Magnetrol®

SERIES 75

Liquid Level Switches

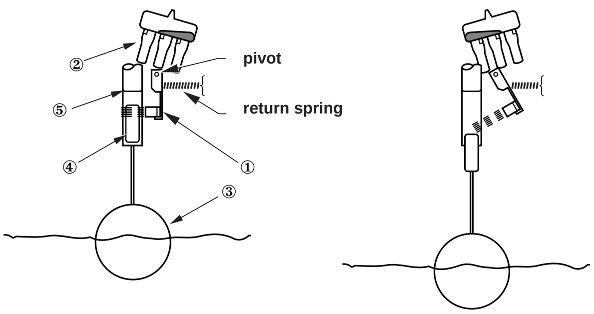
INSTRUCTION MANUAL AND REPLACEMENT PARTS

DESCRIPTION

Magnetrol's Series 75 level switches are float operated units suitable for use on clean liquid applications for level alarm, pump control and safety shutdown functions.

OPERATING PRINCIPLE

A permanent magnet ① is attached to a pivoted switch actuator ②. As the float/ displacer 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. 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.



Rising level

Falling level

UNPACKING

Unpack the instrument carefully. Inspect all units for damage. Report any concealed damage to carrier within 24 hours. Check the contents of the packing slip and purchase order. Check and record the serial number for future reference when ordering parts.

AGENCY APPROVALS

Agency	Approval ①
CENELEC	EEx d IIC T6, explosion proof EEx ia IIC T6, intrinsically safe②
BASEEFA	Ex d IIC T6
CSA ①	Non-Hazardous CSA Type 4X
	Class I, Div. 2, Groups B, C & D
	Class I, Div. 1, Groups C & D Class II, Div. 1, Groups E, F & G
	Class I, Div. 1, Groups B, C & D Class II, Div. 1, Groups E, F & G
FM ①	Non-Hazardous NEMA 4X
	Class I, Div. 1, Groups C & D Class II, Div. 1, Groups E, F & G
	Class I, Div. 1, Groups B, C & D, Class II, Div. 1, Groups E, F & G
SAA ①	Ex d IIC T6 (IP65)

① Not available with all switches; Consult factory for proper model numbers.
② Consult factory for proper model numbers.

MODEL IDENTIFICATION

A complete series 75 liquid level switch, consists of 1 code:

MODEL NUMBER – SPECIFIC GRAVITY & PRESSURE RATINGS — **CARBON STEEL CHAMBERS** ①

Code	*Min. specific gravity Models with material construction code*		*Pressure rating* ③					
			bar @ °C			*PSIG @ °F*		
	1	*2*	*40° C*	*230° C*	*400° C*	*100° F*	*450° F*	*750° F*
A	0.60	0.65	42,7	29,0	25,2	620	420	365
B	0.75	0.75	69,0	58,6	51,7	1000	850	750
C	0.60	0.60	34,5	25,5	20,7	500	370	300
G	0.55	0.57	51,7	38,6	32,7	750	560	475
J	0.50	0.53	27,6	20,3	17,2	400	295	250

MODEL NUMBER – SPECIFIC GRAVITY & PRESSURE RATINGS — **STAINLESS STEEL CHAMBERS** ②

Code	*Min. specific gravity Models with material construction code*	*Pressure rating* ③					
		bar @ °C			*PSIG @ °F*		
	4	*40° C*	*230° C*	*400° C*	*100° F*	*450° F*	*750° F*
A	0.65	42,7	29,0	25,2	620	420	365
B	0.75	69,0	58,6	51,7	1000	850	750
C	0.60	34,5	22,4	19,6	500	325	285
G	0.57	51,7	38,6	32,7	750	560	475
P	0.75	27,6	17,9	15,5	400	260	225
O	0.85	27,6	22,4	19,6	400	325	285

MATERIALS OF CONSTRUCTION

	Chamber	*Float*	*Sleeve*
1	Carbon steel ①	316 SS	400 SS
2	Carbon steel ①	316 SS	316 SS
4	316 SS ②	316 SS	316 SS

① Carbon steel chamber models are used with material of construction codes 1 and 2 only.

② Stainless steel chamber models are used with material of construction code 4 only.

③ Models are limited to max. temperature rating of selected switch mechanism.
See **Switch mechanism charts** on page 3.

④ Contact factory for high pressure and high temperature applications.

SIZE AND TYPE OF TANK CONNECTIONS (see configurations on pages 6 & 8)

	CONNECTION SIZE		
	1" size	*1 1/2" size*	*2" size*
Threaded	B20	C20	D20
Socket weld	B30	C30	D30

Flange	***STYLE & CONNECTION SIZE* – ANSI**								
	1" size			*1 1/2" size*			*2" size*		
	Cage mounting flange ratings – ANSI								
	150	*300*	*600*	*150*	*300*	*600*	*150*	*300*	*600*
upper side/bottom	N30	N40	N50	P30	P40	P50	Q30	Q40	Q50
side/side	S30	S40	S50	T30	T40	T50	V30	V40	V50

Flange	***STYLE & CONNECTION SIZE* – DIN**											
	NW 25 (DIN)				*NW 40 (DIN)*				*NW 50 (DIN)*			
	Cage mounting flange ratings – DIN											
	ND16 (DIN 2633) Form C (DIN 2526)	*ND25 (DIN 2634) Form C (DIN 2526)*	*ND40 (DIN 2635) Form C (DIN 2526)*	*ND64 (DIN 2636) Form E (DIN 2526)*	*ND16 (DIN 2633) Form C (DIN 2526)*	*ND25 (DIN 2634) Form C (DIN 2526)*	*ND40 (DIN 2635) Form C (DIN 2526)*	*ND64 (DIN 2636) Form E (DIN 2526)*	*ND16 (DIN 2633) Form C (DIN 2526)*	*ND25 (DIN 2634) Form C (DIN 2526)*	*ND40 (DIN 2635) Form C (DIN 2526)*	*ND64 (DIN 2636) Form E (DIN 2526)*
upper side/bottom	1FA	1GA	1HA	1JA	2FA	2GA	2HA	2JA	3FA	3GA	3HA	3JA
side/side	1FB	1GB	1HB	1JB	2FB	2GB	2HB	2JB	3FB	3GB	3HB	3JB

SWITCH MECHANISM AND ENCLOSURE
Refer to right page for pneumatic and electric switch mechanisms.

