may vary among different manufacturer, please carefully read specification.

***The calculation of the braking torque is based on 4-pole (1800 rpm) motor.

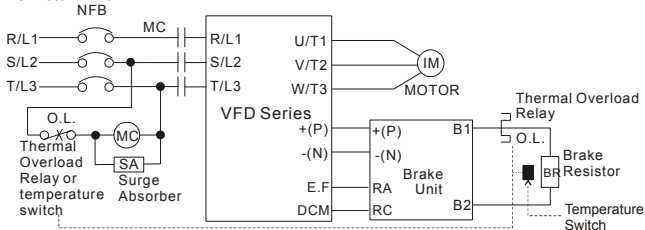
****For heat dissipation, a resistor of 400W or lower should be fixed to the frame and maintain the surface temperature below 250°C (400°C); a resistor of 1000W and above should maintain the surface temperature below 600°C.

1. If damage to the drive or other equipment is due to the fact that the brake resistors and the brake modules in use are not provided by Delta, the warranty will be void.
2. Take into consideration the safety of the environment when installing the brake resistors.
3. Definition for Brake Usage ED%

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



4. Please select the brake unit and/or brake resistor according to the table. "-" means no Delta product. Please use the brake unit according to the Equivalent Resistor Value.
5. For safety reasons, install a thermal overload relay between brake unit and brake resistor. Together with the magnetic contactor (MC) in the mains supply circuit to the drive it offers protection in case of any malfunctioning. The purpose of installing the thermal overload relay is to protect the brake resistor against damage due to frequent brake or in case the brake unit is continuously on due to unusual high input voltage. Under these circumstances the thermal overload relay switches off the power to the drive. Never let the thermal overload relay switch off only the brake resistor as this will cause serious damage to the AC Motor Drive.



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 Brake unit.

Note2: **Do NOT** wire terminal -(N) to the neutral point of power system.

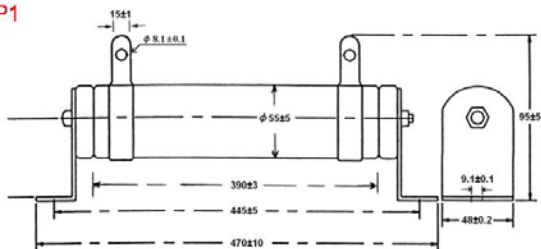
B.1.1 Dimensions and Weights for Brake Resistors

Brake Resistors

Model no.	Dimension (mm)			
	L1±2	L2±2	W±0.5	H±0.5
BR080WXXX	140	125	40	20
BR1K0WXXX	P1			
BR1K1WXXX				
BR1K2WXXX				
BR1K5WXXX				
BR200W360	165	150	60	30
BR300WXXX	215	200	60	30
BR750W033	P2			



P1



P2

