

Side Mounting Liquid Level Controls

Installation and Operating Manual

*Liquid
Level
Control*



Read this Manual Before Installing

This manual provides information on Side Mounting Liquid Level Controls. It is important that all instructions are read carefully and followed in sequence. Detailed instructions are included in the Installation section of this manual.

Conventions Used in this Manual

Certain conventions are used in this manual to convey specific types of information. General technical material, support data, and safety information are presented in narrative form. The following styles are used for notes, cautions, and warnings.

NOTES

Notes contain information that augments or clarifies an operating step. Notes do not normally contain actions. They follow the procedural steps to which they refer.

Cautions

Cautions alert the technician to special conditions that could injure personnel, damage equipment, or reduce a component's mechanical integrity. Cautions are also used to alert the technician to unsafe practices or the need for special protective equipment or specific materials. In this manual, a caution box indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

WARNINGS

Warnings identify potentially dangerous situations or serious hazards. In this manual, a warning indicates an imminently hazardous situation which, if not avoided, could result in serious injury or death.

Safety Messages

Follow all standard industry procedures for servicing electrical equipment when working with or around high voltage. Always shut off the power supply before touching any components.

Low Voltage Directive

For use in Installation Category II, Pollution Degree 2. If equipment is used in a manner not specified by the manufacturer, protection provided by the equipment may be impaired.

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Side Mounting Liquid Level Controls

Table of Contents

1.0 Introduction			
1.1 Principle of Operation	4		
1.2 Operating Cycle.....	4		
2.0 Installation	4		
2.1 Unpacking	4		
2.2 Mounting.....	5		
2.3 Wiring	6		
2.4 Differential Adjustment	8		
2.4.1 Level Differential vs. Mounting Nozzle Length.....	10		
3.0 Reference Information			
3.1 Preventive Maintenance	11		
3.1.1 What To Do.....	11		
3.1.2 What To Avoid.....	12		
3.2 Troubleshooting	13		
3.2.1 Check Switch Mechanism	13		
3.2.2 Check Sensing Unit	14		
3.2.3 Check Complete Unit.....	14		
		3.3 Agency Approvals.....	15
		3.4 Specifications	16
		3.4.1 Dimensional Specifications	16
		3.4.2 Actuation Levels.....	18
		3.5 Replacement Parts.....	19
		3.5.1 Replacement Assemblies Parts Identification.....	19
		3.5.2 Models T52 and T63	20
		3.5.3 Models T62 Threaded, T62 Flanged, T67 Threaded and T67 Flanged	21
		3.6 Model Numbers.....	22
		3.6.1 T52, T62, T63, T64 and T67 Models	22

1.0 Introduction

Side mounting controls mount horizontally to any tank or vessel through a threaded or flanged pipe connection. Standard models are equipped with a single switch mechanism for high or low level alarm or control applications. Tandem models, with two switch mechanisms, are available for two level stage applications—providing the operating functions of two separate instruments, such as high and low level alarm.

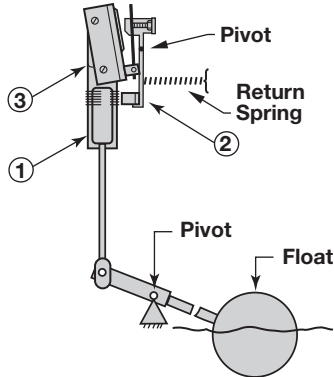


Figure 1

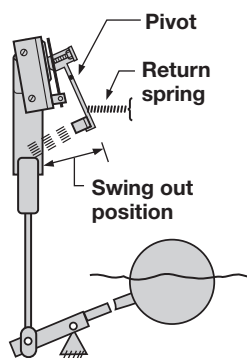


Figure 2

1.1 Principle of Operation

Side mounting units employ permanent magnetic force as the only link between the float and the switching element. As the pivoted float follows liquid level changes, it moves a magnetic sleeve (1) into or out of the field of a switch actuating magnet (2) causing switch operation. A non-magnetic barrier tube (3) effectively isolates the switch mechanism from the controlled liquid.

1.2 Operating Cycle

As the liquid level falls in the vessel, refer to Figure 1, the float moves the magnetic attraction sleeve up within the enclosing tube and into the field of the switch mechanism magnet. As a result, the magnet is drawn in tightly to the enclosing tube causing the switch to trip, making or breaking an electrical circuit. As the liquid level rises, the float moves the attraction sleeve out of the magnetic field, releasing the switch at a predetermined level. Refer to Figure 2. The tension spring ensures the return of the switch in a snap action.

2.0 Installation

Caution: If equipment is used in a manner not specified by the manufacturer, protection provided by the equipment may be impaired.

2.1 Unpacking

Unpack the instrument carefully, making sure all components have been removed from the packing material. Inspect all components for damage, and report any concealed damage to the carrier within 24 hours.

Check the contents of the carton, making sure it agrees with the packing slip and the purchase order. Verify that the model number imprinted on the nameplate matches the number on the packing slip and the purchase order. Report any discrepancies to the factory. Check and record the serial number for future reference when ordering parts.

2.2 Mounting

Caution: This instrument is intended for use in Installation Category II, Pollution Degree 2.

Before assembling control to tank or vessel, check threaded or flanged mounting nozzle for the following:

- Nozzle length and inside diameter must be sized correctly to allow for switch actuation at design levels within the maximum differential available. Refer to the chart on page 10.
- Nozzle should be checked for horizontal alignment. Finished mounting must allow control switch housing to be within 3° of vertical for proper operation. A three degree slant is noticeable by eye, but installation should be checked with a spirit level on top and/or sides of float body.

Caution: Operation of all buoyancy type level devices should be done in such a way as to minimize the action of dynamic forces on the float or displacer sensing element. Good practice for reducing the likelihood of damage to the control is to equalize pressure across the device very slowly.

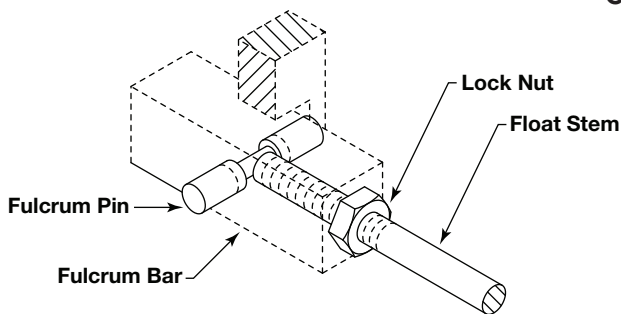


Figure 3
Float Stem Assembly

- Before installation, assemble float and stem to sensing unit. See Figure 3.
1. Remove screw from end of fulcrum bar and replace with float stem.
 2. Make sure end of float stem sets completely in groove of fulcrum pin as shown in Figure 3.
 3. Tighten lock nut with wrench. If float stem is properly located, fulcrum pin can not be pushed out.

2.3 Wiring

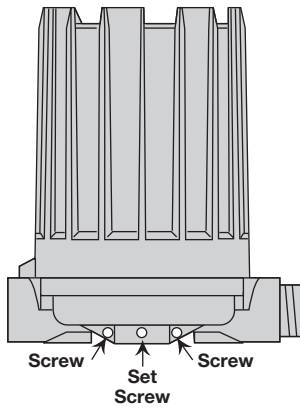


Figure 4

NEMA 4X, NEMA 4X/7/9
NEMA 4X/7/9 Group B

Caution: Level controls are shipped from the factory with the enclosing tube tightened and the middle set screw, on the housing base, locked to the enclosing tube. Failure to loosen the set screw prior to repositioning the conduit connection may cause the enclosing tube to loosen, resulting in the possible leakage of the process liquid or vapor.

