MAGNETROL® / AMETEK®
LEVEL MEASUREMENT SOLUTIONS

Model B40 Liquid Level Switch

DESCRIPTION

The Magnetrol® B40 liquid level switch is specifically designed and constructed for high pressure, high temperature service conditions.



FEATURES

- Choices of chamber materials include carbon steel, stainless steel and chrome-moly
- 300 series stainless steel float.
- Choice of switch mechanism:
  - Dry contact
  - Hermetically sealed
- Minimum specific gravity 0.65
- Process temperatures up to +1000 °F (+538 °C)
- Choice of switch mechanism enclosure:
  - TYPE 4X polymer coated steel
  - Polymer coated aluminum with various approvals for electrical switches
- Choice of tank connection:
  - 1" welding nipples
  - 1" or 1½" socket welds

OPTIONS

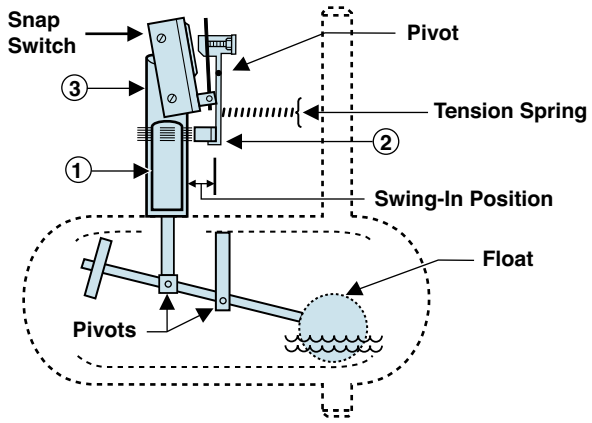
- ATEX housing
- Flanged connections
- Temperature extensions
- Low specific gravity calibration
- ASME B31.1 Construction
- Additional QC testing

APPLICATIONS

- Accumulators
- Receivers
- Flare pots
- Scrubbers
- Flash tanks
- Knock-out drums
- Storage tanks
- Separators

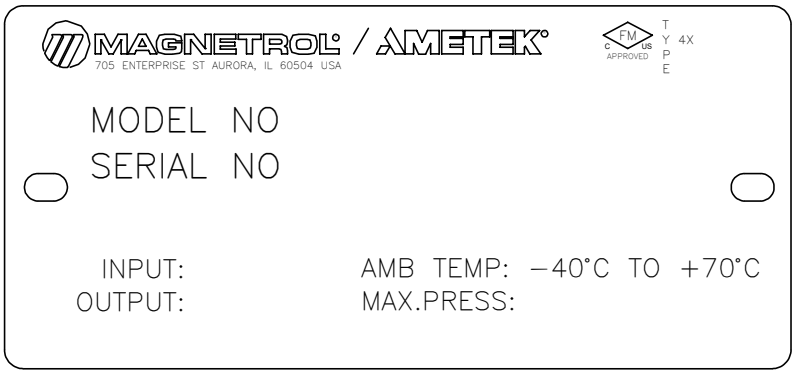
TECHNOLOGY

B40 level switches 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.

