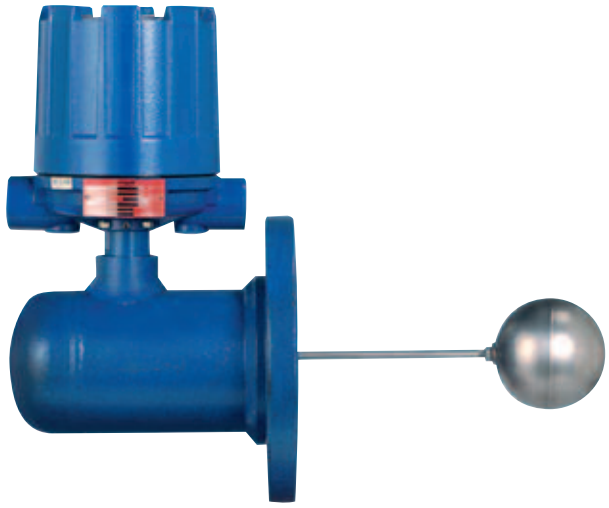
Magnetrol®

Side Mounting Liquid Level Switches

DESCRIPTION

Magnetrol® side mounting controls mount horizontally to any tank or vessel through a threaded or flanged pipe connection. Standard models are normally 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-stage applications.



FEATURES

- Body material of cast iron, carbon steel or stainless steel
- 300 series stainless steel float and trim
- Threaded or flanged mounting
- Specific gravity ratings down to 0.50
- Process temperatures to +1000° F (+538° C)
- Choice of float size:
  - 2½" (64 mm)
  - 2½" × 4" (64 × 102 mm)
  - 3" (76 mm)
  - 3½" (89 mm)
  - 3" × 5" (76 × 127 mm)
- Field-adjustable level differential
- Choice of switch mechanism:

  Dry contact Hermetically sealed

  Pneumatic
- Choice of switch mechanism enclosure:

  NEMA 1 carbon steel for pneumatic

  TYPE 4X/7/9, Class I, Div. 1, Group C & D, polymer coated aluminum

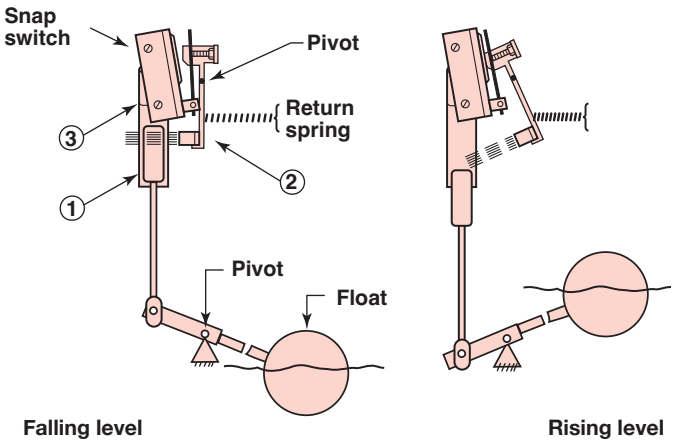
  TYPE 4X/7/9, Class I, Div. 1, Group B, polymer coated aluminum

APPLICATIONS

- Fuel tanks
- Day tanks
- Flash tanks
- Scrubbers
- Cooling towers
- Dump valve controls
- Condensate receivers
- Boilers
- Deaerators
- Holding tanks

TECHNOLOGY

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.



AGENCY APPROVALS

AGENCY	APPROVED MODEL	APPROVAL CLASSES
FM FM APPROVED	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, F, 8 or 9 electric switch mechanism and a housing listed as CSA TYPE 4X	Class I, Div 2, Groups A, 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° to +70° C

SPECIFICATIONS

SWITCH MECHANISMS AND ENCLOSURES

SERIES B, C, D & R DRY CONTACT SWITCHES

- Designs for AC and DC current applications
- Process temperatures to +1000° F (+538° 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)

SERIES J & K PNEUMATIC SWITCHES

- Suited for applications where electrical power is not available
- Bleed and non-bleed designs
- Process temperatures to +400° F (+204° C)

SWITCH ENCLOSURES

- TYPE 4X/7/9 aluminum enclosures
- Designed to meet Class I, Div. 1, Groups C & D and Class I, Div. 1 Group B
- Optional housing heaters and drains available for some enclosures
- Pneumatic switch mechanisms available with a NEMA 1 enclosure

