Westinghouse

DESCRIPTION MAINTENANCE

INSTRUCTIONS

I. L. 16-200-3

TYPE LF-25H230 CONTACTOR

MEDIUM VOLTAGE AIR BREAK

DESCRIPTION

OCD SUB

APPLICATION

THE TYPE LF-25H230 CONTACTOR is designed for starting and controlling a-c motors on 2200-2500 volt, 50-60 cycle, three phase power systems, and is suitable for use with motors up to 900 HP maximum (See Table 1). It has a continuous NEMA open rating of 200 amperes, but it can be used where a continuous NEMA open rating of 100 amperes is required.

When used in NEMA Class E1 controllers where the contactor contacts must interrupt short circuit currents, the contactor interrupting capacity is 25,000 KVA. When used in NEMA Class E2 controllers where current limiting fuses limit and interrupt short circuit currents, the contactor may be used on circuits having a maximum available KVA capacity of 150,000 KVA, as shown in Table 2.

Table 1

CONTACTOR 8 HOUR OPEN RATING (Amperes)	HORSEPOWER RATING		
	2200-2500 Volts		
	Synchronous Motor		Induction Motor
	100% P.F.	80% P.F.	
200	900	700	700

Table 2

VOLTAGE RATING OF SYSTEM	CONTACTOR 8 HOUR RATING (AMPS)		SYMMETRICAL 3 PHASE AVAILABLE SHORT CIRCUIT CAPACITY IN KVA	
	Open	Enclosed	NEMA E1	NEMA E2
2200-2500	200	180	25,000	150,000

