

B40 Sealed External Cage Industrial and ASME B31.1 Construction

Installation and Operating Manual

Liquid

Level

Switches



Read this Manual Before Installing

This manual provides information on the B40 Sealed External Cage Liquid Level Switch. 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.

WARNING! Explosion hazard. Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

Low Voltage Directive

For use in Category II installations. If equipment is used in a manner not specified by manufacturer, protection provided by equipment may be impaired.

Notice of Copyright and Limitations

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Magnetrol reserves the right to make changes to the product described in this manual at any time without notice. Magnetrol makes no warranty with respect to the accuracy of the information in this manual.

Warranty

All Magnetrol mechanical level and flow controls are warranted free of defects in materials or workmanship for five full years from the date of original factory shipment.

If returned within the warranty period; and, upon factory inspection of the control, the cause of the claim is determined to be covered under the warranty; then, Magnetrol will repair or replace the control at no cost to the purchaser (or owner) other than transportation.

Magnetrol shall not be liable for misapplication, labor claims, direct or consequential damage or expense arising from the installation or use of equipment. There are no other warranties expressed or implied, except special written warranties covering some Magnetrol products.

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The quality assurance system in place at Magnetrol guarantees the highest level of quality throughout the company. Magnetrol is committed to providing full customer satisfaction both in quality products and quality service.

Magnetrol's quality assurance system is registered to ISO 9001 affirming its commitment to known international quality standards providing the strongest assurance of product/service quality available.





B40 Sealed External Cage Liquid Level Switches

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1.0 Introduction

Magnetrol's B40 level switches are specifically designed for extremely high pressure, high temperature service conditions found principally in power plants, petroleum and petrochemical refineries, and nuclear power installations.

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

1.1 Principle of Operation

The design of Magnetrol float-operated level switches is based upon the principle that a magnetic field will “see through” non-magnetic materials such as 316 stainless steel. In this case, the float moves a magnetic attraction sleeve (1) within a non-magnetic enclosing tube (2) and actuates a switch mechanism (3). The enclosing tube provides a pressure seal to the chamber and, therefore, to the process.

1.2 Operating Cycle

As the liquid level decreases in the chamber, 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 low level (see Figure 2). The tension spring ensures the return of the switch in a snap action.

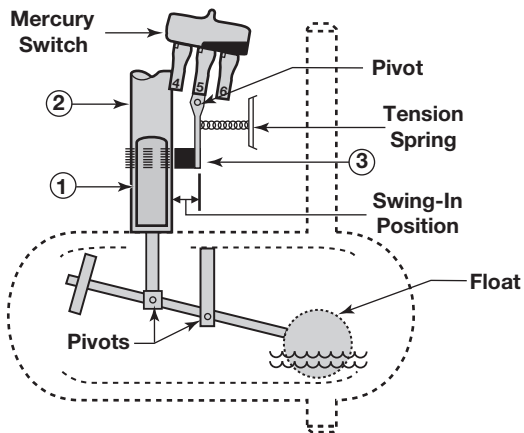


Figure 1
Switch Tripped

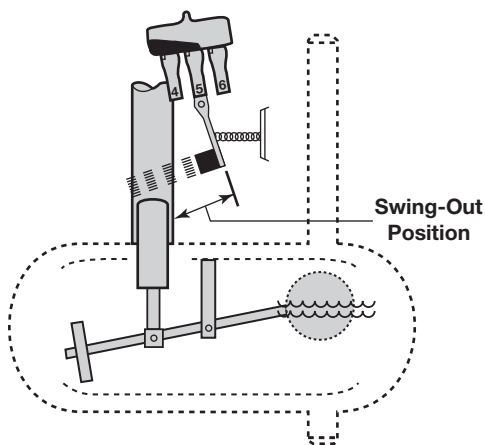


Figure 2
Switch Released

2.0 Installation

2.1 Unpacking

Unpack the instrument carefully, inspecting for damage. Report any concealed damage to the carrier within 24 hours. Check the contents listed on the packing slip and purchase order. Check and record the serial number for future reference when ordering parts.

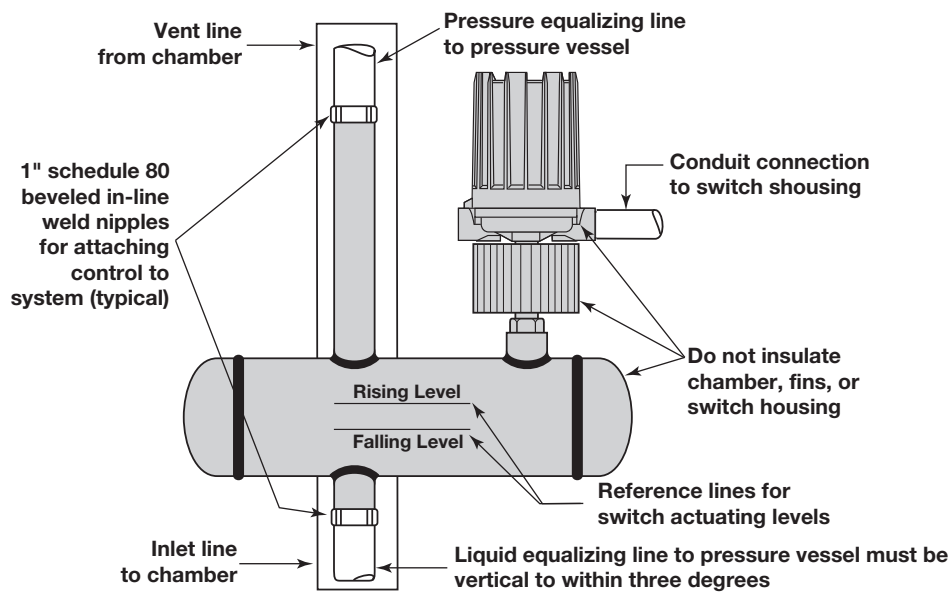


Figure 3

2.2 Piping

Figure 3 shows a typical piping installation of a Model B40 in a pipeline to a pressure vessel. Reference lines, on float chamber, should be aligned to correspond with liquid level in the vessel at which switch control is desired (refer to dimensional drawing, if furnished). Use pipe of sufficient strength to support the unit. If necessary, provide a stand or hanger to help support its weight. All piping should be straight and free of low spots or pockets so that the lower liquid line will drain towards the vessel and the upper vapor line will drain towards the control. Pipeline should be insulated, as shown, to minimize loss of liquid temperature and further control of the heat in the area of the switch housing. DO NOT insulate switch housing or float chamber.