Side mounting controls are shipped with the conduit entry of the switch housing placed 180° opposite to the tank connections to simplify installation in most cases. If this configuration is appropriate to the installation, proceed to Step 4 to begin wiring the unit. If another configuration is desired, the switch housing can be easily rotated by first following Steps 1, 2, and 3.

NOTE: A switch or circuit breaker shall be installed in close proximity to equipment and within easy reach of operator. It shall be marked as the disconnecting device for the equipment.

1. Loosen set screw(s) at base of switch housing. Refer to Figure 4.
2. Switch housing may be rotated 360° to allow correct positioning of conduit outlet.
3. Tighten set screw(s) at base of switch housing.
4. Unscrew and remove switch housing cover. The threads have been lubricated to facilitate removal.
5. The switch terminals are located next to the conduit outlet to facilitate wiring. Bring supply wires through conduit outlet. Route extra wire around enclosing tube under the baffle plate, and connect them to the proper terminals. Refer to the wiring diagram in your switch bulletin for this information. Switch instruction manual numbers are as indicated in chart on page 7.

Switch Series Letter	Description	Bulletin No.
B, C, D	Dry Contact Switch	42-683
G, H, I	Vibration Resistant Dry Contact Switch, Dual Magnets	42-684
HS	Hermetically Sealed Snap Switch	42-694
J	Bleed Type Pneumatic Switch	42-685
K	Non-Bleed Type Pneumatic Switch	42-686
F, R, 8, 9	High Temperature Dry Contact Switch	42-799

NOTE: For supply connections, use wire with a minimum rating of +167° F (+75° C) as required by the process conditions. Use a minimum of 14 AWG wire for power and ground field wires.

NOTE: Housing must be grounded via protective ground screw in base of housing.

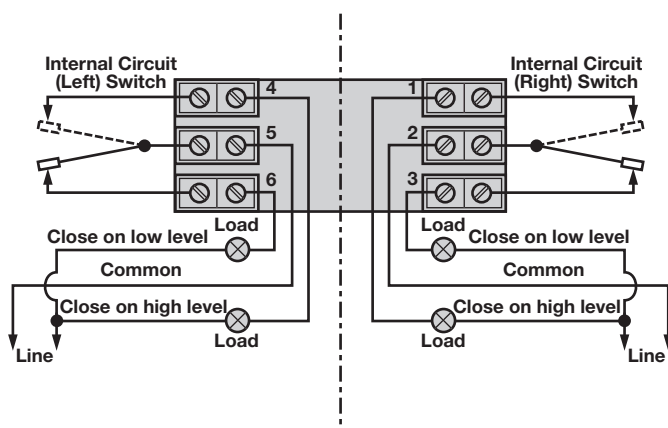


Figure 5
Wiring diagram for
side-mounted float switch
(except HS)

6. Dress wiring to ensure no interference or contact with the switch, or replacement of switch housing cover.

OBSERVE ALL APPLICABLE ELECTRICAL CODES AND PROPER WIRING PROCEDURES.

Prevent moisture seepage into the enclosure by installing approved seal-drain fittings in the conduit run leading into the unit.

Caution: In hazardous areas, do not power the unit until the conduit is sealed and the enclosure is screwed down securely.

7. Replace housing cover.
 8. If control has been furnished with an explosion proof or moisture proof (gasketed) switch housing, it must be sealed at the conduit outlet with a suitable compound or non-hardening sealant to prevent entrance of air.
 9. Test switch action by varying liquid level in float chamber.
- NOTE: If switch mechanism fails to function properly, check vertical alignment of control housing and consult installation bulletin on switch mechanism furnished.
10. Check cover to base fit to be certain gasketed joint is tight. A positive seal is necessary to prevent infiltration of moisture laden air or corrosive gasses into switch housings.

2.4 Differential Adjustment

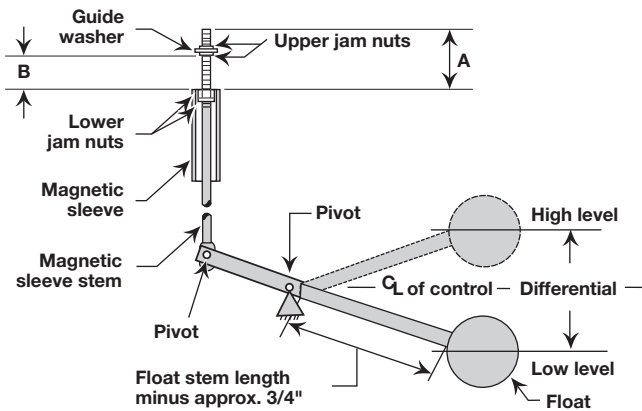


Figure 6

The level differential of single switch models may be adjusted by repositioning the jam nuts on the magnetic sleeve stem as shown in Figure 6.

Refer to the chart below for the minimum and maximum levels obtainable.

Inches (millimeters)

Model ^①		Differentials Obtainable ^{② ④}				Approx. Jam Nut Setting ^③	
		Float Stem Length				A	B
		8.00 (230)	12.00 (305)	18.00 (457)	26.00 (660)		
T52	Min.	1.25 (32)	1.75 (44)	2.50 (64)	3.50 (89)	0.81 (21)	0.03 (0.8)
	Max.	4.75 (121)	7.00 (178)	10.25 (260)	14.50 (368)	1.31 (33)	1.06 (27)
T63	Min.	1.00 (25)	1.75 (44)	2.50 (64)	3.50 (89)	0.81 (21)	0.03 (0.8)
	Max.	2.62 (67)	5.00 (127)	7.38 (187)	10.50 (267)	1.31 (33)	1.06 (27)
T62 (Threaded)	Min.	1.25 (32)	2.00 (51)	2.88 (73)	4.00 (102)	0.81 (21)	0.03 (0.8)
	Max.	5.81 (148)	8.12 (206)	11.56 (294)	16.12 (409)	1.31 (33)	1.06 (27)
T62 (Flanged)	Min.	1.25 (32)	1.62 (41)	2.62 (67)	3.75 (95)	0.62 (16)	0.03 (0.8)
	Max.	3.50 (89)	5.12 (130)	7.50 (191)	10.75 (273)	1.12 (28)	0.69 (18)

NOTES:

- ① All models are factory set at minimum differential unless otherwise specified.
- ② To maintain maximum differential, nozzle length "L" (Fig. 3) must not exceed: 2.38" (60 mm) model T52; 1.19" (30 mm) model T63; 2.50" (64 mm) model T62 threaded; or 3.50" (89 mm) model T62 flanged.
- ③ Dimensions given are approximate and will vary slightly with each unit.
- ④ Consult factory for differentials of models not shown.
- ⑤ Tandem models (T67, T68) are not field adjustable.

Caution: Before attempting any work on the control, be certain to pull disconnect switch or otherwise assure that electrical circuit(s) through control is deactivated. Close operating medium supply valve on controls equipped with pneumatic switch mechanisms.