| | 7 | 5 | | | | | | | |

code for *sealed external cage float level switch*

SELECT PNEUMATIC SWITCH MECHANISM & ENCLOSURE

Pneumatic switch description	*Max. supply pressure bar (PSIG)*	*Max. liquid temperature °C (°F)*	*Bleed orifice Ø mm (inches)*	*Code (NEMA 3R encl.)*	
				mat'l. code 1	*mat'l. code 2 & 4*
Series J bleed type	6.9 bar (100 PSIG)	200°C (400°F)	1.60 mm (0.063")	JDG	JDE
	4.1 bar (60 PSIG)	200°C (400°F)	2.39 mm (0.094")	JEG	JEE
	4.1 bar (60 PSIG)	370°C (700°F)	1.40 mm (0.055")	JFG	JFE
Series K non bleed type	6.9 bar (100 PSIG)	200°C (400°F)	—	KOE	KOE
	2.8 bar (40 PSIG)	200°C (400°F)	—	KOG	—

SELECT ELECTRIC SWITCH MECHANISM & ENCLOSURE

Switch Description ①	Max. liquid temp. °C (°F) ②	*Contacts*	*Cont. per enclosure*	*All models with material of construction code 1*								*All models with material of construction codes 2 and 4*							
				NEMA 4X cast aluminium			*NEMA 7/9 cast iron*	*BASEEFA cast iron*		*CENELEC cast iron*		*NEMA 4X cast aluminium*			*NEMA 7/9 cast iron*	*BASEEFA cast iron*		*CENELEC cast iron*	
				1" NPT	*M 20 x 1.5*	*PG 16*	*1" NPT*	*M20 x 1.5*	*3/4" NPT*	*M20 x 1.5*	*3/4" NPT*	*1" NPT*	*M 20 x 1.5*	*PG 16*	*1" NPT*	*M20 x 1.5*	*3/4" NPT*	*M20 x 1.5*	*3/4" NPT*
Series A – Mercury switch	290°C (550°F)	SPDT	1	AAA	A2A	A3A	AKD	AK8	AU8	AK7	AU7	AAB	A2B	A3B	AKM	AK6	AU6	AK5	AU5
			2	ABA	A4A	A5A	ALD	AL8	AV8	AL7	AV7	ABB	A4B	A5B	ALM	AL6	AV6	AL5	AV5
			3	ACA	A6A	A7A	AMD	A68	A78	A67	A77	ACB	A6B	A7B	AMM	A66	A76	A65	A75
		DPDT	1	ADA	A8A	A9A	AND	AN8	AX8	AD7	AW7	ADB	A8B	A9B	ANM	AN6	AX6	AD5	AW5
			2	AEA	A1A	AZA	AOD	AO8	AY8	AO7	AY7	AEB	A1B	AZB	AOM	AO6	AY6	AO5	AY5
Series 3 – Mercury switch with beaded leads	400°C (750°F)	SPDT	1	3AA	32A	33A	3KD	3K8	3U8	3K7	3U7	3AB	32B	33B	3KM	3K6	3U6	3K5	3U5
			2	3BA	34A	35A	3LD	3L8	3V8	3L7	3V7	3BB	34B	35B	3LM	3L6	3V6	3L5	3V5
			3	3CA	36A	37A	3MD	368	378	367	377	3CB	36B	37B	3MM	366	376	365	375
		DPDT	1	3DA	38A	39A	3ND	3N8	3X8	3D7	3W7	3DB	38B	39B	3NM	3N6	3X6	3D5	3W5
			2	3EA	31A	3ZA	3OD	3O8	3Y8	3O7	3Y7	3EB	31B	3ZB	3OM	3O6	3Y6	3O5	3Y5
Series B – Snap switch	120°C (250°F)	SPDT	1	BAA	B2A	B3A	BKD	BK8	BU8	BK7	BU7	BAB	B2B	B3B	BKM	BK6	BU6	BK5	BU5
			2	BBA	B4A	B5A	BLD	BL8	BV8	BL7	BV7	BBB	B4B	B5B	BLM	BL6	BV6	BL5	BV5
			3	BCA	B6A	B7A	BMD	B68	B78	B67	B77	BCB	B6B	B7B	BMM	B66	B76	B65	B75
		DPDT	1	BDA	B8A	B9A	BND	BN8	BX8	BD7	BW7	BDB	B8B	B9B	BNM	BN6	BX6	BD5	BW5
			2	BEA	B1A	BZA	BOD	BO8	BY8	BO7	BY7	BEB	B1B	BZB	BOM	BO6	BY6	BO5	BY5
Series C – Snap switch	230°C (450°F)	SPDT	1	CAA	C2A	C3A	CKD	CK8	CU8	CK7	CU7	CAB	C2B	C3B	CKM	CK6	CU6	CK5	CU5
			2	CBA	C4A	C5A	CLD	CL8	CV8	CL7	CV7	CBB	C4B	C5B	CLM	CL6	CV6	CL5	CV5
			3	CCA	C6A	C7A	CMD	C68	C78	C67	C77	CCB	C6B	C7B	CMM	C66	C76	C65	C75
		DPDT	1	CDA	C8A	C9A	CND	CN8	CX8	CD7	CW7	CDB	C8B	C9B	CNM	CN6	CX6	CD5	CW5
			2	CEA	C1A	CZA	COD	CO8	CY8	CO7	CY7	CEB	C1B	CZB	COM	CO6	CY6	CO5	CY5
Series D – Snap switch for DC current applications	120°C (250°F)	SPDT	1	DAB	D2B	D3B	DKM	DK6	DU6	DK5	DU5	DAB	D2B	D3B	DKM	DK6	DU6	DK5	DU5
			2	DBB	D4B	D5B	DLM	DL6	DV6	DL5	DV5	DBB	D4B	D5B	DLM	DL6	DV6	DL5	DV5
			3	–	–	–	–	–	–	–	–	DCB	D6B	D7B	DMM	D66	D76	D65	D75
		DPDT	1	DDB	D8B	D9B	DNM	DN6	DX6	DD5	DW5	DDB	D8B	D9B	DNM	DN6	DX6	DD5	DW5
			2	DEB	D1B	DZB	DOM	DO6	DY6	DO5	DY5	DEB	D1B	DZB	DOM	DO6	DY6	DO5	DY5
Series E – Vibration resistant mercury switch	290°C (550°F)	SPDT	1	EAA	E2A	E3A	EKD	EK8	EU8	EK7	EU7	EAB	E2B	E3B	EKM	EK6	EU6	EK5	EU5
			2	EBA	E4A	E5A	ELD	EL8	EV8	EL7	EV7	EBB	E4B	E5B	ELM	EL6	EV6	EL5	EV5
			3	ECA	E6A	E7A	EMD	E68	E78	E67	E77	ECB	E6B	E7B	EMM	E66	E76	E65	E75
		DPDT	1	EDA	E8A	E9A	END	EN8	EX8	ED7	EW7	EDB	E8B	E9B	ENM	EN6	EX6	ED5	EW5
			2	EEA	E1A	EZ8	EOD	EO8	EY8	EO7	EY7	EEB	E1B	EZ7	EOM	EO6	EY6	EO5	EY5
Series 2 – Vibr. resistant mercury switch with beaded leads	400°C (750°F)	SPDT	1	2AA	22A	23A	2KD	2K8	2U8	2K7	2U7	2AB	22B	23B	2KM	2K6	2U6	2K5	2U5
			2	2BA	24A	25A	2LD	2L8	2V8	2L7	2V7	2BB	24B	25B	2LM	2L6	2V6	2L5	2V5
			3	2CA	26A	27A	2MD	268	278	267	277	2CB	26B	27B	2MM	266	276	265	275
		DPDT	1	2DA	28A	29A	2ND	2N8	2X8	2D7	2W7	2DB	28B	29B	2NM	2N6	2X6	2D5	2W5
			2	2EA	21A	2ZA	2OD	2O8	2Y8	2O7	2Y7	2EB	21B	2ZB	2OM	2O6	2Y6	2O5	2Y5
Series F – Snap switch hermetically sealed	400°C (750°F)	SPDT	1	FAA	FCA	FPA	FKD	FK8	FU8	FK7	FU7	FAB	FCB	FPB	FKM	FK6	FU6	FK5	FU5
			2	FBA	FFA	FRA	FLD	FL8	FV8	FL7	FV7	FBB	FFB	FRB	FLM	FL6	FV6	FL5	FV5
		DPDT	1	FDA	FGA	F9A	FND	FN8	FX8	FD7	FW7	FDB	FGB	F9B	FNM	FN6	FX6	FD5	FW5
			2	FEA	FHA	FZA	FOD	FO8	FY8	FO7	FY7	FEB	FHB	FZB	FOM	FO6	FY6	FO5	FY5
Series HS – Snap switch hermetically sealed with terminal block	290°C (550°F)	SPDT	1	HM2	H7A	H6A	HS3	HB1	HB2	HB3	HB4	HM2	H7A	H6A	HS3	HB1	HB2	HB3	HB4
		DPDT	1	HM6	H7C	H6C	HS7	HB5	HB6	HB7	HB8	HM6	H7C	H6C	HS7	HB5	HB6	HB7	HB8
Series U – Snap switch	120°C (250°F)	SPDT	1	UAA	U2A	U3A	UKD	UK8	UU8	UK7	UU7	UAB	U2B	U3B	UKM	UK6	UU6	UK5	UU5
			2	UBA	U4A	U5A	ULD	UL8	UV8	UL7	UV7	UBB	U4B	U5B	ULM	UL6	UV6	UL5	UV5
			3	UCA	U6A	U7A	UMD	U68	U78	U67	U77	UCB	U6B	U7B	UMM	U66	U76	U65	U75
		DPDT	1	UDA	U8A	U9A	UND	UN8	UX8	UD7	UW7	UDB	U8B	U9B	UNM	UN6	UX6	UD5	UW5
			2	UEA	U1A	UZA	UOD	UO8	UY8	UO7	UY7	UEB	U1B	UZB	UOM	UO6	UY6	UO5	UY5
Series W – Snap switch hermetically sealed	230°C (450°F)	SPDT	1	WAA	W2A	W3A	WKD	WK8	WU8	WK7	WU7	WAB	W2B	W3B	WKM	WK6	WU6	WK5	WU5
			2	WBA	W4A	W5A	WLD	WL8	WV8	WL7	WV7	WBB	W4B	W5B	WLM	WL6	WV6	WL5	WV5
			3	WCA	W6A	W7A	WMD	W68	W78	W67	W77	WCB	W6B	W7B	WMM	W66	W76	W65	W75
		DPDT	1	WDB	W8B	W9B	WNM	WN6	WX6	WD5	WW5	WDB	W8B	W9B	WNM	WN6	WX6	WD5	WW5
			2	WEB	W1B	WZB	WOM	WO6	WY6	WO5	WY5	WEB	W1B	WZB	WOM	WO6	WY6	WO5	WY5
Series X – Snap switch hermetically sealed	230°C (450°F)	SPDT	1	XAA	X2A	X3A	XKD	XK8	XU8	XK7	XU7	XAB	X2B	X3B	XKM	XK6	XU6	XK5	XU5
			2	XBA	X4A	X5A	XLD	XL8	XV8	XL7	XV7	XBB	X4B	X5B	XLM	XL6	XV6	XL5	XV5
			3	XCA	X6A	X7A	XMD	X68	X78	X67	X77	XCB	X6B	X7B	XMM	X66	X76	X65	X75
		DPDT	1	XDB	X8B	X9B	XNM	XN6	XX6	XD5	XW5	XDB	X8B	X9B	XNM	XN6	XX6	XD5	XW5
			2	XEB	X1B	XZB	XOM	XO6	XY6	XO5	XY5	XEB	X1B	XZB	XOM	XO6	XY6	XO5	XY5