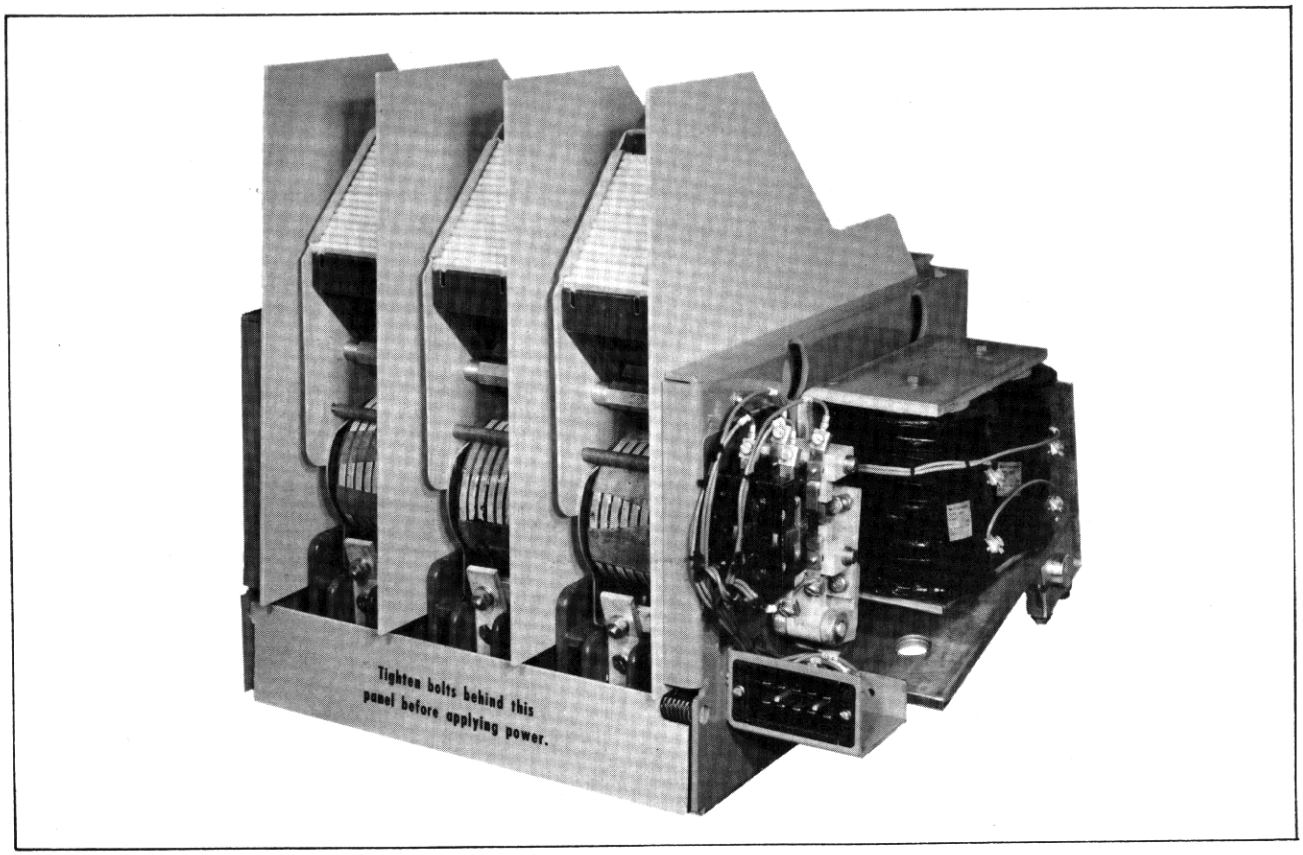

FIG. 1

OPERATING MAGNET

In order to isolate the low voltage control circuits from parts energized by high voltages and to achieve maximum accessibility, the d-c clapper type operating magnet is mounted on the outside of the right hand end plate. The magnet uses two continuously rated coils supported by a magnet frame and coil assembly. The magnet armature is clamped to an uninsulated portion of the main moving contact shaft, which projects through the right hand contactor end plate. The magnet armature is adjusted and locked in position by means of locknuts and a stud, which engages an operating arm clamped and keyed to the same shaft. This adjustment controls the main contact overtravel so that both measurement and adjustment of contact overtravel is made simply, and in a most accessible location.

When an a-c control circuit is used, rectifiers to convert the a-c control power to d-c power for the coils, and an ageing resistor to allow d-c coil voltage adjustment must be provided. No provision is made for mounting these components on the contactor since they are normally mounted on a control panel along with other control components. However, rectifiers and ageing resistors may be ordered by referring to the appropriate style numbers, as listed in Table 3. The operating coil and electrical interlock wiring is provided and terminated at a plug mounted on the right hand end plate.

