



INSTALLATION • ADJUSTMENT • MAINTENANCE INSTRUCTIONS

MOTOR-DRIVEN OPERATING MECHANISM

Type RK

For D-C Field Rheostats

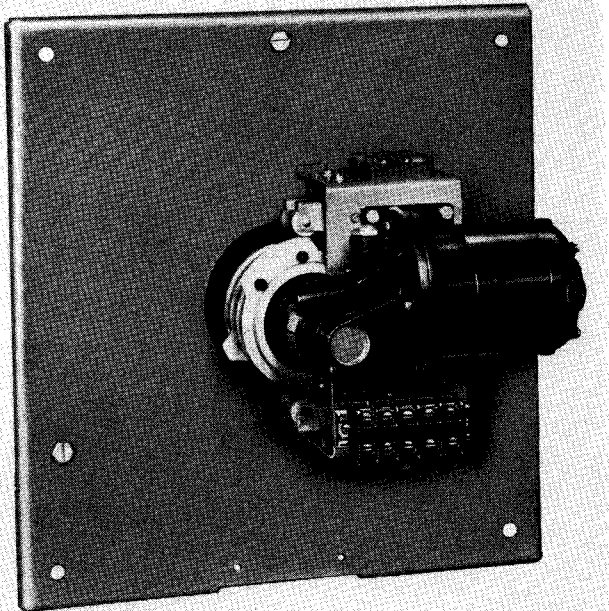


FIG. 1. Type RK Mechanism and Mounting Panel

TYPE RK MOTOR-DRIVEN OPERATING MECHANISM is used for remote control or automatic operation of Westinghouse Types LK and LR Field Rheostats of the 8 or 13-inch sizes. It will drive from one to three 8-inch or one to three 13-inch plates in tandem plus one additional 6-8-10 or 12-inch Ohmite plate when used as a potentiometer. The single Ohmite plate may also be used by itself without serving as an adjunct to the Westinghouse rheostats. Hand operation can be obtained by mounting a handle on the rear of the rheostat assembly. This is not possible when an Ohmite potentiometer is used.

The mechanism (Fig. 2) consists of a direct-current speed reducer motor, jaw coupling, spring clutch, from two to four two-circuit limit switches, cam drum assembly and necessary terminal blocks. With the exception of the cam drum assembly, these parts are integrally mounted on a suitable steel panel against the back of which the rheostats are intended to be supported.

INSTALLATION

Assembly. Before mounting the field rheostats, remove their operating handle and fasten the Cam Drum Assembly in its place. Two $\frac{1}{4}$ -20 x $\frac{3}{4}$ -in. long fillister head machine screws are furnished for this purpose. Insert the screws through holes in the drum. Turn the drum until the screws line up with tapped holes in the rheostat pointer piece and the pointer itself lies in a slot cut through a projecting rim on the rear of the drum. Place the projecting centering tip in the hole drilled in the end of the rheostat shaft.

The drum is now centered and registered with the rheostat so that after its subsequent removal and replacement, the limit switch cams are in their correct position. Tighten the two screws evenly and tightly in order not to disturb the alignment of the drum with the rheostat shaft. This can be done by driving both screws until they are very lightly seated, then driving each alternately not more than one eighth turn at a time until both are solidly seated.

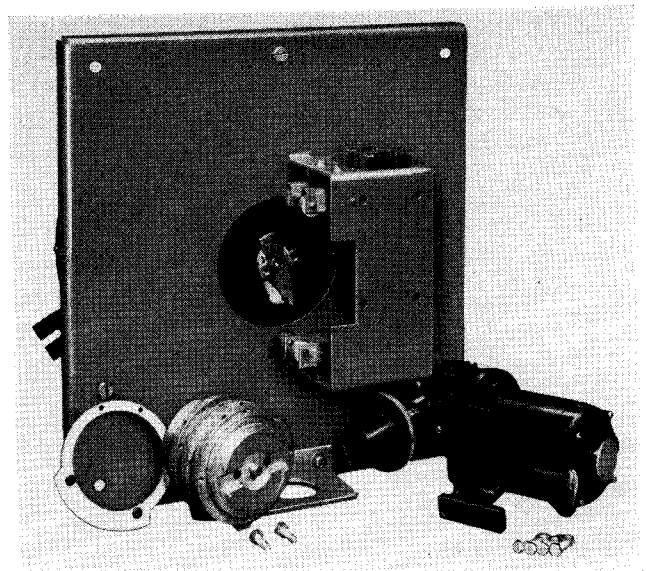


FIG. 2. Mechanism Disassembled

TYPE RK OPERATING MECHANISM

Tighten two set screws which secure the jaw coupling to the speed reducer shaft. Make sure that the spring clutch is correctly assembled inside of the cam drum. This clutch consists of two hardened steel balls and a spring all encased in a tubular steel housing. The balls should ride in the annular groove at the inside center of the drum and one ball should engage the hole in the wall of the drum.

