

Instructions for Large A.C. Motors Type RA Frames 5013H to 6811S-Sleeve Bearings Squirrel Cage WPI and WPII Enclosure



I.L. 3100-28

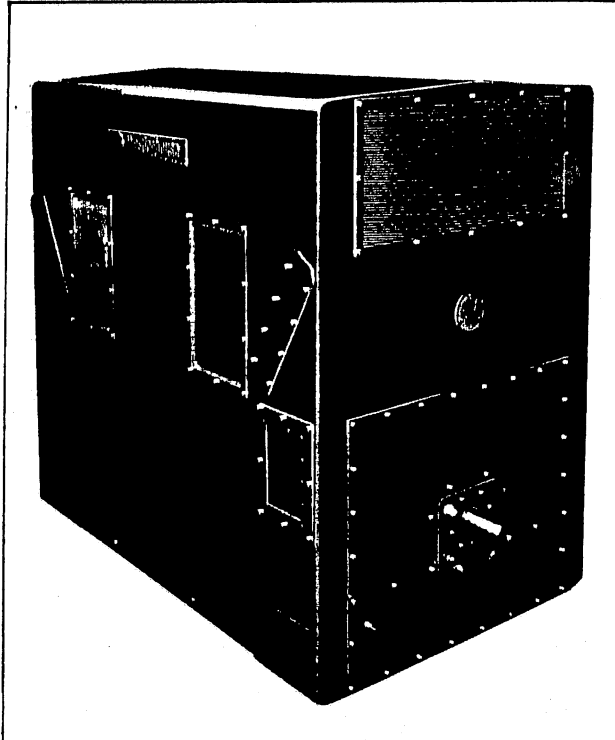


Figure 1 Type RA Motor Assembled

Westinghouse Type RA motors are squirrel-cage induction motors designed for a wide variety of constant speed applications. In the WP II enclosure, they are especially suited for outdoor applications driving pumps in the oil and chemical industries.

The motors feature an easily removable hood, readily accessible bearings, high air exhaust openings on both ends of the motor, high intake air openings on the sides of the motor and an easily removable stator core assembly. Provision is made for the installation of removable air filters, if so desired.

STANDARD WARRANTY

Westinghouse warrants that the equipment delivered by it will be of the kind and quality described in the order or contract and will be free of defects in workmanship or material. Should any failure to conform to this warranty appear within one year after date of initial operation, not to exceed 18 months after date of shipment, Westinghouse