-
1. Disconnect wiring from supply side of switch mechanism and electrical conduit or operating medium line connections to switch housing.
 2. Perform system shutdown as required to relieve pressure from tank or vessel and drain off liquid head above control mounting position. Allow unit to cool.
 3. Remove switch housing assembly by loosening hex nut located immediately below the housing base.

With switch housing removed, jam nuts and magnetic sleeve are now accessible. Refer to Figure 6. Raising the lower jam nuts will reduce the differential. Jam nut adjustments in opposite directions will increase the differential. As the first step in any adjustment procedure, the position of the lower jam nuts (Dimension A) should be established.

4. Loosen and remove upper jam nuts, guide washer and magnetic sleeve. Dimension A, as measured from the top of the stem to the top of the lower jam nuts, may now be increased or decreased as required.

Tandem model controls should not be adjusted in the field. If differential adjustment is required, consult factory.

NOTE: Be certain to tighten jam nuts securely after adjustment.

5. Replace magnetic sleeve on stem and position upper jam nuts to desired B dimension by measuring from top of sleeve to bottom of upper jam nuts to guide washer.
6. Reassemble control.
7. Test switch actuation by varying liquid level in tank or vessel.

Caution: After increasing differential adjustment, be certain to check carefully for proper operation of switch mechanism. Magnet must “snap” cleanly, with additional float movement available after magnet snaps.

2.4 Differential Adjustment (cont.)

2.4.1 Level Differential vs. Mounting Nozzle Length

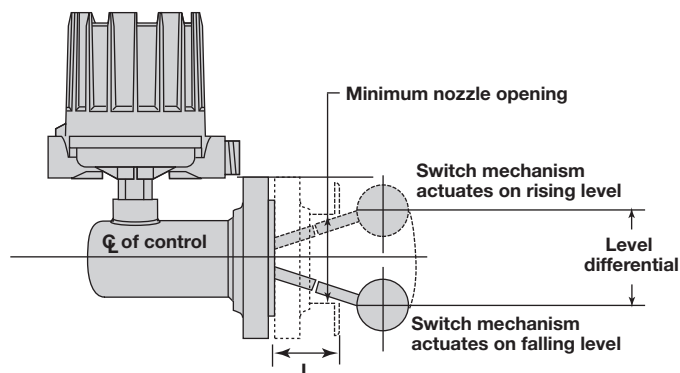


Figure 7

The table below may be used to determine the maximum level travel (differential) available between “Switch on” and “Switch off” actuations with mounting nozzles of different lengths. The differentials given occur with the minimum tank opening diameter listed for each model and are applicable to standard controls.

Inches (millimeters)

Nozzle Length In. (mm)	Maximum Level Differential Available with Several Nozzle Lengths ⑤															
	Model T52 with 3.12" (79 mm) Diameter Minimum Tank Nozzle Opening ②				Model T63 with 2.31" (59 mm) Diameter Minimum Tank Nozzle Opening ②				Model T62 Threaded with 3.06" (78 mm) Diameter Minimum Tank Nozzle Opening ③				Model T62 Flanged with 2.88" (73 mm) Diameter Minimum Tank Nozzle Opening ④			
	Float Stem Length				Float Stem Length				Float Stem Length				Float Stem Length			
	8.00 (203)	12.00 (305)	18.00 (457)	26.00 (660)	8.00 (203)	12.00 (305)	18.00 (457)	26.00 (660)	8.00 (203)	12.00 (305)	18.00 (457)	26.00 (660)	8.00 (203)	12.00 (305)	18.00 (457)	26.00 (660)
2.00 (51)	4.75 (121)	7.00 (178)	10.25 (260)	14.50 (368)	2.62 (67)	5.00 (127)	7.38 (187)	10.50 (267)	5.81 (148)	8.12 (206)	11.56 (294)	16.12 (409)	3.50 (89)	5.12 (130)	7.50 (191)	10.75 (273)
4.00 (102)	4.00 (102)	5.62 (143)	8.12 (206)	11.62 (295)	1.88 (48)	3.50 (89)	5.25 (133)	7.50 (191)	4.38 (111)	6.12 (155)	8.69 (221)	12.19 (310)	3.25 (83)	4.75 (121)	7.00 (178)	10.00 (254)
6.00 (152)	—	4.25 (108)	6.25 (159)	8.88 (226)	—	2.75 (70)	4.12 (105)	5.88 (149)	1.50 (38)	4.69 (119)	6.69 (170)	9.31 (236)	—	3.75 (95)	5.38 (137)	7.75 (197)
8.00 (203)	—	3.50 (89)	5.12 (130)	7.25 (184)	—	2.38 (60)	3.38 (86)	4.88 (124)	—	3.81 (97)	5.44 (138)	7.56 (192)	—	3.00 (76)	4.50 (114)	6.25 (159)
10.00 (254)	—	2.88 (73)	4.25 (108)	6.00 (152)	—	2.00 (51)	2.88 (73)	4.12 (105)	—	3.19 (81)	4.56 (116)	6.38 (162)	—	2.50 (64)	3.75 (95)	5.38 (137)
12.00 (305)	—	—	3.62 (92)	5.12 (130)	—	—	2.50 (64)	3.50 (89)	—	—	3.94 (100)	5.44 (138)	—	—	3.25 (83)	4.62 (117)

NOTES:

- ① Nozzle length is dimension L from end of standard control body to opening in tank having minimum diameter listed for each model.
- ② Minimum diameter given is I.D. of float switch body.
- ③ Minimum diameter given is I.D. of 3" schedule 40 pipe.
- ④ Minimum diameter given is I.D. of 3" schedule 80 pipe.
- ⑤ Consult factory for maximum differential available for models T64 and T67.

3.0 Reference Information

3.1 Preventive Maintenance

Periodic inspections are a necessary means to keep your level control in good working order. This control is a safety device to protect the valuable equipment it serves. A systematic program of preventive maintenance must be implemented when the control is placed into service. If the following is observed, your control will provide reliable protection of your capital equipment for many years.

3.1.1 What To Do

1. **Keep control clean.**

Be sure the switch housing cover is always in place on the control. This cover is designed to keep dust and dirt from interfering with switch mechanism operation. In addition, it protects against damaging moisture and acts as a safety feature by keeping bare wires and terminals from being exposed. Should the housing cover or any seals become damaged or misplaced, obtain a replacement immediately.

2. **Inspect switch mechanisms, terminals, and connections monthly.**

- a. Dry contact switches should be inspected for excessive wear on actuating lever or misalignment of adjustment screw at point of contact between screw and lever. Such wear can cause false switch actuating levels. Adjust switch mechanism to compensate (if possible) or replace switch.
- b. DO NOT operate your control with defective or mal-adjusted switch mechanisms (refer to bulletin on switch mechanisms furnished for service instructions.)
- c. Side mounting controls may sometimes be exposed to excessive heat or moisture. Under such conditions, insulation on electrical wiring may become brittle, eventually breaking or peeling away. The resulting “bare” wires can cause short circuits.

Check wiring carefully and replace at the first sign of brittle insulation.

- d. Vibration may sometimes cause terminal screws to work loose. Check all terminal connections to be certain that screws are tight.

-
- e. On units with pneumatic switches, air (or gas) operating medium lines subjected to vibration, may eventually crack or become loose at connections causing leakage. Check lines and connections carefully and repair or replace, if necessary.

NOTE: As a matter of good practice, spare switches should be kept on hand at all times.

3. **Inspect entire unit periodically.**

Isolate control from vessel. Raise and lower liquid level to check for switch contact and reset.

