MAGNETROL® / AMETEK®
LEVEL MEASUREMENT SOLUTIONS

Models C24 & C25
Boiler and Water Column Liquid Level Switches

DESCRIPTION

C24, C25, Boiler and Water Column Liquid Level Switches are single or multi-switch units that offer versatility and reliable operation in a variety of applications. Available with up to three switch mechanisms for level alarm, control, and shutdown functions, the boiler and water column controls are designed for use in steam boiler applications while the Models C24 & C25 are for general industrial use.



FEATURES

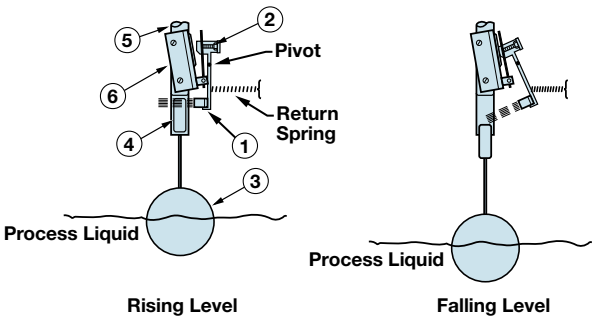
- Easy inspection of float chamber through removable head
- Cast iron or fabricated steel float chambers
- 316 and 316L stainless steel floats
- Brass chamber liner standard in B24 and B25 models
- Right or left hand water column mounting
- Try cock tappings and sight glass tappings available
- Process temperatures up to +1000 °F (+538 °C)
- Multiple switch capability
- Working steam pressure to 600 pounds
- Choice of switch mechanisms:
  - Pneumatic
  - Hermetically sealed
  - Dry contact
- Choice of switch mechanism enclosures:
  - NEMA 1 carbon steel for pneumatic
  - Polymer coated aluminum with various approvals for electrical switches

APPLICATIONS

- Condensate receiver control
- Flash tank high level alarm
- Water tube boiler low water cutoff
- Boiler steam chest high level alarm
- Boiler feedwater pump control
- Day tanks
- Boiler low water cutoff
- Holding tanks

TECHNOLOGY

A permanent magnet ① is attached to a pivoted switch actuator and adjustment screw ②. As the float ③ rises following the liquid level, it raises the attraction sleeve ④ into the field of the magnet, which then snaps against the non-magnetic enclosing tube ⑤, actuating the switch ⑥. The enclosing tube provides a static pressure boundary between the switch mechanism and the process. On a falling level, an inconel spring retracts the magnet, deactivating the switch.

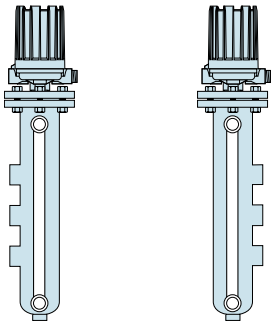


MOUNTING

WATER COLUMN LEVEL SWITCHES

The right- and left-hand mounting arrangement refers to the position of the try cock tappings in relation to the gauge glass connections.

To determine whether the control mounting is right- or left-hand, position the control with the gauge glass connections facing you. If the try cock tappings are to the right, it is a right-hand control, if they are to the left, it is a left-hand control. Refer to illustrations.



Left hand control

Right hand control

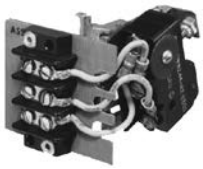
Model W29—
Left-hand mounting
Model W60—
Left-hand mounting
Consult factory for right-hand mounting

SPECIFICATIONS

SWITCH MECHANISMS AND ENCLOSURES

SERIES B, C & D DRY CONTACT SWITCHES

- Dry contact for applications where mercury must be avoided
- Designs for AC and DC current applications
- Process temperatures to +450 °F (+232 °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)



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 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