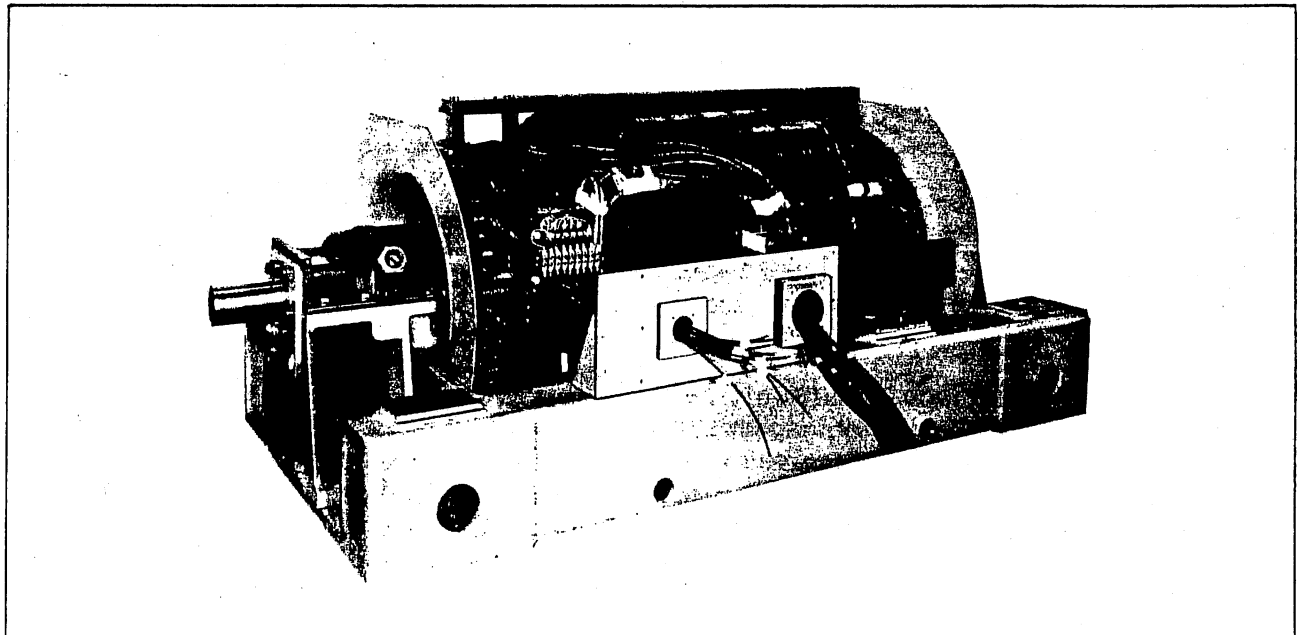


Figure 2 Type RA Motor with Covers Removed

shall, upon prompt notification from the purchaser, and provided that (1) the equipment has been stored, installed, operated and maintained in accordance with the order or contract, generally acceptable industry practices and Westinghouse instructions, and (2) that the equipment has not been subjected to alteration, misapplication or misuse, correct such nonconformity by repair or replacement f.o.b. point of shipment, of the nonconforming part or parts. Westinghouse shall not be responsible for providing working access to the defect. Correction of nonconformities, in the manner and for the period of time provided above, shall constitute fulfillment of all liabilities of Westinghouse with respect to the quality of the equipment.

The foregoing warranty is exclusive and in lieu of all other warranties of quality whether written, oral, or implied including any warranty of merchantability or fitness for purpose.

Any defects that may develop should be referred to the nearest Westinghouse Sales Office for complete servicing information.

Unauthorized Repairs

In the event that the customer sends his motor to an unauthorized Repair shop, the coverage of this warranty policy is automatically terminated.

SHIPMENT AND RECEIVING

Prior to shipment all RA motors undergo electrical and mechanical testing. After completion of tests, the oil is drained from both bearings and the motor is wrapped with a heavy polyethylene covering and mounted on a skid.

Upon receipt of the motor, carefully inspect the wrapping and visibly inspect the motor for signs of any damage received during shipment. Check to see that the nameplate data agrees with the voltage and frequency of the power supply provided for the motor.

The shaft extension may be coated with a slushing compound to prevent rusting during

shipment and storage. This slushing compound may be removed by wiping with turpentine or a petroleum solvent such as benzine, gasoline, Stoddard solvent, etc.

HANDLING

The equipment needed for handling the motor includes a chain hoist, a four-leg spreader and hard rubber pads to protect the enclosure from the spreader sling. The motor must be lifted by fastening the sling hooks in the four holes provided in the motor base. Place the hard rubber pads between the hood and the sling arms to prevent damage to the hood. Be certain that the hooks are properly placed and then take up on the chain hoist slowly and carefully and move the motor to the desired location.

CAUTION

Do not remove hood until motor is properly aligned and firmly bolted down and doweled in place.

MOTOR STORAGE

All motors are supplied with an insulation system which has excellent moisture resistance but reasonable care should be exercised to protect the windings from excessive moisture whenever the motor is not operating. Such protection will also prevent rusting of the core and possible corrosion of metal parts not coated with slushing compound. If the motor is to be stored for an extended period of time it should be stored in a room which is clean, dry and warm. If the motor is equipped with space heaters, the heaters should be energized whenever the storage area is cold and damp. Space heaters are supplied as standard on WP II motors for this purpose.

Bearing oil reservoirs should be filled to the indicated level with the proper lubricating oil. Oil level sight gauges are provided on the end of the lower half of the bearing pedestal housing. Correct oil level is to the center of the sight gauge. Periodically the rotor shaft should be rotated a number

of times to lubricate the journals and prevent rusting.