Mounting Rheostats. Hold the rheostats with their terminals at the bottom and turn the cam drum, until the tubular clutch housing lines up with the slot in the jaw coupling on the output shaft of the speed reducer. Mount the rheostats against the rear of the steel panel while carefully lifting the limit switch operating rollers to clear cams if necessary. The clutch assembly should enter the jaw coupling without requiring effort and the rheostats should be centered so that there is approximately uniform clearance between the cam drum and the Micarta centering washer which will be found mounted on the jaw coupling.

When Ohmite plate type rheostats are used, either alone or as an adjunct to Westinghouse rheostats, they are mounted against triangular shaped steel plates. These in turn should be mounted behind either the operating mechanism panel or the assembly of Westinghouse rheostats as required. A special hub is supplied. This should be fastened to the Ohmite rheostat shaft and used to support the cam drum or part of the flexible coupling as the case may be. Before fastening the hub, turn the Ohmite rheostat until the position of its contacts corresponds with the position of main rheostat pointer.

Inspection. Check the nameplate reading of the speed reducer motor to be sure that its voltage rating agrees with that of the control circuit and that its winding type, NSE for series wound or NCO for compound wound, agrees with the type illustrated on the diagram of connections. See Fig. 5 and Fig. 6 for typical wiring diagrams.

Check actual wiring connections for agreement with the diagram, making sure that both overtravel limit switches are in circuit and that the wiring is connected to their "B" circuits. These two overtravel switches are furnished on all Type RK mechanisms and are those operated by the two short (15°) cams assembled nearest to the steel panel.

ADJUSTMENT

Cams. Adjusting the cams which operate the

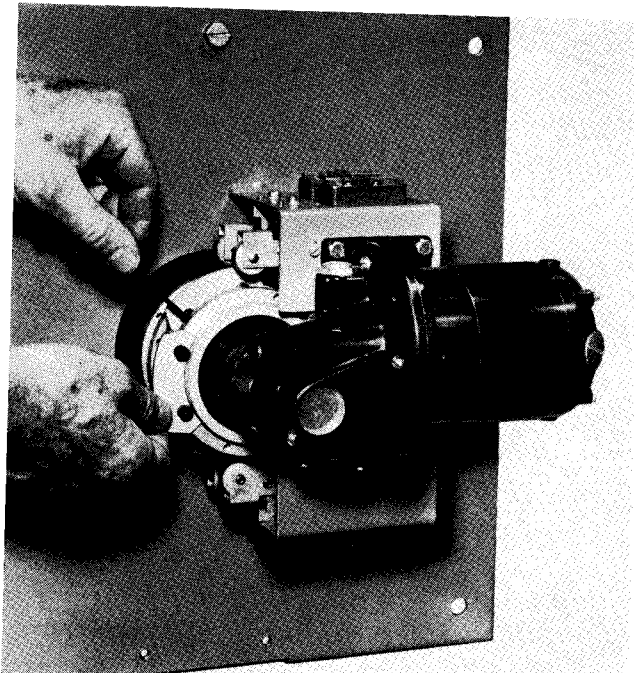


FIG. 3. Loosening Set Screws in Cam Rings

overtravel switches can be done only if suitable control circuit power is available to operate the motor. It is not necessary to have the speed controlling resistors connected, while making adjustments. If they are connected, it is best to set them for highest motor speed or fastest rheostat travel.

Loosen two set screws (see Fig. 3) in each cam ring so that these rings can turn freely around the cam drum. Tighten screws holding cams to cam rings (see Fig. 4). Move both cams so that they do not strike the switch operator rollers. Apply power to the motor, noting the position of the rheostat pointer, the direction of rheostat travel and by lifting cam rollers determine which overtravel limit switch will stop rheostat travel in that direction.

Inch the motor a little at a time until the rheostat pointer almost hits its stop indicating the limit of its travel in that direction. The overtravel limit switch "B" circuit should be open in this position. To open it, turn the corresponding cam ring in the direction of rheostat travel until the cam begins to lift its roller and the overtravel switch indicates by a clicking noise that it has operated. Tighten two screws (Fig. 3) with cam in this position.

These screws should register with the groove in the cam drum. When they do, they will not project above the surface of the ring. Reverse the motor and follow a similar procedure while adjusting the overtravel cam for the opposite direction of travel.