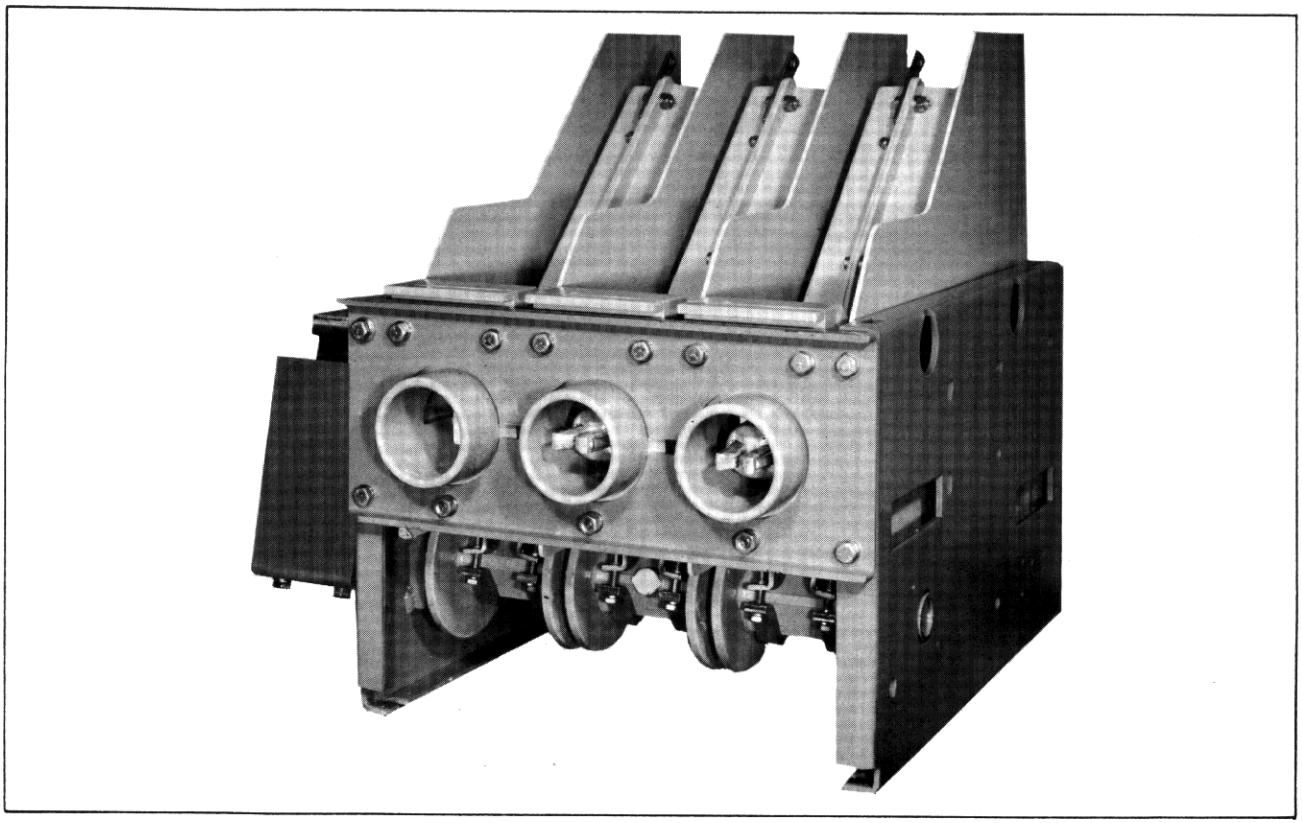

FIG. 2

CONTACT STRUCTURE

The stationary contact assemblies comprise three molded insulators which carry copper contact support assemblies, and which provide:

a) The stationary contact supports.

b) The fuse jaw for the load side of current limiting fuses, for use when the contactor is built into a fused controller.

c) Stab type line connectors. These may be used for the main line connections when fuses are not used. Alternatively, where fuses are used, these stabs can be used to energize the control transformer. They may also be used for reversing, and reduced voltage starter applications.

d) Provision for bolted line connections as an alternative to stab connections and where fuses are not used.

ARC CHUTE

The arc chute assemblies consist of a single cemented grid stack, together with arc resisting arc shields and copper arc horns, bolted and clamped securely in place between arc and flame retarding arc chute sides. The arc chute assemblies are supported by the magnetic blowout pole pieces which are permanently attached to the arc chute sides and are, in turn, bolted to the magnetic blowout cores. The blowout pole pieces have open end slotted holes for bolting to the blowout cores, so that it is only necessary to loosen the blowout core bolts to remove the arc chute assemblies.

The blowout cores are free to rotate in their mounting supports, thus permitting the arc chutes to be rotated out of their normal operating position to provide convenient access for contact inspection or replacement, and for arc chute inspection. When the arc chutes are in their

ELECTRICAL INTERLOCKS

Two Type L-61 electrical interlocks are mounted in front of the magnet to provide a maximum of four auxiliary circuits. Any combination of normally open or normally closed circuits are made available by selection of the appropriate style of interlock assembly in each instance.

Style No.	Circuit Combination Provided by One Interlock Assembly
577D960G01	One normally open
577D960G02	One normally closed
577D960G03	One normally open; one normally closed
577D960G04	Two normally open
577D960G05	Two normally closed

Actuation of the interlocks is by a lever pivoted on the interlock mounting and operated by a pin on the magnet armature. The lever carries an insulated support with adjustable operating screws that operate the Type L-61 plungers.

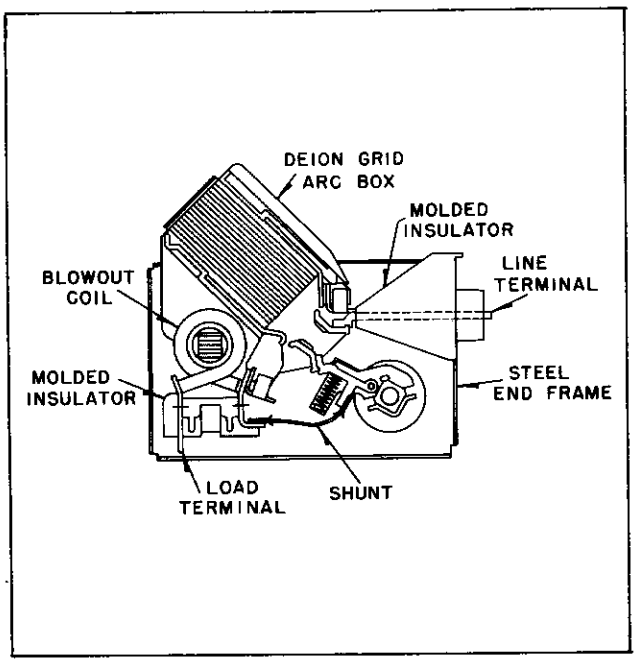

FIG. 3

MAINTENANCE AND REPAIR

The following sections describe the recommended maintenance and repair procedures including details of the various contact gaps and forces, etc.

