Type LF-50H403 Contactor
High Voltage, Spring Closed, Air Break

DESCRIPTION

Application

The type LF-50H403 contactor is a spring closed contactor designed for applications such as dynamic braking in which the contactor is not required to interrupt current. This contactor is supplied without arc chutes, blowout coils, blowout iron etc. and does not have an interrupting rating.

The Type LF-50H403 contactor is for use on 2.5 to 5 KV systems and will close-in on currents associated with 50,000 KVA systems when used in unfused starters or the peak let-through currents of Westinghouse Type CLS-1 and Type CLS-2 current limiting fuses when used in fused starters.

The Type LF-50H403 contactor has a maximum 8 hour open rating of 400 amperes and an enclosed rating of 360 amperes.

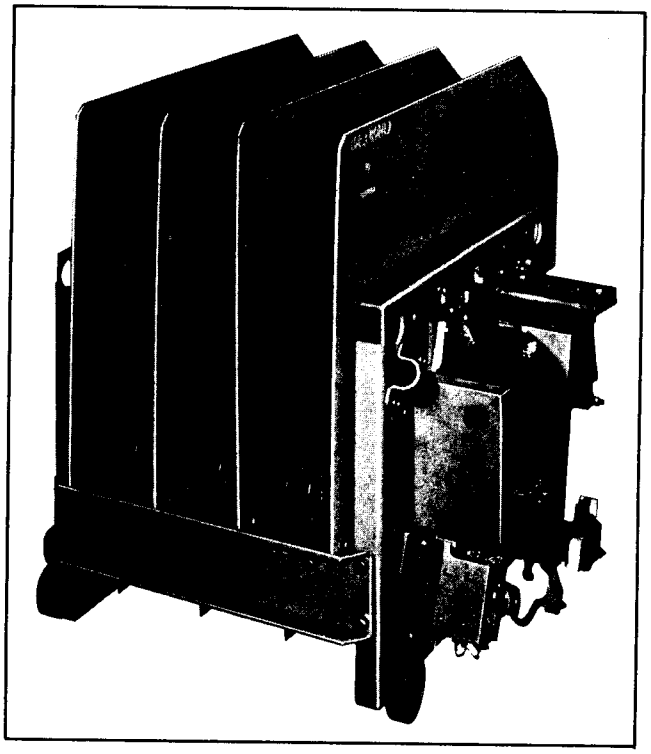

Figure 1 Type LF-50H403 Contactor

GENERAL DESCRIPTION

The Type LF-50H403 contactor is a 3 pole, spring closed device. It employs single break contacts with weld resisting silver alloy faces. The moving contact assemblies are mounted on molded insulating supports attached to a round steel shaft, which is supported by self-aligning ball bearings mounted in vertical end plates. The stationary contact assemblies are mounted on molded insulating supports which are in turn bolted to a molded cross member supported between the contactor end plates.

Arc resistant and flame retarding insulating barriers are mounted between phases and also between the two outside poles and the contactor end plates.

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 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 an adjusting bolt, with locknut, which engages an operating arm clamped and keyed to the same shaft. This adjustment controls the main contact over-travel so that both measurement and adjustment of contact over-travel is made simply, and in a most accessible location.

When an a-c control circuit is used, a rectifier to convert the a-c control power to d-c power for the coils, must be provided. No provision is made for mounting this detail on the contactor. Silicon rectifiers for this purpose may be ordered by referring to the appropriate style number as listed in Table 1. The operating coil and electrical interlock wiring is terminated at a plug

RATING TABLE 1

AC Control Voltage	Nominal Coil Voltage (DC)	Rectifier Unit S #	Coil S #	Protective Resistor S #
115	100	657C780G01	660C188G01	443A326H01 (50 Ohms)
230	200	657C780G02	660C188G02	443A326H11 (200 Ohms)
---	230	---	660C188G02	443A326H13 (250 Ohms)

mounted on the right hand end-plate. Contactors which are to be used as part of an "Ampgard" starter may in addition be supplied with control transformer, fuses, and miscellaneous mechanical details to provide mechanical interlocking with the isolating switch, with other contactors, and to latch the contactor in place within the starter enclosure.