TYPE RK OPERATING MECHANISM

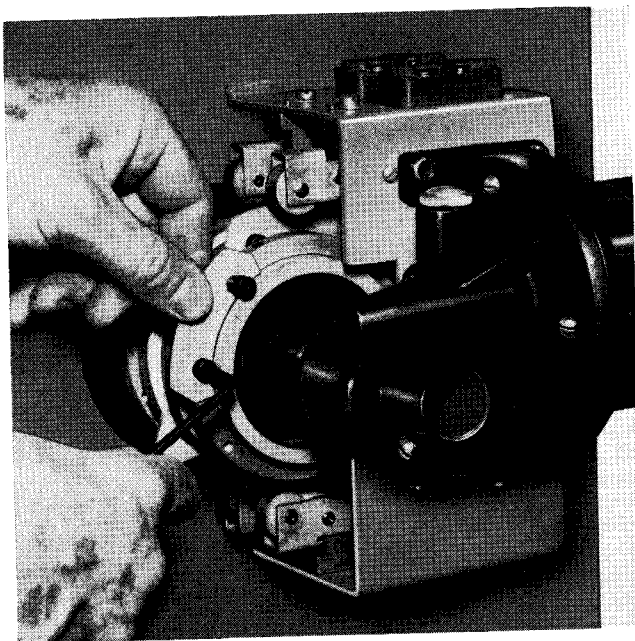


FIG. 4. Securing Cams to Cam Rings

Important: Do not make either of these adjustments unless the spring clutch ball is engaged with the hole through the wall of the cam drum. If disengaged, it may be engaged either by turning the cam drum by hand or by rotating the motor until it engages.

Check adjustments by operating the motor for full travel in each direction. Note the position of rheostat pointer at extreme travel and make closer adjustment of cams if necessary. Overtravel of the motor after the limit of rheostat travel is reached will disengage the clutch before injurious stresses are set up. Extremely close overtravel switch adjustment is not necessary.

Optional Switches. If additional switches are used their cams should be similarly adjusted. Note that each switch has two circuits. The "A" circuit is open and the "B" circuit is closed when their rollers are not lifted by the cams. If both circuits are to be used they should be connected to a common point or at least must have the same control circuit potential.

Several cam shapes are available (15° - 45° - 90°). Choice of one of these together with use of either "A" or "B" circuits will usually make it possible to get all of the circuit combinations required. Extended cam lengths, if necessary, can be obtained by overlapping two cams mounted on the same ring.

Speed Adjustment. The type RK operating mechanism may be driven by either series or

compound wound d-c motors. Series wound motors are available for either 115-volt or 230-volt control circuit voltage. Compound wound motors are available for 230-volt control only. Figures 5 and 6 show typical connections schemes.

For each type of motor winding, two gear ratios are available. These are chosen to produce complete travel of the rheostat in approximately 5 seconds or approximately 15 seconds respectively when no speed controlling resistors are used. The time for complete rheostat travel can be changed over a range of three to one if speed controlling resistors are used and connected as shown in Fig. 5 or Fig. 6. For the smaller gear ratio, the time range for complete travel is approximately 5 to 15 seconds; for the larger gear ratio, it is approximately 15 to 45 seconds.

Speed controlling resistors should be shunted around the armature of series wound driving motors. Increasing the value of resistance will decrease the time for rheostat travel.

Compound wound driving motors should be operated at full voltage shunt field strength. Their speed can be controlled by varying their armature voltage with a potentiometer resistor. Increasing the value of resistance in parallel with the armature and series field circuit will decrease the time for rheostat travel.

Variations in control voltage or torque requirements will change the travel time to some extent. Extension of time range beyond three to one is not recommended because the increased motor speed regulation may cause it to stall if torque requirements become excessive.

MAINTENANCE

Speed Reducer Motor. The motor ball bearings and the reducer gears are both grease lubricated. They are packed at the factory with a sufficient quantity for several years operation. Before repacking ball bearings, wash in gasoline, then repack and replace so that the built in grease seal is facing toward the motor interior.

To renew lubricant in reducer gears, remove the gear housing cover supporting the drive shaft and refill to three-quarter capacity. Use Socony Oil Co. BRB #4 grease or equal for ball bearings. Use Socony Oil Co. Sovarex L-1 grease or equal for reducer gears.

Inspect brushes regularly for wear and replace before their length is reduced to less than $\frac{1}{4}$ inch.

Do not attempt to turn the drive shaft of the speed reducer.