GENERAL

A maintenance program should be established as soon as the contactor is installed and put into operation. After the contactor has been inspected a number of times at monthly intervals, and the condition noted, the frequency of inspection can be increased or decreased to suit the conditions found, since this will depend upon the severity of the contactor duty.

All work on this contactor should be done with the main circuit disconnect device open, and using a separate source of control power to operate the magnet.

HANDLING

Two men can lift and carry the contactor. Handholes are provided in the left hand end plate, and handholds can be obtained at the magnet end by placing one hand under the bracket supporting the wiring plug, and the other hand under the shaft at the right hand end of the magnet.

Additional holes are provided at the top edge of both right and left hand end plates for use with lifting hooks or ropes. Remove the outer phase barriers to obtain full access. By removing all 4 phase barriers, and rotating all 3 arc chutes forward, lifting bars may be inserted to pass through both end plates to provide even greater convenience in handling.

INSULATION LEVEL

After installation, and before energizing the contactor for the first time, the insulation resistance between poles and from each pole to ground should be measured and recorded. It is not practical to specify an absolute value for this reading since it is dependent on other connected apparatus, and conditions of service. However, any abrupt reduction in this reading would indicate a possible source of trouble, and the cause should be established and corrected.

MAIN CONTACTS AND SHUNTS

To obtain access to the contacts, either for examination or replacement, pull the arc chutes forward to rotate them out of the normal operating position, and remove the four phase barriers.

The general condition of the connectors and shunts should be noted, especially any discoloration which would indicate excessive heating due to loose hardware, high current, or low contact force. Since silver alloy contact faces are used, dressing or filing of the contacts is not required.

When replacing contacts, make sure that they sit flat against the contact supports and tighten the bolts firmly until the lock washers are fully compressed. Check, and if necessary, adjust the contact overtravel, and see that all contacts touch simultaneously. Use the following procedure:

1) Move the contacts to the contact touch position by blocking or operating the magnet armature by hand.

2) Make sure that all contacts touch simultaneously, within 1/32". Adjustment to satisfy this condition is obtained by a selective tightening of the four bolts clamping the moving contact support assemblies to the insulated contact shaft, to produce a slight rotation of the assembly on the shaft.

The gap "X" (shown in Fig. 4) at the magnet armature with the armature closed to the contact touch position, is a convenient measure of contact overtravel. With new contacts the contact overtravel should be measured at point "X" and adjusted as follows:

1) Loosen the two bolts "C" in Fig. 4, which clamp the magnet armature to the shaft.

2) Block the magnet armature in the contact touch position.

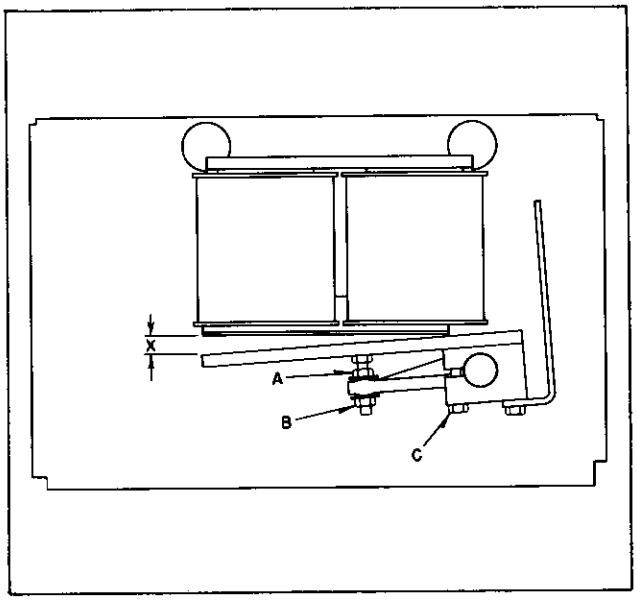

FIG. 4

3) Adjust the locknuts "A" and "B" in Fig. 4 either up or down, and lock them in position when the gap at "X" is 9/16" ± 1/64".

4) Retighten the two bolts "C".

Note that the main contacts should be replaced when this 9/16" gap has decreased to 1/8", with all three contacts making contact.