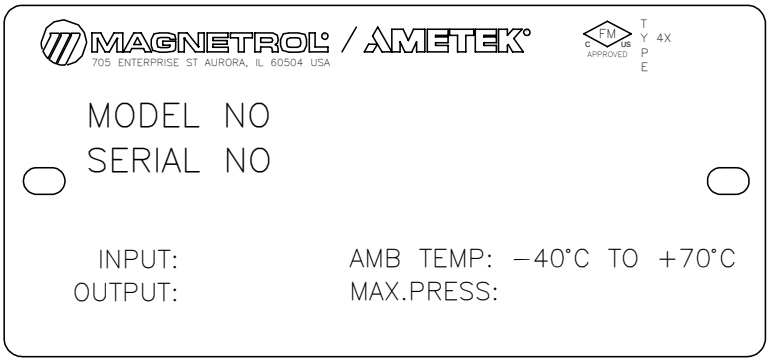


BASIC ELECTRICAL RATINGS

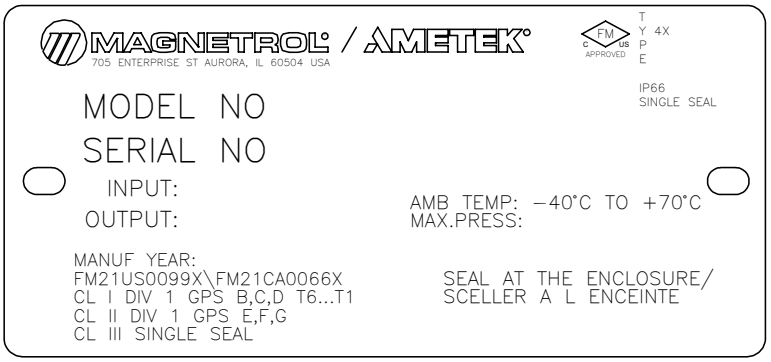
Voltage	Switch Series and Non-Inductive Ampere Rating							
	B	C	D	F	HS	R	8	9
120 VAC	15.00	15.00	10.00	2.50	5.00	1.00	1.00	—
240 VAC	15.00	15.00	—	—	5.00	1.00	—	—
24 VDC	6.00	6.00	10.00	4.00	5.00	1.00	3.00	0.50
120 VDC	0.50	1.00	10.00	0.30	0.50	0.40	—	—
240 VDC	0.25	0.50	3.00	—	0.25	—	—	—

AGENCY APPROVALS

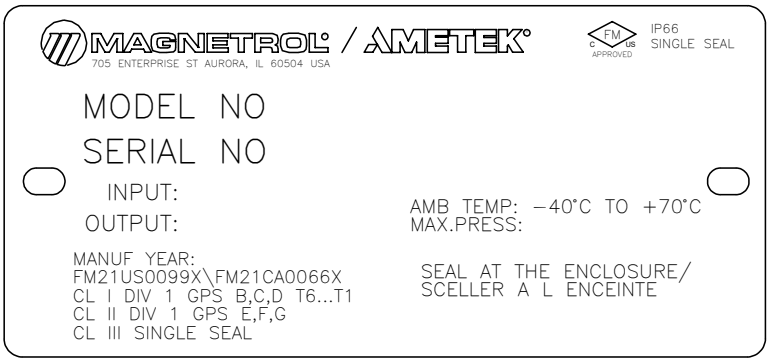
EMC directive 2014/30/EU (electromagnetic compatibility)
The following standard has been applied:
EN 61326-1:2013-(Low Voltage Directive-CE)



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

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.

Maximum Pressure Ratings:

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

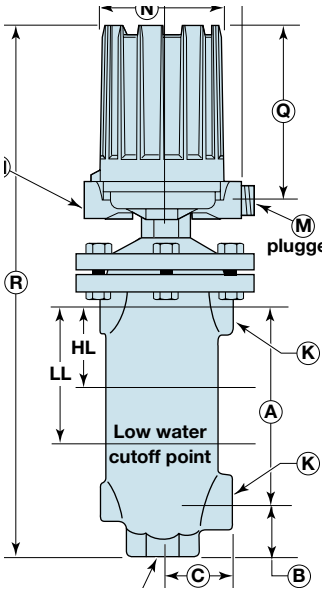
Nominal Thickness (in)	Minimum Thickness (in)	Pressure Rating for 316 SST Version (psig)
0.035	0.0295	1300
0.065	0.0595	2710
0.093	0.087	5000

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.

