The optional accessories listed in this chapter are available upon request. Installing additional accessories to your drive substantially improves the drive's performance. Select accessories according to your need or contact your local distributor for suggestions.

7-1 Brake Resistors and Brake Units Used in AC Motor Drives

115V one-phase

Model	Applicable Motor		*1 125% Braking Torque / 10% ED						Max. Braking Torque		
	HP	KW	*2 Braking Torque (kg-m)	Resistor Value Spec. for Each AC Motor Drive	Brake Resistor for Each Brake Unit			Braking Current (A)	Min. Resistor Value (Ω)	Max. Total Braking Current (A)	Peak Power (kW)
					*3 Part No.	Q'ty	Usage				
VFD1A6MS11XNSAA	0.25	0.2	0.1	80W 750 Ω	BR080W750	1	-	0.5	190.0	2	0.8
VFD2A5MS11XNSAA	0.5	0.4	0.3	80W 200 Ω	BR080W200	1	-	1.9	95.0	4	1.5
VFD4A8MS11XNSAA	1	0.75	0.5	80W 200 Ω	BR080W200	1	-	1.9	63.3	6	2.3

Table 7-1-1

230V one-phase

Model	Applicable Motor		*1 125% Braking Torque / 10% ED						Max. Braking Torque		
	HP	KW	*2 Braking Torque (kg-m)	Resistor Value Spec. for Each AC Motor Drive	Brake Resistor for each Brake Unit			Braking Current (A)	Min. Resistor Value (Ω)	Max. Total Braking Current (A)	Peak Power (kW)
					*3 Part No.	Q'ty	Usage				
VFD1A6MS21XNSAA VFD1A6MS21AFSAA	0.25	0.2	0.1	80 W 750 Ω	BR080W750	1	-	0.5	190.0	2	0.8
VFD2A8MS21XNSAA VFD2A8MS21AFSAA	0.5	0.4	0.3	80 W 200 Ω	BR080W200	1	-	1.9	95.0	4	1.5
VFD4A8MS21XNSAA VFD4A8MS21AFSAA	1	0.75	0.5	80 W 200 Ω	BR080W200	1	-	1.9	63.3	6	2.3
VFD7A5MS21XNSAA VFD7A5MS21AFSAA	2	1.5	1	200 W 91 Ω	BR200W091	1	-	4.2	47.5	8	3.0
VFD11AMS21XNSAA VFD11AMS21AFSAA	3	2.2	1.5	300 W 70 Ω	BR300W070	1	-	5.4	38.0	10	3.8

Table 7-1-2

230V three-phase

Model	Applicable Motor		*1 125% Braking Torque / 10% ED						Max. Braking Torque		
	HP	KW	*2 Braking Torque (kg-m)	Resistor Value Spec. for Each AC Motor Drive	Brake Resistor for each Brake Unit			Braking Current (A)	Min. Resistor Value (Ω)	Max. Total Braking Current (A)	Peak Power (kW)
					*3 Part No.	Q'ty	Usage				
VFD1A6MS23XNSAA	0.25	0.2	0.1	80 W 750 Ω	BR080W750	1	-	0.5	190.0	2	0.8
VFD2A8MS23XNSAA	0.5	0.4	0.3	80 W 200 Ω	BR080W200	1	-	1.9	95.0	4	1.5
VFD4A8MS23XNSAA	1	0.75	0.5	80 W 200 Ω	BR080W200	1	-	1.9	63.3	6	2.3
VFD7A5MS23XNSAA	2	1.5	1	200 W 91 Ω	BR200W091	1	-	4.2	47.5	8	3.0
VFD11AMS23XNSAA	3	2.2	1.5	300 W 70 Ω	BR300W070	1	-	5.4	38.0	10	3.8
VFD17AMS23XNSAA	5	3.7/4	2.5	400 W 40 Ω	BR400W040	1	-	9.5	19.0	20	7.6
VFD25AMS23XNSAA	7.5	5.5	3.7	1000 W 20 Ω	BR1K0W020	1	-	19	16.5	23	8.7
VFD33AMS23XNSAA	10	7.5	5.1	1000 W 20 Ω	BR1K0W020	1	-	19	14.6	26	9.9
VFD49AMS23XNSAA	15	11	7.4	1500 W 13 Ω	BR1K5W013	1	-	29	12.6	29	11.0
VFD65AMS23XNSAA	20	15	10.2	2000 W 8.6 Ω	BR1K0W4P3	2	2 in series	44	8.3	46	17.5