3.1.2 What To Avoid

1. **NEVER** leave switch housing cover off the control longer than necessary to make routine inspections.
2. **NEVER** place a jumper wire across terminals to cut-out the control. If a jumper is necessary for test purposes, be certain it is removed before placing control into service.
3. **NEVER** attempt to make adjustments or replace switches without reading instructions carefully. Certain adjustments provided for in side mounting controls should not be attempted in the field. When in doubt, consult the factory or your local representative.
4. **NEVER** use lubricants on pivots of switch mechanisms. A sufficient amount of lubricant has been applied at the factory to ensure a lifetime of service. Further oiling is unnecessary and will only tend to attract dust and dirt which can interfere with mechanism operation.

3.2 Troubleshooting

Usually the first indication of improper operation is failure of the controlled equipment to function, i.e.: pump will not start (or stop), signal lamps fail to light, etc. When these symptoms occur, whether at time of installation or during routine service thereafter, check the following potential external causes first.

- Fuses may be blown.
- Reset button(s) may need resetting.
- Power switch may be open.
- Controlled equipment may be faulty.
- Wiring leading to control may be defective.

If a thorough inspection of these possible conditions fails to locate the trouble, proceed next to a check of the control's switch mechanism.

3.2.1 Check Switch Mechanism

1. Pull disconnect switch or otherwise disconnect power to the control.
2. Remove switch housing cover.
3. Disconnect power wiring from switch assembly.
4. Swing magnet assembly in and out by hand to check carefully for any sign of binding. Assembly should require minimal force to move it through its full swing.
5. If binding exists, magnet may be rubbing enclosing tube. If magnet is rubbing, loosen magnet clamp screw and shift magnet position. Retighten magnet clamp screw.
6. If switch magnet assembly swings freely and mechanism still fails to actuate, check installation of control to be certain it is within the specified 3° of vertical. Use spirit level on side of enclosing tube in two places, 90° apart.
7. Examine the switch closely as previously described in Preventive Maintenance section. Check continuity of switch with ohmmeter. If switch does not function properly, replace it immediately.
8. If switch mechanism is operating satisfactorily, proceed to check sensing unit.

3.2.2 Check Sensing Unit

1. Check to be certain liquid is entering float chamber. A valve may be closed or piping plugged.
2. Proceed to check level sensing action by removing switch housing assembly, as described in Steps 4 through 7 of the Switch Differential Adjustment section on pages 8 and 9.

Caution: Unit must be normalized to atmospheric pressure before removing switch housing assembly.

3. Inspect attraction sleeve(s) and inside of enclosing tube for excessive corrosion or solids build-up which could restrict movement, preventing sleeve(s) from reaching field of magnet(s).
4. If the differential has been changed in the field, check tightness and position of the jam nuts.

NOTE: Differential adjustment causes a change in the amount of level travel between switch-on and switch-off actuations. Refer to pages 8 and 9.

5. Vary liquid level in vessel. Check float to be certain it is buoyant in the liquid (vessel must have adequate liquid level). If float is determined to be filled with liquid or collapsed, float must be replaced. Do not attempt to repair a float.

3.2.3 Check Complete Unit

Caution: With electrical power on, care should be taken to avoid contact with switch leads and connections at terminal block.





Reassemble unit. Reconnect power supply and carefully actuate switch mechanism manually (using a non-conductive tool) to determine whether controlled equipment will operate.

If all components in the control are in operating condition, the trouble must be (and should be) located external to the control. Repeat inspection of external conditions previously described.

NOTE: If difficulties are encountered which cannot be identified, consult the factory or your local representative for assistance. A complete description of the trouble should be provided along with information concerning your piping and mounting arrangement, plus a description of your operating sequence. Sketches or photographs showing the installation are also beneficial.

When communicating about your control, be certain always to specify the complete Model and Serial numbers.

3.3 Agency Approvals

AGENCY	APPROVED MODEL	APPROVAL CLASSES
FM 	All with an electric switch mechanism and a housing listed as Type 4X/7/9	Class I, Div 1, Groups C & D Class II, Div 1, Groups E, F & G
	All with an electric switch mechanism and a housing listed as Type 4X/7/9 Class I, Div 1, Group B	Class I, Div 1, Groups B, C & D Class II, Div 1, Groups E, F & G
CSA 	All with a Series HS, H1, F, 8 or 9 electric switch mechanism and a housing listed as CSA Type 4X	Class I, Div 2, Groups B, C & D
	All with an electric switch mechanism and a housing listed as Type 4X/7/9	Class I, Div 1, Groups C & D Class II, Div 1, Groups E, F & G
	All with an electric switch mechanism and a housing listed as Type 4X/7/9 Class I, Div 1, Group B	Class I, Div 1, Groups B, C & D Class II, Div 1, Groups E, F & G
ATEX / IEC Ex ② 	All with an electric switch mechanism and an ATEX housing ^①	ATEX II 2 G EEx d IIC T6 94/9/EC IEC Ex Ex d IIC T6 IP 66
CE 	Low Voltage Directives 2006/95/EC Per Harmonized Standard: EN 61010-1/1993 & Amendment No. 1	Installation Category II Pollution Degree 2

① Dual stage units with 'HS' switches are not ATEX approved.

② IEC Installation Instructions:

The cable entry and closing devices shall be Ex d certified suitable for the conditions of use and correctly installed.

For ambient temperatures above +55° C or for process temperatures above +150° C, suitable heat resistant cables shall be used.

Heat extensions (between process connection and housing) shall never be insulated.

Special conditions for safe use:

When the equipment is installed in process temperatures higher than +85° C the temperature classification must be reduced according to the following table as per IEC60079-0.

Maximum Process Temperature	Temperature Classification
< 85° C	T6
< 100° C	T5
< 135° C	T4
< 200° C	T3
< 300° C	T2
< 450° C	T1