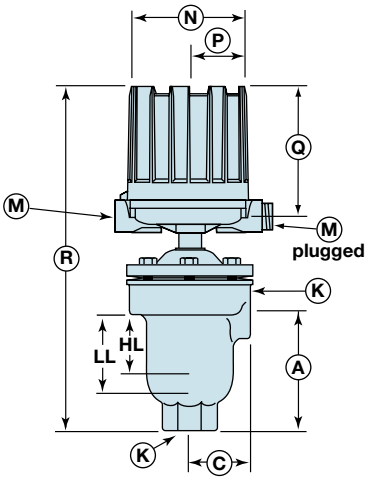
Maximum Process Temperature	Temperature Classification
<85°C	T6
<100°C	T5
<135°C	T4
<200°C	T3
<300°C	T2
<450°C	T1

DIMENSIONAL SPECIFICATIONS

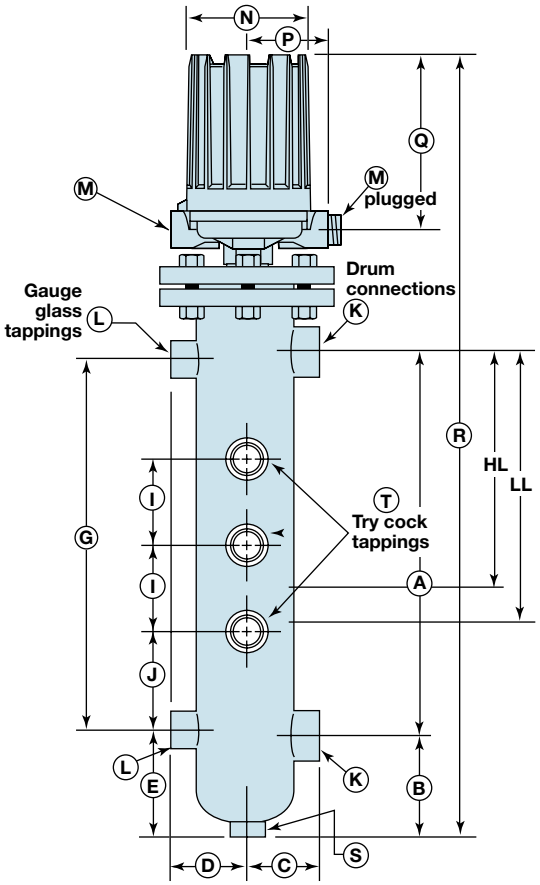
INCHES (MM)



Models B25, C25



Models B24, C24



Models W29, W60

Allow 10.00 (254) overhead clearance for cover removal.

ACTUATION LEVELS *

Model	Min. S.G		1.0	
	HL	LL	HL	LL
B24/ C24	0.69 (18)	1.56 (40)	0.94 (24)	1.69 (42)
B25/ C25	3.69 (94)	4.50 (114)	4.13 (105)	4.88 (124)
W29	11.00 (279)	11.88 (302)	11.50 (292)	12.25 (311)
W60	10.50 (267)	11.06 (281)	11.19 (284)	11.69 (297)

* single switch mechanism only. Consult factory for multiple switches.

Levels are ±0.25" (6 mm)

Conduit Connections M
Electrical Switches: 1" NPT
Pneumatic Switches: ¼" NPT

All housings rotatable 360°

DIMENSIONS

Model	A	B	C	D	E	G	I	J	K	L	N	P	Q	R	S	T
B24/C24	5.56 (141)	N/A	2.81 (71)	N/A	N/A	N/A	N/A	N/A	1" NPT	N/A	5.93 (150)	3.78 (96)	6.25 (158)	16.25 (412)	N/A	N/A
B25/C25	7.00 (177)	2.00 (51)	2.63 (66)	N/A	N/A	N/A	N/A	N/A	1" NPT	N/A	5.93 (150)	3.78 (96)	8.46 (214)	22.12 (561)	1¼" NPT	N/A
W29	15.00 (381)	4.50 (114)	2.83 (71)	2.88 (73)	4.50 (114)	15.00 (381)	3.50 (88)	4.00 (101)	1¼" NPT	¾" NPT	5.93 (150)	3.78 (96)	8.46 (214)	33.50 (850)	¾" NPT	¾" NPT
W60	15.00 (381)	4.19 (106)	3.61 (91)	3.66 (92)	4.19 (106)	15.00 (381)	3.50 (88)	4.00 (101)	1¼" NPT	¾" NPT	5.93 (150)	3.78 (96)	8.46 (214)	34.37 (872)	¾" NPT	¾" NPT