TYPE RK OPERATING MECHANISM

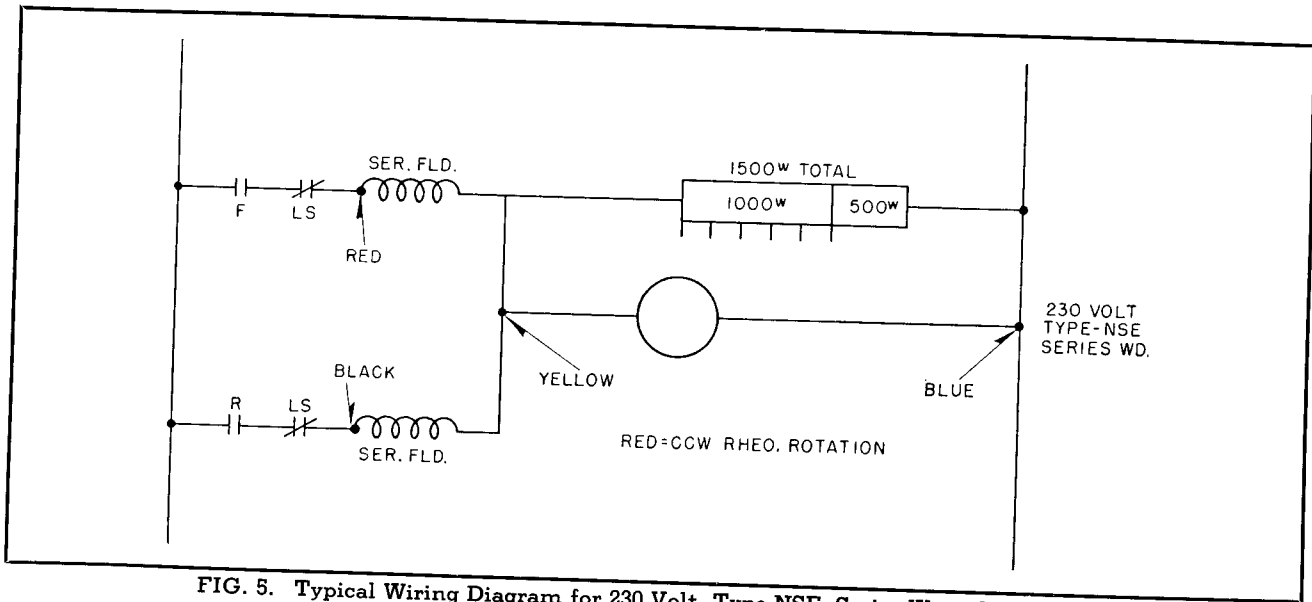


FIG. 5. Typical Wiring Diagram for 230 Volt, Type NSE, Series Wound D-C Motor

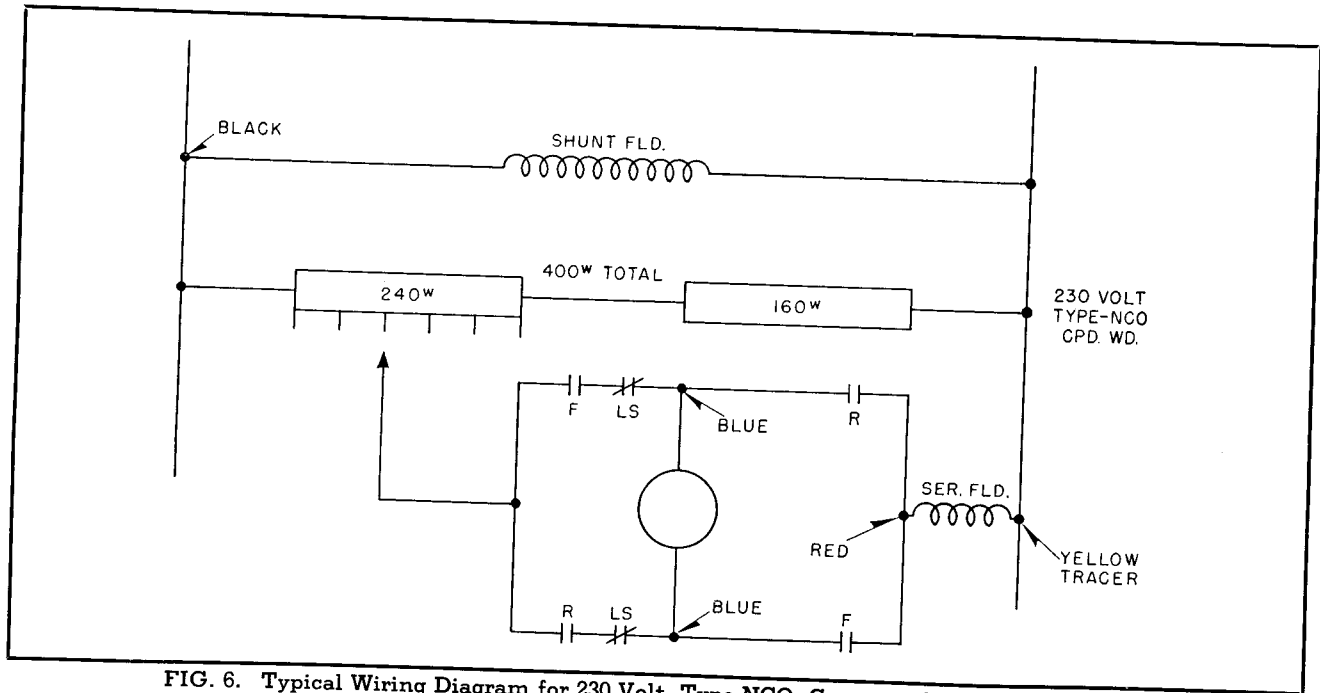


FIG. 6. Typical Wiring Diagram for 230 Volt, Type NCO, Compound Wound D-C Motor



WESTINGHOUSE ELECTRIC CORPORATION
BUFFALO PLANT • MOTOR AND CONTROL DIVISION • BUFFALO 5, N. Y.