NOTE: Manufacturer recommends that when welding chrome-moly steel piping, the procedures used conform to AWS-D10.8-61.

Caution: DO NOT INSULATE SWITCH MECHANISM HOUSING.

2.3 Mounting

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

Before welding, adjust piping to bring control to a vertical position. B40 level controls require that the enclosing tube be mounted within three degrees of vertical in all directions. A three degree slant is noticeable by eye, but installation should be checked using a spirit level.

2.4 Wiring

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.

Most B40 level control switch housings are designed to allow 360° positioning of the conduit outlet by loosening the set screw(s) located under the housing base. High temperature wire must be used between control and first junction box located in a cooler area.

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 equipment.

1. To gain access to switch mechanism, remove switch housing cover.
2. Pull in supply wires (conductors), wrap them around enclosing tube under the baffle plate and connect to proper terminals. Be certain that excess wire does not interfere with tilt of switch, and that adequate clearance exists for replacement of switch housing cover.

NOTE: For supply connections in installations with ambient temperature up to +70° C, use wire with a minimum rating of +75° C as required by process conditions. Installations with ambient temperatures up to +80° C require wire with a minimum rating of +85° C as required by process conditions. Use a minimum of 14 AWG wire for power and ground field wires.

NOTE: See Figure 4 or bulletin on switch mechanism furnished for proper terminal connections. Switch bulletin numbers are listed in the chart below.

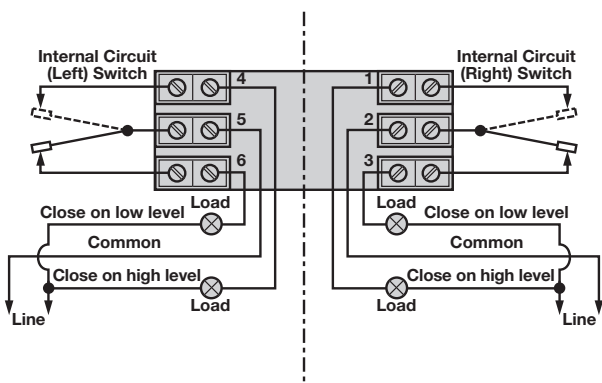


Figure 4

Switch Series Letter	Description	Bulletin No.
A	Standard Mercury Switch	
3, L	Mercury Switch w/Beaded Leads	
C, D, S	Dry Contact Switch	42-683
2, E, L	Vibration Resistant Mercury Switch	
F	Hermetically Sealed Snap Switch	
HS	Hermetically Sealed Snap Switch	42-694
R	High Temperature Snap Switch	42-799

3. Connect power supply to control and test switch action by varying liquid level in float chamber. If switch mechanism fails to function, check vertical alignment of control and consult installation instructions in switch mechanism bulletin.

-
4. Replace switch housing cover and place control into service.

If control has been furnished with NEMA 7/9 explosion proof (cast) or NEMA 4 moisture proof (gasketed) switch housing, check the following:

1. After wiring connections have been completed, housings must be sealed at the conduit outlet with a suitable compound to prevent entrance of air.
2. 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 gases into switch housings.

3.0 Preventive Maintenance

Periodic inspections are a necessary means to keep your Magnetrol 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 What to do

3.1.1 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.

3.1.2 Inspect switch mechanisms, terminals, and connections monthly

- a. Mercury switches may be visually inspected for short circuit damage. Check for small cracks in the glass tube containing the mercury. Such cracks can allow entrance of air into the tube causing the mercury to oxidize. This is noticeable as the mercury will appear dirty or dull, and will not break into clean, round pools. If these conditions exist, replace the mercury switch immediately.
- b. 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. Replace switch mechanism if wear or misalignment are apparent.

-
- c. DO NOT operate your control with defective or mal-adjusted switch mechanism (refer to bulletin on switch mechanisms furnished for service instructions).
 - d. Magnetrol 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.
 - e. Vibration may sometimes cause terminal screws to work loose. Check all terminal connections to make certain that screws are tightened.

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

3.1.3 Inspect entire unit periodically

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

3.2 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 level 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.

4.0 Reference Information

4.1 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.





- a. Fuses may be blown.
- b. Reset button(s) may need resetting.
- c. Power switch may be open.
- d. Controlled equipment may be faulty.
- e. 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.

4.1.1 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 three degrees of vertical. (Use spirit level on side of enclosing tube in two places, 90° apart.) Refer to Figure 3 on page 5.
7. If mechanism is equipped with a mercury switch, examine glass mercury tube closely as previously described in *Section 3.0 Preventive Maintenance* (page 7). If switch is damaged, replace it immediately. If microswitch, check continuity with ohmmeter.
8. If switch mechanism is operating satisfactorily, consult factory.

4.2 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 2, 3, F, L or HS 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 ① 	All with an electric switch mechanism and an ATEX housing	ATEX II 2 G EEx d IIC T6 IEC Ex Ex d IIC T6
CE 	Low Voltage Directives 73/23/EEC & 93/68/EEC Per Harmonized Standard: EN 61010-1/1993 & Amendment No. 1	Installation Category II Pollution Degree 2

① 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

4.3 Replacement Parts

Item	Description	Model					
		B40-1C50	B40-1F30 B40-1B60 B40-PF30 B40-PB60 B40-3C30 B40-PC30	B40-PC20 B40-5C20	B40-HF30 B40-HB60	B40-4C40 B40-PC40	B40-HC40
1	Housing Cover	Refer to bulletin 42-683, 42-694 or 42-799					
2	Housing Base						
3	Switch mechanism						
4	Jam nut(s)	10-2106-004 (qty. 4)					
5	Attraction sleeve	32-4203-001			04-4511-002		
6	E-tube gasket	12-1204-001					
7	Enclosing tube	32-6312-001	32-6346-003	32-6357-002	32-6308-002	32-6357-003	
8	O-ring	12-2201-215	N/A	12-2201-215	N/A	N/A	
9	Float chamber assembly	Consult Factory					

IMPORTANT: When ordering, please specify:
 A. Model and serial number of control.
 B. Name and number of replacement assembly.

