Motor Control Resistors

The purpose of a motor control resistor is to regulate the speed and torque of AC and DC motors. The resistor can adjust the speed and torque by limiting the in-rush current to predetermined values through the use of contactors that short sections of the resistor in sequence.
In wound rotor motors the resistors are wye connected to the rotor; In squirrel cage motors the resistors are connected in the line with the motor leads; In DC series wound motors the resistors are connected in line with the armature and in Star-Delta motors the resistors are connected in the windings.

The most important parameters in the design of a motor control resistor are the ohmic value, the current capacity and the duty cycle required. For low ohmic values and high currents stamped steel welded grids are used most of the time; for high ohmic values and low currents wirewound resistors and for intermediate values edgewound ribbon resistors. The total ohmic value of the resistor is divided into several steps to allow for a smooth acceleration of the load or to provide multiple speeds as required by the particular application.

In general there will always be one more speed level than resistor steps because the maximum speed is achieved with all the steps cut out. An exception ocurrs when a permanent slip resistor is required to reduce internal heating of the motor.

The main advantages obtained by using motor control resistors are:

- Limit torque and speed of wound rotor motors to safe levels.
- Soft-starting of AC squirrel cage motors.
- Keep motor voltages within safe levels.
- Reduce overheating.
- Reduce wasted time during braking.
- Increase life of the equipment.
- Improved service reliability.

To enable manufacturers to test resistors under the same conditions NEMA has set up resistor classes based on duty and type of application.

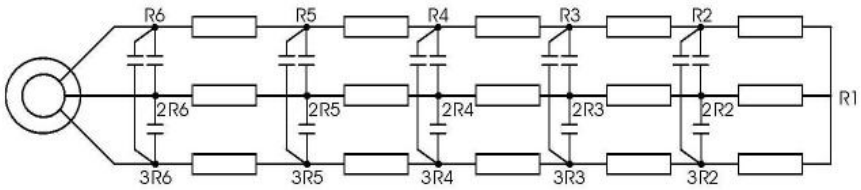
Class Numbers of Resistors for Nonreversing Service and Reversing Nonplugging Service without armature shunt or dynamic braking

	Class Numbers						
	Duty Cycles						
Approximate Per Cent of Full-Load Current on first point starting from Rest	5 Sec On 75 Sec Off	10 Sec On 70 Sec Off	15 Sec On 75 Sec Off	15 Sec On 45 Sec Off	15 Sec On 30 Sec Off	15 Sec On 15 Sec Off	Continuous Duty
25	111	131	141	151	161	171	91
50	112	132	142	152	162	172	92
70	113	133	143	153	163	173	93
100	114	134	144	154	164	174	94
150	115	135	145	155	165	175	95
200 or over	116	136	146	156	166	176	96

Features:

- Very wide range of power and resistance ratings.
- Galvanized Steel or Satin Coated Steel
- Optional stainless steel or anodized aluminum frame and covers for corrosive atmospheres.
- Stainless steel bolts and nuts.
- Stainless steel and Silver plated connectors and internal connections for positive contact and reduced oxidation.
- Low TCR electric grade stainless steel resistor elements.
- Designed to absorb thermal expansions and contractions.
- High-temperature insulators.
- Optional NEMA 3R (outdoor) and NEMA 4 (completely enclosed) enclosures .
- Rating, design, manufacturing and testing according to IEEE, NEMA and CSA standards.
- 24 month guarantee.

• Elementary diagram



• Frame dimensions