① Housing heater available in NEMA 4X and 7/9 enclosures. Drain available in NEMA 7/9 enclosures. Consult factory for standard part number.
② Temperatures based on 38°C (100°F) ambient.

INSTALLATION

CRITICAL ALARM FUNCTION

It is recommended that for critical alarm functions, an additional level switch be installed as a high-high or low-low level alarm for maximum protection.

PIPING

Figure 3 shows a typical piping installation of a Magnetrol Series 75 control to a pressure vessel. Level decals on control identify the actuation levels for a unit with three switches at minimum specific gravity. Refer to the Actuation Level charts on Page 8 for the actuation levels for a unit with one switch at different minimum specific gravities.

Use pipe of sufficient strength to support the control. 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 lower liquid line will drain towards the vessel and upper vapor line will drain toward the control. Shut-off valves are recommended for installation between the vessel and the control. If control is to be used with a low temperature liquid (one which will "boil" in the float chamber if outside heat is absorbed), the chamber and piping should be insulated. Such boiling in the chamber will cause false level indications. DO NOT INSULATE SWITCH MECHANISM HOUSING.

On controls equipped with pneumatic switch assemblies, consult bulletin on mechanism furnished for air (or gas) piping instructions. Refer to chart below for bulletin numbers for pneumatic switches.

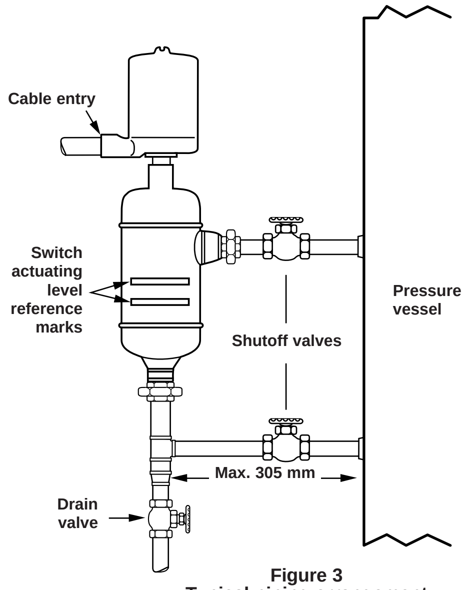


Figure 3
Typical piping arrangement

MOUNTING

Adjust piping as required to bring control to a vertical position. Magnetrol controls must be mounted within three degrees (3°) of vertical. A three degree slant is noticeable by eye, but installation should be checked with a spirit level on top and/or sides of float chamber.

