

Post Glover Wound Rotor Motor Resistors

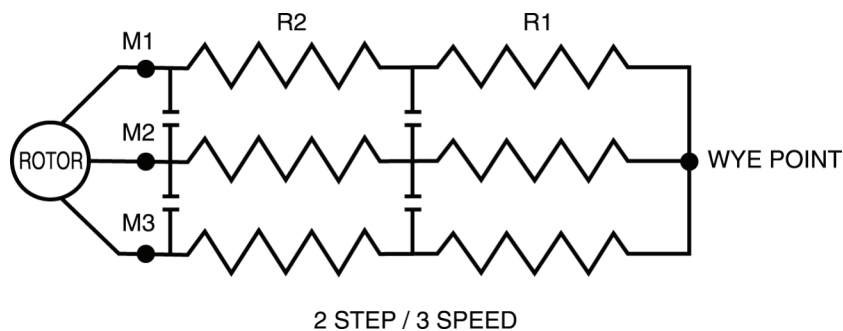
Wound rotor motors, as opposed to AC induction motors, generate the same torque in both forward and reverse. They are commonly used on fans, pumps, conveyors and crane systems.

The motors are rated according to their primary and secondary windings. The primary ratings are given in volts and power (kilowatts), while the secondary ratings are specified in terms of voltage and current (the secondary current is defined by the locked rotor output, verified during testing of the motor).

Resistance Calculation

To calculate the total resistance per phase, the following information is required:

1. Secondary voltage
2. Secondary current
3. The number of speeds/steps required for the application. The number of steps is the actual number of resistor stages to be switched through, whereas the number of speeds is the number of steps plus one (the "extra" speed being no resistors at all in the circuit.)
4. Duty class, according to NEMA
5. Starting torque, (which can also be specified as the last digit of the classification number.)



Formula for Total Resistance

$R_{tot} = \text{Secondary Voltage} / (\text{Secondary Current} \times 1.713 \times \text{Percentage Starting Torque})$

The total resistance is then divided into the requisite number of steps. The size is not uniform to allow for smooth transitions of motor speed as the load's inertia changes. The most common breakdowns are given below, with the first step being that closest to the secondary AC power source and then moving progressively toward the motor.

The amperage associated with each step is determined by the amount of current seen by the individual steps, as dictated by how long they are left in the circuit and by the duty class of the motor. These values listed below are percentages of the rated secondary current. As a general rule, pumps, fans and conveyor systems are Class 130, while crane systems can be Class 160, 170 or 190.

One note concerning the secondary current: if the starting torque is greater than 100%, remember to also use this factor in sizing the individual resistor steps. For example, if the starting torque is 150% of nominal, the amperage used for designing the resistor sizes will be 1.5 times the rated secondary current of the motor.

Post Glover Wound Rotor Motor Resistors

The following table is for selecting the NEMA Class for an application in relation to starting torque and duty cycle.

NEMA Classification of Resistors								
Approximate Percent of Full-Load Current on First Point Starting @ Rest	Class Numbers Applying to Duty Cycles							
	30 sec. on Out of each 15 min.	5 sec. on Out of each 80 sec.	10 sec. on Out of each 80 sec.	15 sec. on Out of each 90 sec.	15 sec. on Out of each 60 sec.	15 sec. on Out of each 45 sec.	15 sec. on Out of each 30 sec.	Continuous Duty
25	101	111	131	141	151	161	171	91
50	102	112	132	142	152	162	172	92
70	103	113	133	143	153	163	173	93
100	104	114	134	144	154	164	174	94
150	105	115	135	145	155	165	175	95
200 or over	106	116	136	146	156	166	176	96

