

Chapter 50

SWITCH, MAGNETIC, TYPE 4Y (ROTAX D 6812/2)

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LEADING PARTICULARS

Switch, magnetic, Type 4Y	Stores Ref. 5CW/4778
Main contact voltage	208-V. three phase a.c.
Coil voltage	28-V. d.c.
Auxiliary contact voltage	28-V. d.c.
Main contact rating	30 KVA (400 c.p.s.)
Auxiliary contact rating	5 amperes
Pull-in coil resistance (at 20 deg. C.)	2.6 ohm \pm 7 per cent
Hold-in coil resistance (at 20 deg. C.)	65 ohm \pm 10 per cent
Operational temperature range	-70 deg. C. to + 70 deg. C.
Operational ceiling	50,000 ft.
Length	7.468 in.
Width	5.187 in.
Height (from mounting base)	4.890 in.
Weight	8 lb.

Introduction

1. The Type 4Y magnetic switch is a 208-V. three-phase a.c. contactor operated (and magnetically held) by a 28-V. d.c. coil. The switch has four pairs of auxiliary contacts, two pairs normally open and two normally closed.

DESCRIPTION

2. The switch is mounted on a moulded base and is enclosed by a metal cover having flame-trap ventilation. The six main terminals and twelve auxiliary terminals are

situated underneath the base. Terminals A, B, C (which are connected to the three main moving contacts) and their corresponding fixed contact terminals (L1, L2, L3 respectively) are contained in two moulded boxes, one at each end of the base, and enclosed by screw retained covers. The auxiliary and coil terminals are set in two moulded terminal blocks between the main terminal boxes.

3. A moving contact carrier is pivoted between the vertical side plates of a switch

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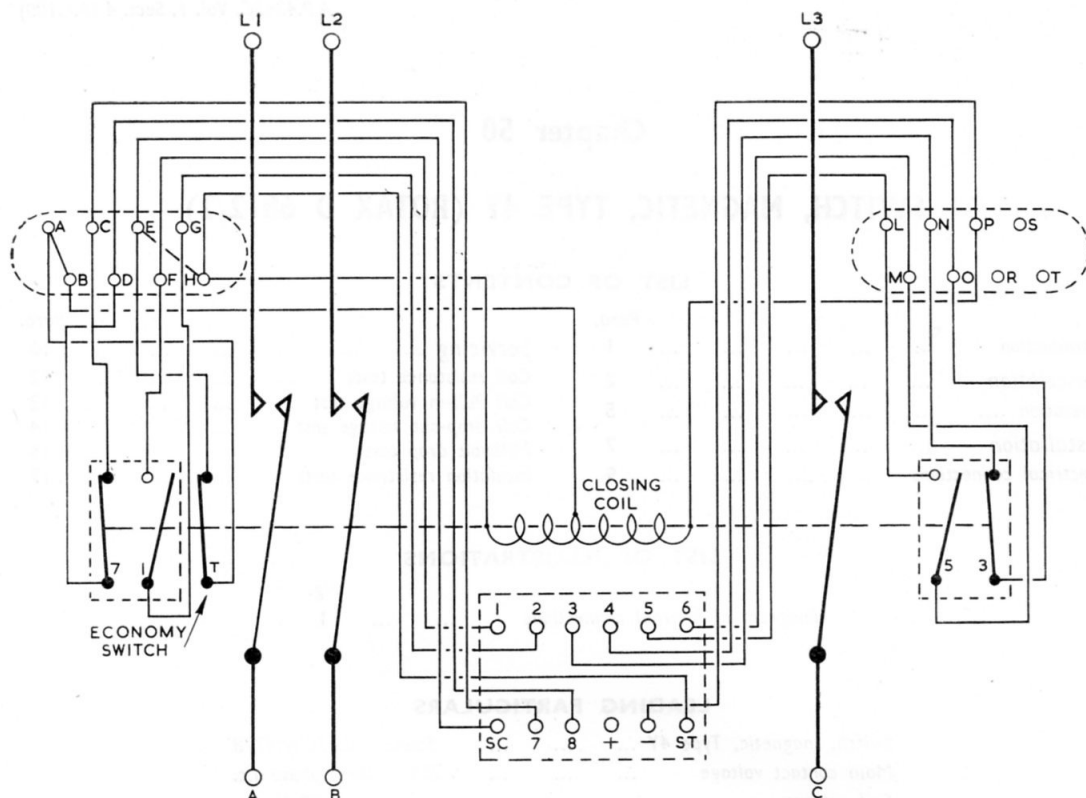


Fig. 1. Diagram of internal connections

frame which is screwed to the base. The contact carrier is connected by a toggle linkage to the plunger of the operating coil, which is mounted on the switch frame. The contact carrier has three moving contacts which mate with corresponding fixed contacts mounted on the base. Terminals A, B, C are connected to the moving contacts by flexible braid. Each moving contact is spring loaded to permit follow-through when the contact makes. Each pair of contacts operates within a separate compartment formed by moulded phase barriers. The contacts are fitted with arcing fingers to protect the contact faces from arcing.

4. The four pairs of auxiliary contacts are mounted in two moulded contact housings, one housing being fixed to each side of the switch frame. The contacts are operated by pins fitted to the main contact carrier and projecting through the side plates of the switch frame. The coil economy switch is fitted to one of the side frames and is operated

by a moulded sleeve on an extension of the centre toggle pin. The economy switch has a latch mechanism to time its operation; it opens at the end of the plunger "in" stroke and closes at the end of the plunger "drop-out" stroke.