These units are in conformity with IECEx KEM 05.0020X

Classification Ex d IIC T6

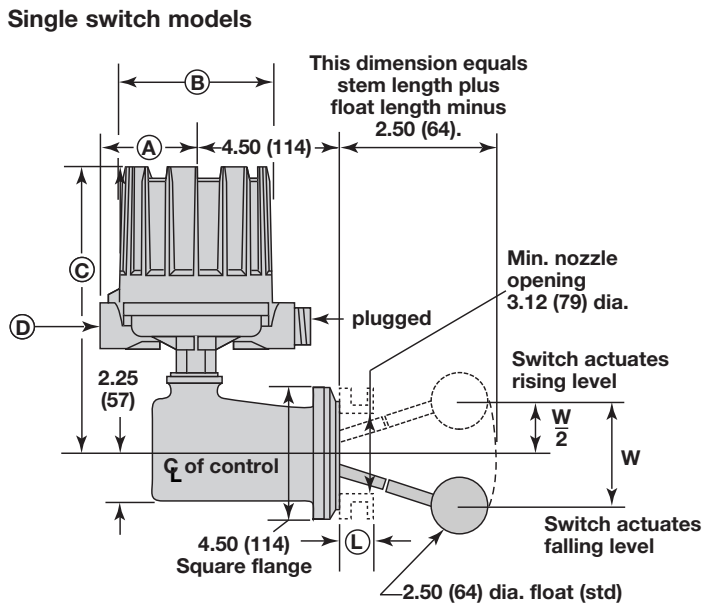
T_{ambient} -40° C to +70° C

3.4 Specifications

3.4.1 Dimensional Specifications

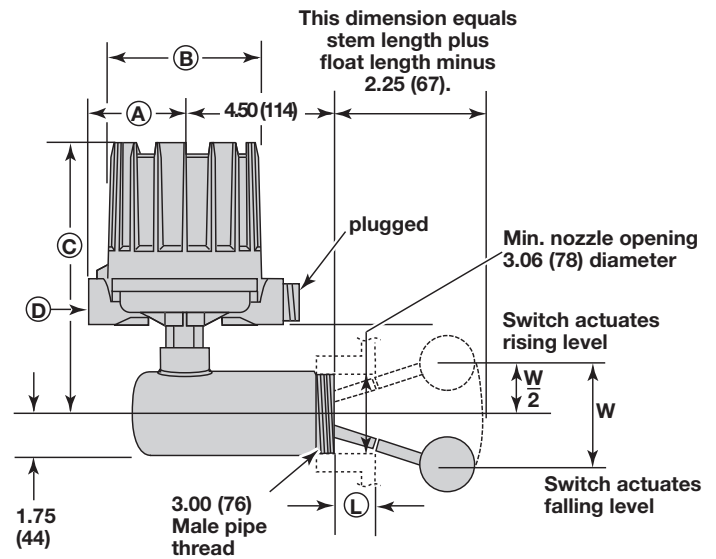
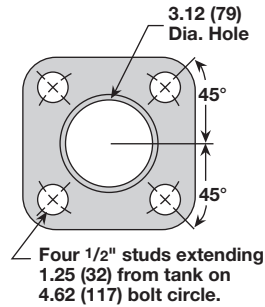
Inches (mm)

Single switch models



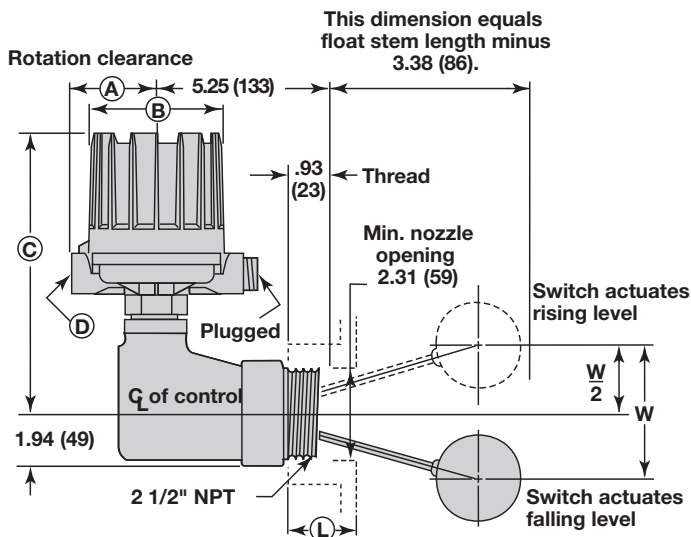
Model T52 with flanged body

Figure 8



Model T62 with threaded body

Figure 9



Model T63 with threaded body

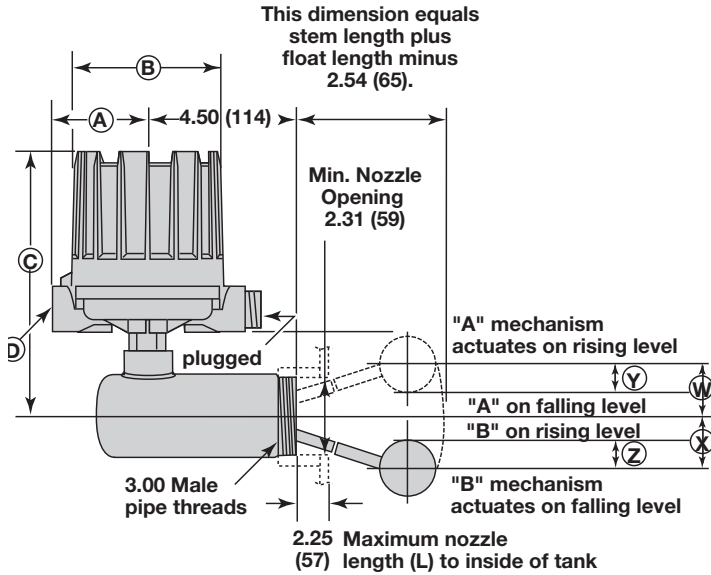
Figure 10

3.4 Specifications

3.4.1 Dimensional Specifications (cont.)

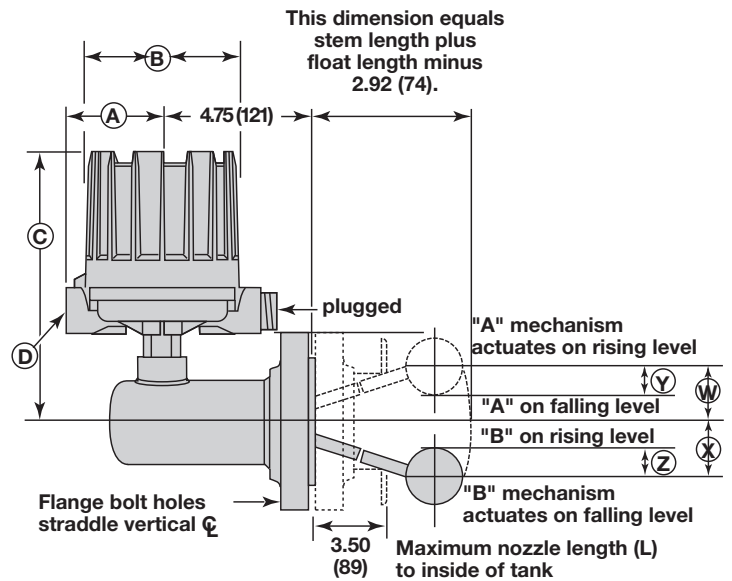
Inches (mm)

Tandem switch models



Model T67 with threaded body

Figure 11



Model T67 with flanged body

Figure 12

Outline Dimensions					
			T52/T62	T63	T67
Housing	A	B	C		
NEMA 4X NEMA 4X/7/9 GROUP B	3.87 (98)	5.93 (151)	10.69 (272)	10.69 (272)	12.88 (327)
NEMA 1 PNEUMATIC	5.00 (127)	4.69 (119)	9.00 (229)	9.12 (323)	—

Conduit Connections D
Electrical Switches NEMA 4X/7/9: 1" NPT Group B: 1" NPT
Pneumatic Switches NEMA 1: 1/4" NPT

NOTE:

Allow 8.00 (203) overhead clearance for cover removal.