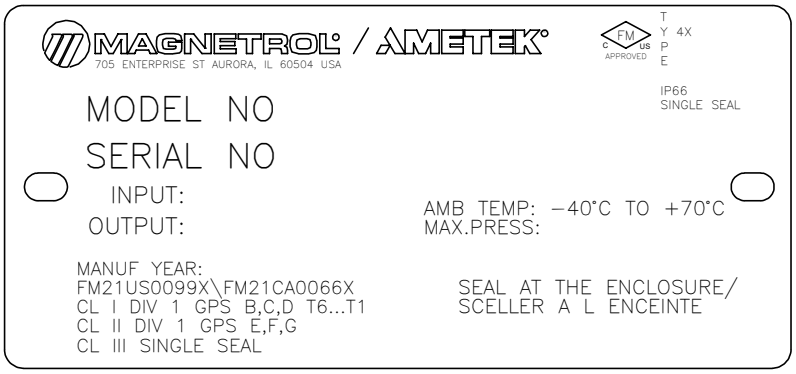


AGENCY APPROVALS

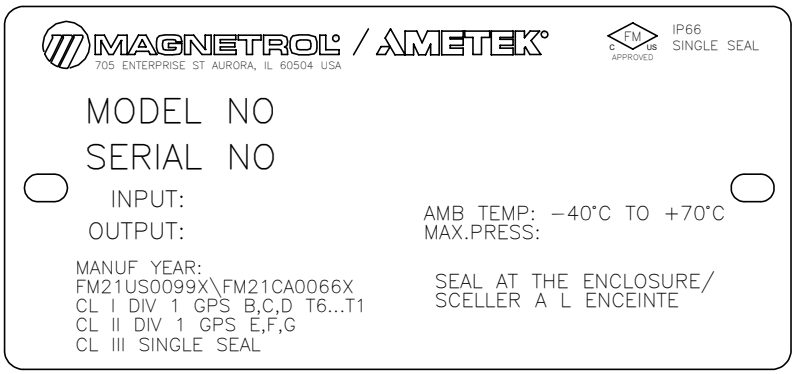
EMC directive 2014/30/EU (electromagnetic compatibility)
The following standard has been applied: EN 61326-1:2013-
(Low Voltage Directive-CE)



Approval: FM Type 4X 005-8047-003
Housing Material: Carbon Steel/Aluminum



005-8049-009
Approval: FM US/CA
Housing Material: Aluminum



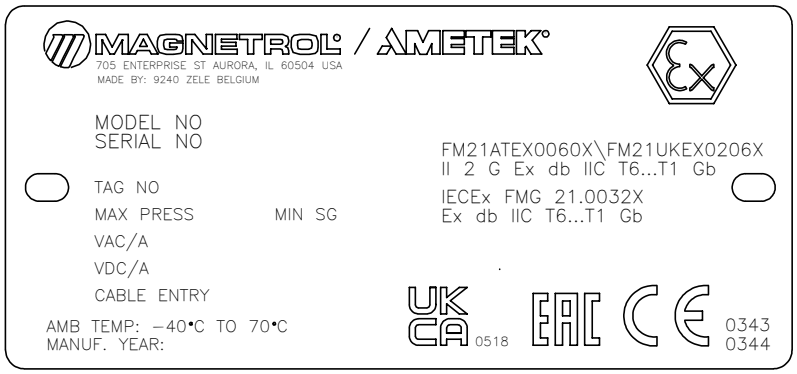
Approval: FM US/CA 005-8049-072
Housing Material: Cast Iron

AGENCY APPROVALS



005-8060-008

Approval: ATEX/IECEx
Housing Material: Aluminum



005-8060-021

Approval: ATEX/IECEx
Housing Material: Cast Iron

Maximum Pressure Ratings:
These are the ranges of process pressure ranges based on each individual model as mention in each individual manual.

Nominal Thickness (in)	Minimum Thickness (in)	Pressure Rating for 316 SST Version (psig)
0.035	0.0295	1300
0.065	0.0595	2710
0.093	0.087	5000

When the equipment is installed in process temperatures higher than +85°C the temperature classification must be increased 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

Specific Conditions of Use

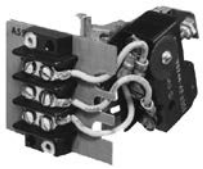
1. The flamepaths of the equipment are not intended to be repaired. Consult the manufacturer if repair of the flamepath joints is necessary.
2. Refer to the manufacturer's instructions to reduce the potential of an electrostatic charging hazard on the equipment enclosure.
3. The cast iron enclosure for ATEX, UKEX and IECEx certification does not contain an IP rating.
4. The cast iron enclosure for North American certification does not contain a Type 4X rating.
5. For installation with ambient temperature of 70°C, refer to the manufacturer's instruction for guidance on proper selection of conductors.

Additional Approvals:

- Series C, U, W, and X switch mechanisms, along with Tuffy T3X designs, in Aluminum or Cast Iron housings, are certified for Ex ia IIC T6 Ga per Certificate No. IECEx KIWA 18.0011X and ATEX II 1 G Ex ia IIC T6 Ga per Certificate No. KIWA 18ATEX0022 X Issue: 1.
- Series HS, F, 8, and 9 switch mechanisms, in Type 4X housings, are CSA certified for Class I, Div 2, Groups A, B, C & D.

SPECIFICATIONS

SWITCH MECHANISMS AND ENCLOSURES





SERIES C, D, R & S DRY CONTACT SWITCHES

- Designed for AC and DC current applications
- Process temperatures to +1000 °F (+538 °C); Consult factory for process temperatures up to +1200 °F (+650 °C)

SERIES F, HS, 8 & 9 HERMETICALLY SEALED SWITCHES

- Ideal for use in salt and other corrosive atmospheres
- HS is a positively pressurized capsule for entire mechanism and contacts
- Process temperatures to +1000 °F (+538 °C)

SWITCH ENCLOSURE

- Carbon Steel/Aluminum Type 4X
- Aluminum with various hazardous location approvals and Type 4X
- Cast Iron with various hazardous location approvals



Aluminum Enclosure



Cast Iron Enclosure



Carbon Steel Enclosure

ASME B31.1 CONSTRUCTION

PRODUCT DESIGN

Pressure vessels are designed within code specified stress limits. Design calculations, design prints and weld qualifications are available for audit. All chamber branch and circumferential weld joints are designed to achieve FULL penetration.

