



INSTRUCTIONS

TYPE LG PUNCHED GRID RESISTORS

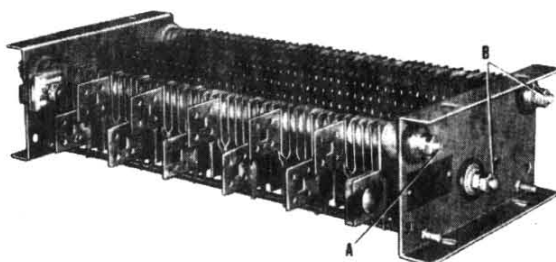


FIG. 1. Type LG Punched Grid Resistor

GENERAL INFORMATION

Grid Resistors convert electrical energy to heat. To obtain full advantage of their rating, without overheating, adequate ventilation must be supplied. Grid frames should be mounted so that grids are in a vertical plane and ventilating air can flow upward through them to carry away this heat. Frames stacked more than 3 high, should be separated from adjacent frames by the full height or width of the end frame.

Grid Resistors should be inspected periodically. Loose nuts and connections should be tightened and accumulated dust should be blown out.

The rod "A" Fig. 1 should be tight enough to maintain considerable pressure on grids and termi-

nals. Tie rods "B" should float with approximately $\frac{1}{16}$ " end play to permit freedom for thermal expansion of grids.

Westinghouse resistors for starting and regulating the speed of motors are rated according to N.E.M.A. classification, shown in Table I. Horsepower and resistor class numbers appear either on the resistor nameplates or on the resistor layout drawing. When the type of motor is known, Table I may be used to indicate the time rating of the resistor, the starting torque, and the per cent of full load current that will be obtained on the first point of the controller.

Table I shows 42 classes of resistors. Experience has shown that the requirements of practically all industrial applications can be met by using classes 93, 95, 134, 135, 152, 153, 162 and 163.

RESISTORS FOR D-C MOTORS

Resistors for D-C motors may have one or more frames. The name plates should always be checked to see that all frames have been received. After connecting frames in series by connecting A to A, B to B, etc., the resistor should be connected to the controller in line with the diagram inside of the controller cover. Fig. 2 shows resistor connections for a D-C motor, for the specific case of a five-point resistor consisting of two frames.

Table I—N.E.M.A. CLASSIFICATION

PER CENT FULL LOAD CURRENT ON FIRST POINT	**STARTING TORQUE % OF FULL LOAD					RESISTOR CLASS NUMBER						
	Series Motors	Compound Motors	Shunt Motors	Wound Rotor Induction Motors		5 Sec. on out of 80 Sec.	10 Sec. on out of 80 Sec.	15 Sec. on out of 90 Sec.	15 Sec. on out of 60 Sec.	15 Sec. on out of 45 Sec.	15 Sec. on out of 30 Sec.	Cont.
				1 Ph. Stg.	3 Ph. Stg.							
25	8	12	25	15	25	111	131	141	151	161	171	91
50	30	40	50	30	50	112	132	142	152	162	172	92
70	50	60	70	40	70	113	133	143	153	163	173	93
100	100	100	100	55	100	114	134	144	154	164	174	94
150	170	160	150	85	150	115	135	145	155	165	175	95
200	250	230	200		200	116	136	146	156	166	176	96

**Based on Westinghouse Motors.

The letter D indicates additional capacity for dynamic lowering.

The letter B added to any class indicates additional step for dynamic braking.

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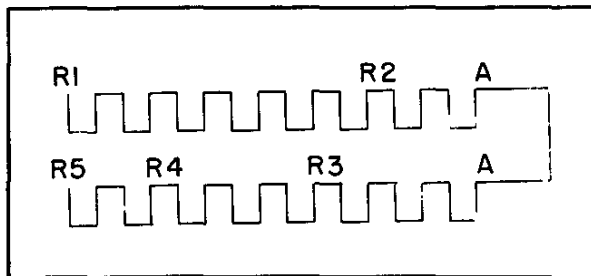


FIG. 2. Resistor Connections for D-C Motors

RESISTORS FOR A-C MOTORS

All standard A-C wound rotor motors, whether for two or three phase circuits, have their secondaries wound for three phase. The resistors, for each phase, used with these motors are identical with the exception of the terminal marking. The resistor for the first phase has its terminals marked consecutively R1, R2, R3, etc.; the second phase, R11, R12, R13, etc.; the third phase, R21, R22, R23, etc. The actual resistor will consist of 1, 2, 3 or multiples of three frames of tubes or grids. Check name plate to see if all frames have been received. When two frames are furnished they should be connected in series by connecting terminals A to A. When three frames are furnished, this connec-

tion is not required. When more than three frames are supplied, sort out the frames for each phase according to the terminal marking, and connect those frames belonging to each phase by connecting A to A, B to B, etc. Make all other connections in line with the following information and the diagram located in controller cover.

Secondary resistors for A-C motors are designed for star connection. Resistors for most manual controllers may be connected either with all three secondary phases closed or with one secondary phase open on the first point of the controller. Resistors for magnetic controllers are connected with all three phases closed in the secondary on the first point.

The torque obtained with a resistor of a given class number varies with the connection used on the first point. The torques available on the first point with single phase and three phase starting are shown in Table I. Where it is possible to use both methods of connection, the control diagram shows one method of connection, and explains how to obtain the other method. The method actually shown on the diagram is ordinarily recommended, but if a change in starting torque is desirable, the other method may be used.



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(Rev 2-67) Printed in U.S.A.