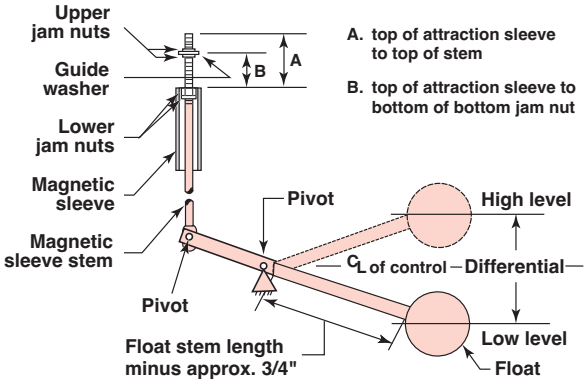
BASIC ELECTRICAL RATINGS

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

LEVEL DIFFERENTIAL ADJUSTMENT

INCHES (MM)

The level differential may be adjusted by repositioning the jam nuts on the magnetic sleeve stem as shown below. Refer to the charts at right for the minimum and maximum levels obtainable.



Inches

Model ①		Differentials Obtainable ② ④ Float Stem Length 8.00	12.00	18.00	26.00	Approx. Jam Nut Setting ③ A	B
T52	Min.	1.25	1.75	2.50	3.50	0.81	0.03
	Max.	4.75	7.00	10.25	14.50	1.31	1.06
T63	Min.	1.00	1.75	2.50	3.50	0.81	0.03
	Max.	2.62	5.00	7.38	10.50	1.31	1.06
T62 (Threaded)	Min.	1.25	2.00	2.88	4.00	0.81	0.03
	Max.	5.81	8.12	11.56	16.12	1.31	1.06
T62 (Flanged)	Min.	1.25	1.62	2.62	3.75	0.62	0.03
	Max.	3.50	5.12	7.50	10.75	1.12	0.69

Millimeters

Model ①		Differentials Obtainable ② ④ Float Stem Length 230	305	457	660	Approx. Jam Nut Setting ③ A	B
T52	Min.	32	44	64	89	21	0.8
	Max.	121	178	260	368	33	27
T63	Min.	25	44	64	89	21	0.8
	Max.	67	127	187	267	33	27
T62 (Threaded)	Min.	32	51	73	102	21	0.8
	Max.	148	206	294	409	33	27
T62 (Flanged)	Min.	32	41	67	95	16	0.8
	Max.	89	130	191	273	28	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.

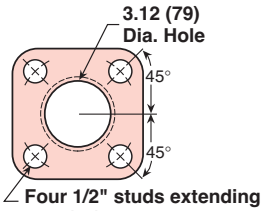
DIMENSIONAL SPECIFICATIONS

INCHES (MM)

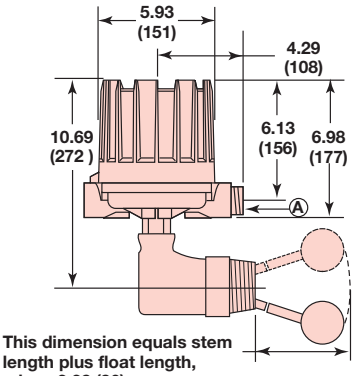
Single switch models only

Conduit Connections A	
Electrical Switches	
TYPE 4X/7/9:	1" NPT
Group B:	1" NPT
Pneumatic Switches	
NEMA 1:	¼" NPT

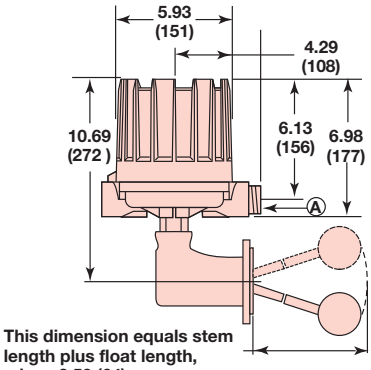
Note: Allow 8.00 (203) overhead clearance for cover removal.