Controls should be mounted as close to the vessel as possible. This will result in a more responsive and accurate level change in the control. Liquid in a long line may be cooler and more dense than liquid in the vessel causing lower level indication in the control than actual level in the vessel.

WIRING

Most mechanical control switch housings are designed to allow 360° positioning of the cable entries by loosening the set screw(s). See **figure 4**. On high temperature applications (above 120° C [250° F]), high temperature wire should be used between control and first junction box located in a cooler area.

1. To gain access to switch mechanism(s) remove switch housing cover. (See CAUTION next page)
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: See bulletin on switch mechanism furnished with your control (as listed below) for proper connections.

3. Connect power supply to control and test switch action by varying liquid level in tank or vessel.

> *CAUTION:*
> *In hazardous area, do not power the unit until the cable gland is sealed and the enclosure cover is screwed down securely.*

NOTE: If switch mechanism fails to function properly, check vertical alignment of control housing and consult installation instructions in switch mechanism bulletin.

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

NOTE: If control has been furnished with an explosion proof (cast) or moisture proof (gasketed) switch housing, check the following:

– After wiring connections have been completed, housings must be sealed via the correct cable gland to prevent entrance of air.
– 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 housing.

Switch mechanism	*Bulletin*	*Reference series*
Mercury switches	42-783	A
Dry contact switches	42-683	B, C, D, U, W, X
Anti-vibration mercury switches		E
Anti-vibration dry contact switches	42-684	G, H, I
Bleed type pneumatic valve	42-685	J
Non-bleed type pneumatic valve	42-686	K

WIRING (cont.)

OBSERVE ALL APPLICABLE ELECTRICAL CODES AND PROPER WIRING PROCEDURES

NEMA 4x

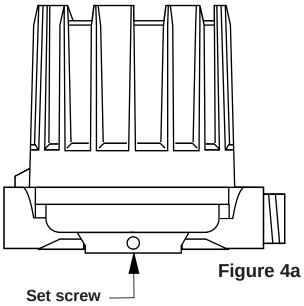


Figure 4a

CENELEC/BASEEFA

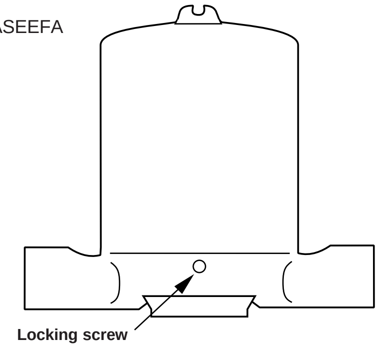


Figure 4c

NEMA 7/9

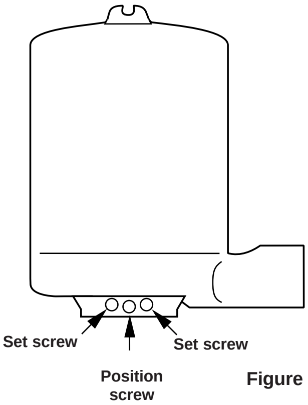


Figure 4b

> *CAUTION:*
> - *DO NOT attempt to reposition NEMA 4 / NEMA 7/9 housings without loosening the set screws; CENELEC/BASEEFA housings MAY NOT BE REPOSITIONNED. ALWAYS retighten set screw(s) after repositionning.*
> - *DO NOT attempt to unscrew cover of CENELEC/BASEEFA housings before loosening locking screw in base of housing. ALWAYS retighten locking screw after replacing cover.*

SWITCH DIFFERENTIAL ADJUSTMENT

The standard differential of Series 75 level controls may be field adjusted. Adjustment may be necessary if a wider differential needs to be set to overcome switch chatter caused by the process.

The differential, or the amount of level travel between "switch-on" and "switch-off", may be adjusted by repositioning the lower jam nuts on the float stem. This adjustment is different for high level and low level controls. Please refer to the appropriate section below for adjustments instructions.

> *CAUTION:*
>
> *Maximum differential adjustment is 25 mm (1")*

LOW LEVEL CONTROLS

On low level controls the switch trips on the lower actuation point and resets on the higher actuation point. Widening the differential will allow the switch to trip on the original actuation point and reset at a later, or higher, point.

The differential on low level controls may be adjusted by repositioning the lower jam nuts on the float stem. The standard factory setting is for a minimum amount of play (gap) between the top jam nuts and the attraction sleeve as shown in Figure 6.

1. Determine what change in differential is necessary.

NOTE: To widen the differential 25 mm (1"), the lower jam nuts must be set proportionately lower on the stem [i.e. in this example 25 mm (1")].

2. Make sure power source is turned off.

3a. NEMA 4X/7/9 - Unscrew and remove switch housing cover.

3b. CENELEC and BASEEFA - Loosen cover set screw, unscrew and remove housing cover.

4. Disconnect power supply wires from switch mechanism. Pull wires out of conduit connection opening in housing base. See **Figure 5**.
5. Perform system shut-down procedures as required to relieve pressure from float chamber of control. Allow unit to cool.
   a. Close shut-off valves (if so equipped) to isolate control from tank. Drain off liquid in float chamber. See **Figure 3** on page 4.
   b. On installations without shut-off valves, relieve pressure from the tank. Drain liquid in tank to a level below the connections of the float chamber.

NOTE: Level control, connections and pipe lines need not be removed from the tank.

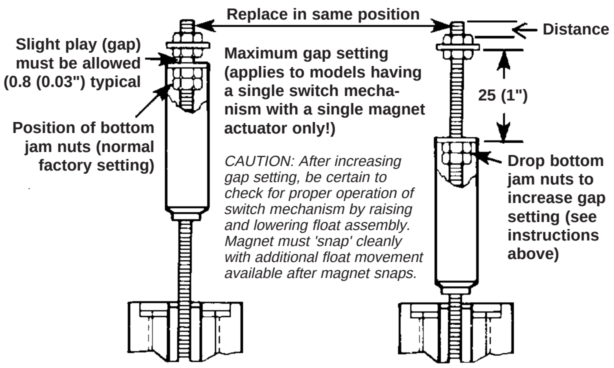
6. Loosen enclosing tube nut with a 35 mm wrench. Unscrew enclosing tube counterclockwise (switch and housing base will rotate also), until it is free. See **Figure 5**.
7. Lift enclosing tube, switch, and base off float chamber. Jam nuts and attraction sleeve are now accessible.
8. Measure the distance "D" from the top edge of the upper jam nuts to the top of the float stem. See **Figure 7**. Record this measurement.
9. Loosen and remove upper jam nuts, guide washer and attraction sleeve.
10. Loosen and adjust lower jam nuts to the desired position. Tighten lower jam nuts securely. See **Figure 7**.
11. Replace attraction sleeve on stem.
12. Replace upper jam nuts and guide washer on the stem in the position previously noted. Tighten upper jam nuts securely. See **Figure 7**.