The procedures outlined above, provided they are done when new contacts are fitted, will automatically set the contact forces; however, the contact forces should be checked as a matter of routine. They are most conveniently measured by looping a piece of string around the center line of the moving contact face, and pulling in a direction perpendicular to the contact face. Measured at this point, the contact forces with new contacts should be:

Initial force — 6 - 8 lbs.

Final force — 13 1/2 - 15 1/2 lbs.

Failure to fall within these limits would indicate either:

a) An incorrect overtravel adjustment (final force only)

b) Weak, broken or incorrect contact springs

Examine the lower fuse finger mounted at the rear of the stationary contact support. The contact surface should be clean, and the fuse finger should pivot smoothly. Check the initial spring force. Measured at the point of contact with the fuse, this initial force should be 19 ± 2 lbs.

OPERATING MAGNET

The section above, dealing with main contact overtravel, also covered the principal magnet adjustment since this controls the contact overtravel. One more adjustment is available to control the armature and pole face alignment. This adjustment is normally never needed, but if for any reason the magnet frame is removed from the contactor end plate, it will be necessary to realign the armature as follows:

1) The magnet frame is held to the contactor end plate by four bolts. Three of these pass through slotted holes, the fourth (the lower of the two front bolts) acts as a pivot. Loosen these four bolts slightly so that the frame can be pivoted by tapping with a mallet.
2) Block the moving contacts open by placing a spacer between the copper moving contact support and the steel moving contact stop plate as indicated at Y in Fig. 5.
3) Place a .020" thick shim between the armature and the rear pole face (nearest to the contact shaft).
4) Operate the armature by hand and tap the magnet frame to pivot it so that the armature seals flat at both pole faces, with the shim in place.
5) Lock the magnet frame in this position by tightening all four bolts firmly. Recheck the setting. Remove the shim at the rear pole face, and the spacers blocking the moving contacts open.
6) Correctly set, the armature should seat squarely and flat at the front pole face, with a .020" gap at the rear pole face when the magnet is de-energized.
7) Finally, check the main contact overtravel and adjust as necessary as explained above.

In carrying out general inspections, operate the magnet armature by hand. Any friction should be investigated and corrected. Check that the armature seats squarely without hitting the magnet pole face bolts, and carefully check that the armature does not strike the rear pole face (nearest to the shaft) before striking the front pole face.

REPLACING COILS

To change operating coils, proceed as follows:

1) Disconnect the leads from the coil terminals.
2) Remove the two bolts located on top of the magnet frame.
3) Both coils, both magnet cores and pole faces can now be removed as a complete assembly, thus permitting coil removal and replacement.

Reverse the procedure to reassemble.

ARC CHUTES

Usually, the arc chutes require little or no maintenance, but it is convenient to check them whenever the main contacts are examined or changed.

With the arc chutes pulled forward out of the operating position, examine the copper arc horns and the insulating supports for excessive arc erosion; also examine the arc shields at each side of the arc chute and the grid stack assembly for either excessive arc erosion or metal deposits, and for cracks. Examine the two knife switch blades at the ends of the arc horns, and the corresponding knife switch jaws mounted adjacent to the contacts, to ensure good contact surfaces. Note the deflection of the knife switch jaws when the blade is engaged, since this deflection indicates the presence of contact pressure. Visual inspection of the jaws adjacent to the moving contacts is difficult when the arc chutes are in the operating position. In this case, the deflection should be checked either by measurement of the gap at the jaws, or by placing a finger tip at the edge of the jaw, and closing the arc chute gently so as to feel the deflection. Note that these knife switch assemblies carry current only while an interruption is taking place.

If more minute examination is desired, or if, after prolonged use, there is sufficient arc erosion to require replacement of parts, the arc chutes may be removed and dismantled as follows:

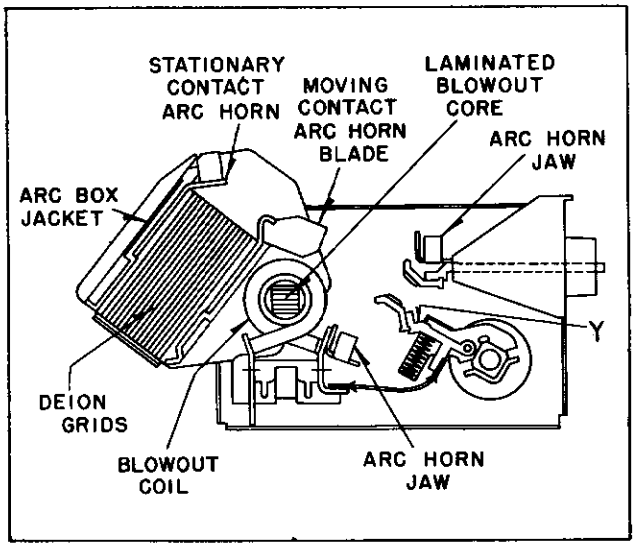

FIG. 5

1) With the arc chutes in the operating position, loosen the two blowout core bolts so that they are loose on the blowout pole pieces mounted on the arc chute.