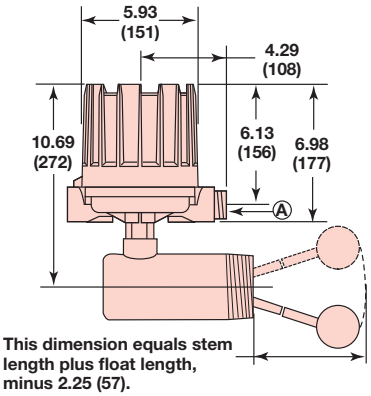
Flange



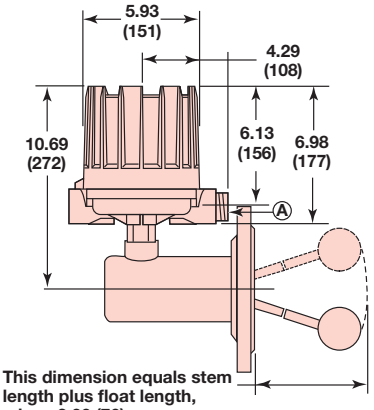
Model T63 with Threaded Body



Model T52 with Flanged Body



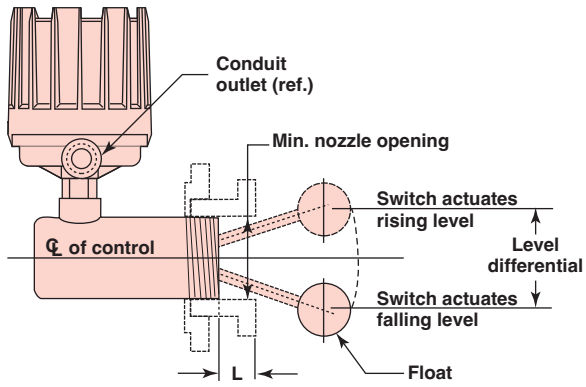
Model T62 with Threaded Body



Model T62 with Flanged Body

LEVEL DIFFERENTIAL VS. MOUNTING NOZZLE LENGTH

The tables 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

Nozzle Length (Dim. L) ①	Maximum Level Differential Available with Several Nozzle Lengths ⑤															
	Model T52 with 3.12" Diameter Minimum Tank Nozzle Opening ②				Model T63 with 2.31" Diameter Minimum Tank Nozzle Opening ②				Model T62 Threaded with 3.06" Diameter Minimum Tank Nozzle Opening ③				Model T62 Flanged with 2.88" Diameter Minimum Tank Nozzle Opening ④			
	Float Stem Length				Float Stem Length				Float Stem Length				Float Stem Length			
	8.00	12.00	18.00	26.00	8.00	12.00	18.00	26.00	8.00	12.00	18.00	26.00	8.00	12.00	18.00	26.00
2.00	4.75	7.00	10.25	14.50	2.62	5.00	7.38	10.50	5.81	8.12	11.56	16.12	3.50	5.12	7.50	10.75
4.00	4.00	5.62	8.12	11.62	1.88	3.50	5.25	7.50	4.38	6.12	8.69	12.19	3.25	4.75	7.00	10.00
6.00	—	4.25	6.25	8.88	—	2.75	4.12	5.88	1.50	4.69	6.69	9.31	—	3.75	5.38	7.75
8.00	—	3.50	5.12	7.25	—	2.38	3.38	4.88	—	3.81	5.44	7.56	—	3.00	4.50	6.25
10.00	—	2.88	4.25	6.00	—	2.00	2.88	4.12	—	3.19	4.56	6.38	—	2.50	3.75	5.38
12.00	—	—	3.62	5.12	—	—	2.50	3.50	—	—	3.94	5.44	—	—	3.25	4.62

Millimeters

Nozzle Length (Dim. L) ①	Maximum Level Differential Available with Several Nozzle Lengths ⑤															
	Model T52 w/79 mm Diameter Minimum Tank Nozzle Opening ②				Model T63 w/59 mm Diameter Minimum Tank Nozzle Opening ②				Model T62 Threaded w/78 mm Diameter Minimum Tank Nozzle Opening ③				Model T62 Flanged w/73 mm Diameter Minimum Tank Nozzle Opening ④			
	Float Stem Length				Float Stem Length				Float Stem Length				Float Stem Length			
	203	305	457	660	203	305	457	660	203	305	457	660	203	305	457	660
51	121	178	260	368	67	127	187	267	148	206	294	409	89	130	191	273
102	102	143	206	295	48	89	133	191	111	155	221	310	83	121	178	254
152	—	108	159	226	—	70	105	149	38	119	170	236	—	95	137	197
203	—	89	130	184	—	60	86	124	—	97	138	192	—	76	114	159
254	—	73	108	152	—	51	73	105	—	81	116	162	—	64	95	137
305	—	—	92	130	—	—	64	89	—	—	100	138	—	—	83	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 T57, T64, T67, and T68 .

MODEL NUMBER

Models available for quick shipment, usually within one week after factory receipt of a complete purchase order, through the Expedite Ship Plan (ESP).