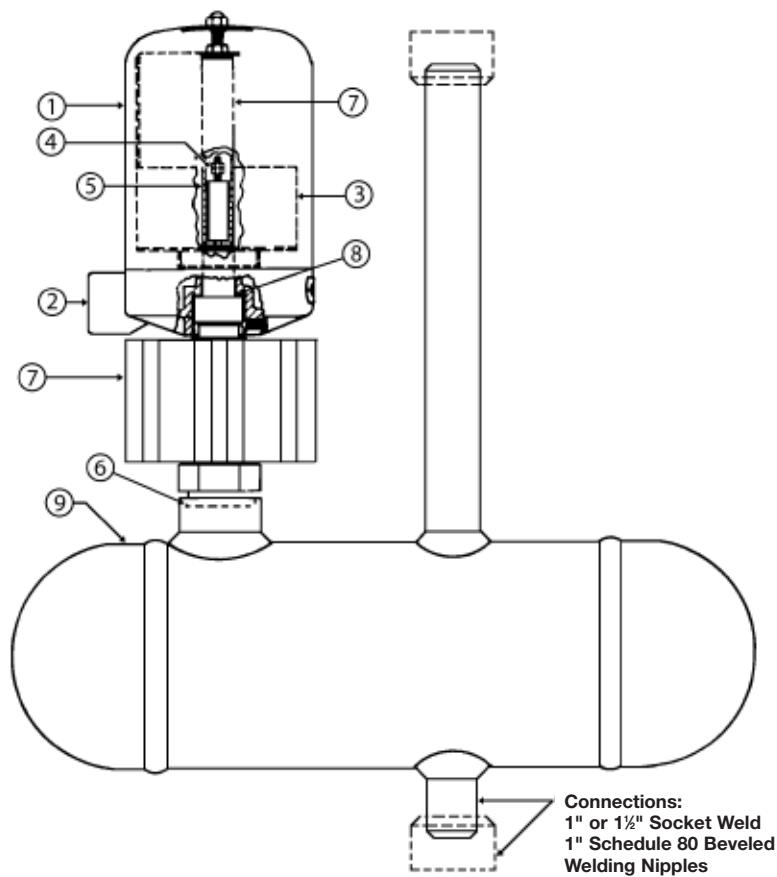
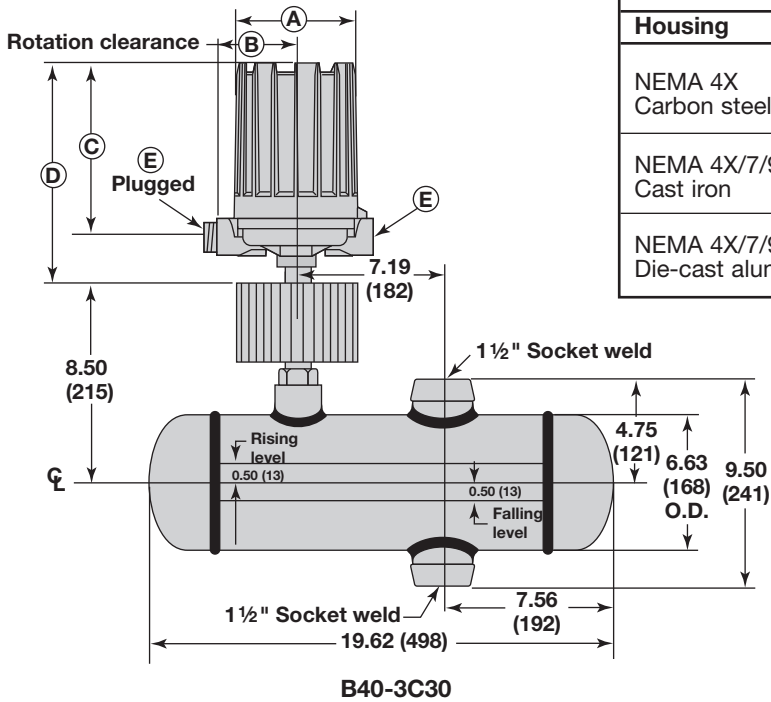


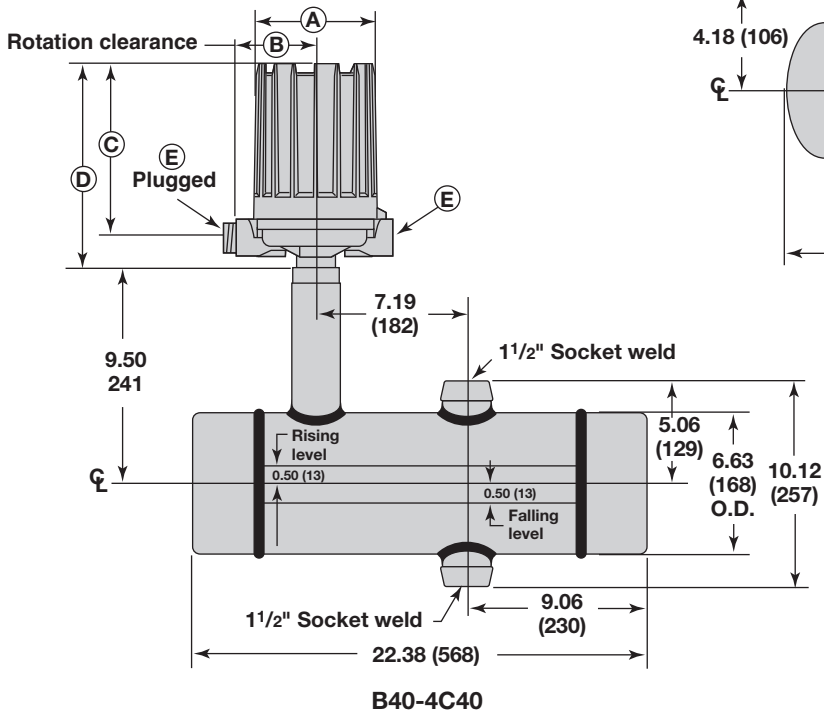
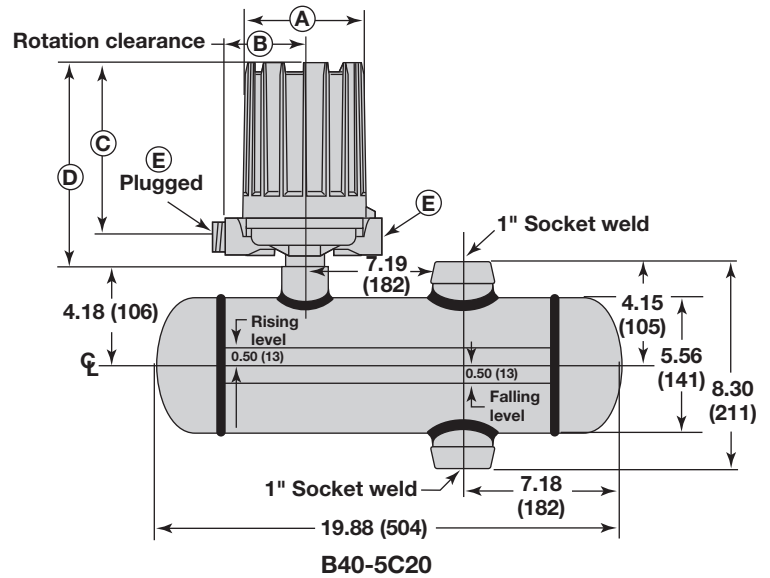
Figure 10