SWITCH DIFFERENTIAL ADJUSTMENT (cont.)

NOTE: Use a new enclosing tube gasket when reassembling enclosing tube to the chamber. Coat enclosing tube threads with "anti-seizing" compound.

13. Replace enclosing tube, switch, and base on chamber. Screw tube clockwise until tightened to 10,42 - 13,90 kgm of torque.
14. Rotate switch housing to correct position and tighten set screw at base of switch housing. See **Figure 4**.
15. Bring supply wires through conduit outlet. Follow steps 5 through 10 of the "Wiring" section on page 4.

NOTE: If switch mechanism fails to function properly, check vertical alignment of control housing and consult installation bulletin on switch mechanism. If the unit still fails to function properly, consult the factory.



Normal factory setting (minimal differential)
Figure 6

Differential adjustement
Figure 7

HIGH LEVEL CONTROLS

On high level controls, the switch trips on the higher actuation point and resets on the lower actuation point.

> *CAUTION:*
> *On high level controls, widening the differential requires raising the trip point a proportionate amount. The reset point will remain the same.*

To widen the differential by raising the trip point, follow steps 1 through 16 under "Low Level Controls".

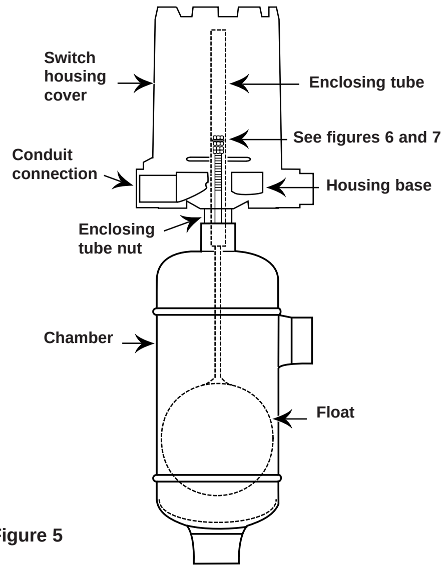


Figure 5

PREVENTIVE MAINTENANCE

Periodic inspections are a necessary means to keep your Magnetrol level control in good working order. This control is, in reality, a safety device to protect the valuable equipment it serves. Therefore, a systematic program of "preventive maintenance" should be implemented when control is placed into service. If the following sections on "what to do" and "what to avoid" are observed, your control will provide reliable protection of your capital equipment for many years.

WHAT TO DO

1. Keep control clean

NEVER leave switch housing cover off 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 become damaged or misplaced, order a replacement immediately.

2. Inspect switch mechanisms, terminals and connections monthly.

– 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 and have a tendency to "string out" like water, instead of breaking into round pools. If these conditions exist, replace the mercury switch immediately.

– Dry contact switches should be inspected for excessive wear on actuating lever or misalignment of adjusting 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.

Do **NOT** operate your control with defective or maladjusted switch mechanisms (refer to bulletin on switch mechanism furnished for service instructions).

– Magnetrol controls may sometimes be exposed to excessive heat or moisture. Under such conditions, insulation on electrical wires may become brittle, eventually breaking or peeling away. The resulting "bare" wires can cause short circuits.

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

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

– On units with pneumatic switches, air (or gas) operating medium lines subjected to vibration, may eventually crack or become loose at 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.

PREVENTIVE MAINTENANCE (cont.)

WHAT TO AVOID

1. **NEVER** leave switch housing cover off the control longer than necessary to make routine inspections.

2. **NEVER** use lubricants on pivots of switch mechanisms. A sufficient amount of lubricant has been applied at the factory to insure a lifetime of service. Further oiling is unnecessary and will only tend to attract dust and dirt which can interfere with mechanism operation.

3. **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.

4. **NEVER** attempt to make adjustments or replace switches without reading instructions carefully. Certain adjustments provided for in Magnetrol controls should not be attempted in the field. When in doubt, consult the factory or your local Magnetrol representative.

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)
— 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.

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 (3°) degrees of vertical (Use spirit level on side of enclosing tube in two place, 90° apart. Refer to **Figure 3** on page 4).
7. If mechanism is equipped with a mercury switch, examine glass mercury tube closely as previously described in "Preventive Maintenance" section. If switch is damaged, replace it immediately.
8. If switch mechanism is operating satisfactorily, proceed to check sensing unit.

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 **Page 5**.

> *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 **Page 5**.

5. Fill chamber with liquid at room pressure. Check float(s) to be certain it is buoyant in the liquid (float chamber must have adequate liquid level). If float is determined to be filled with liquid or collapsed, entire float chamber assembly (sensing unit) should be replaced.

CHECK COMPLETE UNIT

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

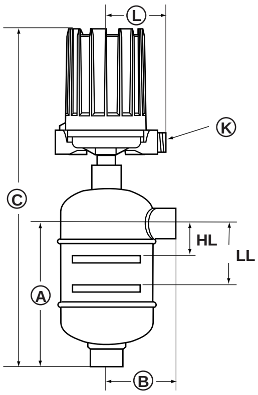
> *CAUTION:*
> *With electrical power "on", care should be taken to avoid contact with switch leads and connections at terminal block.*

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.

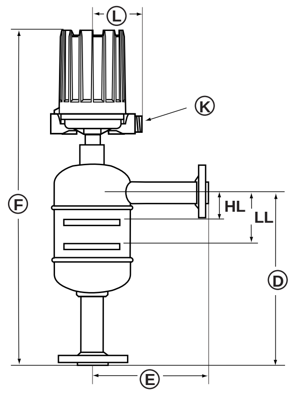
NOTE: If difficulties are encountered which can not be identified, consult with the factory or your local representative for assistance. A complete description of the trouble should be provided along with information concerning your piping and mounting arrangement, plus a description of your operation 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.

ACTUATING LEVELS

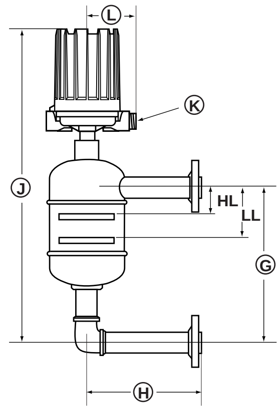
Actuating levels shown are for single switch units at minimum specific gravity only. Levels will change for multistage units. Consult factory for these units.