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WESTINGHOUSE SPECIAL FEATURES

1. Adjustable operating speeds - Two gear ratios available permitting travel from all in to all out position in 5 to 15 seconds or 15 to 45 seconds. Travel time can be varied over 3 to 1 range by inserting resistance in the motor circuit.
2. Snap action type limit switches. - Two cam operated switches normally provided and two additional switches are available for auxiliary circuits. Cams adjustable over 360 degree range from front of the rheostats and available for 15, 45 and 90 degree travel.
3. Standard Rheostat Plates - Uses one to three thirteen or eight inch type LK or LR plates. Plates are of standard construction as described in P.L. 14515.
4. Totally enclosed motor. - Motors and gears mounted as integral unit in a totally enclosed housing. Conservatively rated for long trouble free life.
5. Versatile - Limit switches are all two circuit type one normally open, the other normally closed, thus making it possible to get all circuit combinations usually required.
6. Easily installed and maintained - Drive mechanism mounts on front of steel plate. Rheostat plates on rear of panel. All components readily accessible for inspection or adjustment. Mechanism electrical connections made to terminal blocks.

Westinghouse motor operated field rheostats type RK are used for adjusting the speed of direct-current motors up to approximately 200 HP and for controlling the voltage of generators up to approximately 300 KW.

These mechanisms are designed for use with type LK or LR rheostat plates (See P.L. 14515) and will handle one to three thirteen or one to three eight inch plates in tandem.

Type RK rheostats are provided with two overtravel limit switch. Two additional switches for external circuit indication can be supplied as optional. All limit switches are easily adjustable from the front of the rheostats.



CONSTRUCTION

The type RK motor operated rheostat consists of a motor operating mechanism and either type LK or LR plates. Rheostat plates are described in P.L. 14515 and require no modification when used with the type RK mechanism.

The mechanism consists of a gear motor, limit switches and cam drum all mounted on the front of a 15" times 16" steel mounting panel. Rheostat plates are mounted on the rear of the panel.

The operating mechanism is driven by either a series or compound wound D-C totally enclosed gear motor conservatively rated to insure long trouble free life.

Series motors are available for either 115 or 230 volts; compound motors for 230 volts only.

Series motor is actuated by the equivalent of a single pole double throw switch; the compound wound motor by the equivalent of a double pole double throw switch. Actuating means is normally supplied as part of the overall control and is not included in the price of the rheostat.

For each type of motor, two gear ratios are available. The smaller ratio gives a travel time from the "all in" to the "all out" position of 5 seconds minimum and 15 seconds maximum; the larger ratio provides an operating time of 15 seconds minimum and 45 seconds maximum.

Travel time over the three to one time range can be varied by means of resistance inserted in the motor circuit. Resistors can be of the permanent type with taps or can be of the ring type. For series motors, the resistor is shunted around the armature; for compound motors, a potentiometer resistor is used. Time adjusting resistors are not included in the price of the rheostat and should be ordered as a separate item.

The purpose of the cam drum is to provide the coupling between the motor and rheostat plates and to provide means for mounting of cams used to actuate the limit switches. It is provided with a slip clutch for protection of the motor and rheostat plates in the event of accidental overtravel and for ease of installation.

The cam drum is mounted directly on the rheostat plates and is provided with a universal coupling having sufficient rigidity but allowing for a small amount of misalignment between the drive mechanism and rheostat plates.



LIMIT SWITCHES

Two adjustable snap action cam operated limit switches are provided. Two additional limit switches, also adjustable, can be provided for external auxiliary circuits. All switches have two circuits, one normally open and one normally closed.

Cams for operating the limit switches are thin steel segments bolted to steel rings. These rings can be located and secured to the cam drum at any point throughout 360 degrees of rotation. Adjustment is made from the front of the mechanism and can be made before or after installation.

Three lengths of cams are available, 15°, 45° and 90° respectively. Since the limit switches have both normally closed circuits, these three lengths of cams make it possible to get all of the circuit combinations usually required. Extended cam lengths, if necessary, can be obtained by mounting two cams in an overlapping arrangement on the same ring.

ELECTRICAL CONNECTIONS

Terminal blocks, are provided on the front of the mechanism for making motor connections and to limit switches. Connections to the field circuits are made direct to the rheostat terminals.