If storage is to be prolonged, motor should be prepared for long-term storage; refer to nearest Westinghouse Sales office for assistance.

INSTALLATION PROCEDURES

Install motors on a non-combustible surface. Never install where hazardous, inflammable or combustible vapors or dust are present.

1. Carefully lower the motor onto foundation provided using method described under "Handling". Position the motor to the driven equipment to obtain the best possible alignment.

2. Remove both end covers and end panels with a suitable tool. (Do not remove the hood) This will provide access to the holes in the motor base for the holding down bolts, the motor base dowels and the jack-screw holes. (No jackscrews or holding down bolts are supplied by Westinghouse unless so ordered)

3. If the motor half of the coupling has not been mounted by Westinghouse, it should be attached to the motor shaft at this time according to the instructions provided by the coupling manufacturer.

NOTE

Coupling halves should fit tight on the shaft extension to avoid hammering out in operation. If it is necessary to drive the part into position, it is important that the end of the shaft opposite the extension be backed up so that the force of the blow is not taken in the bearing. Use a pinion puller when removing tight couplings from the shaft.

4. Adjust the motor vertically by inserting jackscrews into the four holes provided. Make correct axial adjustment, as nearly as possible, before beginning the alignment of the couplings. Install the hold-

ing down bolts with a suitable box wrench.

5. Insert the required number of shims under the base feet until the coupling halves are in approximate alignment. Back off jackscrews.

6. Connect the motor to the mechanical load in accordance with the following instructions. The motor should be accurately aligned with its connected mechanical load so that shaft stresses, vibration and coupling wear will be reduced to a minimum.

7. Flexible couplings should not be forced to accommodate excessive misalignment; this misalignment will produce undue wear and can cause vibration. The following procedure should be used to align flexible couplings:

(a) Check angular alignment by using a feeler gauge between hubs at four points 90° apart. Position motor to obtain the best possible alignment and the correct hub separation.

(b) The off set alignment is checked by fastening an indicator bracket on one hub with the dial indicator button contacting the alignment surface of the opposite hub. Rotate the shaft on which the indicator is attached to the hub and take readings at four points 90° apart. Move motor until the readings are identical. Transfer the indicator to the opposite hub and check offset alignment. Recheck the angular alignment as described in Step (a).

After each corrective adjustment, the holding down bolts should be tightened and the alignment checked. After the alignment is completed, check to insure that all load is removed from the jackscrews.

8. Tighten holding down bolts securely with the use of the proper wrench.

9. Dowel the base to the soleplate.

10. Remove the protective tape from the oil sight glasses and the oil level gauges.

11. Fill the pedestal bearing reservoirs to the proper level with a good grade of machine oil. Westinghouse recommends the use of a good grade of clean, high-quality turbine oil which is free of fillers and other additives. The viscosity of this oil should be 180 to 220 S.S.U. at 100°F.

ELECTRICAL CONNECTIONS

Be certain that the motor is connected to the power source as shown on the nameplate diagram and that the voltage, frequency and number of phases of the power supply corresponds with the nameplate data.

Connect to the power supply through a suitable switch and overload protection.

Install all wiring and fusing in accordance with the National Electric Code and any special local requirements.

To change the direction of rotation on three phase motors, interchange any two line leads.

To change the direction of rotation on two-phase 4 wire motors interchange the line leads of either phase. To change the direction of rotation on 2 phase 3 wire motors, interchange the two outside leads.

INITIAL START UP

Before starting motor for the first time the following procedure should be strictly followed:

1. Check the power supply as described above.
2. Inspect all electrical connections for correct termination, clearance, mechanical strength and electrical continuity.
3. Inspect the lubrication system to ensure that the oil reservoirs have been filled with the correct oil to the proper level. Do not overfill.
4. If possible bar rotor over with a barring tool to be certain that it rotates freely.

5. Bump motor to check direction of rotation by momentarily applying power to the machine.

NOTE

Many motors are suitable for only one direction of rotation. The rotational nameplate mounted on the motor indicates the correct direction of rotation. When no rotational nameplate is supplied, the motor may be operated in either direction.

