

Instruction Bulletin

Limit Switches Heavy Duty, Oil Tight Class 9007 Types T and FT

Retain for future use.

PRODUCT OVERVIEW

This instruction bulletin describes heavy duty, oil tight, Type T and FT limit switches, including momentary and maintained contact versions. To identify lettered parts, refer to Figures 2 and 3 on pages 6 and 7, unless otherwise indicated.

Types of Switches

These limit switches include two basic types:

- Universal and standard, as shown in Figure 2 on page 6.
 - The universal switch has adjustable latches (A) and a return spring positioning plate (B). It is adjustable to one of eleven different operating sequences. It is identified as Type TU or FTU.
 - The standard switch has adjustable latches (A) only. It differs from the universal switch in that contact action is identical when the operating arm moves clockwise or counterclockwise. Because of this feature, the standard switch is adjustable only to three different operating sequences. It is identified as Type TS or FTS.
- The special, maintained-contact limit switch, as shown in Figure 3 on page 7, is identified as Types TU_12 and FTU_12.

NOTE: Forked arms at angles of 120° are not suitable for use with Class 9007 Types TU_12 and FTU_12 limit switches. If using forked arms with Class 9007 limit switches, select only Types X, Y, and Z.

Refer to the *Digest* for full limit switch details.

CONTACTS

All contacts are silver. Discoloration and slight pitting do not harm them. *Do not file them.* This wastes contact material. Replace contacts only if the silver is worn thin.

To inspect the contacts, turn off all power, remove the cover (C), and fold back the liner (D). If contacts need replacement, use the appropriate contact parts kit. See item 2 in Table 3 on page 6.

ADJUSTMENT

⚠ DANGER

HAZARDOUS VOLTAGE

Turn off all power before servicing this equipment.

Failure to follow this instruction will result in death or serious injury.

⚠ WARNING

UNINTENTIONAL EQUIPMENT OPERATION

After any adjustment, always check for correct operation before placing the equipment in service.

Failure to follow this instruction can result in death or serious injury.

Refer to Table 4 on page 7 for tightening torques.

Make and Break Contact Action

To obtain slow make and break contact action with either universal or standard switches, remove the adjustable latches (A) entirely. The speed of the contact action is then proportional to the speed of the operating arm movement; published electrical ratings do not apply. When used without latches, the limit switches are suitable for *pilot duty only*.

Operating Sequence

To inspect or adjust the switch mechanism, remove the base plate (E). When replacing the base plate screws (F and G), be sure to place the sealing washer (H) under the head of the base plate screw (F, G). Removal of the positioning plate screw (J) allows disassembly of all mechanism parts.

Refer to Tables 1 and 2 on pages 4 and 5 for a list of operating sequences.

To select an operating sequence:

1. Determine the mechanical and electrical limit switch operating requirements.
2. Match the appropriate operating sequence from Tables 1 and 2 with the requirements determined in Step 1.
3. Modify an existing limit switch as shown in Tables 1 and 2, or order a limit switch containing the proper operating sequence.

To change an operating sequence, first remove the base plate (E) from the switch. This provides access to the adjustable parts: positioning plate (B), return spring (K), and latches (A). See Figure 1.

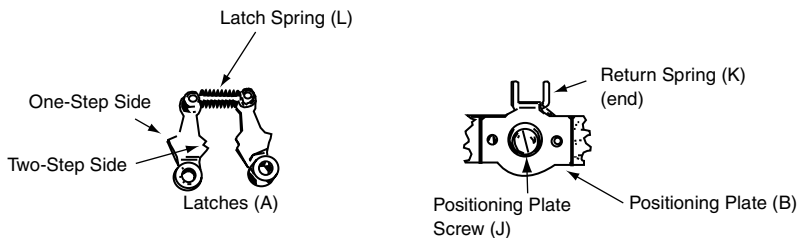


Figure 1: Latches and Positioning Plate – Detail Views







- To adjust the positioning plate (B), loosen the positioning plate screw (J) and rotate the positioning plate (B) around the screw. Three notches are provided on each side, with the notches on the right hand side marked A, O, and B. When the proper notches are above the latch assembly post (M) (see “Location of Return Spring Positioning Plate” in Tables 1 and 2), press the positioning plate into place and retighten the positioning plate screw (J).
- To provide maintained contact action, loosen the positioning plate screw (J) and remove the positioning plate (B) from the device. Remove the return spring (K) from the back of the positioning plate (B), and replace the positioning plate (B) to hold the latch assemblies in position. Retighten the positioning plate screw (J).
- To access the latches (A) remove the positioning plate (B). Each latch has a one-step side and a two-step side, as shown in Figure 1. If the “Latch Position” column in Tables 1 and 2 calls for:
 - A one-step position: Place the latches (A) on the latch assembly posts (M) with the one-step sides closer to the center of the switch.
 - A two-step position: Install the latches (A) on the latch assembly posts (M) with the two-step sides toward the center of the switch.