3.4 Specifications

3.4.2 Actuation Levels

Inches (mm)

Model T52

Length of Float Stem	Differential Levels Obtainable		Maximum Differential (W) with Nozzle Lengths (L) of						Maximum Nozzle Length (L) to Maintain Maximum Differential
	W		2.00 (51)	4.00 (102)	6.00 (152)	8.00 (203)	10.00 (254)	12.00 (305)	
	Minimum	Maximum							
8.00 (203)	1.25 (32)	4.75 (121)	4.00 (102)	–	–	–	–	–	2.38 (60)
12.00 (305)	1.75 (44)	7.00 (178)	7.00 (178)	5.62 (143)	4.25 (108)	3.50 (89)	2.88 (73)	–	
18.00 (457)	2.50 (64)	10.25 (260)	10.25 (260)	8.12 (206)	6.25 (159)	5.12 (130)	4.25 (108)	3.62 (92)	
26.00 (660)	3.50 (89)	14.50 (368)	14.50 (368)	11.62 (295)	8.88 (226)	7.25 (184)	6.00 (152)	5.12 (130)	

Model T62 with threaded body

Length of Float Stem	Differential Levels Obtainable		Maximum Differential (W) with Nozzle Lengths (L) of						Maximum Nozzle Length (L) to Maintain Maximum Differential
	W		2.00 (51)	4.00 (102)	6.00 (152)	8.00 (203)	10.00 (254)	12.00 (305)	
	Minimum	Maximum							
8.00 (203)	1.25 (32)	5.81 (148)	5.81 (148)	4.38 (111)	1.50 (38)	–	–	–	2.50 (64)
12.00 (305)	2.00 (51)	8.12 (206)	8.12 (206)	6.12 (155)	4.69 (119)	3.81 (97)	3.19 (81)	–	
18.00 (457)	2.88 (73)	11.56 (294)	11.56 (294)	8.69 (221)	6.69 (170)	5.44 (138)	4.56 (116)	3.94 (100)	
26.00 (660)	4.00 (102)	16.16 (410)	16.16 (410)	12.19 (310)	9.31 (236)	7.56 (192)	6.38 (162)	5.44 (138)	

Model T63

Length of Float Stem	Differential Levels Obtainable		Maximum Differential (W) with Nozzle Lengths (L) of						Maximum Nozzle Length (L) to Maintain Maximum Differential
	W		2.00 (51)	4.00 (102)	6.00 (152)	8.00 (203)	10.00 (254)	12.00 (305)	
	Minimum	Maximum							
8.00 (203)	1.00 (25)	2.62 (67)	2.62 (67)	1.88 (48)	–	–	–	–	1.19 (30)
12.00 (305)	1.75 (44)	5.00 (127)	5.00 (127)	3.50 (89)	2.75 (70)	2.38 (61)	2.00 (51)	–	
18.00 (457)	2.50 (64)	7.38 (187)	7.38 (187)	5.25 (133)	4.12 (105)	3.38 (86)	2.88 (73)	2.50 (64)	
26.00 (660)	3.50 (89)	10.50 (267)	10.50 (267)	7.50 (190)	5.88 (149)	4.88 (124)	4.12 (105)	3.50 (89)	

Model T67

Switch Actuation Levels Obtainable With Standard Length Float Stems ①				
Length of Float Stem	W & X ②		Y & Z ③	
	Minimum	Maximum	Minimum	Maximum
8.00 (203)	2.50 (64)	2.50 (64)	1.00 (25)	2.50 (64)
12.00 (305)	3.75 (95)	3.75 (95)	1.50 (38)	3.75 (95)
18.00 (457)	5.50 (140)	5.50 (140)	2.12 (54)	5.50 (140)
26.00 (660)	7.75 (197)	7.75 (197)	3.00 (76)	7.75 (197)

① Differential adjustment on tandem units must be done at the factory. Advise required differentials at time of order placement.

② Dimensions W and X set for maximum unless otherwise specified.

③ Dimensions Y and Z set for maximum unless otherwise specified.

3.5 Replacement Parts

3.5.1 Replacements Assemblies Parts Identification

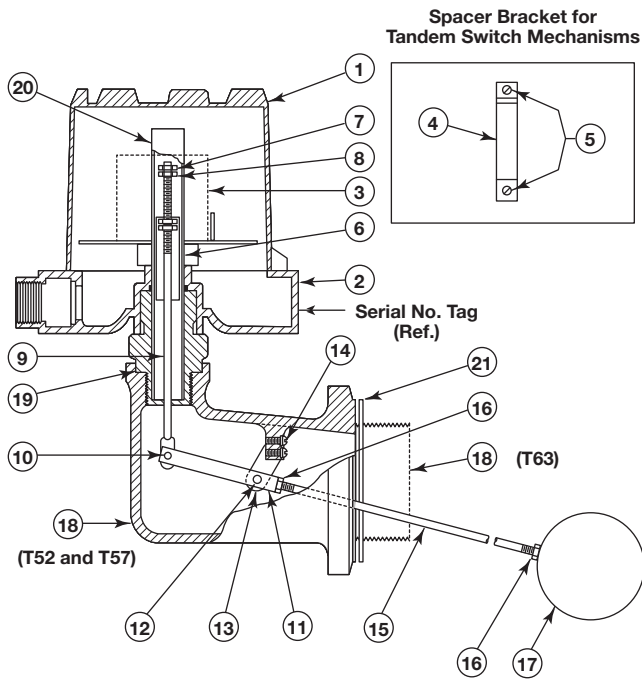


Figure 13

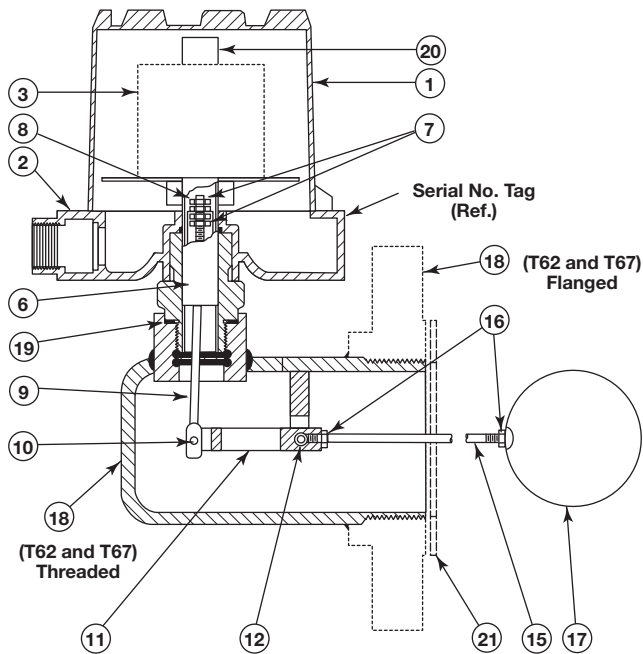


Figure 14

Item	Description
1	Switch housing cover
2	Switch housing base
3	Switch mechanism
4	Spacer bracket
5	Rd head screws
6	Attraction sleeve(s)
7	Jam nuts
8	Guide washer
9	Sleeve stem
10	Connecting pin
11	Fulcrum
12	Fulcrum pin
13	Pivot bracket
14	Rd head screws
15	Float stem
16	Stem lock nuts
17	Float
18	Body
19	E-tube gasket
20	Enclosing tube
21	Flange gasket

3.5 Replacement Parts

3.5.2 Models T52 and T63

	T52	T63
Switch hsg cover	Refer to Bulletin 42-680/42-780 for switch housing cover and base assembly	
Switch hsg base	Refer to Bulletin 42-680/42-780 for switch housing cover and base assembly	
Switch mechanism	Refer to bulletin on switch mechanism furnished (refer to chart on page 7)	
Spacer bracket	Not required	
Rd head screws	Not required	
Standard sleeve assy ^①		
(includes items 6 through 16)	089-5508-001	
Sheathed sleeve assy ^①		
(includes items 6 through 16)	089-5516-001	089-5517-001
Float 2.50	Z07-1102-001	
2.50 x 4.00	Z07-1202-001	
3.00	Z07-1202-004	Z07-1102-004
Body	Consult Factory	
E-tube gasket	012-1301-002	
Enclosing tube	Z32-6325-001 ^②	
Flange gasket	012-1301-003	Not Required

NOTES:

All replacement assemblies listed are for standard base models which use Series B, C, D, F, 8, 9 and J switch mechanisms only. Consult your local representative for ordering assistance on all special model replacement parts not listed above.

