

# GRID TYPE RESISTORS

5", 8", 14" and L Grids—3 Point

## INSTRUCTIONS

### General Information

The capacity of grid resistors depends largely upon the ventilating space. The frames should never be stacked more than 4 high, and, when space is available, each frame should be separated from the next by approximately the width of the end frame. Frames may be mounted on the floor, platform or on the wall, but the grids in all cases must be in a vertical position.

Grid resistors should be given periodic inspections that include the tightening of loose lock nuts, connections, etc. The collection of dirt and dust should be blown out from between the resistor units.

Westinghouse standard resistors, for starting and regulating the speed of motors, are rated in accordance with the NEMA Standards Classification, shown in Table I. The name plates on Westinghouse resistors specify horsepower and class numbers, which, if used in conjunction with Table I, indicate the rating of the resistor and the starting torque and current that will be obtained on the first point of the controller in per cent of full load.

### Resistors for D-C. Motors

Resistors for D-C. motors may have one or more frames and the nameplates 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

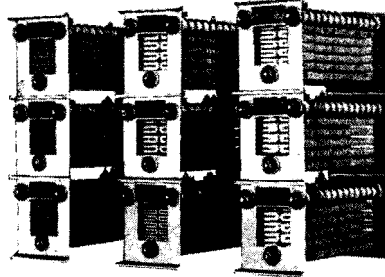


FIG. 1—METHOD OF MOUNTING RESISTORS

cover. Fig. 2 shows resistor connections for a D-C. motor, for the specific case of a five-point resistor consisting of two frames.

### 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 R-1, R-2, R-3, etc.; the second phase, R-11, R-12, R-13, etc.; the third phase, R-21, R-22, R-23, etc. The actual resistor will consist of 1, 2, 3, or multiples of three frames of tubes or grids. Check nameplate 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 connection 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 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 of the controller. 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

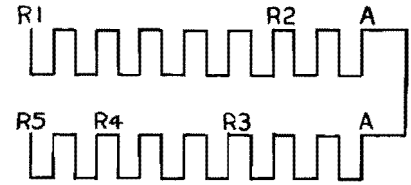


FIG. 2—RESISTOR CONNECTIONS

TABLE I  
NEMA, RESISTOR SERVICE CLASSIFICATION

Approx. Per Cent Full Load Current on First Point	STARTING TORQUE IN PER CENT OF FULL LOAD TORQUE						RESISTOR CLASSIFICATION NUMBERS APPLYING TO DUTY CYCLES							
	D-C. MOTORS			A-C. MOTORS WOUND ROTOR			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
	Series	Compound	Shunt	†1-Phase Starting	†3-Phase Starting									
25	8	12	25	15	25	101	111	131	141	151	161	171	91	
50	30	40	50	30	50	102	112	132	142	152	162	172	92	
70	50	60	70	40	70	103	113	133	143	153	163	173	93	
100	100	100	100	55	100	104	114	134	144	154	164	174	94	
150	170	160	150	85	150	105	115	135	145	155	165	175	95	
200 or over	250	230	200	..	200	106	116	136	146	156	166	176	96	

† This refers to the connections of the rotor circuit.  
The letter D indicates additional capacity for dynamic lowering  
The letter B indicates additional step for dynamic braking.