Table 7-1-3

460V three-phase

Model	Applicable Motor		*1 125% Braking Torque / 10% ED						Max. Braking Torque		
	HP	KW	*2 Braking Torque (kg-m)	Resistor Value Spec. for Each AC Motor Drive	Brake Resistor for each Brake Unit			Braking Current (A)	Min. Resistor Value (Ω)	Max. Total Braking Current (A)	Peak Power (kW)
					*3 Part No.	Q'ty	Usage				
VFD1A5MS43XNSAA VFD1A5MS43AFSAA	0.5	0.4	0.3	80 W 750 Ω	BR080W750	1		1	380.0	2	1.5
VFD2A7MS43XNSAA VFD2A7MS43AFSAA	1	0.75	0.5	80 W 750 Ω	BR080W750	1		1	190.0	4	3.0
VFD4A2MS43XNSAA VFD4A2MS43AFSAA	2	1.5	1	200 W 360 Ω	BR200W360	1		2.1	126.7	6	4.6
VFD5A5MS43XNSAA VFD5A5MS43AFSAA	3	2.2	1.5	300 W 250 Ω	BR300W250	1		3	108.6	7	5.3
VFD7A3MS43ANSAA VFD7A3MS43ENSAA VFD7A3MS43AFSAA	4	3	2	400W 150Ω	BR400W150	1	2 in series	5.1	95.0	8	6.1
VFD9A0MS43XNSAA VFD9A0MS43AFSAA	5	3.7/4	2.5	400 W 150 Ω	BR400W150	1		5.1	84.4	9	6.8
VFD13AMS43XNSAA VFD13AMS43AFSAA	7.5	5.5	3.7	1000 W 75 Ω	BR1K0W075	1		10.2	50.7	15	11.4
VFD17AMS43XNSAA VFD17AMS43AFSAA	10	7.5	5.1	1000 W 75 Ω	BR1K0W075	1		10.2	40.0	19	14.4
VFD25AMS43XNSAA VFD25AMS43AFSAA	15	11	7.4	1500 W 43 Ω	BR1K5W043	1		17.6	33.0	23	17.5
VFD32AMS43XNSAA VFD32AMS43AFSAA	20	15	10.2	2000 W 32 Ω	BR1K0W016	2	2 in series	24	26.2	29	22.0
VFD38AMS43XNSAA VFD38AMS43AFSAA	25	18	12.2	2000 W 32 Ω	BR1K0W016	2	2 in series	24	26.2	29	22.0
VFD45AMS43XNSAA VFD45AMS43AFSAA	30	22	14.9	3000 W 26 Ω	BR1K5W013	2	2 in series	29	23.0	33	25.1

Table 7-1-4

575V three-phase

Model	Applicable Motor		*1 125% Braking Torque / 10% ED						Max. Braking Torque		
	HP	KW	*2 Braking Torque (kg-m)	Resistor Value Spec. for Each AC Motor Drive	Brake Resistor for each Brake Unit			Braking Current (A)	Min. Resistor Value (Ω)	Max. Total Braking Current (A)	Peak Power (kW)
					*3 Part No.	Q'ty	Usage				
VFD1A7MS53ANSAA	1	0.75	0.5	80W 750Ω	BR080W750	1	-	1.2	280.0	4	4.5
VFD3A0MS53ANSAA	2	1.5	1	200W 360Ω	BR200W360	1	-	2.6	186.7	6	6.7
VFD4A2MS53ANSAA	3	2.2	1.5	300W 400Ω	BR300W400	1	-	2.3	160.0	7	7.8
VFD6A6MS53ANSAA	5	3.7	2.5	500W 100Ω	BR500W100	1	-	9.2	93.3	12	13.4
VFD9A9MS53ANSAA	7.5	5.5	3.7	750W 140Ω	BR750W140	1	-	6.6	80.0	14	15.7
VFD12AMS53ANSAA	10	7.5	5.1	1000W 75Ω	BR1K0W075	1	-	12.3	70.0	16	17.9