MATERIALS OF CONSTRUCTION

All pressure-retaining materials are procured with Certificates of Conformance to assure compliance of components with required standards.

WELDING

All welding is performed by qualified welders and per procedures required by the ASME Boiler Pressure Vessel Code Sec. IX. Welds are visually inspected for FULL penetration. All other non-destructive examination is performed per ANSI B31.1.

HYDROSTATIC TEST

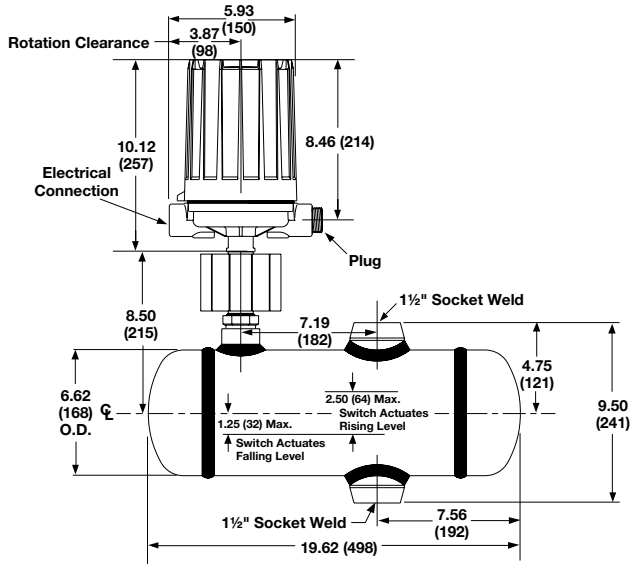
All chambers are hydrostatically tested at 1.5 times the design pressure.

BASIC ELECTRICAL RATINGS

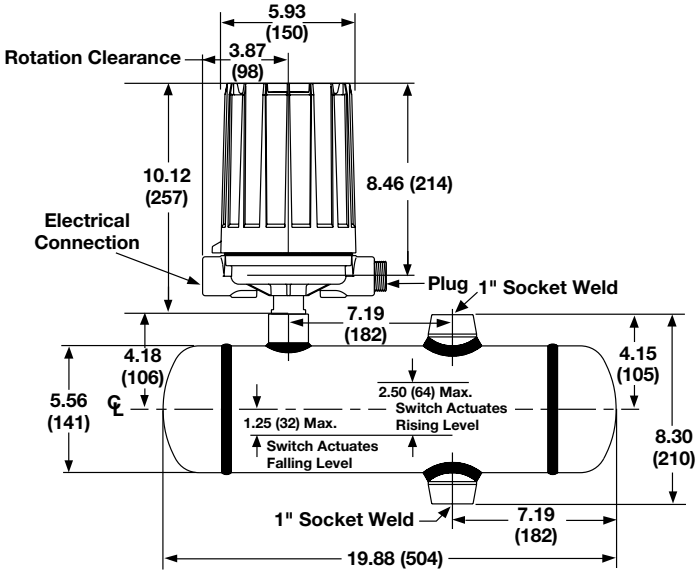
Voltage	Switch Series and Non-Inductive Ampere Rating								
	C	**D**	**F**	**HS**	**R**	**S** (AC)	**S** (DC)	**8**	**9**
120 VAC	15.00	10.00	2.50	5.00	1.00	15.00	10.00	1.00	—
240 VAC	15.00	—	—	5.00	1.00	15.00	—	—	—
24 VDC	6.00	—	4.00	5.00	1.00	—	—	3.00	0.50
120 VDC	1.00	10.00	0.30	0.50	0.40	1.00	10.0	—	—
240 VDC	0.50	3.00	—	0.25	—	0.50	3.00	—	—