Contact Structure

The stationary contact assemblies comprise three molded insulators on which are mounted the following:

(a) Stationary contact support.
(b) Stab type line & load connectors.

Removable contact tips bolt to the stationary contact support member and have thick weld resisting silver alloy faces.

Spring loaded moving support assemblies are provided with tapped holes for bolting the removable contact tips and flexible shunt connection in place. The removable contact tips for the moving contact assemblies are identical to the stationary contact tips.

Electrical Interlocks

Two type L-64 electrical interlocks are mounted in front of the magnet to provide a maximum of four auxiliary circuits for use in the starter control 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.

Actuation of the interlocks is by a pushrod attached to the armature adjusting casting mounted on the uninsulated portion of the moving contact shaft. The pushrod carries an adjustable operating disc that operates the type L-64 interlock plungers.

A third type L-64 electrical interlock with two normally closed contacts is mounted on the lower magnet core and is reserved for use in the coil circuit to insert a protective resistor in series with the magnet coil when the armature is picked up.

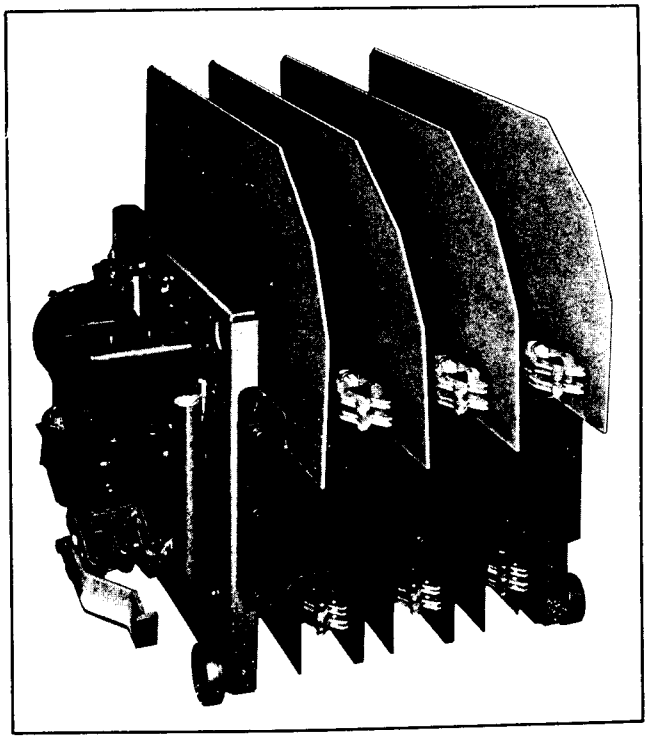

Figure 2 Rear View of Type LF-50H403 Contactor

L-64 INTERLOCKS

Interlock Style	Circuit Combination Provided by One Interlock Assembly
843D943G04	One normally open, one normally closed
843D943G05	Two normally open
843D943G06	Two normally closed

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

Lifting 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.

Contactors which are to be used in "Ampgard" starters are supplied with wheels and provision for inserting a short length of standard 3/4" pipe in the contactor end plate to aid in moving the contactor about.

For further "Ampgard" starter details see I.L. 11-202-3.

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 unusually low reading or abrupt reduction in this reading would indicate a possible source of trouble, and the cause should be established and corrected.

Main Contacts and Shunts

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.

To obtain access to the contacts and shunts for tightening or replacement, remove the phase barriers.