- ① Sleeve kits contain 8.00 inch (203 mm) stem lengths. Consult factory for longer stem lengths. Standard sleeve is type 400 series stainless steel. Sheathed attraction sleeves are used on models specified for corrosive service. Sheathed sleeve kits are used on models with material of construction codes 2 through 9.
- ② This e-tube is for models with material of construction code 1 only. Consult factory for e-tubes used with other material of construction codes.

3.5 Replacement Parts

3.5.3 Models T62 Threaded, T62 Flanged, T67 Threaded and T67 Flanged

	T62 Threaded	T62 Flanged	T67 Threaded	T67 Flanged
Switch hsg cover	Refer to Bulletin 42-680/42-780 for switch housing cover and base assembly			
Switch hsg base	Refer to Bulletin 42-680/42-780 for switch housing cover and base assembly			
Switch mechanism	Refer to bulletin on switch mechanism furnished (refer to chart on page 7)			
Spacer bracket	Not required		005-7542-121	
Rd head screws	Not required		010-1409-006	
Standard sleeve assy ^①				
(includes items 6 through 16)	089-5510-001		089-5511-001	
Sheathed sleeve assy ^①				
(includes items 6 through 16)	089-5514-001		N/A	N/A
Float	2.50		089-5546-001	
	2.50 x 4.00		089-5553-001	
	3.00		089-5551-001	
	3.50		089-5552-001	
	3.00 x 5.00		089-5554-001	
	3.00 x 6.00		089-5555-001	
Body	Consult Factory			
E-tube gasket	012-1301-002			
Enclosing tube	Z32-6325-001 ^②		Z32-6325-007	
Flange gasket	Not Required	Not Available ^③	Not Required	Not Available ^③

NOTES:

All replacement assemblies listed are for standard base models which use Series B, C, D, F, 8, 9 and J switch mechanisms only. Consult your local representative for ordering assistance on all special model replacement parts not listed above.

- ① Sleeve kits contain 8.00 inch (203 mm) stem lengths. Consult factory for longer stem lengths. Standard sleeve is type 400 series stainless steel. Sheathed attraction sleeves are used on models specified for corrosive service. Sheathed sleeve kits are used on models with material of construction codes 2 through 9.
- ② This e-tube is for models with material of construction code 1 only. Consult factory for e-tubes used with other material of construction codes.
- ③ Flange gaskets used on models T62 and T67 are standard ANSI type, readily available at local supply houses.

3.6 Model Numbers

3.6.1 T52, T62, T63, T64 and T67 Models

MODEL NUMBER, MATERIAL OF CONSTRUCTION AND TANK CONNECTION

Model	Set Points	Material of Construction		Tank Connection		Pressure Rating ^①									
		Code	Description	Code	Description	psig @ °F					bar @ °C				
						100	450	750	900	1000	38	232	399	482	538
T52	1	1	Cast Iron body, 300 Series SS trim, 400 Series SS sleeve	E3	4" Cast Iron Square Flange	250	150	n/a	n/a	n/a	17	10	n/a	n/a	n/a
		2	Cast Iron body, 316 SS trim and sleeve												
T62	1	1	Carbon Steel body, 300 series SS trim, 400 Series SS sleeve	F2	3" NPT	500	—	377	353	144	34	—	26	24	23
		2	Carbon Steel body, 316 SS trim and sleeve	G3	3" 150 lb. RF Flange	ANSI RF Flange Ratings									
		3	304 SS body, 300 Series SS trim and sleeve	G4	3" 300 lb. RF Flange										
		4	316 SS body, trim and sleeve	G5	3" 600 lb. RF Flange										
				H3	4" 150 lb. RF Flange										
		H4	4" 300 lb. RF Flange												
T63	1	1	Cast Iron body, 300 Series SS trim, 400 Series SS sleeve	E2	2½" NPT	250	150	n/a	n/a	n/a	17	10	n/a	n/a	n/a
		4	316 SS body, trim and sleeve												
T64	1	1	Carbon Steel body, 300 Series SS trim, 400 Series SS sleeve	H3	4" 150 lb. RF Flange	ANSI RF Flange Ratings									
				H4	4" 300 lb. RF Flange										
				H5	4" 600 lb. RF Flange										
T67	2	1	Carbon Steel body, 300 Series SS trim, 400 Series SS sleeve	F2	3" NPT	500	—	377	353	144	34	—	26	24	23
				G3	3" 150 lb. RF Flange	ANSI RF Flange Ratings									
				G4	3" 300 lb. RF Flange										
				G5	3" 600 lb. RF Flange										
				H3	4" 150 lb. RF Flange										

FLOAT AND FLOAT STEM LENGTH

Float Size All Models Excluding T64		Float Stem Length and Specific Gravity Rating								Pressure/Temperature Ratings							
		Inches		mm		Inches		mm		PSIG @ °F				Bar @ °C			
		8.00	203	12.00	305	18.00	457	26.00	660	100	750	900	1000	38	399	482	538
Inches	mm	S.G.	Code	S.G.	Code	S.G.	Code	S.G.	Code	100	750	900	1000	38	399	482	538
2.50	64	0.80	A	0.80	B	0.90	C	0.90	D	350	282	271	268	24	19	19	18
2.50 × 4.00	64 × 102	0.52	E	0.55	F	0.60	G	0.66	H	100	81	78	77	7	6	5	5
3.00 ^③	76 ^③	0.55	J	0.55	K	0.60	L	0.60	M	250	201	194	191	17	14	13	13
3.50 ^{②④}	89 ^{②④}	0.50	N	0.50	P	0.55	Q	0.55	R	400	322	310	306	28	22	21	21
3.00 × 5.00 ^{③④}	76 × 127 ^{③④}	0.65	S	0.65	T	0.70	V	0.70	W	500	377	353	335	34	26	24	23
Model T64 Only																	
3.50	89	0.40	N	—	—	—	—	—	—	1200	936	876	794	83	65	60	58

- ① Compare with float rating and use lower value for selection.
- ② Float cannot pass through 3" NPT opening.
- ③ To pass float, tank nozzle internal bore diameter must not be less than 3.06 (78).
- ④ 3.50 (89) diameter and 3.00 × 5.00 (76 × 127) floats not available in models T52 and T63.
- ⑤ Process temperature based on +100° F (+38° C) ambient.
- ⑥ Dual switches available only with tandem model T67.
- ⑦ CSA approval does not apply to Series HE switches.
- ⑧ On condensing applications, temperature down-rated to +400° F.
- ⑨ Pneumatic switches not available on models T64 or T67.