4.4 Specifications

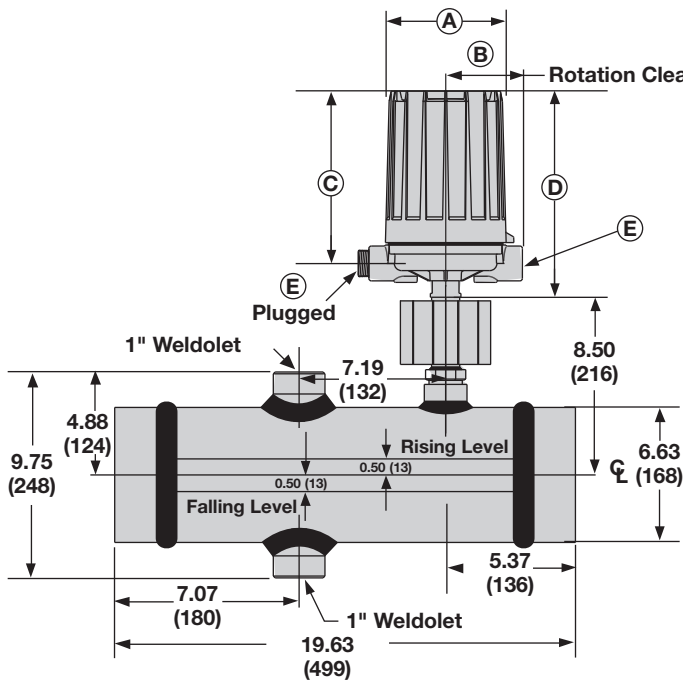
4.4.1 Dimensional Inches (mm)



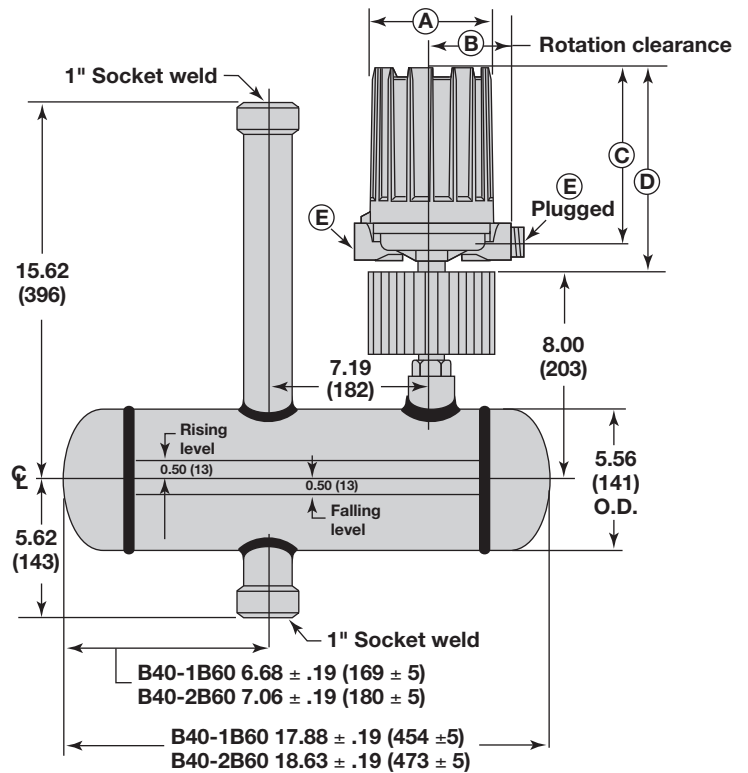
Outline Dimensions					
Housing	A	B	C	D	E
NEMA 4X Carbon steel	4.64 (117)	3.25 (82)	6.82 (173)	8.50 (215)	3/4" NPT Single conduit
NEMA 4X/7/9 Cast iron	5.62 (142)	5.25 (133)	8.88 (225)	10.50 (266)	1" NPT Single conduit
NEMA 4X/7/9 Die-cast aluminum	5.93 (150)	3.87 (98)	8.46 (214)	10.12 (257)	1" NPT Dual conduit