When replacing contacts, make sure that they sit flat against the contact supports and tighten the bolts firmly until the lockwashers

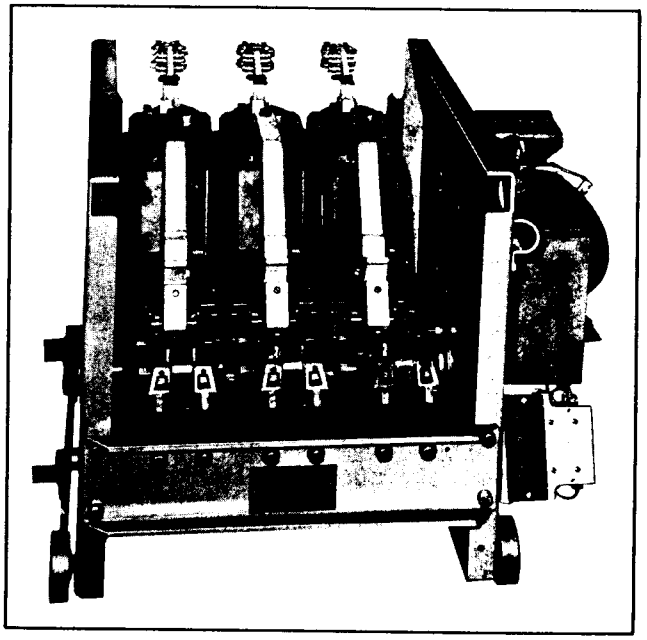

Figure 3 Front View of Main Contacts and Shunts

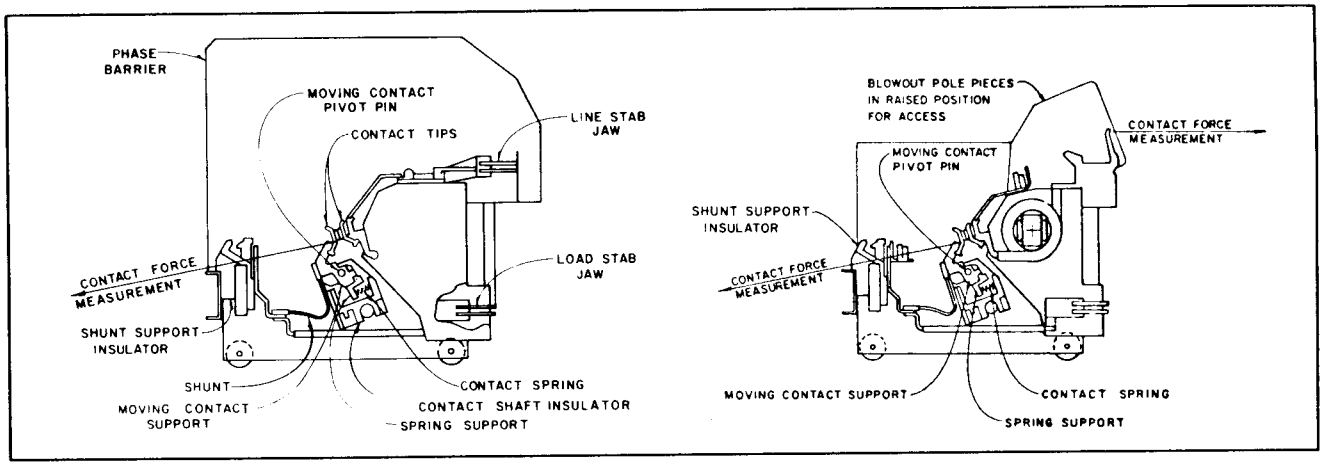

Figure 4

are fully compressed. Bolts used to hold the contacts in place and also those used to make main circuit connections should be high strength S.A.E. grade 8 which is indicated by six radial marks on the bolt head.

Check, and if necessary, adjust the contact forces and overtravel, and see that all contacts touch simultaneously, using the following procedure:

1. Move the contacts to the contact touch position by hand and check to see that moving and stationary contacts line-up within 1/32".

Lateral adjustments of the moving contacts may be made by loosening the 5/16" bolt attaching the molded spring support to the moving contact support and sliding the moving contact support to the left or right on the pivot pin as required to obtain proper contact alignment. Following this adjustment the 5/16" bolt must be re-tightened before proceeding with the remaining contact adjustments.

2. Again move the contacts to the contact touch position by hand and check to see that all contacts touch simultaneously within 1/32 in.

3. Check initial contact forces. Initial contact forces measured at the heel of contact face, as shown in Figure 4, should be 6 to 8 pounds.