Table 7-1-5

*1 Calculation for 125% brake torque: (kW)*125%*0.8; where 0.8 is motor efficiency.

Because of the limited resistor power, the longest operation time for 10% ED is 10 seconds (ON: 10 sec. / OFF: 90 sec.).

*2 The calculation of the brake resistor is based on a four-pole motor (1800 rpm).

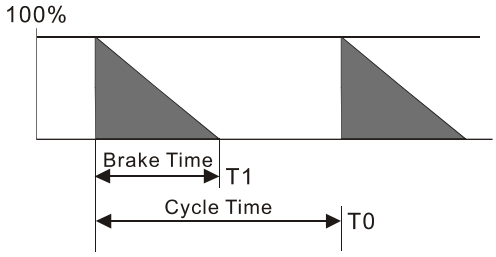
*3 For heat dissipation, a resistors of 400 W or lower should be fixed to the frame and maintain the surface temperature below 250°C; a resistor of 1000 W and above should maintain the surface temperature below 350°C.

(If the surface temperature is higher than the temperature limit, install extra cooling or increase the size of the resistor.)

NOTE

1. Select the resistance value, power and brake usage (ED %) according to Delta rules.

   Definition for Brake Usage ED%



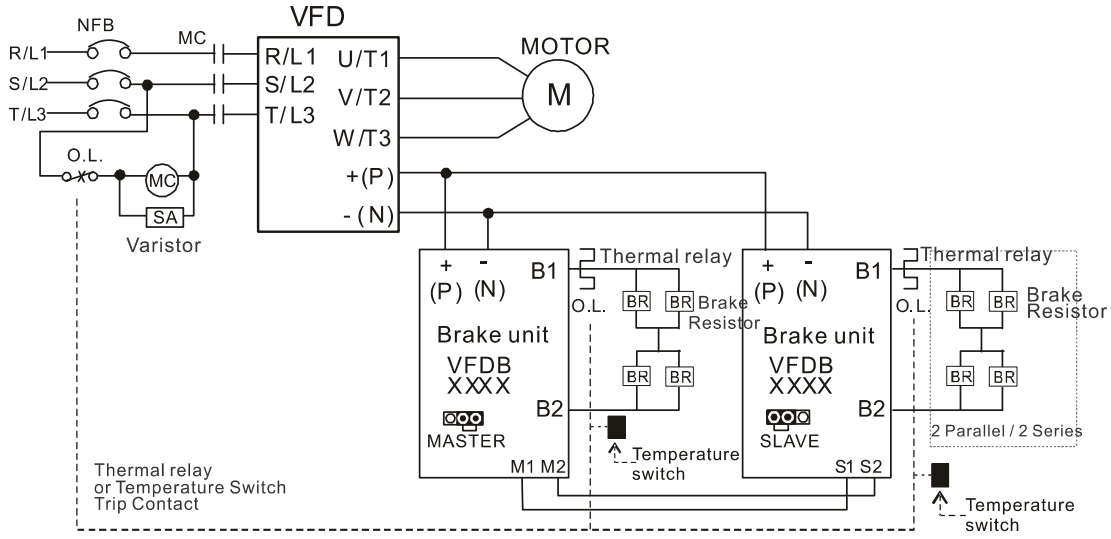
ED% = T1 / T0 x 100(%)

Explanation:
Brake usage ED (%) is the amount of time needed for the brake unit and brake resistor to dissipate heat generated by braking. When the brake resistor heats up, the resistance increases with temperature, and braking torque decreases accordingly.