4.4.1 Dimensional Inches (mm) (continued)

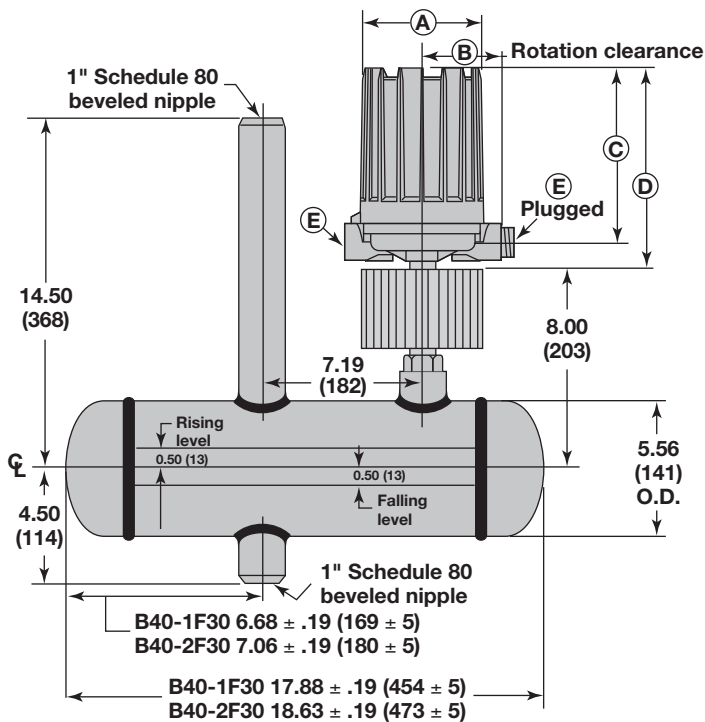


B40-1C50



B40-1B60 6.68 ± .19 (169 ± 5)
 B40-2B60 7.06 ± .19 (180 ± 5)
 B40-1B60 17.88 ± .19 (454 ± 5)
 B40-2B60 18.63 ± .19 (473 ± 5)

B40-1B60 and B40-2B60



B40-1F30 6.68 ± .19 (169 ± 5)
 B40-2F30 7.06 ± .19 (180 ± 5)
 B40-1F30 17.88 ± .19 (454 ± 5)
 B40-2F30 18.63 ± .19 (473 ± 5)

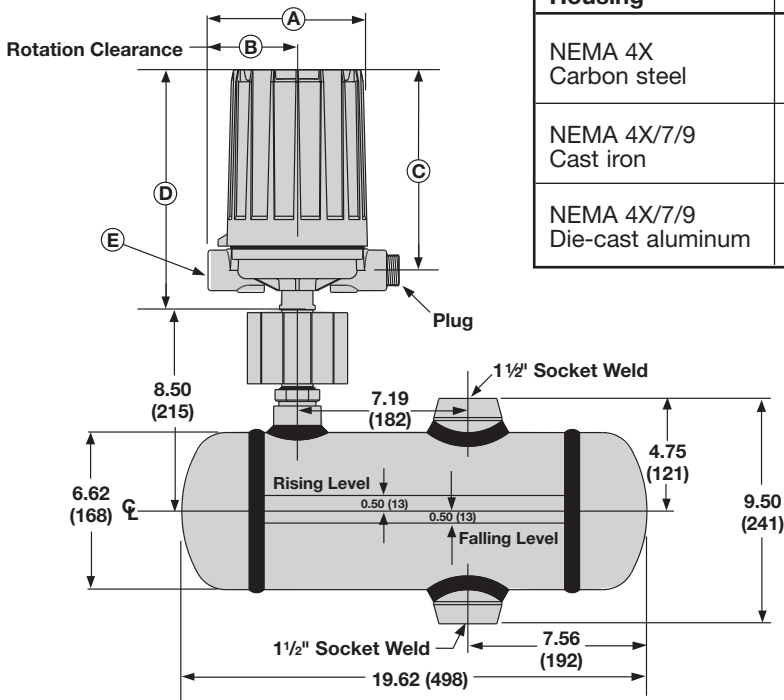
B40-1F30 and B40-2F30

NOTES:

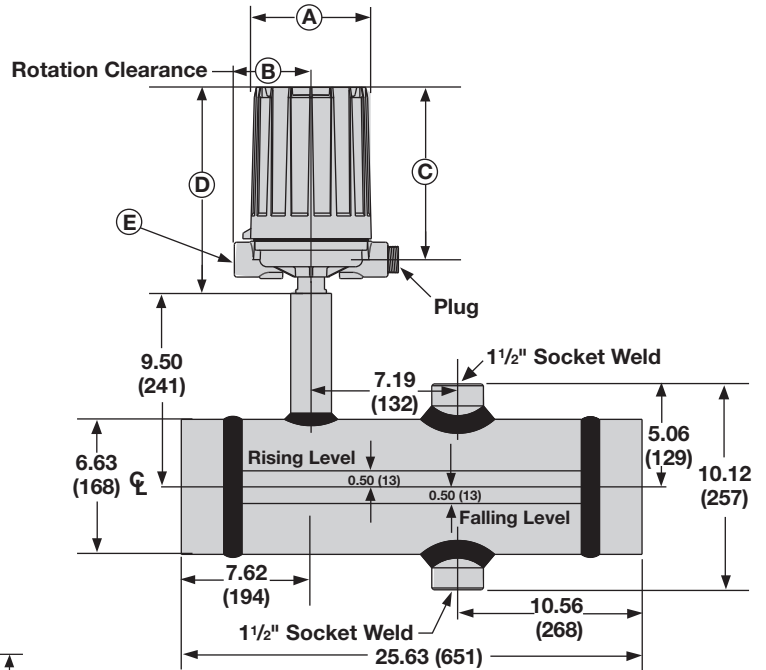
1. Allow 8 in (203 mm) overhead clearance for cover removal.
2. Maximum ambient temperature at switch head should not exceed +140° F (+60° C).