To measure the initial force the armature should be blocked within 1/16-1/8" of the contact touch point. Force is then conveniently measured by looping a piece of string around the heel of the moving contact face and pulling in a direction perpendicular to the contact face as indicated in Figure 4. A small piece of cardboard or wood approximately 3" long should be suspended between the two strands of string to avoid interference with the shunt support insulator.

In the event initial contact forces or contact touch points are not within allowable limits, adjustment may be made by increasing or decreasing the number of flat washers under the stop bracket mounting lugs as shown in Figure 5.

Since this adjustment affects both the initial contact force and touch point simultaneously both contact force and touch point must be re-checked following an adjustment.

4. Check, and if necessary, adjust contact overtravel. Correct overtravel for new contacts is obtained when dimension "X" between armature and pole face (not residual shim) is 1" ± .016" when contacts touch. Overtravel adjustment is made as follows:

a) Loosen the two bolts at "A", in Figure 6, which clamp the magnet armature to the shaft.

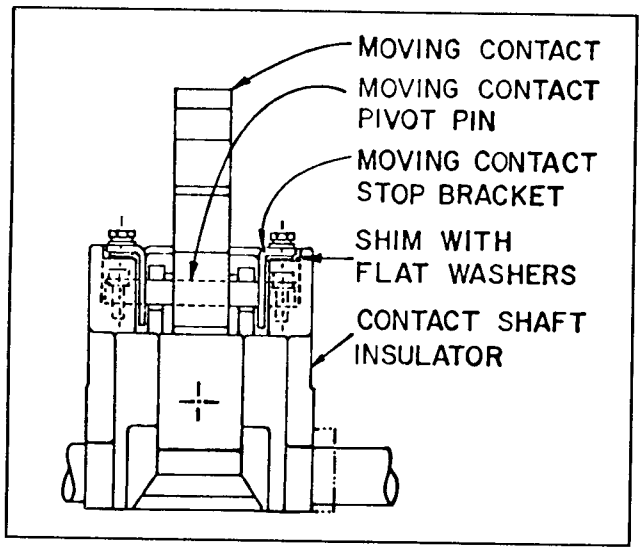

Figure 5

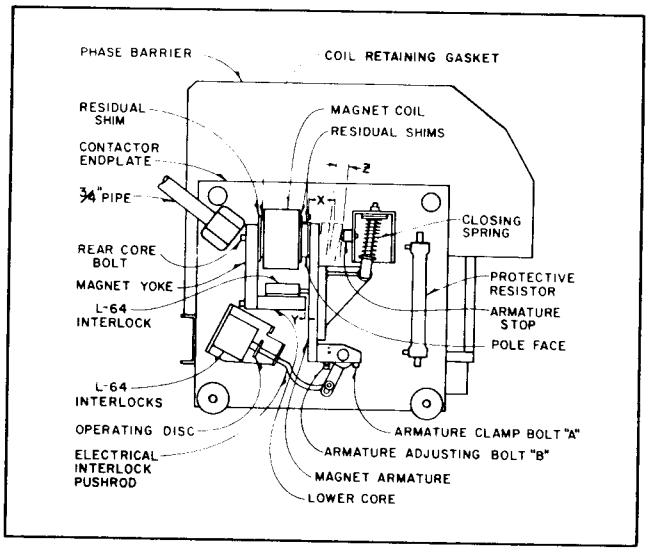

Figure 6

b) Block armature with 1" gap at point "X" Figure 6.

c) Adjust bolt "B" to make contacts touch.

d) Re-tighten the two bolts at "A" and locking nut on bolt "B".

5. When the magnet is deenergized, the armature should come to rest within 1/16" of its' stop or rest lightly against the stop with a force of 1 to 2 pounds. In this position, the armature gap "X" should be approximately 1 7/8" and final contact forces, with new contacts, should be 13.5 to 15.5 pounds when measured at the heel of contact face as shown in Figure 4. When measuring final contact force, the armature should be blocked against its stop to obtain correct readings.