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(Select from Next Page)

3.6 Model Numbers

3.6.1 T52, T62, T63, T64 and T67 Models (cont.)

ELECTRIC SWITCH MECHANISM AND ENCLOSURE

Switch Description	Process Temperature Range °F (°C)	Contacts	Set ⑥ Points	All models with Material of Construction Code 1, except model T64			All models with Material of Construction Codes 2, 3 & 4, except model T64			Model T64 only		
				TYPE 4X/7/9 Aluminum Enclosure								
				Class I, Div 1 Groups C&D	Class I, Div 1 Group B	ATEX Ex II 2 G EEx d IIC T6	Class I, Div 1 Groups C&D	Class I, Div 1 Group B	ATEX Ex II 2 G EEx d IIC T6	Class I, Div 1 Groups C&D	Class I, Div 1 Group B	ATEX Ex II 2 G EEx d IIC T6
Series B Snap Switch	-40 to +250 (-40 to +121)	SPDT	1	BKP	BKT	BAC	BKQ	BKS	BA9	BKA	BKJ	BCC
			2	BLA	BLJ	BDC	N/A			N/A		
		DPDT	1	BNP	BNT	BBC	BNQ	BNS	BB9	BNA	BNJ	BFC
			2	BOA	BOJ	BGC	N/A			N/A		
Series C Snap Switch	-40 to +450 (-40 to +232)	SPDT	1	CKP	CKT	CAC	CKQ	CKS	CA9	CKA	CKJ	CCC
			2	CLA	CLJ	CDC	N/A			N/A		
		DPDT	1	CNP	CNT	CBC	CNQ	CNS	CB9	CNA	CNJ	CFC
			2	COA	COJ	CGC	N/A			N/A		
Series D DC Current Snap Switch	-40 to +250 (-40 to +121)	SPDT	1	N/A			DKQ	DKS	DA9	DKB	DKK	DC9
		DPDT	1	N/A			DNB	DNK	DF9	DNB	DNK	DF9
Series F Hermetically Sealed Snap Switch	-50 to +750 (-46 to +399)	SPDT	1	FKP	FKT	FAC	FKQ	FKS	FA9	FKA	FKJ	FCC
			2	FLA	FLJ	FDC	N/A			N/A		
		DPDT	1	FNP	FNT	FBC	FNQ	FNS	FB9	FNA	FNJ	FFC
			2	FOA	FOJ	FGC	N/A			N/A		
Series HS Hermetically Sealed 5-amp Snap Switch with Wiring Leads	-50 to +550③ (-46 to +288)	SPDT	1	N/A			HMC	HEK⑦	N/A	HMJ	HMK	N/A
		DPDT	1	N/A			HMF	HET⑦		HMS	HMT	
Series HS Hermetically Sealed 5-amp Snap Switch with Terminal Block	-50 to +550③ (-46 to +288)	SPDT	1	N/A			HM3	HM4	HA9	HM3	HM4	HA9
		DPDT	1	N/A			HM7	HM8	HB9	HM7	HM8	HB9
Series H1 Hermetically Sealed 1-amp Snap Switch with Wiring Leads	-50 to +750 (-46 to +399)	SPDT	1	N/A			HKC	N/A		HKJ	HKK	N/A
Series R High Temperature Snap Switch	-40 to +750 (-40 to +399)	SPDT	1	N/A			RKB	RKK	RC9	RKB	RKK	RC9
		DPDT	1	N/A			RNB	RNK	RF9	RNB	RNK	RF9
Series 8 Hermetically Sealed Snap Switch	-50 to +750 (-46 to +399)	SPDT	1	8KP	8KT	8AC	8KQ	8KS	8A9	8KA	8KJ	8CC
			2	8LA	8LJ	8DC	N/A			N/A		
		DPDT	1	8NP	8NT	8BC	8NQ	8NS	8B9	8NA	8NJ	8FC
			2	8OA	8OJ	8GC	N/A			N/A		
Series 9 High Temperature Hermetically Sealed Snap Switch	-50 to +750 (-46 to +399)	SPDT	1	9KP	9KT	9AC	9KQ	9KS	9A9	9KA	9KJ	9CC
			2	9LA	9LJ	9DC	N/A			N/A		
		DPDT	1	9NP	9NT	9BC	9NQ	9NS	9B9	9NA	9NJ	9FC
			2	9OA	9OJ	9GC	N/A			N/A		
Switch Description	Process Temperature Range °F (°C)	Contacts	Set ⑥ Points	CS/ Aluminum	Cast Iron		CS/ Aluminum	Cast Iron		CS/ Aluminum	Cast Iron	
				NEMA 4X	Class I, Div 1 Groups C&D	Class I, Div 1 Group B	NEMA 4X	Class I, Div 1 Groups C&D	Class I, Div 1 Group B	NEMA 4X	Class I, Div 1 Groups C&D	Class I, Div 1 Group B
Series R High Temperature Snap Switch	-40 to +1000 (-40 to +538)	SPDT	1	N/A			R1M	RKM	RKW	R1M	RKM	RKW
			2	N/A			N/A			N/A		
		DPDT	1	N/A			RDM	RNM	RNW	RDM	RNM	RNW
			2	N/A			N/A			N/A		
Series 9 High Temperature Hermetically Sealed Snap Switch	-50 to +1000 (-46 to +538)	SPDT	1	9AR	9KR	9KV	9AY	9KY	9KW	9AD	9KD	9KV
			2	9BD	9LD	9LV	N/A			N/A		
		DPDT	1	9DR	9NR	9NV	9DY	9NY	9NW	9DD	9ND	9NV
			2	9ED	9OD	9OV	N/A			N/A		

PNEUMATIC SWITCH MECHANISM AND ENCLOSURE ⑨

Switch Description	Maximum Supply Pressure		Maximum Process Temperature		Bleed Orifice Diameter		All Models with Material of Construction Code 1	All Models w/Material of Construction Codes 2, 3 or 4
	PSIG	Bar	° F	° C	Inches	mm	NEMA 1	NEMA 1
Series J Bleed Type	100	7	400	204	0.63	1.6	JDE	JDE
	60	4	400	204	0.94	2.3	JEE	JEE
Series K Non-Bleed Type	100	7	400	204	—	—	—	KOE
	40	3	400	204	—	—	KOG	—



Service Policy

Owners of Magnetrol controls may request the return of a control or any part of a control for complete rebuilding or replacement. They will be rebuilt or replaced promptly. Controls returned under our service policy must be returned by Prepaid transportation. Magnetrol will repair or replace the control at no cost to the purchaser (or owner) other than transportation if:

1. Returned within the warranty period; and
2. The factory inspection finds the cause of the claim to be covered under the warranty.

If the trouble is the result of conditions beyond our control; or, is NOT covered by the warranty, there will be charges for labor and the parts required to rebuild or replace the equipment.

In some cases it may be expedient to ship replacement parts; or, in extreme cases a complete new control, to replace the original equipment before it is returned. If this is desired, notify the factory of both the model and serial numbers of the control to be replaced. In such cases, credit for the materials returned will be determined on the basis of the applicability of our warranty.

No claims for misapplication, labor, direct or consequential damage will be allowed.

Return Material Procedure

So that we may efficiently process any materials that are returned, it is essential that a "Return Material Authorization" (RMA) number be obtained from the factory, prior to the material's return. This is available through Magnetrol's local representative or by contacting the factory. Please supply the following information:

1. Company Name
2. Description of Material
3. Serial Number
4. Reason for Return
5. Application

Any unit that was used in a process must be properly cleaned in accordance with OSHA standards, before it is returned to the factory.

A Material Safety Data Sheet (MSDS) must accompany material that was used in any media.

All shipments returned to the factory must be by prepaid transportation.

All replacements will be shipped F.O.B. factory.



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