4.4.1 Dimensional Inches (mm) (continued)

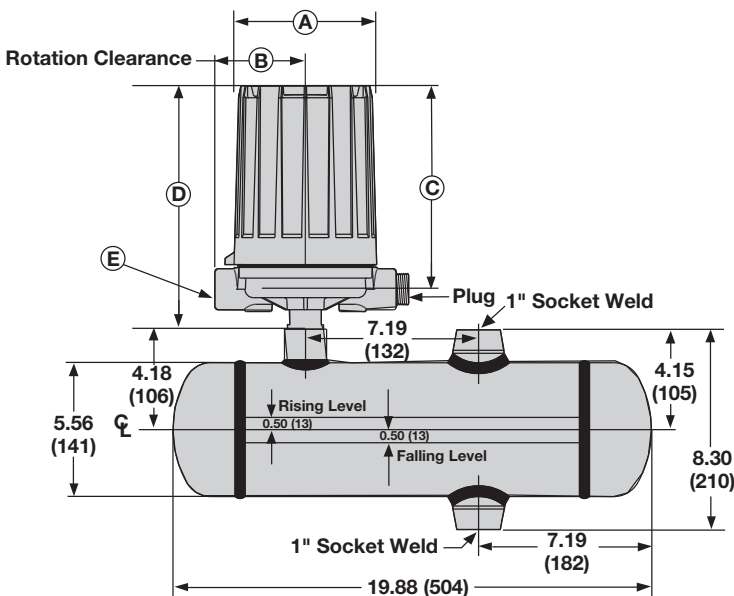
Outline Dimensions					
Housing	A	B	C	D	E
NEMA 4X Carbon steel	4.64 (117)	3.25 (82)	6.82 (173)	8.50 (215)	3/4" NPT Single conduit
NEMA 4X/7/9 Cast iron	5.62 (142)	5.25 (133)	8.88 (225)	10.50 (266)	1" NPT Single conduit
NEMA 4X/7/9 Die-cast aluminum	5.93 (150)	3.87 (98)	8.46 (214)	10.12 (257)	1" NPT Dual conduit



B40-PC30

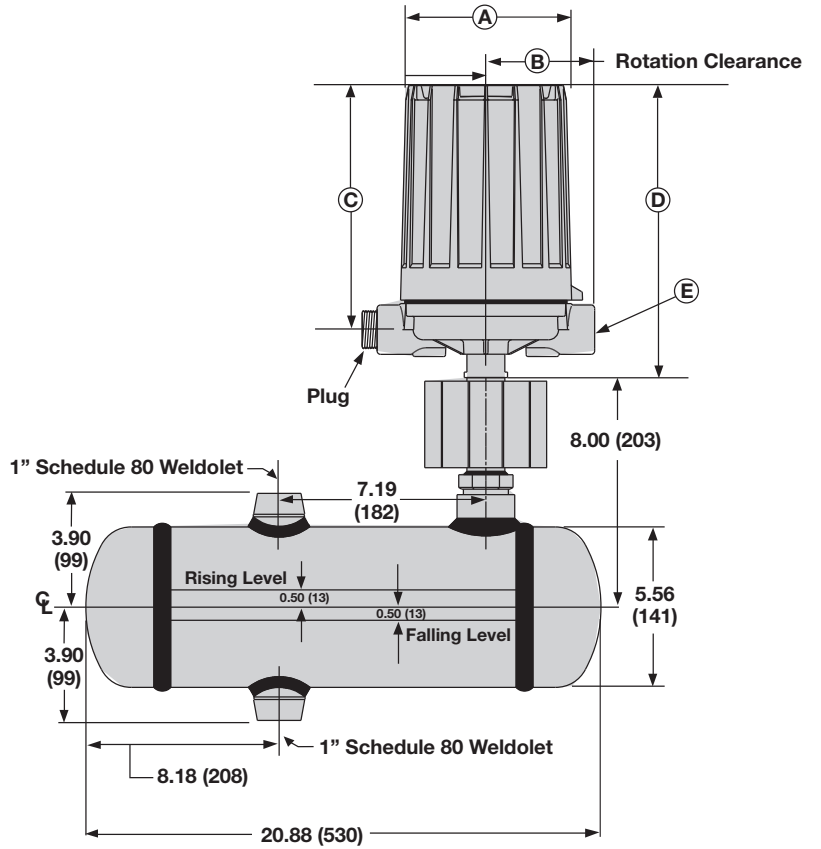


B40-PC40 and B40-HC40

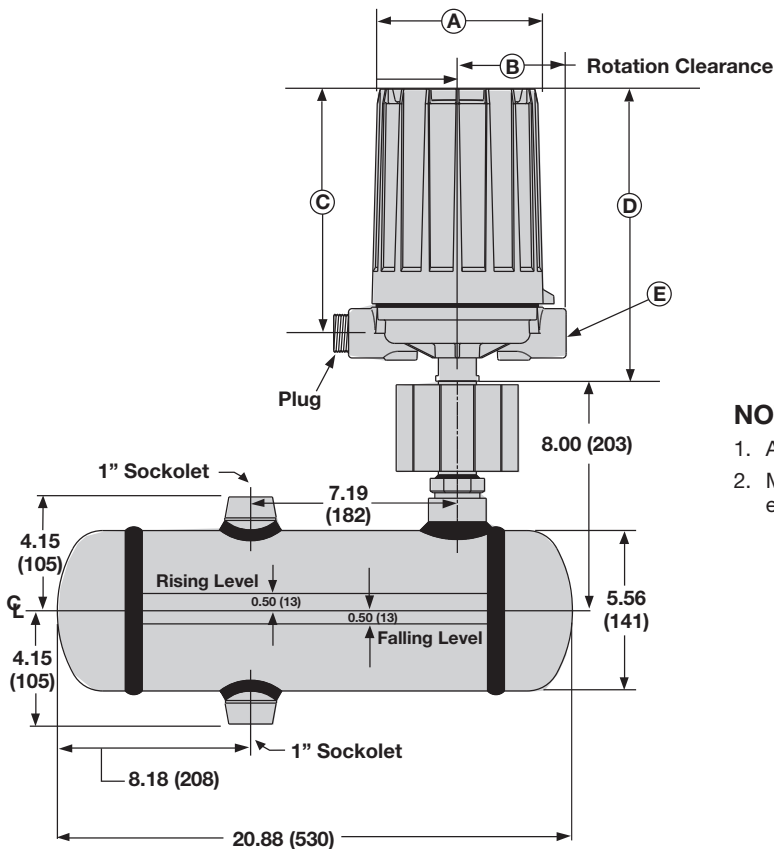


B40-PC20

4.4.1 Dimensional Inches (mm) (continued)



B40-HF30 and B40-PF30



B40-PB60 and B40-HB60

NOTES:

1. Allow 8 in (203 mm) overhead clearance for cover removal.
2. Maximum ambient temperature at switch head should not exceed +140° F (+60° C).