DIMENSIONAL SPECIFICATIONS

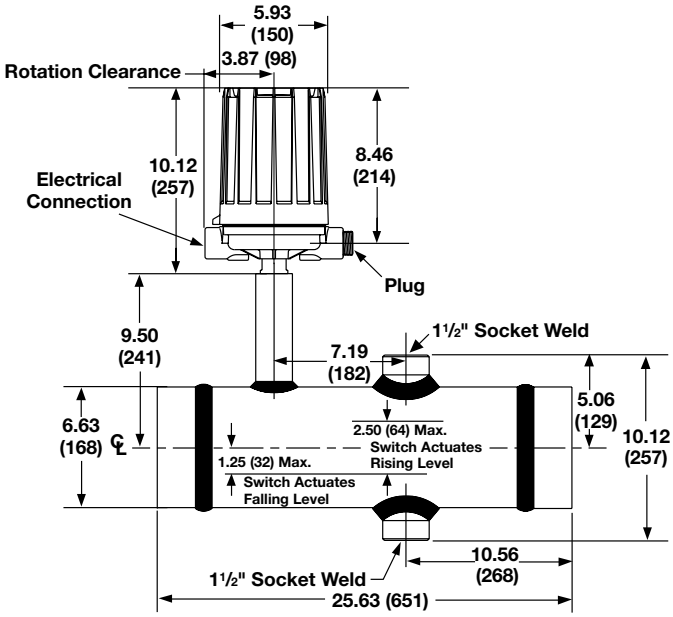
Inches (mm)



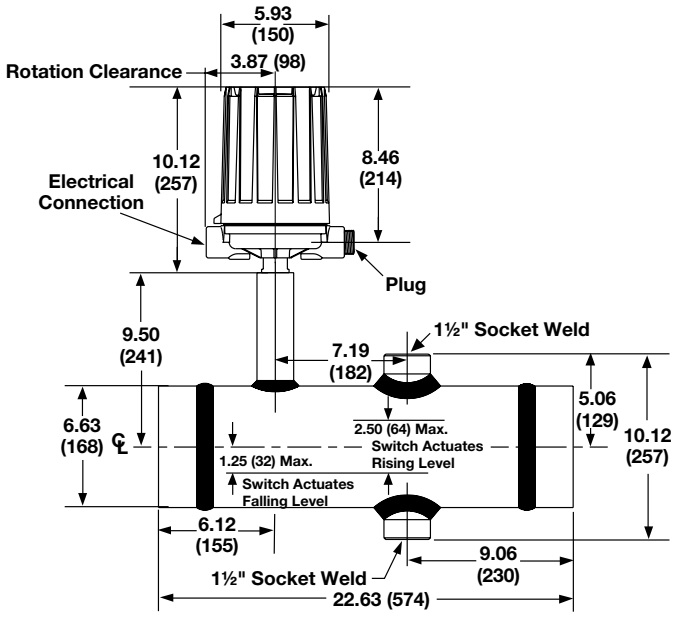
B40-3C30 / B40-PC30



B40-5C20 / B40-PC20



B40-PC40 and B40-HC40



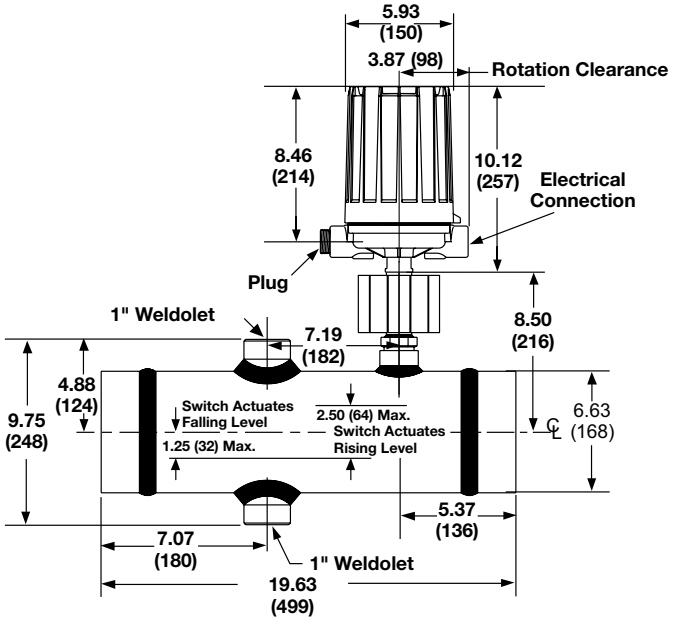
B40-4C40

NOTES:

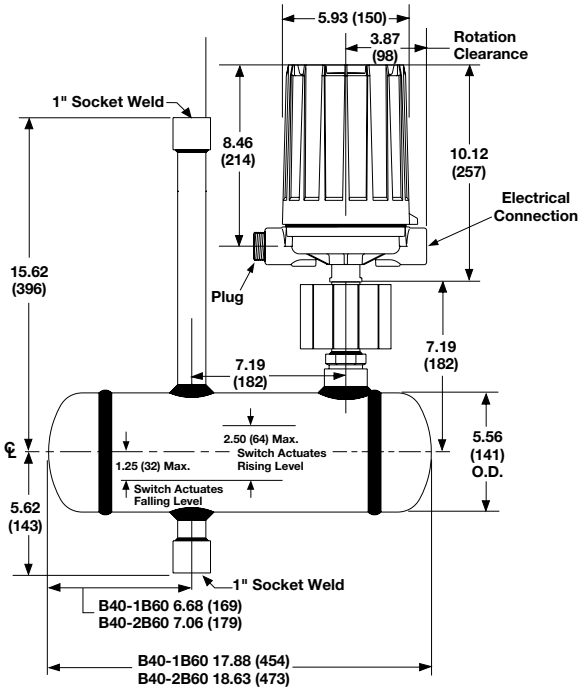
1. Allow 8 inches (203 mm) overhead clearance for cover removal.
2. Maximum ambient temperature at switch head should not exceed +140 °F (+60 °C).

DIMENSIONAL SPECIFICATIONS (CONT.)

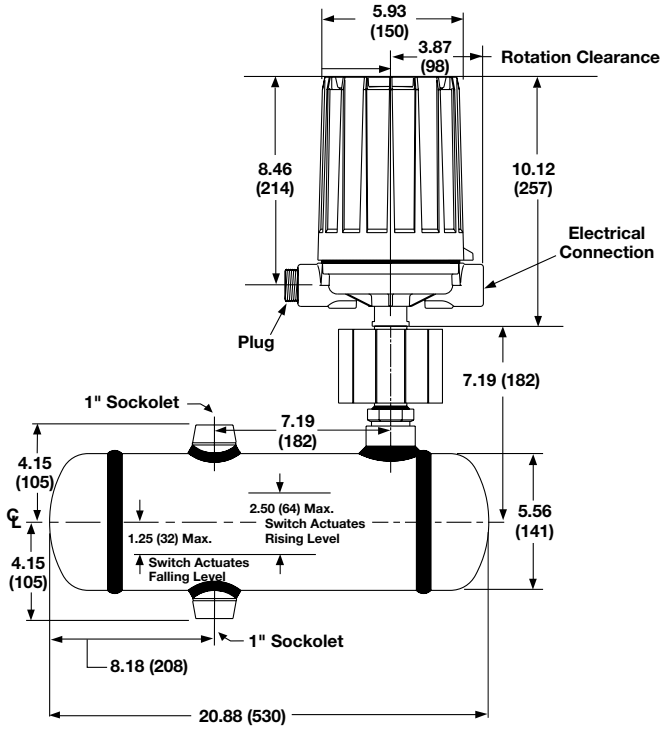
Inches (mm)