6. When the magnet is energized, contact open gap with new contacts should be 5/8" ± .062".

7. As the contact faces become worn, the amount of contact overtravel and contact forces will gradually decrease. When gap "Z" between armature and armature stop decreases to 3/8", at the contact touch point, the main contacts should be replaced.

Failure of contact forces to fall within limits would indicate the following:

a) An incorrect overtravel adjustment and/or weak closing springs (final force only).

b) Weak, broken or incorrect contact springs.

c) Incorrect adjustment of the moving contact stop bracket.

Operating Magnet

The section above, dealing with main contact overtravel, also covered the principal magnet adjustment since this controls the contact overtravel.

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 that a 3/32" to 5/32" gap at point "Y" of Figure 6 has been maintained.

Replacing Coils

To change operating coils, proceed as follows:

1) Disconnect the leads from the coil terminals.

2) Remove the 3/8"-16 Allen head cap screw used to attach the magnet pole face to the contactor end plate.

3) Remove the rear core bolt attaching the core to the magnet yoke and lift the core and coil assembly out of the magnet frame in a vertical direction.

4) Install the new coil on the core assembly being sure the three residual shims and coil retainer gasket are mounted as shown in Figure 6.

5) Re-install the core assembly by reversing the above disassembly procedure.

> Following any inspection procedure, or after any maintenance work--BE SURE TO REPLACE the four large phase barriers. Never energize the contactor at line potential without having phase barriers in place.

Electrical Interlocks

Two type L-64 interlocks for general use in the control circuit are mounted on a steel base which is in turn bolted to the right hand contactor end plate, in front of the magnet. It is very important to be sure the interlock plunger does not reach its solid stop before the contactor is fully closed. The interlock adjustment is properly set when the plunger can be depressed slightly beyond the position it takes when the magnet armature is fully sealed. This adjustment is effected by adjustment of the operating disc mounted on the pushrod.

A third type L-64 interlock which is used in the magnet coil circuit, to insert a protective resistor, is mounted on the lower magnet core and is operated directly by the magnet armature. In this application a "late break" operation is required so the interlock is permanently mounted in a position such that its contacts will open when the armature gap "X" of Figure 6 is approximately 3/16".

For further details of the L-64 interlock see I.L. 15-829-7.

Protective Resistor

The nominal voltage rating of the magnet coil is the D-C voltage which must be applied to the coil to close the main contacts. When the armature picks up, a protective resistor is inserted in series with the coil to reduce the coil voltage to a value which the coil can withstand continuously. The holding voltage applied to the coil should be approximately 25% of nominal rating when the coil is cold and approximately 30% of nominal coil voltage when the coil is hot.

RENEWAL PARTS

The following parts are most subject to wear in ordinary operation.

Name of Part	Style No. of Parts	No. Used
Moving and stationary contact	316B948G01	6
Stationary contact assembly support	872D213H01	1
Stationary contact insulator	648J248H01	3
Side cover for above	872D210G01	3
Stationary contact support	657C719G01	3
Moving contact support	484B505G01	3
Moving contact pivot shaft	484B510H01	3
Moving contact stop	484B544H01	3
Moving contact insulator	657C759H01	3
Moving contact spring	488A898H04	3
Moving contact shunt	657C766G01	3
Armature	657C754H02	1
Armature clamp	657C752H01	1
Armature adjusting lever	657C751H02	1
Stationary magnet pole face	640C443H06	1
Operating coil retainer	484B512G02	1
Magnet residual shim	484B501H01	1
Core (top)	484B500H02	1
Core (lower)	657C764H01	1
Magnet yoke	657C755H01	1
Armature stop	484B477H01	1
Load stab	657C773G01	1
Contact shaft key	316B929H03	1
Contact shaft bearing	430A762H01	2
L-64 interlock	843D943G06	1
Insulator for above	484B534H01	1
Phase barrier	657C767H02	4
Closing spring	462A430H01	2
Spring seat	484B475H01	2
Contact shaft	490A813G08	1
Drawout contact assembly	490A813G07	6

NOTE: Parts indented are included in the part under which they are indented. Order part by name and identification number--give complete nameplate reading.

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