4.5 Model Numbers

4.5.1 Part Number Industrial Grade Construction

BASIC MODEL

B40	B40 Liquid Level Switch
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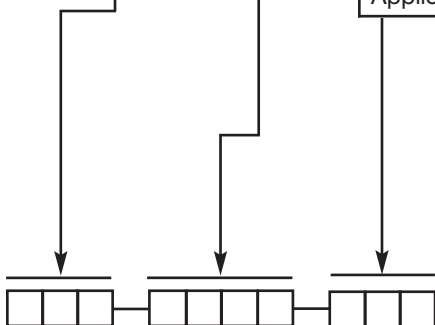
MATERIALS OF CONSTRUCTION/PRESSURE RATING (PSIG)

Code	Chamber Material	Float Material	Tank Connection	Min. S.G.	Temperature (°F)				
					100	500	750	800	1000
1F30	Chrome-Moly	321/347 SS	1" welding nipple	0.65	2067	1777	1670	1668	651
1B60			1" socket weld						
2F30	304 SS	316 SS	1" welding nipple		1857	1566	1294	1240	n/a
2B60			1" socket weld						
3C30	Carbon Steel	321/347 SS	1½" socket weld		1925	1820	1250	1100	215
4C40	316 SS		1½" socket weld		3700	3543	3169	3129	3011
5C20	Carbon Steel		1" socket weld		2085	1820	1350	1110	165
1C50	Chrome-Moly		1" weld coupling		2533	2010	1872	1845	956

ELECTRIC SWITCH MECHANISM AND ENCLOSURE FOR ALL MODELS EXCEPT B40-5C20 ②

Switch Description	Maximum ③ Process Temperature ° F (° C)	One Set Point	NEMA 4X/7/9		
			Aluminum, Polymer Coated	Aluminum, CI I Div. 1 Grp B	ATEX Ex II 2 G EEx d IIC T6
Series F Snap Switch Hermetically Sealed	750 (399)	SPDT	FKB	FKK	FC9
		DPDT	FNB	FNK	FF9
Series R High Temp Snap Switch	750 (399)	SPDT	RKB	RKK	RC9
Series S Snap Switch for AC Current Applications	550 (288)	SPDT	SKB	SKK	SA9
		DPDT	SNB	SNK	SB9
Series S Snap Switch for DC Current Applications	400 (204)	SPDT	SLB	SLK	SC9
		DPDT	SOB	SOK	SF9

(continued on next page)



4.5.1 Part Number Industrial Grade Construction (continued)

Switch Description	Maximum ^③ Process Temperature ° F (° C)	One Set Point	NEMA 4X	NEMA 4X/7/9	
			Steel, Polymer Coated	Cast Iron, Polymer Coated	Cast Iron, CI I Div. 1 Grp B
Series L Mercury Switch	1000 (538)	SPDT	LAM	LKM	LKW
		DPDT	LDM	LNM	LNW
Series L Vibration Resistant Mercury Switch	1000 (538)	SPDT	LBM	LLM	LLW
		DPDT	LEM	LOM	LOW
Series R High Temp Snap Switch	1000 (538)	SPDT	R5M	RWM	RWW

ELECTRIC SWITCH MECHANISM AND ENCLOSURE FOR MODEL B40-5C20 ONLY ^②

Switch Description	Maximum ^③ Process Temperature ° F (° C)	One Set Point	NEMA 4X/7/9		
			Aluminum, Polymer Coated	Aluminum, CI I Div. 1 Grp B	ATEX Ex II 2 G EEx d IIC T6
Series C Snap Switch	450 (232)	SPDT	CKB	CKK	CC9
		DPDT	CNB	CNK	CF9
Series D Snap Switch for DC Current Applications	250 (121)	SPDT	DKB	DKK	DC9
		DPDT	DNB	DNK	DF9
Series F Snap Switch Hermetically Sealed	750 (399)	SPDT	FKB	FKK	FC9
		DPDT	FNB	FNK	FF9
Series HS 5 amp Snap Switch Hermetically Sealed w/Terminal Block	550 ^④ (288)	SPDT	HM3	HM4	HA9
		DPDT	HM7	HM8	HB9
Series HS 5 amp Snap Switch Hermetically Sealed w/Wiring Leads	550 ^④ (288)	SPDT	HMJ	HMK	n/a
		DPDT	HMS	HMT	n/a
Series R Snap Switch	750 (399)	SPDT	RKB	RKK	RC9
Series 2 Vibration Resistant Mercury Switch w/Beaded Lead	750 (399)	SPDT	2KB	2KK	2C9
		DPDT	2NB	2NK	2F9
Series 3 Mercury Switch w/Beaded Leads	750 (399)	SPDT	3KB	3KK	3C9
		DPDT	3NB	3NB	3F9

- ① Float material based on availability. Both 321 SS and 347 SS are stabilized austenitic stainless steels.
- ② Consult factory for NEMA 4X/7/9 cast iron housings.
- ③ Process temperature based on +100° F (+38° C) ambient.
- ④ On steam applications, temperature down-rated to +400° F (+204° C) process at +100° F (+38° C) ambient.