MODEL NUMBER

MODEL NUMBER CODE, MATERIALS OF CONSTRUCTION AND TANK CONNECTION

Model Code	Minimum S.G.	Chamber Material	Attraction Sleeve	Float Material	Trim Material	Max. WSP Rating	Max.Pressure @100 °F (38 °C)	Try Cock Mounting
B24-1B10 ②	0.85	Cast Iron ①	400 Series SS	316L SS	316 SS	250 psi @ 406 °F (17 bar @ 207 °C)	400 psi (28 bar)	N/A
C24-1B10 ③								
B25-1B10 ②	0.84							
C25-1B10 ③								
C25-2B10 ③	0.84	Cast Iron ①	316 SS					
W29-1B10	0.84	Fabricated Steel	400 Series SS	316L SS	316 SS	300 psi @ 422 °F (21 bar @ 217 °C)	500 psi (34 bar)	Left Hand
W60-1B10	0.75					600 psi @ 489 °F (41 bar @ 254 °C)	900 psi (62 bar)	

ELECTRIC SWITCH MECHANISM AND ENCLOSURE (Additional models on next page)

Switch Description	Max. ④ Process Temp ° F (° C)	Contacts	Set Points	B24 & C24 only	
				TYPE 4X/7/9 Aluminum Enclosure	
				Class I, Div. 1, Groups C & D	Class I, Div. 1, Group B
Series B Snap Switch	250 (121)	SPDT	1	BKP	BKT
		DPDT	1	BNP	BNT
Series C Snap Switch	450 (232)	SPDT	1	CKP	CKT
		DPDT	1	CNP	CNT
Series F Hermetically Sealed Snap Switch	750 (399)	SPDT	1	FKP	FKT
		DPDT	1	FNP	FNT

PNEUMATIC SWITCH MECHANISM AND ENCLOSURE

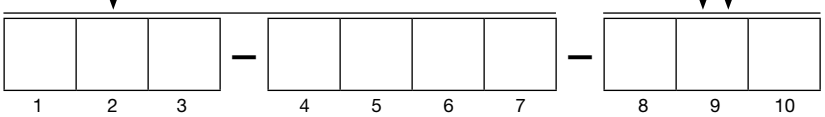
Switch Description	Maximum Supply Pressure		Maximum Process Temperature		Bleed Orifice Diameter		All except B24, C24	Code B24, C24
	psig	bar	° F	° C	inches	mm	NEMA 1	NEMA 1
Series J Bleed Type	100	7	400	204	.063	1.6	JDE	—
	60	4	400	204	.094	2.3	JEE	JEG
Series K Non-Bleed Type	100	7	400	204	—	—	K0E	—
	40	3	400	204	—	—	K0G	K0G

① Cast iron models limited to maximum service temperature of +406 °F (+207° C) or switch mechanism temperature rating if lower.

② Models B24 and B25 include brass inner liners.

③ Models C24 and C25 are intended for non-boiler service as they do not contain a chamber liner.

④ Process temperature based on +100 °F (+38 °C) ambient.