2) Rotate the arc chutes forward, lift, and remove them from the contactor by disengaging the blowout core bolts.

To dismantle the arc chutes, continue as follows:

3) With the left hand arc chute side facing upwards, remove the ¼-20 hardware bolting the flanged joint along the top edge of the arc chute; also remove the two 10-32 screws, one on each side of the flange. Remove the three remaining ¼-20 nuts located in the lower half of the arc chute. Leave intact the two 10-32 screws holding the arc shields to the arc chute side.

4) Remove the left hand arc chute side. Loosen, and back off the eccentric. The two arc horn assemblies and the grid stack can now be lifted out, and the two screws holding the arc shields can be removed if arc shield replacement is necessary.

5) The arc horns are mounted on their supports by two 10-32 screws. These too can now be removed.

This completes the dismantling of the arc chute. To reassemble, reverse this procedure, but in doing so, check the following points:

6) In replacing the arc shields, be sure to replace the asbestos washers and tighten the screws only snug, to avoid cracking the arc shield. Having replaced the arc shields, the arc horn assemblies, the grid stack and, finally, the left hand side plate, replace all hardware and fasten only to a finger tightness.

7) To lock the grid stack in the correct location, push it down towards the arc shields as far as it will go, snug the lower arc horn assembly to the grid stack by adjusting the eccentric, and then lock first the eccentric, and then the bolt locating the other end of the lower arc horn assembly. Tighten all remaining hardware.

8) When fitting the arc chutes to the contactor, be sure that the core bolt washers fit on the outside of the blowout pole pieces. Having fitted the arc chutes, rotate them into the operating position and tighten the blowout core bolts. Finally, rotate the arc chute out of position once or twice and check that the knife switch assemblies operate smoothly, and develop contact pressure.

Following any inspection procedure, or after any maintenance work — BE SURE TO REPLACE THE 4 LARGE PHASE BARRIERS. NEVER ENERGIZE THE CONTACTOR AT LINE POTENTIAL WITHOUT HAVING THESE BARRIERS IN PLACE.

ELECTRICAL INTERLOCKS

The Type L-61 interlocks are mounted on an insulated base which is bolted to the right hand end plate, in front of the magnet. This insulated base also provides the hinge for the interlock operating lever with its interlock actuating screws carried on an insulated finger.

The interlock plunger has a maximum travel of ⅜", therefore, it is very important to be sure that this plunger does not reach its solid stop before the contactor is fully closed. The plunger travel is correctly set when ¼" of the plunger protrudes from the front of the molded body of the interlock, with the magnet energized and the contactor

sealed. This adjustment is effected by adjustment of the operating screws and locknuts carried by the operating lever.

The contact overtravel should be 3/32". With new contacts, this is automatically set when the plunger travel is adjusted as described above. Contacts should be replaced when the overtravel is reduced to less than 1/32". Contacts and overtravel can be examined by removing the two screws holding the interlock to the mounting base and then pulling the interlock forward. By removing the electrical connections, the interlock can be removed altogether.

For further details, see IL 15-829-1-47.

AGEING RESISTOR

The rectifier ageing resistor in the rectifier/coil circuit will rarely require adjustment. However, the adjustment should be checked whenever a routine contactor inspection is made. To do this, apply nominal a-c control voltage to energize and thus close the contactor. With the contactor closed, measure the total voltage that appears across the coils. Depending upon whether the coils are cold, or hot, this voltage should be as follows (see Table 3):

With cold coils — 95% of nominal d-c coil voltage

With hot coils — nominal d-c coil voltage

If the value measured is anything other than these recommended values, then remove the power, adjust the ageing resistor by moving the sliding connection slightly, and then recheck the voltage at the coil terminals. Repeat this procedure until the adjustment is satisfactory.

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