4.5.2 Part Number ASME B31.1 Construction

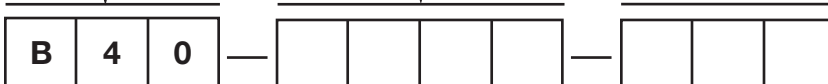
BASIC MODEL

B40	B40 Liquid Level Switch
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MATERIALS OF CONSTRUCTION/PRESSURE RATING (PSIG)

	Chamber Material	Float Material	Tank Connection	Minimum S.G.	Temperature ° F				
					100	500	750	800	1000
PF30	Chrome-Moly	321/347 SS ^①	1" butt-weld	0.65	1573	1573	1552	n/a	n/a
HF30					n/a	n/a	n/a	1510	661
PB60			1" socket weld		1573	1573	1552	n/a	n/a
HB60					n/a	n/a	n/a	1510	661
PC30	Carbon Steel		1 1/2" socket weld		1444	1444	1251	n/a	n/a
PC40	316 SS				1 1/2" socket weld	3700	3543	3169	n/a
HC40			n/a			n/a	n/a	3129	3011
PC20	Carbon Steel		1" socket weld		1335	1335	1157	n/a	n/a

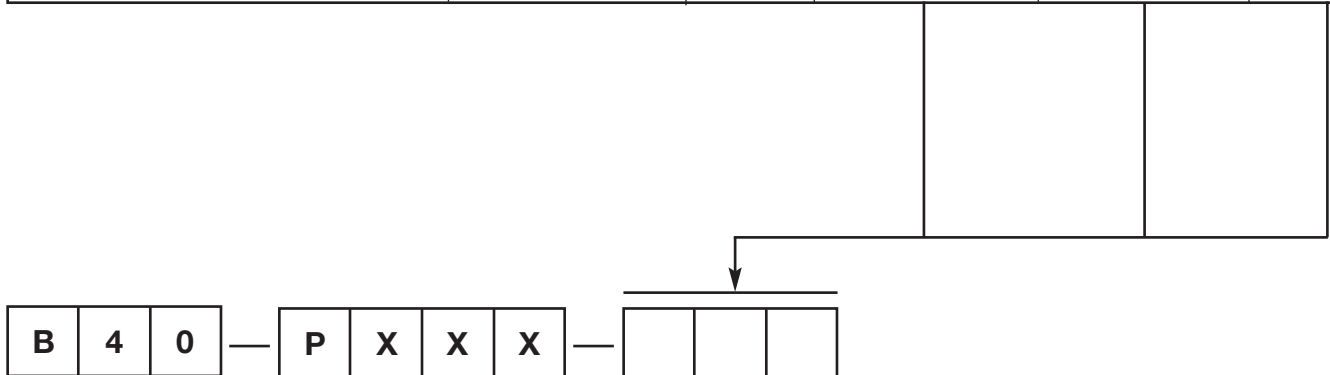
- ① Float material based on availability. Both 321SS and 347SS are stabilized austenitic stainless steels.
- ② Consult factory for NEMA 4X/7/9 cast iron housings.
- ③ Aluminum enclosure limited to +750° F (+399° C) in hazardous locations.
- ④ Process temperature based on +100° F (+38° C) ambient.
- ⑤ On steam applications, temperature down-rated to +400° F (+204° C) process at +100° F (+38° C) ambient.



4.5.2 Part Number ASME B31.1 Construction (continued)

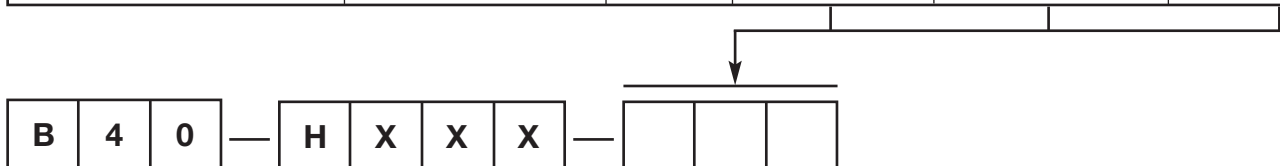
ELECTRIC SWITCH MECHANISM AND ENCLOSURE FOR MODEL B40-PXXX ONLY

Switch Description	Process Temperature Range ^④	One Set Point	NEMA 4X/7/9 Aluminum Enclosure ^{② ③}		
			Class I, Div. 1 Groups C & D	Class I, Div. 1 Group B	ATEX
Series C Snap Switch	-40° to +450° F (-40° to +232° C)	SPDT DPDT	CKB CNB	CKK CNK	CC9 CF9
Series D Snap Switch for DC Current Applications	-40° to +250° F (-40° to +121° C)	SPDT DPDT	DKB DNB	DKK DNK	DC9 DF9
Series F Snap Switch Hermetically Sealed	-50° to +750° F (-46° to +399° C)	SPDT DPDT	FKB FNB	FKK FNK	FC9 FF9
Series HS 5 amp Snap Switch Hermetically Sealed w/Terminal Block	-50° to +550° F ^⑤ (-46° to +288° C)	SPDT DPDT	HM3 HM7	HM4 HM8	HA9 HB9
Series HS 5 amp Snap Switch Hermetically Sealed w/Wiring Leads	-50° to +550° F ^⑤ (-46° to +288° C)	SPDT DPDT	HMJ HMS	HMK HMT	— —
Series R snap switch	-40° to +750° F (-40° to +399° C)	SPDT	RKB	RKK	RC9
Series S Snap Switch for AC Current Applications	-40° to +550° F (-40° to +288° C)	SPDT DPDT	SKB SNB	SKK SNK	SA9 SB9
Series S Snap Switch for DC Current Applications	-40° to +250° F (-40° to +121° C)	SPDT DPDT	SLB SOB	SLK SOK	SC9 SF9
Series 2 Vibration Resistant Mercury Switch w/Beaded Leads	-20° to +750° F (-29° to +399° C)	SPDT DPDT	2KB 2NB	2KK 2NK	2C9 2F9
Series 3 Mercury Switch w/Beaded Leads	-20° to +750° F (-29° to +399° C)	SPDT DPDT	3KB 3NB	3KK 3NK	3C9 3F9



ELECTRIC SWITCH MECHANISM AND ENCLOSURE FOR MODEL B40-HXXX ONLY

Switch Description	Process Temperature Range ^④	One Set Point	NEMA 4X	NEMA 4X/7/9	
			Steel polymer coated	Cast iron, Class I, Div 1, Grps C&D	Cast iron, Class I, Div 1, Group B
Series L mercury switch	-20° to +1000° F (-29° to +538° C)	SPDT DPDT	LAM LDM	LKM LNM	LKW LNW
Series L vibration resistant mercury switch	-20° to +1000° F (-29° to +538° C)	SPDT DPDT	LBM LEM	LLM LOM	LLW LOW
Series R high temperature snap switch	-40° to +1000° F (-40° to +538° C)	SPDT	R5M	RWM	RWW



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.