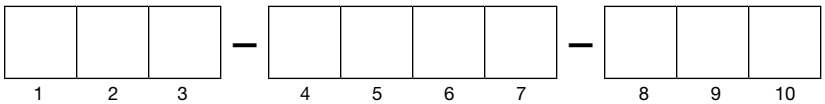


ELECTRIC SWITCH MECHANISM AND ENCLOSURE

Switch Description	Process Temperature Range °F (°C) ④	Contacts	Set Points	All models except B24, C24 and C25-2B10			Model C25-2B10 only		
				Aluminum Enclosure					
				FM (US/CA) Groups C&D 1" NPT	FM (US/CA) Group B 1" NPT	ATEX / IECEx 1" NPT	FM (US/CA) Groups C&D 1" NPT	FM (US/CA) Group B 1" NPT	ATEX / IECEx 1" NPT
Series B Snap Switch	-40 to +250 (-40 to +121)	SPDT	1	BKA	BKJ	BCC	BKB	BKK	BC9
			2	BLA	BLJ	BDC	BLB	BLK	BD9
			3	BMA	BMJ	BEC	BMB	BMK	BE9
		DPDT	1	BNA	BNJ	BFC	BNB	BNK	BF9
			2	BOA	BOJ	BGC	BOB	BOK	BG9
Series C Snap Switch	-40 to +450 (-40 to +232)	SPDT	1	CKA	CKJ	CCC	CKB	CKK	CC9
			2	CLA	CLJ	CDC	CLB	CLK	CD9
			3	CMA	CMJ	CEC	CMB	CMK	CE9
		DPDT	1	CNA	CNJ	CFC	CNB	CNK	CF9
			2	COA	COJ	CGC	COB	COK	CG9
Series D DC Current Snap Switch	-40 to +250 (-40 to +121)	SPDT	1	N/A			DKB	DKK	DC9
			2				DLB	DLK	DD9
			3				DMB	DMK	DE9
		DPDT	1				DNB	DNK	DF9
			2				DOB	DOK	DG9
Series F Hermetically Sealed Snap Switch	-50 to +750 (-46 to +399)	SPDT	1	FKA	FKJ	FCC	FKB	FKK	FC9
			2	FLA	FLJ	FDC	FLB	FLK	FD9
		DPDT	1	FNA	FNJ	FFC	FNB	FNK	FF9
			2	FOA	FOJ	FGC	FOB	FOK	FG9
Series HS Hermetically Sealed 5-amp Snap Switch with Wiring Leads	-50 to +550 (-46 to +288) ⑤	SPDT	1	N/A			HMJ	HMK	N/A
			2				HMN	HMP	
		DPDT	1				HMS	HMT	
			2				HMY	HMZ	
Series HS Hermetically Sealed 5-amp Snap Switch with Terminal Block	-50 to +550 (-46 to +288) ⑤	SPDT	1	N/A			HM3	HM4	HA9
		DPDT	1				HM7	HM8	HB9
Series R High Temperature Snap Switch	-40 to +750 (-40 to +399)	SPDT	1	N/A			RKB	RKK	RC9
			2				RLB	RLK	RD9
		DPDT	1				RNB	RNK	RF9
			2				ROB	ROK	RG9
Series 8 Hermetically Sealed Snap Switch	-50 to +750 (-46 to +399)	SPDT	1	8KA	8KJ	8CC	8KB	8KK	8C9
			2	8LA	8LJ	8DC	8LB	8LK	8D9
			3	8MA	8MJ	8EC	8MB	8MK	8E9
		DPDT	1	8NA	8NJ	8FC	8NB	8NK	8F9
			2	8OA	8OJ	8GC	8OB	8OK	8G9
Series 9 High Temperature Hermetically Sealed Snap Switch	-50 to +750 (-46 to +399)	SPDT	1	9KA	9KJ	9CC	9KB	9KK	9C9
			2	9LA	9LJ	9DC	9LB	9LK	9D9
			3	9MA	9MJ	9EC	9MB	9MK	9E9
		DPDT	1	9NA	9NJ	9FC	9NB	9NK	9F9
			2	9OA	9OJ	9GC	9OB	9OK	9G9
Switch Description	**Process ④ Temp. Range °F (°C)**	**Contacts**	**Set Points**	**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**
Series R High Temperature Snap Switch	-40 to +1000 (-40 to +538) ⑥	SPDT	1	N/A			R1M	RKM	RKW
			2				R3M	RLM	RLW
		DPDT	1				RDM	RNM	RNW
			2				REM	ROM	ROW
Series 9 High Temperature Hermetically Sealed Snap Switch	-50 to +1000 (-46 to +538) ⑥	SPDT	1	9AD	9KD	9KV	9AM	9KM	9KW
			2	9BD	9LD	9LV	9BM	9LM	9LW
			3	9CD	9MD	9MV	9CM	9MM	9MW
		DPDT	1	9DD	9ND	9NV	9DM	9NM	9NW
			2	9ED	9OD	9OV	9EM	9OM	9OW

⑤ On steam and other condensing applications, temperature down-rated to +400 °F (+204 °C) process at +100 °F (+38 °C) ambient.

⑥ Consult factory for temperatures above +842 °F (+450 °C).



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

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