NPT & Socket weld



Upper side/bottom



Side/side

Material code 1 (for minimum specific gravity)

1" and NW 25 (DIN) connections NPT, flanged side - side or side - bottom

Part n° code	*mm (inches)*	
	HL	*LL*
A75	24 (0.94)	47 (1.85)
B75	76 (3.00)	92 (3.62)
C75	76 (3.00)	93 (3.66)
G75	64 (2.50)	81 (3.18)
J75	79 (3.12)	97 (3.81)

1 1/2" and NW 40 (DIN) connections NPT, flanged side - side or side - bottom

Part n° code	*mm (inches)*	
	HL	*LL*
A75	24 (0.94)	47 (1.85)
B75	59 (2.31)	75 (2.94)
C75	61 (2.38)	78 (3.07)
G75	46 (1.81)	63 (2.48)
J75	62 (2.44)	80 (3.14)

2" and NW 50 (DIN) connections NPT, flanged side - side or side - bottom

Part n° code	*mm (inches)*	
	HL	*LL*
A75	24 (0.94)	47 (1.85)
B75	47 (1.88)	63 (2.48)
C75	49 (1.94)	66 (2.59)
G75	38 (1.50)	55 (2.16)
J75	54 (2.12)	72 (2.83)

Material code 2 and 4 (for minimum specific gravity)

1" and NW 25 (DIN) connections NPT, flanged side - side or side - bottom

Part n° code	*mm (inches)*	
	HL	*LL*
A75	25 (0.98)	52 (2.05)
B75	76 (3.00)	96 (3.77)
C75	70 (2.77)	93 (3.63)
G75	64 (2.50)	84 (3.30)
075	75 (2.94)	103 (4.05)
P75	65 (2.56)	89 (3.50)

1 1/2" and NW 40 (DIN) connections NPT, flanged side - side or side - bottom

Part n° code	*mm (inches)*	
	HL	*LL*
A75	25 (0.98)	52 (2.05)
B75	59 (2.31)	79 (3.11)
C75	53 (2.08)	76 (3.00)
G75	46 (1.88)	66 (2.60)
P75	48 (1.88)	72 (2.83)

2" and NW 50 (DIN) connections NPT, flanged side - side or side - bottom

Part n° code	*mm (inches)*	
	HL	*LL*
A75	25 (0.98)	52 (2.05)
B75	47 (1.88)	67 (2.63)
C75	41 (1.61)	64 (2.51)
G75	38 (1.50)	58 (2.28)
P75	36 (1.41)	60 (2.36)

SEALED CAGE MODEL DIMENSIONAL SPECIFICATIONS in mm (inches)

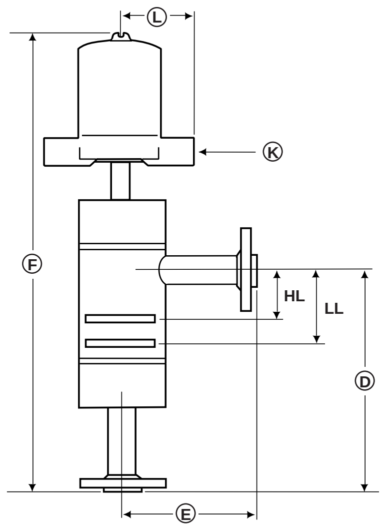
– Only A75 Model –

Rotation clearance	L
NEMA 4X (IP 65)	109 (4.29)
NEMA 7/9	100 (3.94)
BASEEFA & CENELEC	110 (4.33)
Pneumatic K (NEMA 3R)	130 (5.12)
Pneumatic J (NEMA 3R)	110 (4.33)

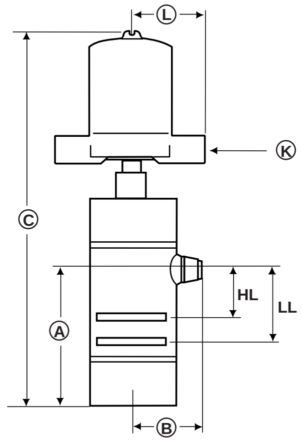
All housings rotatable 360°

Allow 200 mm (7.87") overhead clearance for cover removal.

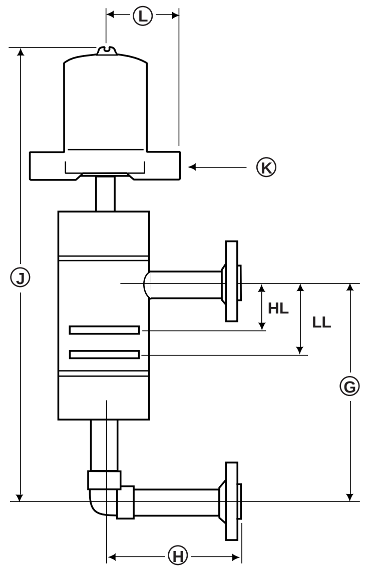
Conduit connections	K
Electrical switches	
NEMA 4X (IP 65)	1" NPT, PG 16 or M20 x 1.5 entries (2 entries - one plugged)
NEMA 7/9	1" NPT-F entry
BASEEFA & CENELEC	M20 x 1.5 or 3/4" NPT-F entry
Pneumatic switches	
K Series (Nema 3R)	1/4" NPT-F (two entries)
J Series (Nema 3R)	1/4" NPT-F (one entry)



Flanged
upper side/bottom
CENELEC housing



Threaded & socket weld
upper side/bottom
CENELEC housing



Flanged
side/side
CENELEC housing

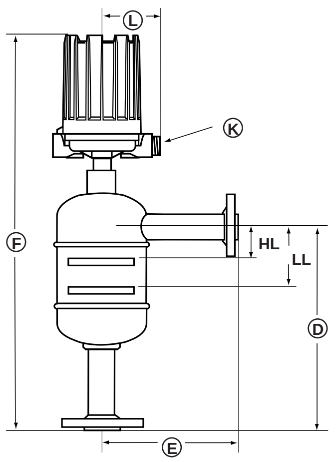
– All models except A75 –

Rotation clearance	L
NEMA 4X (IP 65)	109 (4.29)
NEMA 7/9	100 (3.94)
BASEEFA & CENELEC	110 (4.33)
Pneumatic K (NEMA 3R)	130 (5.12)
Pneumatic J (NEMA 3R)	110 (4.33)

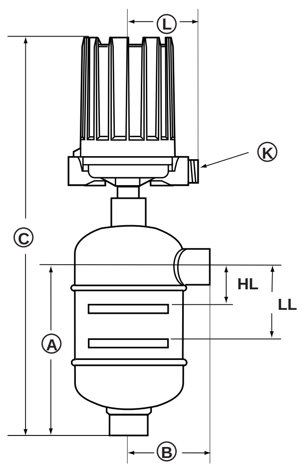
All housings rotatable 360°.