B40-1C50



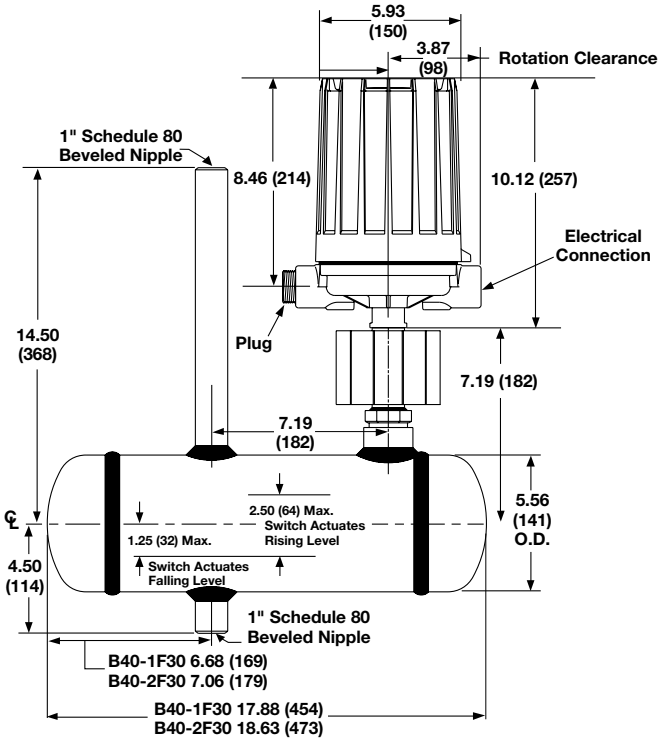
B40-1B60 and B40-2B60



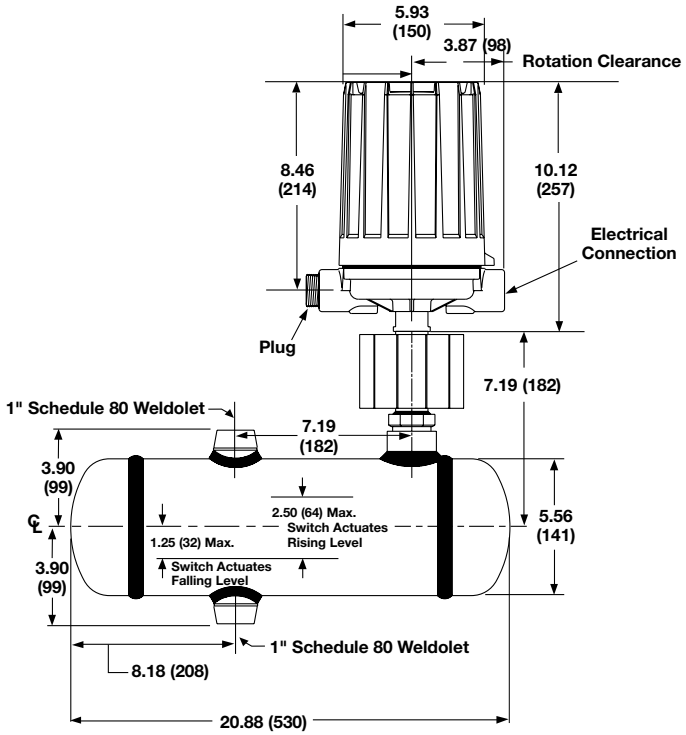
B40-PB60 and B40-HB60

DIMENSIONAL SPECIFICATIONS

Inches (mm)



B40-1F30 and B40-2F30



B40-HF30 and B40-PF30

MODEL NUMBER

INDUSTRIAL

BASIC MODEL

B40	B40 Liquid Level Switch

MATERIALS OF CONSTRUCTION/PRESSURE RATING PSI (BAR)

Code	Chamber Material	Float Material	Tank Connection	Min. S.G.	Temperature °F (°C)				
					100 (38)	500 (260)	750 (400)	800 (427)	1000 (538)
1F30	P11/F11 Chrome-Moly	321/347 SS ②	1" welding nipple	0.65	2067 (142)	1777 (122)	1670 (115)	1668 (115)	651 (44)
1B60			1" socket weld						
2F30	304 SS	316 SS	1" welding nipple		1857 (128)	1566 (107)	1294 (89)	1240 (85)	—
2B60			1" socket weld						
3C30	Carbon Steel ①	321/347 SS ②	1½" socket weld		1925 (132)	1820 (125)	1250 (86)	1100 (75)	215 (14)
4C40	316 SS		1½" socket weld		3700 (255)	3543 (244)	3169 (218)	3129 (215)	3011 (207)
5C20	Carbon Steel ①		1" socket weld		2085 (143)	1820 (125)	1350 (93)	1110 (76)	165 (11)
1C50	P11/F11 Chrome-Moly		1" weld coupling		2533 (174)	2010 (138)	1872 (129)	1845 (127)	956 (65)

① Use caution when specifying carbon steel above +800 °F (+427 °C).

② Float material based on availability. Both 321SS and 347SS are stabilized austenitic stainless steels.

B	4	0	–					–			
1	2	3		4	5	6	7		8	9	10

MODEL NUMBER

INDUSTRIAL (continued)