LIMIT SWITCH RATINGS

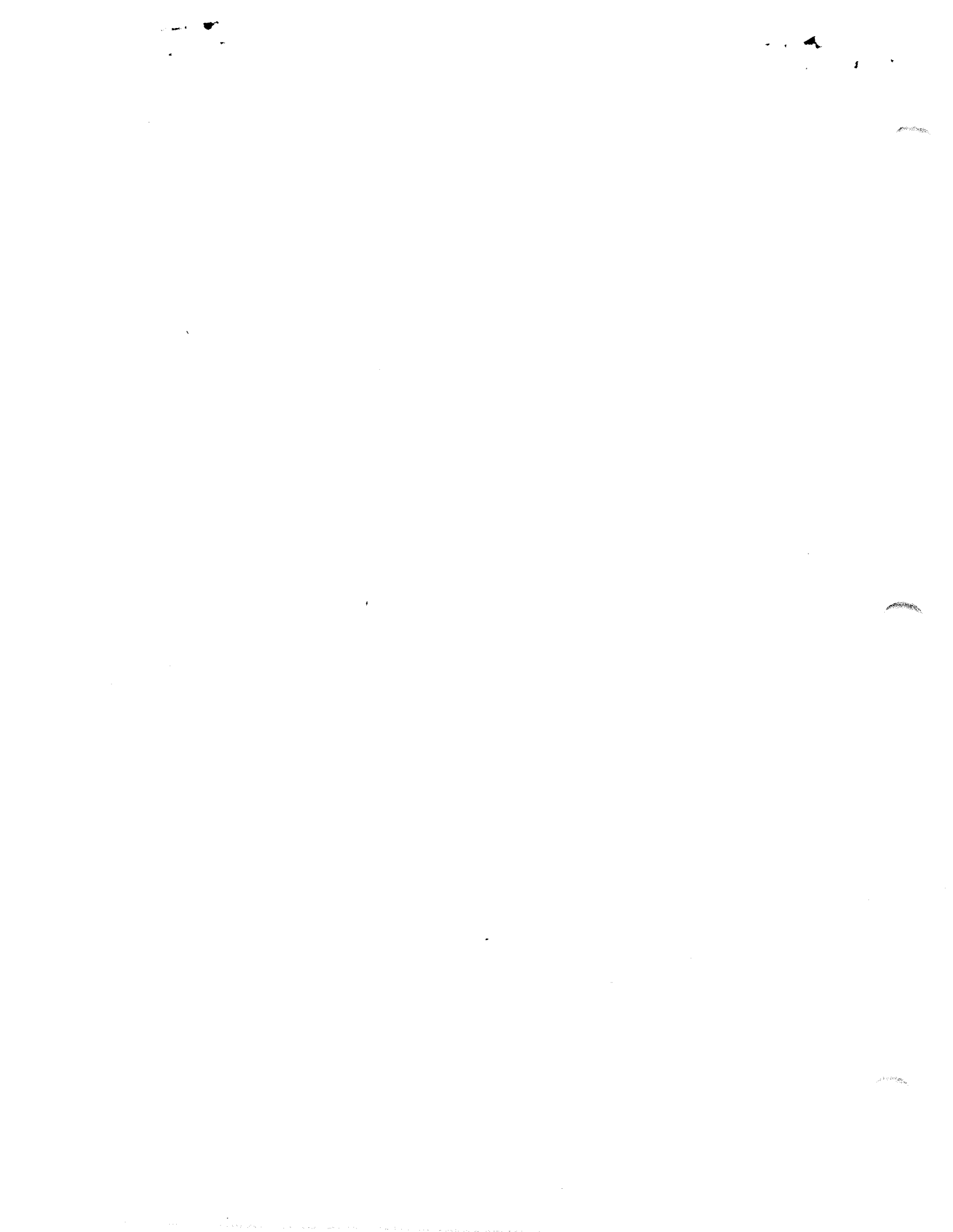
Both limit switch circuits must be connected to the same side of the line. Opposite electrical polarity should not be connected to the contacts of these switches.

