This App/Upgrade note applies to AC Drives

E-Stop Duty Dynamic Braking Protection

Dynamic braking is a very common option used with both AC and DC drives. Calculating the wattage for both types drives can sometimes be difficult and to some degree require some guesswork. This is because in many cases not enough information about the machine inertia is known. In general, for most applications (barring indexing and stamping press drives) an E-Stop duty rated braking resistor is sufficient for applications requiring occasional stops and some regeneration. In DC drive applications, resistor protection is typically not needed since once the motor is stopped, there is no longer a source of energy to the resistor. In AC drives on the other hand, even though the motor is stopped, the resistor is still connected across the DC bus of the drive through the braking transistor and the bus is powered directly across the AC line. If for some reason the braking transistor fails (which is normally a short); the resistor will be tied directly across the DC bus and thus will continuously dissipate energy. The E-Stop duty resistors were designed to dissipate energy for 5 seconds continuously. These resistors typically have wattage ratings of approximately 10% of the drive kilowatt rating times 1.5 (for 150% braking). Therefore in the event of a braking transistor failure, the resistor would dissipate about 13 times its allowable wattage! Thus the reason for providing some form of overload protection.

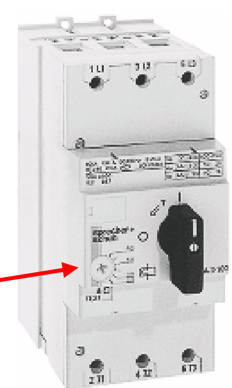
As mentioned above, E-Stop resistors were designed to dissipate energy for a maximum time of 5 seconds and then be allowed to cool back down to “room” temperature. The protection device must allow this current to flow during normal operation without tripping. If this time is exceeded, it must open, protecting the resistor. To perform this protective function, a **manual motor circuit protector** will be used. The overload current for the device for a particular resistor will be selected based on the trip curves provided for the device, the dynamic braking current and a trip time of approximately 5 seconds. The circuit wiring is shown in figure 1.

From the “normalized” timed-current characteristic curves, to achieve a trip time of 5-8 seconds, the current through the overload circuit must be 5-6 times the overload rated current level as set by the adjustment dial. Therefore if you take the Idb current for a particular resistor kit and divide it by 5-6 (table used 5.5) you get the required overload setting. Table 1 gives the overload current settings for the various DB kits