ELECTRIC SWITCH MECHANISM AND ENCLOSURE FOR ALL MODELS

Switch Description	Process Temperature Range ③	One Set Point	Aluminum Enclosure ④		
			FM (US/CA) Groups C&D 1" NPT	FM (US/CA) Group B 1" NPT	ATEX / IECEx 1" NPT
Series F Snap Switch Hermetically Sealed	-50 to +750 °F (-46 to +399 °C)	SPDT	FKB	FKK	FC9
		DPDT	FNB	FNK	FF9
Series R Snap Switch	-40 to +750 °F (-40 to +399 °C)	SPDT	RKB	RKK	RC9
		DPDT	RNB	RNK	RF9
Series S Snap Switch for AC Current Applications	-40 to +550 °F (-40 to +288 °C)	SPDT	SKB	SKK	SA9
		DPDT	SNB	SNK	SB9
Series S Snap Switch for DC Current Applications	-40 to +250 °F (-40 to +121 °C)	SPDT	SLB	SLK	SC9
		DPDT	SOB	SOK	SF9
Series 8 Hermetically Sealed Snap Switch	-50 to +750 °F (-46 to +399 °C)	SPDT	8KB	8KK	8C9
		DPDT	8NB	8NK	8F9
Series 9 Hermetically Sealed Snap Switch	-50 to +750 °F (-46 to +399 °C)	SPDT	9KB	9KK	9C9
		DPDT	9NB	9NK	9F9
			CS/Aluminum	Cast Iron	
			Type 4X ¾" NPT	FM (US/CA) Groups C&D 1" NPT	FM (US/CA) Group B 1" NPT
Series R Snap Switch	-40 to +1000 °F (-40 to +538 °C) ⑤	SPDT	R1M	RKM	RKW
		DPDT	RDM	RNM	RNW
Series 9 Hermetically Sealed Snap Switch	-50 to +1000 °F (-46 to +538 °C) ⑤	SPDT	9AM	9KM	9KW
		DPDT	9DM	9NM	9NW

B	4	0	–					–			
1	2	3		4	5	6	7		8	9	10

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

Switch Description	Process Temperature Range °F (°C) ③	One Set Point	Aluminum Enclosure ④		
			FM (US/CA) Groups C&D 1" NPT	FM (US/CA) Group B 1" NPT	ATEX / IECEx 1" NPT
Series C Snap Switch	-40 to +450 °F (-40 to +232 °C)	SPDT	CKB	CKK	CC9
		DPDT	CNB	CNK	CF9
Series D Snap Switch for DC Current Applications	-40 to +250 °F (-40 to +121 °C)	SPDT	DKB	DKK	DC9
		DPDT	DNB	DNK	DF9
Series F Snap Switch Hermetically Sealed	-50 to +750 °F (-46 to +399 °C)	SPDT	FKB	FKK	FC9
		DPDT	FNB	FNK	FF9
Series HS 5 amp Snap Switch Hermetically Sealed w/Terminal Block	-50 to +550 °F (-46 to +288 °C) ⑥	SPDT	HM3	HM4	HA9
		DPDT	HM7	HM8	HB9
Series HS 5 amp Snap Switch Hermetically Sealed w/Wiring Leads	-50 to +550 °F (-46 to +288 °C) ⑥	SPDT	HMJ	HMK	—
		DPDT	HMS	HMT	—

B	4	0	–	5	C	2	0	–			
1	2	3		4	5	6	7		8	9	10

③ Process temperature based on +100 °F (+38 °C) ambient.

④ Consult factory for cast iron housings.

⑤ Consult factory for temperatures above +842 °F (+450 °C).

⑥ On steam applications, temperature down-rated to +400 °F (+204 °C) process at +100 °F (+38 °C) ambient.

MODEL NUMBER

ASME B31.1 Construction

BASIC MODEL

B40-H	B40-H Liquid Level Switch for Temperatures Above +750 °F (+399 °C)

MATERIALS OF CONSTRUCTION/PRESSURE RATING PSI (BAR)

	Chamber Material	Float Material	Tank Connection	Min. S.G.	Temperature °F (°C)		
					750 (400)	800 (427)	1000 (538)
F30	P11/F11 Chrome-Moly	321/347 SS ①	1" butt-weld	0.65	1552 (107)	1510 (104)	661 (45)
B60			1" socket weld				
C40	A312/A479 T316/316L SS		1½" socket weld		3169 (218)	3129 (215)	3011 (207)

ELECTRIC SWITCH MECHANISM AND ENCLOSURE FOR MODEL B40-HXXX ONLY

Switch Description	Process Temperature Range ②	One Set Point	CS/Aluminum	Cast Iron	
			Type 4X ¾" NPT	FM (US/CA) Groups C&D 1" NPT	FM (US/CA) Group B 1" NPT
Series R Snap Switch	-40 to +1000 °F (-40 to +538 °C) ③	SPDT	R1M	RKM	RKW
		DPDT	RDM	RNM	RNW
Series 9 Hermetically Sealed Snap Switch	-50 to +1000 °F (-46 to +538 °C) ③	SPDT	9AM	9KM	9KW
		DPDT	9DM	9NM	9NW

① Float material based on availability. Both 321SS and 347SS are stabilized austenitic stainless steels.

② Process temperature based on +100 °F (+38 °C) ambient.

③ Consult factory for temperatures above +842 °F (+450 °C).