CAUTION

Any motor which is made to rotate in the wrong direction will be improperly ventilated and will rapidly overheat, causing serious damage to the stator windings and the bearings.

6. Be certain that all panels, covers and air shields are in place so the motor is completely enclosed.

7. Start motor in accordance with instructions supplied with control.

8. As soon as motor starts, inspect oil level in both bearings to be sure that the lubricating system is operating properly. Check to be certain that the oil rings are turning.

9. If abnormal noise, vibration or temperature should be detected during motor operation, shut motor off immediately and determine the cause.

INSPECTION AND MAINTENANCE

A complete set of standard tools should be available for the installation and maintenance of the RA Motor. A lifting crane, chain hoist and four leg spreader sling are necessary for lifting the motor or its component parts. Foundation bolts, holding down bolts, jack screws, alignment dial gauges, air gap feeler gauges, stator lifting eye bolts and a rotor barring tool are also required.

Other necessary supplies include heavy Kraft paper, flashlight, large tarpaulins, paint brush, red lead paint, oil cans, steel pipe (for rotor removal), wooden blocks, heavy duty jacks, commercial vacuum cleaner, meggar and a high voltage voltmeter.

A) Periodic Inspection

The Type RA motor will provide a long period of trouble free service if properly cared for. The motor should be kept clean and dust-free. Periodic inspections should be made to ensure that all ventilating ducts are free from the presence of foreign materials. All screens should be checked to be certain they are not clogged. If filters are used, they should be removed at regular intervals for cleaning or replacement.

The lubrication system should be checked and if any leakage is found it should be traced to the source and corrected. The oil level should be checked at regular intervals and oil added as needed. Rotation of the oil rings can be observed by looking into the oil sight gauges provided on the sides of the bearing housings. Any excessive noise and/or vibration should be traced to its source and eliminated. These conditions may be due to a change in alignment between the motor and the driven equipment, the presence of a foreign object within the motor, contamination of the lubricating system or some other serious malfunctioning.

The temperature of the motor bearings should be checked at regular intervals. The maximum allowable total temperature of the bearing is 85°C. If bearing temperature detectors are supplied these should be used, otherwise, glass thermometers should be employed as required.

B) Complete Disassembly of Motor

The correct procedure for the disassembly of the RA motor is as follows:

1. Turn off all power to the motor and accessories by opening the proper switches or circuit breakers. Tag these switches to

prevent their being closed by careless personnel.

2. Remove the end covers and the end panels (both ends).

3. Remove the bolts holding the two halves of the airshields together (both ends).

4. Remove the bolts holding the upper half of the airshield to the hood (both ends of motor).

5. Remove the bolts holding the bottom half of the airshields to the base (both ends).

6. Remove the bolts which hold the hood to the motor base (4 bolts total).

7. Insert a bar through the air intake openings from one side of the motor to the other side (screens may have to be removed first).

8. If hood is bolted to a conduit box adapter plate, remove these bolts.

9. Attach spreader sling hooks to the ends of the two bars and slowly lift the hood straight up until it is completely clear of the motor proper.

10. Open all electrical connections between the power source and the motor including accessories. Tape the exposed terminals of the power leads.

11. Uncouple motor from the connected load in accordance with instructions supplied with the coupling.

12. Remove the top halves of both bearing pedestals. It may be necessary to break the seal between the upper and lower half of the bearing pedestal by inserting a prying tool.

13. The top halves of the bearings may now be removed by carefully lifting them off.

14. Remove the two diagonally located dowel bolts holding the stator end plates to

the base and then remove the eight bolts holding the stator end plate feet to the base.

15. Remove with a socket wrench the four bolts holding the lower part of the stator end plates to the base (Holes are provided in the base for access to these bolts and are covered by means of a pipe plug).

16. Carefully thread lifting eye bolts into the top stator core bar and attach lifting hooks to these eye bolts. Then lift the entire stator assembly (with the rotor resting in the stator bore) straight up so that the windings are completely clear of the base and move the entire stator and rotor assembly to a convenient storage area.