MODEL NUMBER, MATERIAL OF CONSTRUCTION AND TANK CONNECTION

Model	Set Points	Material of Construction		Tank Connection		Pressure Rating①									
						psig @ °F					bar @ °C				
		Code	Description	Code	Description	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	—	—	—	17	10	—	—	—
		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 G4 G5 H3 H4 H5	3" 150 lb. RF Flange 3" 300 lb. RF Flange 3" 600 lb. RF Flange 4" 150 lb. RF Flange 4" 300 lb. RF Flange 4" 600 lb. RF Flange	ANSI RF Flange Ratings									
		3	304 SS body, 300 Series SS trim and sleeve												
		4	316 SS body, trim and sleeve												
T63	1	1	Cast Iron body, 300 Series SS trim, 400 Series SS sleeve	E2	2½" NPT	250	150	—	—	—	17	10	—	—	—
		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 G4 G5 H3	3" 150 lb. RF Flange 3" 300 lb. RF Flange 3" 600 lb. RF Flange 4" 150 lb. RF Flange	ANSI RF Flange Ratings									

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	Inches	mm	Inches	mm								
		8.00	203	12.00	305	18.00	457	26.00	660	PSIG @ ° F				Bar @ ° C			
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 x 5.00 (76 x 127) floats not available in models T52 and T63.

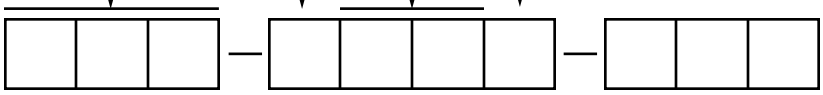
⑤ Process temperature based on +100° F (+38° C) ambient.

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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ELECTRIC SWITCH MECHANISM AND ENCLOSURE

Switch Description	Process ⑤ 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		—			—	
		DPDT	1	BNP	BNT	BBC	BNQ	BNS	BB9	BNA	BNJ	BFC
			2	BOA	BOJ	BGC		—			—	
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		—			—	
		DPDT	1	CNP	CNT	CBC	CNQ	CNS	CB9	CNA	CNJ	CFC
			2	COA	COJ	CGC		—			—	
Series D DC Current Snap Switch	-40 to +250 (-40 to +121)	SPDT	1	—			DKQ	DKS	DA9	DKB	DKK	DC9
		DPDT	1				DNQ	DNS	DB9	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		—			—	
		DPDT	1	FNP	FNT	FBC	FNQ	FNS	FB9	FNA	FNJ	FFC
			2	FOA	FOJ	FGC		—			—	
Series HS Hermetically Sealed 5-amp Snap Switch with Wiring Leads	-50 to +550⑧ (-46 to +288)	SPDT	1	—			HMC	HEK⑦	—	HMJ	HMK	—
		DPDT	1				HMF	HET⑦		HMS	HMT	
Series HS Hermetically Sealed 5-amp Snap Switch with Terminal Block	-50 to +550⑧ (-46 to +288)	SPDT	1	—			HM3	HM4	HA9	HM3	HM4	HA9
		DPDT	1				HM7	HM8	HB9	HM7	HM8	HB9
Series R High Temperature Snap Switch	-40 to +750 (-40 to +399)	SPDT	1	—			RKB	RKK	RC9	RKB	RKK	RC9
		DPDT	1				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		—			—	
		DPDT	1	8NP	8NT	8BC	8NQ	8NS	8B9	8NA	8NJ	8FC
			2	8OA	8OJ	8GC		—			—	
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		—			—	
		DPDT	1	9NP	9NT	9BC	9NQ	9NS	9B9	9NA	9NJ	9FC
			2	9OA	9OJ	9GC		—			—	

Switch Description	Process ⑤ Temp. 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	—			R1M	RKM	RKW	R1M	RKM	RKW
			2					—			—	
		DPDT	1				RDM	RNM	RNW	RDM	RNM	RNW
			2					—			—	
Series 9 High Temperature Hermetically Sealed Snap Switch	-50 to +1000 (-46 to +538)	SPDT	1	9AR	9KR	PKV	9AY	9KY	9KW	9AD	9KD	9KV
			2	9BD	9LD	9LV		—			—	
		DPDT	1	9DR	9NR	9NV	9DY	9NY	9NW	9DD	9ND	9NV
			2	9ED	9OD	9OV		—			—	

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	JDG	JDE
	60	4	400	204	0.94	2.3	JEG	JEE
Series K Non-Bleed Type	100	7	400	204	—	—	—	KOE
	40	3	400	204	—	—	KOG	—

QUALITY

MAGNETROL
REGISTERED TO
ISO 9001
Your Assurance of
Quality and Service

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.

The MAGNETROL 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.

ESP

Expedite
Ship
Plan

Several Liquid Level Switches are available for quick shipment, usually within one week after factory receipt of a complete purchase order, through the Expedite Ship Plan (ESP).

To take advantage of ESP, match the color coded model number codes in the selection charts (standard dimensions apply).

ESP service may not apply to orders of ten units or more. Contact your local representative for lead times on larger volume orders, as well as other products and options.

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.

Magnetrol®

705 Enterprise Street • Aurora, Illinois 60504-8149 • 630-969-4000 • Fax 630-969-9489
info@magnetrol.com • www.magnetrol.com

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