B	4	0	–	H				–			
1	2	3		4	5	6	7		8	9	10

MODEL NUMBER

ASME B31.1 Construction

BASIC MODEL

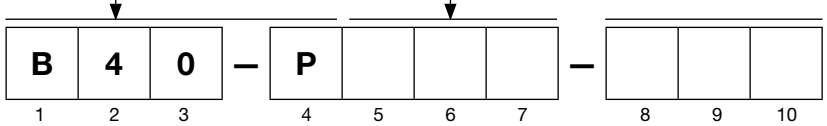
B40-P	B40-P Liquid Level Switch for Temperatures Up To and Including +750 °F (+399 °F)

MATERIALS OF CONSTRUCTION/PRESSURE RATING PSI (BAR)

	Chamber Material	Float Material	Tank Connection	Min. S.G.	Temperature °F (°C)		
					100 (38)	**500 (260)**	**750 (400)**
F30	P11/F11 Chrome-Moly	321/347 SS ②	1" butt-weld	0.65	1573 (108)	1573 (108)	1552 (107)
B60			1" socket weld				
C30	A105/A106 ① Carbon Steel		1½" socket weld		1444 (99)	1444 (99)	1251 (86)
C40	A312/A479 T316/316L SS		1½" socket weld		3700 (255)	3543 (244)	3169 (218)
C20	A105/A106 ① Carbon Steel		1" socket weld		1335 (92)	1335 (92)	1157 (79)

① Use caution when specifying carbon steel above +800 °F (+427 °C).

② Float material based on availability. Both 321SS and 347SS are stabilized austenitic stainless steels.



MODEL NUMBER

ASME B31.1 Construction (continued)

ELECTRIC SWITCH MECHANISM AND ENCLOSURE FOR MODEL B40-PXXX ONLY

Switch Description	Process Temperature Range ③	One Set Point	Aluminum Enclosure		
			FM (US/CA) Groups C&D 1" NPT	FM (US/CA) Group B 1" NPT	ATEX / IECEx 1" NPT
Series C Snap Switch	-40 to +450 °F (-40 to +232 °C)	SPDT	CKB	CKK	CC9
		DPDT	CNB	CNK	CF9
Series D Snap Switch for DC Current Applications	-40 to +250 °F (-40 to +121 °C)	SPDT	DKB	DKK	DC9
		DPDT	DNB	DNK	DF9
Series F Snap Switch Hermetically Sealed	-50 to +750 °F (-46 to +399 °C)	SPDT	FKB	FKK	FC9
		DPDT	FNB	FNK	FF9
Series HS 5 amp Snap Switch Hermetically Sealed w/Terminal Block	-50 to +400 °F (-46 to +204 °C) ④	SPDT	HM3	HM4	HA9
		DPDT	HM7	HM8	HB9
Series HS 5 amp Snap Switch Hermetically Sealed w/Wiring Leads	-50 to +400 °F (-46 to +204 °C) ④	SPDT	HMJ	HMK	—
		DPDT	HMS	HMT	—
Series R Snap Switch	-40 to +750 °F (-40 to +399 °C)	SPDT	RKB	RKK	RC9
		DPDT	RNB	RNK	RF9
Series S Snap Switch for AC Current Applications	-40 to +550 °F (-40 to +288 °C)	SPDT	SKB	SKK	SA9
		DPDT	SNB	SNK	SB9
Series S Snap Switch for DC Current Applications	-40 to +250 °F (-40 to +121 °C)	SPDT	SLB	SLK	SC9
		DPDT	SOB	SOK	SF9
Series 8 Hermetically Sealed Snap Switch	-50 to +750 °F (-46 to +399 °C)	SPDT	8KB	8KK	8C9
		DPDT	8NB	8NK	8F9
Series 9 Hermetically Sealed Snap Switch	-50 to +750 °F (-46 to +399 °C)	SPDT	9KB	9KK	9C9
		DPDT	9NB	9NK	9F9

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.

B	4	0	–	P				–			
1	2	3		4	5	6	7		8	9	10

QUALITY

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

The AMETEK LMS 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.

WARRANTY



All AMETEK LMS mechanical level and flow controls are warranted free of defects in materials or workmanship for three 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, AMETEK LMS will repair or replace the control at no cost to the purchaser (or owner) other than transportation.

AMETEK LMS 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 AMETEK LMS products.

MAGNETROL® / AMETEK®
LEVEL MEASUREMENT SOLUTIONS

ametek-measurement.com

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EFFECTIVE: October 2024
SUPERSEDES: August 2021