Allow 200 mm (7.87") over head clearance for cover removal.

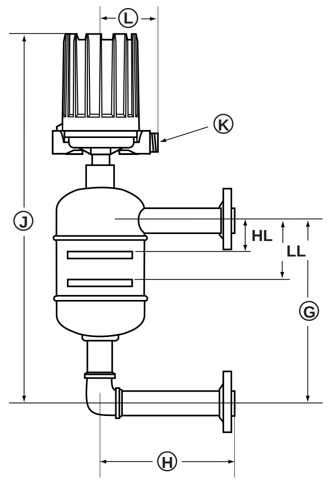
Conduit connections	K
Electrical switches	
NEMA 4X (IP 65)	1" NPT, PG 16 or M20 x 1.5 entries (2 entries - one plugged)
NEMA 7/9	1" NPT-F entry
BASEEFA & CENELEC	M20 x 1.5 or 3/4" NPT-F entry
Pneumatic switches	
K Series (Nema 3R)	1/4" NPT-F (two entries)
J Series (Nema 3R)	1/4" NPT-F (one entry)



Flanged
upper side/bottom
NEMA 4X housing



Threaded & socket weld
upper side/bottom
NEMA 4X housing



Flanged
side/side
NEMA 4X housing

SEALED CAGE MODEL DIMENSIONAL SPECIFICATIONS in mm (inches)

Carbon steel and Stainless steel chambers with 1" and NW 25 (DIN) connections.

mm	1" NPT & socket weld			1" or NW 25 Flanged upper side / bottom			1" or NW 25 Flanged side / side		
Part n° code	A	B	C (max)	D	E	F (max)	G	H	J (max)
A75	222	82	605	356	185	738	356	185	738
B75	222	95	579	356	200	713	356	200	713
C75	222	95	579	356	200	713	356	200	713
G75	242	109	609	356	215	723	356	215	723
J75	242	109	609	356	215	723	356	215	723
P75*	222	82	567	356	185	701	356	185	701
O75*	222	70	561	356	165	695	356	165	695

inches	1" NPT & socket weld			1" or NW 25 Flanged upper side / bottom			1" or NW 25 Flanged side / side		
Part n° code	A	B	C (max)	D	E	F (max)	G	H	J (max)
A75	8.74	3.23	23.80	14	7.28	29.05	14	7.28	29.05
B75	8.74	3.74	22.79	14	7.87	28.07	14	7.87	28.07
C75	8.74	3.74	22.79	14	7.87	28.07	14	7.87	28.07
G75	9.53	4.29	23.97	14	8.46	28.46	14	8.46	28.46
J75	9.53	4.29	23.97	14	8.46	28.46	14	8.46	28.46
P75*	8.74	3.23	22.32	14	7.28	27.60	14	7.28	27.60
O75*	8.74	2.75	22.08	14	6.50	27.36	14	6.50	27.36

* 316 / 316L stainless steel only

Carbon steel and Stainless steel chambers with 1 1/2" and NW 40 (DIN) connections.

mm	1 1/2" NPT			1 1/2" socket weld			1 1/2" or NW 40 Flanged upper side / bottom			1 1/2" or NW 40 Flanged side / side		
Part n° code	A	B	C (max)	A	B	C (max)	D	E	F (max)	G	H	J (max)
A75	222	84	605	222	93	605	356	200	738	356	200	738
B75	217	98	584	225	108	592	356	215	723	356	215	723
C75	217	98	584	225	108	592	356	215	723	356	215	723
G75	236	114	613	243	122	620	356	230	733	356	230	733
J75	236	114	613	243	122	620	356	230	733	356	230	733
P75*	217	84	573	224	93	580	356	200	712	356	200	712

inches	1 1/2" NPT			1 1/2" socket weld			1 1/2" or NW 40 Flanged upper side / bottom			1 1/2" or NW 40 Flanged side / side		
Part n° code	A	B	C (max)	A	B	C (max)	D	E	F (max)	G	H	J (max)
A75	8.74	3.30	23.80	8.74	3.66	23.80	14	7.87	29.05	14	7.87	29.05
B75	8.56	3.88	23.00	8.84	4.25	23.30	14	8.46	28.46	14	8.46	28.46
C75	8.56	3.88	23.00	8.84	4.25	23.30	14	8.46	28.46	14	8.46	28.46
G75	9.29	4.49	24.13	9.56	4.80	24.40	14	9.05	28.85	14	9.05	28.85
J75	9.29	4.49	24.13	9.56	4.80	24.40	14	9.05	28.85	14	9.05	28.85
P75*	8.56	3.30	22.56	8.84	3.66	22.83	14	7.87	28.03	14	7.87	28.03

* 316 / 316L stainless steel only

Carbon steel and Stainless steel chambers with 2" and NW 50 (DIN) connections.

mm	2" NPT			2" socket weld			2" or NW 50 Flanged upper side / bottom			2" or NW 50 Flanged side / side		
Part n° code	A	B	C (max)	A	B	C (max)	D	E	F (max)	G	H	J (max)
A75	222	84	605	222	101	605	356	200	738	356	200	738
B75	211	98	584	228	115	601	356	220	729	356	220	729
C75	211	98	584	228	115	601	356	220	729	356	220	729
G75	231	115	614	248	132	631	356	235	739	356	235	739
J75	231	115	614	248	132	631	356	235	739	356	235	739
P75*	211	84	576	228	101	593	356	200	721	356	200	721

inches	2" NPT			2" socket weld			2" or NW 50 Flanged upper side / bottom			2" or NW 50 Flanged side / side		
Part n° code	A	B	C (max)	A	B	C (max)	D	E	F (max)	G	H	J (max)
A75	8.74	3.31	23.80	8.74	3.97	23.80	14	7.87	29.05	14	7.87	29.05
B75	8.33	3.88	23.00	9.00	4.55	23.66	14	8.66	28.70	14	8.66	28.70
C75	8.33	3.88	23.00	9.00	4.55	23.66	14	8.66	28.70	14	8.66	28.70
G75	9.11	4.53	24.17	9.78	5.20	24.84	14	9.25	29.09	14	9.25	29.09
J75	9.11	4.53	24.17	9.78	5.20	24.84	14	9.25	29.09	14	9.25	29.09
P75*	8.33	3.31	22.67	9.00	3.97	23.34	14	7.87	28.38	14	7.87	28.38

* 316 / 316L stainless steel only

REPLACEMENT PARTS

Item	*Description*		*Models with mat'l code 1*	*Models with mat'l code 2*
			A, B, C, G, J75	*A, B, C, G, J75*
1	Housing cover	Housing kits	Refer to bulletin 42-780 for switch housing cover and base assemblies	
2	Housing base			
3	Switch mechanism		Refer to bulletin on switch mechanism furnished (listed on page 4)	
4	Jam nuts	Sleeve kits	089-3409-009	089-3410-001
5	Guide washer			
6	Attraction sleeve			
7	Stop tube (not shown)			
8	Enclosing tube	NEMA 4X, 7/9	032-6302-033	
		Pneumatic SW. HSG.	032-6302-031	
		BASEEFA & CENELEC	032-6344-002	
9	E-tube gasket		012-1204-001 (B, G75)	
			012-1301-002 (A, C, J75)	
10	Chamber assembly		Chamber assemblies are available as complete sensing units only with all parts listed under items 4 through 10 assembled. When ordering specify model & serial number of control.	