NOTE

(a) When the stator core assembly is first separated from the base, carefully note the location and number of any shims located between the stator feet and base. If present, they should be marked and replaced in their exact location upon reassembly.

(b) The oil rings should be removed from the shaft and carefully protected and wrapped.

17. The bottom half the bearings may be removed from bottom half of the pedestal housing by simply lifting them out.

18. The motor has now been completely disassembled (except for the removal of the rotor from the stator bore).

C) Complete Reassembly of Motor

The RA motor may be reassembled by reversing the procedure used in the complete disassembly of the motor with the following exception.

(a) The bottom halves of the airshields should be removed from the motor base.

(b) The entire stator core and rotor assembly should then be lifted into position. After the stator core assembly is resting

on the base, the lower half of the airshields should be put into position by carefully working the airshield in from one side and top, being careful not to scrape the stator winding end turns. Fasten the lower halves into place by means of bolts previously removed.

(c) With feeler gage, check the air gap between the stator and rotor at 4 points 90° apart. Check should be made at both ends of the rotor. If gap is not concentric shim between stator feet and base as required.

(d) When bearings or pedestals are replaced realign bearings in pedestals as follows:

1. Vertical Alignment - With rotor sitting in the bearings and pedestals, and upper bearing half removed, check height between pedestal and top of bearing journal over entire length of journal. Height difference should not exceed .0015 inches.

2. Horizontal Alignment - Insert feeler gage between shaft journal and bearing in a vertical direction. Difference in readings over length of bearing journal should not exceed .0015 inches.

(e) Follow other steps of the disassembly procedure in the reverse order.

(f) When replacing the bearing cartridges be sure to remove all old sealing compound from both halves of the parts. To remove sealing compound, first scrape then use a coal tar solvent such as Xylol or Toluol. Do not apply new sealing compound to parts until ready to join both halves as compound sets up quickly. Use Permatex* #2 as the sealing agent.

D) Bearing Removal Only

If the bearings only need to be removed for inspection or replacement proceed as follows:

1. Remove both end covers and end panels.

2. Remove the top halves of the pedestal

bearing housing and the top halves of the bearings.

3. Jack up the end of the rotor at which the work is being done in order to remove the rotor weight from the bottom half of the bearing. (A rope sling may also be used if the hood is first removed)

4. Roll out the bottom halves of the bearings and then remove the oil rings if necessary from the shaft.

5. Lower the rotor.

E) Rotor Removal

1. Disassemble the complete motor by following all steps in Section B (Disassembly). Be sure that the complete stator and rotor assembly has been placed where there is sufficient room for removal of the rotor from the stator bore.

2. Protect the shaft journals by wrapping with heavy Kraft paper.

3. Fit a steel pipe or tube (proper inside diameter, length, and strength) over end of the rotor shaft opposite coupling end of shaft. Do not place pipe over journal, but locate it instead over portion of shaft adjacent to rotor core.

4. Attach rope slings (fastened to hoisting crane or chain hoist) to steel pipe and portion of shaft adjacent to coupling location.

5. Slowly and carefully move rotor through stator assembly until end of steel pipe extends beyond coupling end of stator assembly. Move hoist horizontally and vertically in such a way that rotor does not slide against stator winding.

6. Wrap Kraft paper around the shaft adjacent to end of steel pipe. Secure a rope sling to this wrapped-portion of shaft, and attach sling to an additional hoist (or to same hoist if a turnbuckle or other means of vertical adjustment can be used with this third rope sling).

7. Lift third rope sling until it supports weight of rotor end to which pipe is fitted.

8. Remove steel pipe (and its associated sling) from shaft.

9. Carefully lower rotor onto a large sheet of thick cardboard (or other suitable material) placed on floor. Block rotor in place.

10. The rotor and the interior of the stator assembly may now be inspected or cleaned as desired.

RENEWAL PARTS

Renewal Parts information may be obtained from the nearest Westinghouse Sales Office. Be sure to name the part or parts required and give the complete nameplate reading on the motor for positive identification.