Be careful not to overstress the latch spring (L) when changing the latch assembly positions.

Once the latches are in the required position, reassemble the positioning plate (B) and retighten the positioning plate screw (J).

NOTE: The first number in the switch type is called the operating sequence number, and is stamped on the nameplate before shipping from the factory.

Table 1: Standard Switch Operating Sequence

| Operating Sequence Number | Operating Sequence Diagram ^[1] | Snap Action | Spring Return to Initial Position | Latch Position | Location of Return Spring Positioning Plate | Assembly Diagram ^[2] |
|---------------------------|---|-------------|-----------------------------------|----------------|---|--|
| 1 |  | X | X | 1 step | A |  |
| 2 |  | X | X | 2 step | A |  |
| 3 |  | — | X | Removed | A |  |

^[1] The direction of lever movement as viewed from the front of the switch. A solid line denotes the maintained (normal) position. A dashed line denotes the spring return (tripped) position. A = contact A is closed. B = contact B is closed. O = both contacts are open.

^[2] Only the latches and positioning plate are shown.

Table 2: Universal Switch Operating Sequence

| Operating Sequence Number | Operating Sequence Diagram ^[1] | Snap Action | Spring Return to Initial Position | Latch Position | Location of Return Spring Positioning Plate | Assembly Diagram ^[2] |
|---------------------------|---|-------------|-----------------------------------|----------------|---|---------------------------------|
| 1 | | X | X | 1 step | A | |
| 2 | | X | X | 2 step | A | |
| 3 | | X | X ^[3] | 1 step | O | |
| 4 | | X | X | 2 step | O | |
| 5 | | X | X | 1 step | B | |
| 6 | | X | X | 2 step | B | |
| 7 | | X | — | 1 step | O ^[4] | |
| 8 | | X | — | 2 step | O ^[4] | |
| 9 | | — | X | Removed | A | |
| 10 | | — | X | Removed | O | |
| 11 | | — | X | Removed | B | |

^[1] The direction of lever movement as viewed from the front of the switch. A solid line denotes the maintained (normal) position. A dashed line denotes the spring return (tripped) position. A = contact A is closed. B = contact B is closed. O = both contacts are open.

^[2] Only the latches and positioning plate are shown.

^[3] The contact position is maintained until the arm is operated in the reverse direction. Design the cam to prevent any fly-back action of the operating arm.

^[4] The return spring is removed from the positioning plate and the plate is replaced as explained in "Operating Sequence" on page 3.

REPLACEMENT PARTS

When ordering replacement parts, specify the quantity and the Class and Type number.