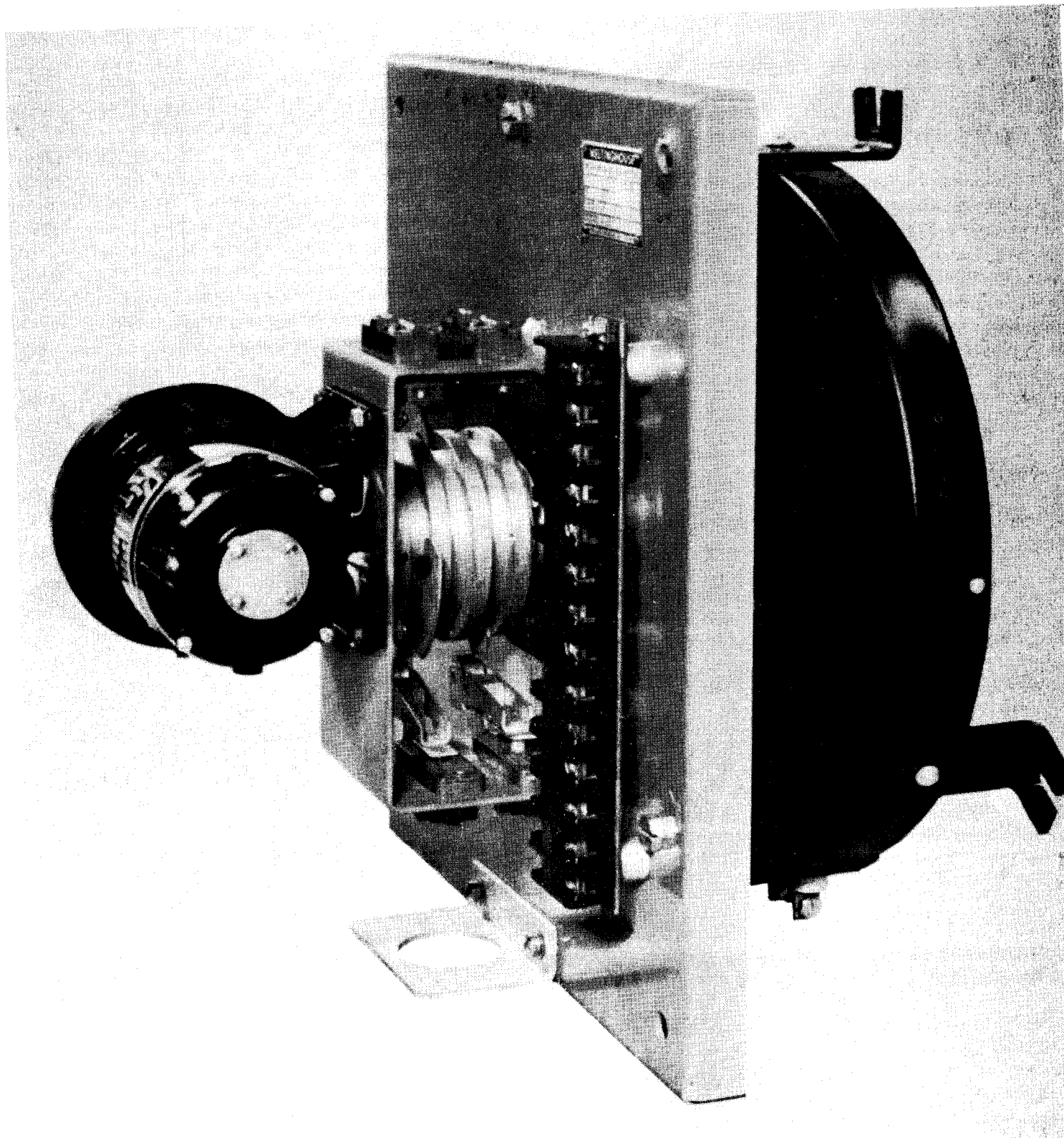
ORDERING INSTRUCTIONS

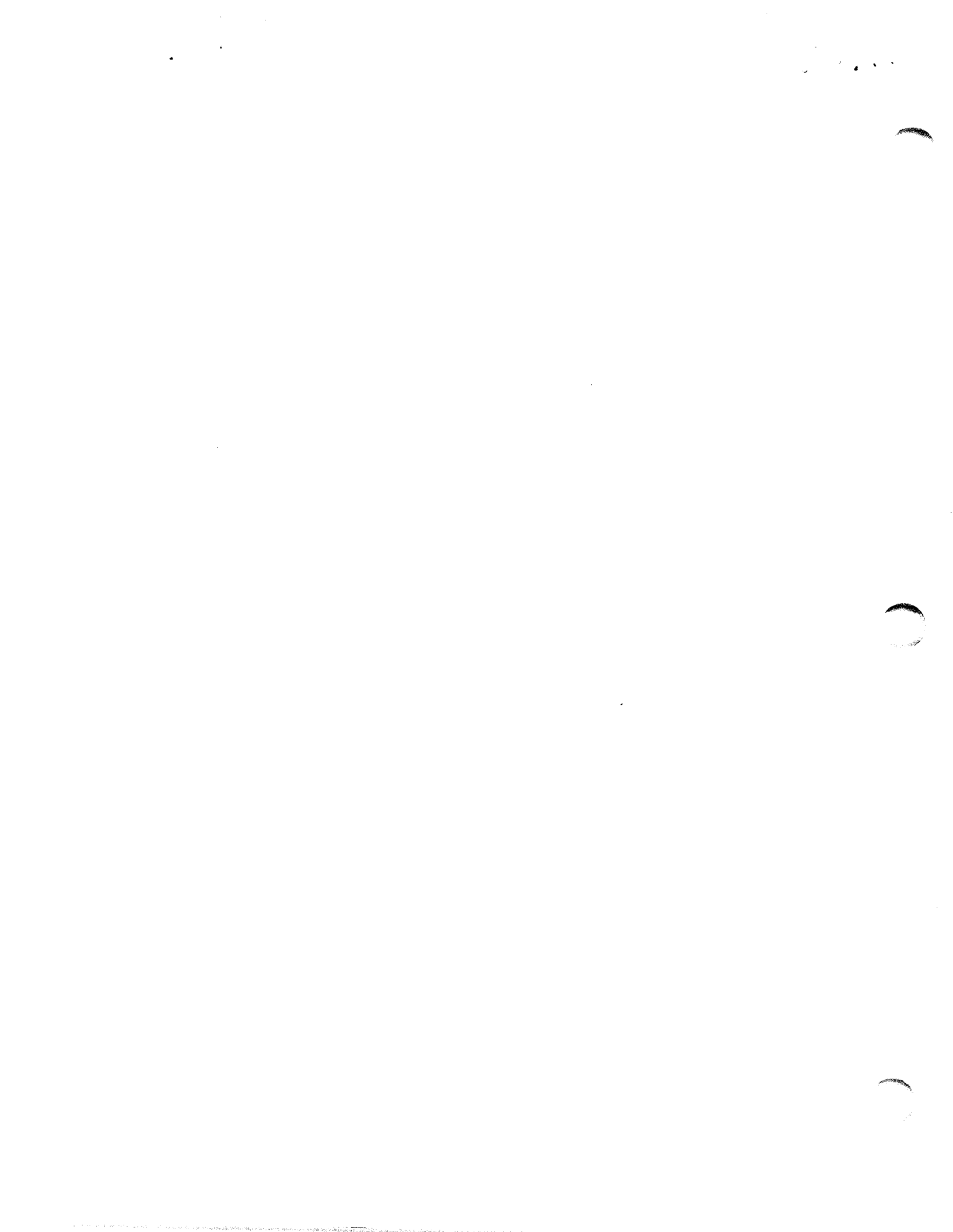
Operating Mechanism - Specify Class voltage rating type of motor and travel time.