NEMA Resistor Application Standards					
APPLICATION	NEMA CLASS	APPLICATION	NEMA CLASS	APPLICATION	NEMA CLASS
Blowers		Food Plants		Rubber Mills	
Centrifugal.....	133-93	Butter Churns, Dough Mixer.....	135	Banbury, Crackers.....	135
Constant Pressure.....	135-95	Hoists		Calenders.....	155
Brick Plants		Winch.....	153	Mixing Mills, Washers.....	135
Augers, Conveyors.....	135	Mine Slope.....	172	Steel Mills	
Dry Plans, Pug Mills		Mine Vertical.....	162	Accumulators.....	153
By-product Coke Plants		Contractor's Hoists.....	152	Casting Machines-Pig.....	153
Door Machine, Leveler Ram.....	153	Larry Cars	153	Charging Machines	
Pusher Bar, Valve Reversing Machines		Lift Bridges	152	Bridge.....	153 or 163
Cement Mills		Machine Tools		Peel.....	153 or 163
Conveyors.....	135	Bending Rolls.....	163 or 164	Trolley.....	153 or 163
Crushers.....	145	Boring Mills.....	135	Coiling Machines.....	135
Elevators.....	135	Bulldozers.....	135	Converters-Metal.....	154
Rotary Dryers.....	145-95	Drills, Gear Cutters.....	115	Conveyors.....	135-155
Grinders and Pulverizers.....	135	Grinders.....	135	Crushers.....	145
Kilns.....	135-95	Hobbing Machines, Lathes.....	115	Furnace Door, Gas Valves.....	155
Coal and Ore Bridges		Milling Machines		Gas Washers	
Bridge.....	153	Presses, Punches.....	135	Hot Metal Mixers.....	163
Closing, Holding.....	162	Saws, Shapers.....	115	Ingot Buggy, Kickoff.....	153
Trolley.....	162 or 163	Metal Mining		Levelers	
Coal Mines		Ball, Rod and Tube Mills.....	135	Manipulator Fingers.....	153 or 163
Car Hauls.....	162	Car Dumpers-Rotary.....	153	Pickling Machine.....	153
Conveyors.....	135 or 155	Converters-Copper.....	154	Pilars-Slab, Racks	
Cutters.....	135	Crushers.....	145	Reelers.....	135
Crushers.....	145	Conveyors.....	135	Saws-Hot or Cold.....	155
Fans.....	134 or 95	Tilting Furnace.....	153	Screw Downs.....	153 or 163
Hoists		Paper Mills		Shears, Shuffle Bars.....	155
Slope.....	172	Beaters.....	135	Side Guards.....	153 or 163
Vertical.....	162	Calenders.....	154-92	Sizing Rolls, Slab Buggy.....	155
Jigs, Picking Tables.....	135	Chippers.....	145	Soaking Pit Covers	
Rotary Car Dumpers.....	153	Pipeworking		Straighteners.....	153
Shaker Screens.....	135	Cutting and Threading.....	135	Tables	
Compressors		Expanding and Flanging.....	135-95	Approach.....	153
Constant Speed.....	135	Power Plants		Lift.....	153 or 163
Varying Speed		Clinker Grinders.....	135	Main Roll.....	153 or 163
Centrifugal.....	93	Coal Crushers.....	135	Roll.....	153
Plunger Type.....	95	Conveyors		Shear Approach.....	153 or 163
Concrete Mixers	135	Belt, Screw.....	135	Transfer.....	153
Cranes-General Purpose		Pulverized Fuel Feeders.....	135	Tilting Furnace.....	153
Hoist.....	153-163	Pulverizers		Wire Stranding Machine.....	153
Bridge or Trolley with		Ball Type.....	135	Woodworking Plants	
Sleeve Bearings.....	153-163	Centrifugal.....	134	Boring Machines, Lathe.....	115
Roller Bearings.....	152-162	Stokers.....	135-93	Mortiser, Moulder, Planers,	
Flour Mills		Pumps		Power Trimmer and Mitre,	
Line Shafting.....	135	Centrifugal.....	134-93	Sanders, Saws, Shapers,	
		Plunger.....	135-95	Shingle Machine	

324 Governor Road • Braeside, Victoria 3195 • AUS
 Phone: +61 (0)3 9587 4099 • Fax: +61 (0)3 9587 4130
 www.postgloverasia.com

4750 Olympic Blvd. • Erlanger, KY 41018 • USA
 Phone: 800-537-6144 / 859-283-0778 • Fax: 859-283-2978
 www.postglover.com

Quality System Certified to ISO 9001



Serving the Electrical Industry Since 1892