Figure 7-1-1

For safety, install a thermal overload relay (O.L) between the brake unit and the brake resistor in conjunction with the magnetic contactor (MC) before the drive for additional protection. The thermal overload relay protects the brake resistor from damage due to frequent or continuous braking. Under such circumstances, turn off the power to prevent damage to the brake resistor, brake unit and drive.

NOTE: Never use it to disconnect the brake resistor.



- When AC Drive is equipped with a DC reactor, please read user manual for the correct wiring for the brake unit input circuit +(P).
- DO NOT connect input circuit -(N) to the neutral point of the power system.

Figure 7-1-2

2. Any damage to the drive or other equipment caused by using brake resistors and brake modules that are not provided by Delta voids the warranty.
3. Consider environmental safety factors when installing the brake resistors. If you use the minimum resistance value, consult local dealers for the power calculation.
4. When using more than two brake units, the equivalent resistor value of the parallel brake unit cannot be less than the value in the column “Min. Resistor Value (Ω)”. Read the wiring information in the brake unit instruction sheet thoroughly prior to operation. Visit the following links to get the instruction sheets for the wiring in the brake unit:
   - VFDB2015 / 2022 / 4030 / 4045 / 5055 Braking Modules Instruction Sheet
     http://www.deltaww.com/filecenter/Products/download/06/060101/Option/DELTA_IA-MDS_VFDB_I_EN_20070719.pdf

- VFDB4110 / 4160 / 4185 Braking Modules Instruction Sheet
  http://www.deltaww.com/filecenter/Products/download/06/060101/Option/DELTA_IA-MDS_VFDB4110-4160-4185_I_EN_20101011.pdf
- VFDB6055 / 6110 / 6160 / 6200 Braking Modules Instruction Sheet
  http://www.deltaww.com/filecenter/Products/download/06/060101/Option/DELTA_IA-MDS_VFDB6055-6110-6160-6200_I_TSE_20121030.pdf

5. The selection tables are for normal usage. If the AC motor drive requires frequent braking, increase the Watts by two to three times.
6. Thermal Overload Relay (TOR):
   Thermal overload relay selection is based on its overload capacity. A standard braking capacity of the MS300 is 10% ED (Tripping time=10 s). As shown in the figure below, a 460V, 1kw MS300 required the thermal relay to take 260% overload capacity for 10 seconds (hot starting) and the braking current is 24A. In this case, select a thermal overload relay rated at 10 A (10 * 260% = 26 A > 24 A). The property of each thermal relay may vary among different manufacturers. Carefully read the specification before using it.

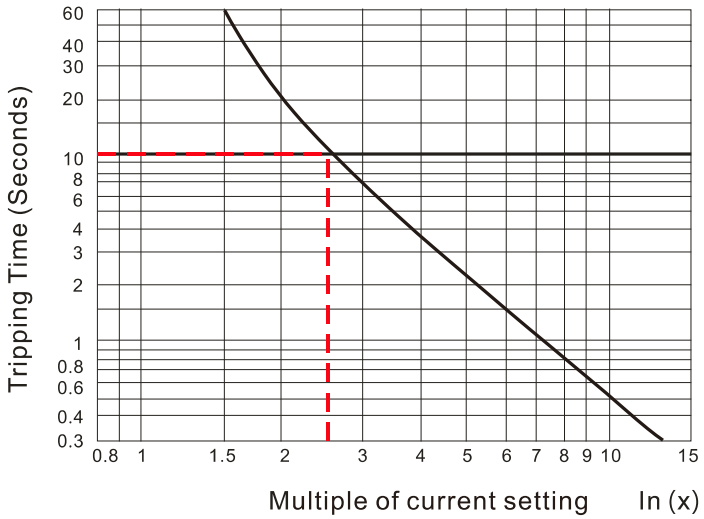


Figure 7-1-3