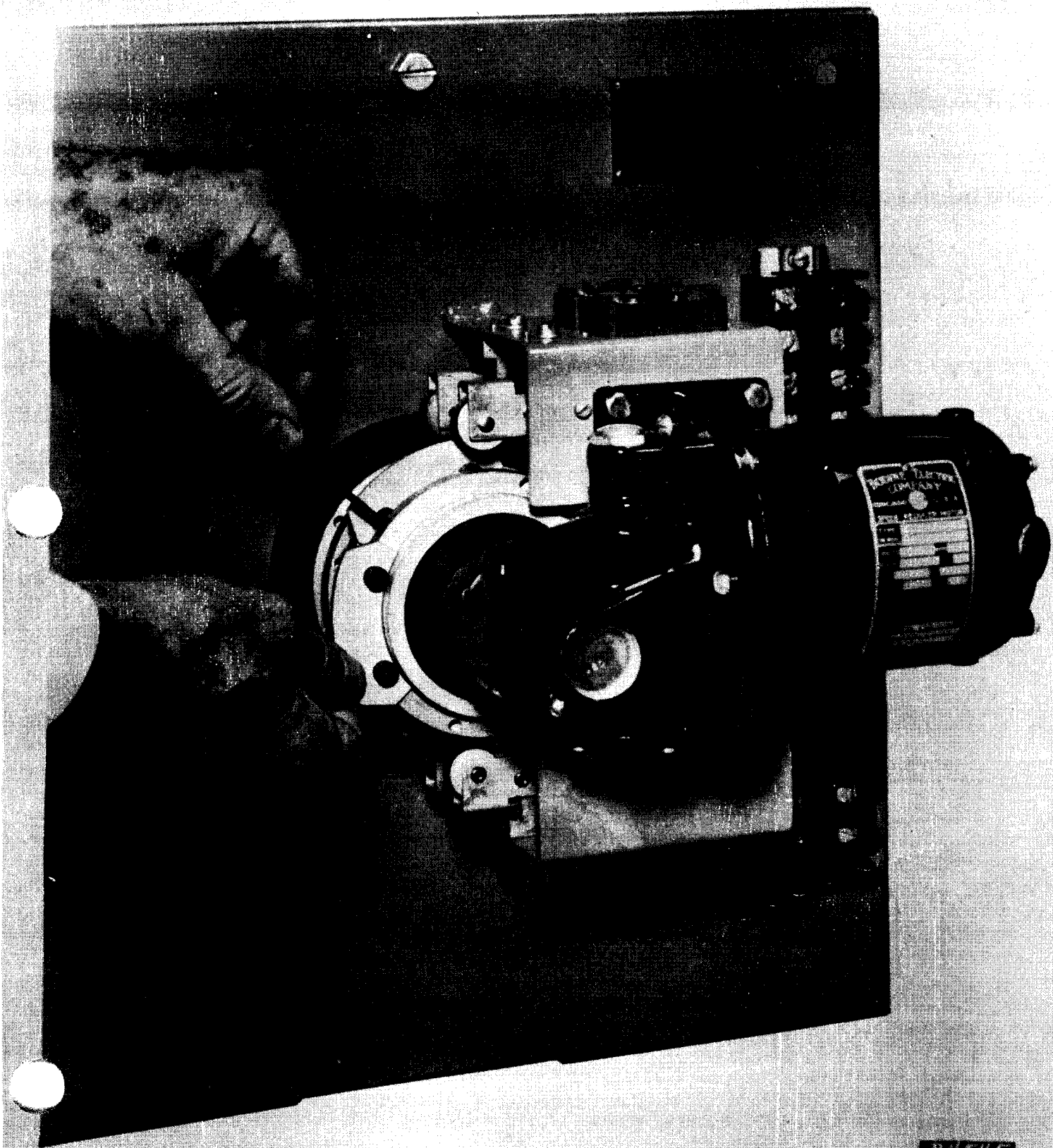
Rheostat - Select from P.L. 14515.

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