Operation

5. When the operating coil is energized, the plunger pulls the toggle linkage overcentre, so that the contact carrier pivots to its operated position and the three pairs of main contacts make. The auxiliary contacts are operated by the contact carrier pins, and at the end of the plunger stroke the economy switch opens, bringing the "hold-on" winding in circuit with the low resistance "pull-in" winding in order to limit the continuous hold-in coil current to a safe value.

6. When the coil is de-energized, torsion return springs fitted to the centre toggle pin and the contact carrier hinge pin return the contacts and linkage to normal.

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INSTALLATION

7. The switch may be mounted in any convenient attitude. For mounting, four bushes are set in the moulded base and provided with 0.257 in. diameter clearance holes. The fixing centres of the four holes form a rectangle 6.156 in. by 4.187 in.

8. In order to mount the switch it is necessary to remove the main cover, which is retained by three screws. The fixing hole adjacent to terminal "A" may require a longer bolt in order to accommodate the earthing strip which connects the switch frame to aircraft frame.

Electrical connections

9. The six main terminals are standard 68 ampere S.B.A.C. sockets whilst the twelve auxiliary terminals are 7 ampere S.B.A.C. sockets.

SERVICING

10. Make a general inspection of the switch to ensure that it is in good condition and that it has not sustained damage. The electrical connections should be secure and clean and the switch should be secure on its mounting.

11. Remove the cover and examine the main contacts for excessive burning and pitting; also ensure that the three pairs of arcing fingers are fit to give further service.

Coil resistance tests

12. The resistance of the "pull-in" coil, measured between terminals "SC" and "—" (contacts normal) should be between 2.4 and 2.8 ohm. The resistance of the total winding, measured between terminals "ST" and "—" should be between 58.5 and 71.5 ohm. These values apply at 20 deg. C. ambient temperature and the readings obtained should be corrected to this temperature.

Coil pull-in voltage test

13. Connect a variable supply (with a suitable ammeter in circuit) to terminals "SC" and "—". Commencing at zero current, slowly increase the current flowing until the plunger pulls in, closing the main contacts. The current reading at this point should be between 4.3 and 6.6 amperes. The product of the current reading obtained and the actual resistance of the "pull-in" coil at 20 deg. C. (para. 12) should be between 12 and 16 volt. Ensure that the current reading is approximately 0.45 ampere with 29-V. applied to

the coil, after the plunger has pulled in, indicating that the coil economy switch has operated.

Coil drop-out voltage test

14. Commence this test with the contactor normal. Apply 29-V. to pull in the plunger and then slowly reduce the current flowing in the coil until the plunger drops out. The product of the current reading at this moment and the actual resistance of the total winding at 20 deg. C. (para. 12) should be between 5 and 10 volt.

Note . . .

While applying the tests given in paras. 13 and 14 ensure that any movement of the main contact carrier to the extent of closing contacts produces a full follow-through at all the contacts made. The main contact follow-through is 0.040 in. \pm 0.010 in.

Millivolt drop tests

15. Allow 100 amperes d.c. to flow through each pair of main contacts in turn and measure the potential drop across each appropriate pair of main terminals. A reading of not more than 100 millivolt should be obtained in each test.

Note . . .

Care should be taken not to break main contacts when d.c. is flowing.

16. The millivolt drop across each pair of auxiliary contacts should be measured with 5 amperes d.c. flowing. A reading of not more than 40 millivolt should be obtained in each test.

Insulation resistance tests

17. Measure the insulation resistance between the following points, using a 500-V. insulation resistance tester. A reading of at least 50,000 ohm should be obtained in each test.

- (1) Main contacts open
 - (a) Terminal A and terminals B, C, L1
 - (b) Terminal B and terminals C, L2
 - (c) Terminal C and terminal L3
 - (d) Terminal A and terminals 1, 2, 4, 5, 6, 8, SC
 - (e) Terminal B and terminals 1, 2, 4, 5, 6, 8, SC
 - (f) Terminal C and terminals 1, 2, 4, 5, 6, 8, SC
 - (g) Frame and terminals A, B, C

(A.L.100, Mar. 57)

- (2) Main contacts closed
 - (a) Terminal L1 and terminals L2, L3
 - (b) Terminal L2 and terminal L3
 - (c) Terminal L1 and terminals 1, 3, 4, 5, 7, 8, SC
 - (d) Terminal L2 and terminals 1, 3, 4, 5, 7, 8, SC
 - (e) Terminal L3 and terminals 1, 3, 4, 5, 7, 8, SC
 - (f) Frame and terminals L1, L2, L3

18. Measure the insulation resistance between the following points, using a 250-V. insulation resistance tester. A reading of at least 50,000 ohm should be obtained in each test.

- (1) Main contacts open
 - (a) Terminal 1 and terminal 2
 - (b) Terminal 5 and terminal 6
 - (c) Terminal SC and terminals 3, 7
 - (d) Frame and terminals SC, 3, 7

- (2) Main contacts closed

- (a) Terminal 3 and terminal 4
- (b) Terminal 7 and terminal 8
- (c) Terminal SC and terminals 1, 5
- (d) Frame and terminals SC, 1, 5

Note . . .

The value of insulation resistance given in paras. 17 and 18 applies to switches being tested under normal workshop conditions. Due allowance should be made for the climatic conditions of the locality and those of the aircraft servicing area or dispersal point where the tests are being applied. In particularly damp climates, the readings obtained may be low enough to give apparently sufficient reason for rejection and, in these instances, discretion should be exercised.

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