Example: 5 HP, 480 Vac Unidrive UNI1405

From Table 1
DB Resistor Kit – 8200-00156
Overload Kit – 8200-00156OLK

Overload Current setting –1.31



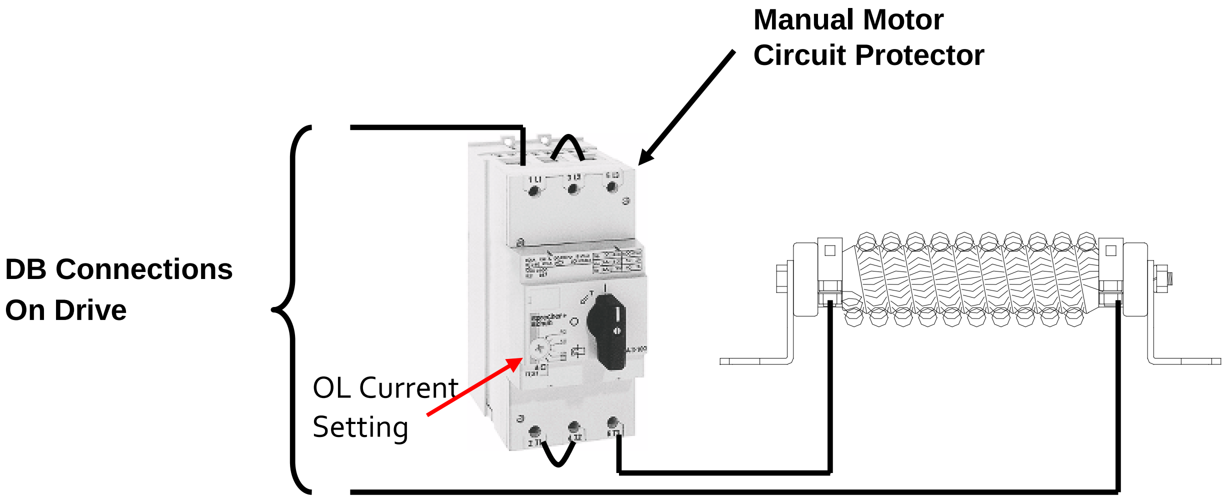


Figure 1

Time-Current Characteristic

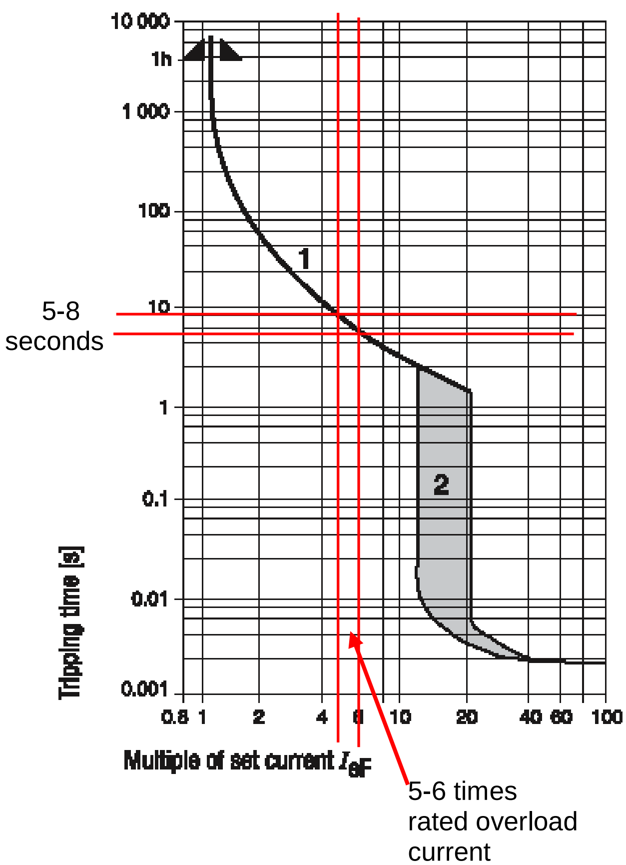


Figure 2

1. Thermal Release Trip Current

The adjustable current-dependent delayed bimetal release protects motors against overload. The curve shows the mean operating current at an ambient temperature of 20°C starting from the cold state. Careful testing and setting ensures effective motor protection even in the case of single-phasing. The overload characteristic is also valid for transformer protection.

2. Magnetic Release Trip Current

The instantaneous magnetic trip has a fixed operating current setting. This corresponds to 13 times the maximum value of setting range (high inrush protection -20 x I_e maximum). At a lower overload setting the magnetic trip is correspondingly higher.

Current Setting I_{ef}

The overload trip corresponds to a thermal overload relay in a motor starter conforming to IEC 947-4-1. If a different value is prescribed (e.g., reduced I_e for cooling medium having a temperature higher than 40°C or a place of installation higher than 2000 m above sea level), the setting current is equal to the reduced rated current I_e of the motor.

Table 1

480 Vac Drives

HP	DB Kit P/N	OL Current Setting	Over Load P/N
1	8200-00151	0.26	8200-00151OLK
1.5	8200-00152	0.39	8200-00152OLK
2	8200-00153	0.53	8200-00153OLK
3	8200-00155	0.79	8200-00155OLK
5	8200-00156	1.31	8200-00156OLK
7.5	8200-00157	1.97	8200-00157OLK
10	8200-00158	2.63	8200-00158OLK
15	8200-00159	3.94	8200-00159OLK
20	8200-00161	5.25	8200-00161OLK
25	8200-00162	6.56	8200-00162OLK
30	8200-00163	7.88	8200-00163OLK
40	8200-00164	10.50	8200-00164OLK
50	8200-00165	13.13	8200-00165OLK
60	8200-00167	15.75	8200-00167OLK
75	8200-00166	19.69	8200-00166OLK
100	8200-00203	26.25	8200-00203OLK
125	8200-00204	32.82	8200-00204OLK
150	8200-00205	39.38	8200-00205OLK

240 Vac Drives

HP	DB Kit P/N	OL Current Setting	OL P/N
1	8200-00218	0.52	8200-00218OLK
1.5	8200-00208	0.78	8200-00208OLK
2	8200-00209	1.04	8200-00209OLK
3	8200-00210	1.57	8200-00210OLK
5	8200-00211	2.61	8200-00211OLK
7.5	8200-00212	3.91	8200-00212OLK
10	8200-00213	5.22	8200-00213OLK
15	8200-00214	7.83	8200-00214OLK
20	8200-00215	10.43	8200-00215OLK
25	8200-00216	13.04	8200-00216OLK
30	8200-00217	15.65	8200-00217OLK

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