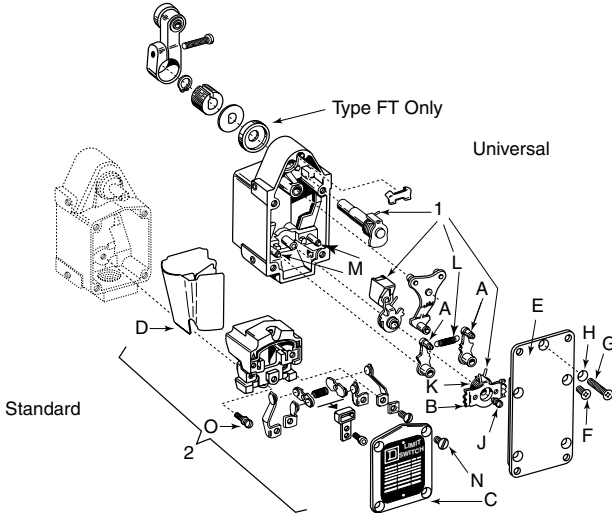


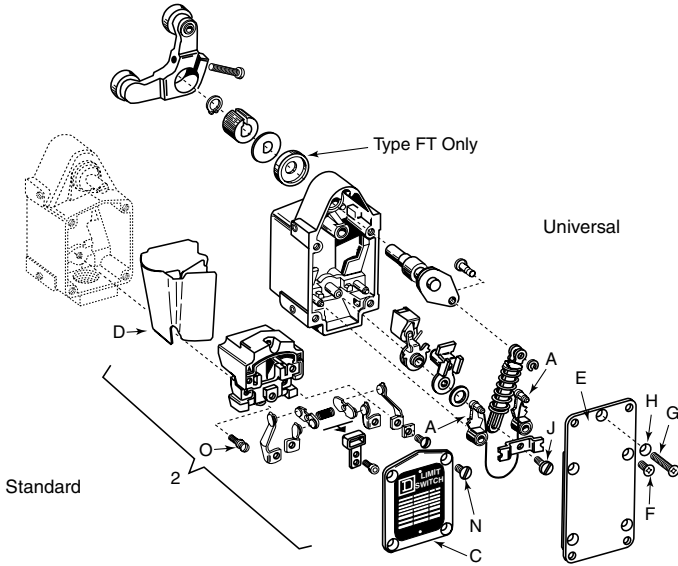
Figure 2: Heavy Duty, Oil-Tight Limit Switch (Universal and Standard Types)

Table 3: Replacement Parts Kit List

| Item | Description | Class | Type |
|-------|---|-------|--------------|
| 1 [1] | Spring Kit, comprised of: 1 Overtravel Spring, 1 Return Spring, 1 Latch Spring, 1 Moving Contact Arm Assembly | 9998 | 2934-S925-G1 |
| 2 | Contact Parts Kit for Types TS, TU, FTU, and FTS, comprised of: 1 Contact Block Assembly, 2 Moving Contacts, 1 Contact Spring, 1 Liner | 9998 | 2934-S923-G1 |
| | Contact Parts Kit for Types TX, TY, FTX, and FTY, comprised of: 1 Contact Block Assembly, 1 Contact Finger Assembly, 1 Contact Spring, 1 Liner | 9998 | 2934-S924-G1 |
| 3 [2] | Gasket Kit, comprised of: 1 Cover Gasket, 1 Base Plate Gasket, 1 Seal Washer, 1 Dust Boot | 9998 | 2934-S926-G1 |

[1] This kit does not apply to Types TU_12 and FTU_12.

[2] Not shown in Figures 2 and 3.



**Figure 3: Special Maintained-Contact Limit Switch
 (Types TU_12 and FTU_12)**

Table 4: Factory-Recommended Tightening Torques

| Item | Description | Qty. | Tightening Torques | |
|------|-------------------------|------|--------------------|-------|
| | | | N•m | lb-in |
| F | Base Plate Screw | 4 | 2.7–3.2 | 24–28 |
| G | Base Plate Screw | 1 | 2.7–3.2 | 24–28 |
| J | Positioning Plate Screw | 1 | 1.0–1.4 | 9–12 |
| N | Cover Plate Screw | 4 | 2.7–3.2 | 24–28 |
| O | Terminal Block Screw | 2 | 1.0–1.4 | 9–12 |

CAM DESIGN DATA

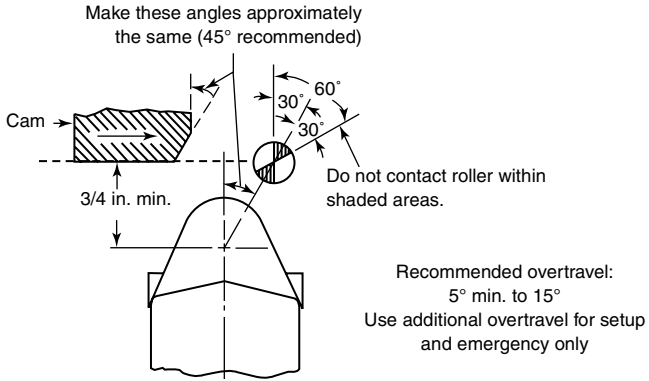


Figure 4: Cam Design—Leading Edge

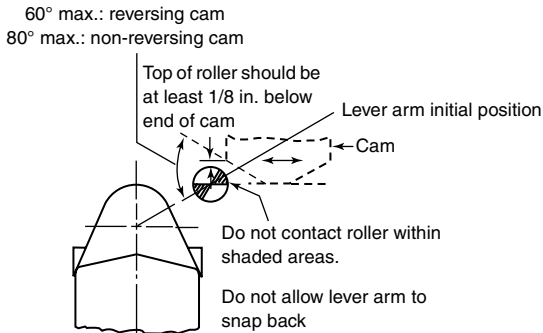


Figure 5: Cam Design—Trailing Edge

Overtravel Limitations

Do not operate the limit switch beyond its overtravel limit position. Select an operating mechanism which ensures that the limit switch operates within its range under all normal and emergency conditions. *Do not use a limit switch as a mechanical stop.*

Square D Company
8001 Highway 64 East
Knightdale, NC 27545
1-888-SquareD (1-888-778-2733)
www.SquareD.com

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