Item	*Description*		*Models with mat'l code 4*
			A, B, C, G, J, O, P75
1	Housing cover	Housing kits	Refer to bulletin 42-780 for switch housing cover and base assemblies
2	Housing base		
3	Switch mechanism		Refer to bulletin on switch mechanism furnished (listed on page 4)
4	Jam nuts	Sleeve kits	089-3410-001
5	Guide washer		
6	Attraction sleeve		
7	Stop tube (not shown)		
8	Enclosing tube	NEMA 4X, 7/9	032-6302-037
		Pneumatic SW. HSG.	032-6302-036
		BASEEFA & CENELEC	032-6344-001
9	E-tube gasket		012-1204-001 (B, G75)
			012-1301-002 (A, C, J75)
10	Chamber assembly		Chamber assemblies are available as complete sensing units only with all parts listed under items 4 through 10 assembled. When ordering specify model & serial number of control.

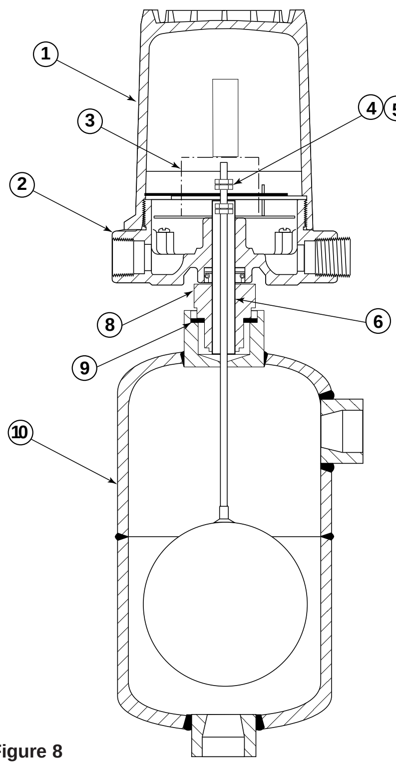


Figure 8

SERIES 75 TANDEM FLOAT UNITS

DESCRIPTION

Series 75 units with tandem style floats are used on applications where widely spaced high and low switching functions can be accomplished with a single control. These units incorporate two floats which operate independently and are arranged so that the lower float actuates the upper switch mechanism and the upper float actuates the lower switch mechanism. The upper float is attached to the lower attracting sleeve by means of a hollow stem. The lower float attaches to the upper attracting sleeve with a solid stem which extends upward through the upper float and stem assembly.

INSTALLATION, PREVENTATIVE MAINTENANCE AND TROUBLE SHOOTING

Installation and maintenance of tandem float models is accomplished in much the same manner as previously described for standard models. Some additional consideration must be given to the piping arrangement to allow for alignment of the two switch actuating level marks on the float chamber with the desired levels in the vessel. When trouble-shooting the level sensing portion of the control, additional checks may be made of the following :

1. Inspect for binding of solid (lower) float stem within hollow (upper) float stem due to corrosion or possible damage incurred in shipment.
2. Make certain that retaining “snap” rings, used to locate lower attracting sleeve, are locked in place. An extreme shock or hammer may have damaged a ring causing it to snap out of its retaining groove in the hollow (upper) float stem.

DIFFERENTIAL ADJUSTMENT

CAUTION: No differential adjustment should be made on tandem float models in the field. Switch actuation levels have been set at the factory to meet specific customer specifications. Variations in actual conditions from design conditions usually requires special control modifications. Consult the factory or your local representative for assistance.

REPLACEMENT OF FLOAT AND STEM ASSEMBLIES

Should replacement of either upper or lower float and stem assembly be required, entire float chamber assembly (sensing unit) should be replaced.

REPLACEMENT PARTS

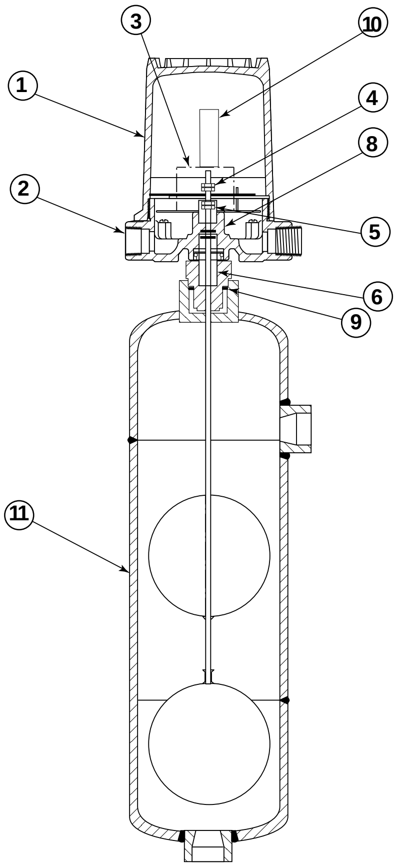


Figure 9

Item	*Description*		*Standard Replacement Assembly Kits*	
			B75, C75, G75, J75	
1	Housing Cover (Tall)	Housing Kits	See bulletin 42-780 for reference switch housing replacement assemblies	
2	Housing Base			
3	Switch Mechanisms	-	See bulletin on mechanism furnished (listed on Page 4)	
4	Jam Nuts	Sleeve Kits ①	089-3411-001 (Std.) 089-3412-001 (SST)	
5	Upper Attraction Sleeve			
6	Lower Attraction Sleeve			
7	Spacer Washer			
8	Retaining Ring			
9	E-Tube Gasket	Gasket	012-1204-001	
10	Enclosing Tube	E-Tube	Nema 4X, Nema 7/9	032-6302-037
			BASEEFA & CENELEC	032-6344-001
11	Chamber Assembly	Sensing Unit	②	

NOTES:

① Sleeve kit part numbers denote “SST” include sheathed type attraction sleeves used on models specified for corrosive service. Standard kit part numbers denoted “Std.” include attraction sleeves of type 400 series stainless steel.

② Chamber assemblies are available as complete sensing units only with all parts listed under items 4 through 11 assembled. See important note following.

IMPORTANT:

When ordering, please specify:

A. Model and Serial Number of control.

B. Name and/or Number of replacement assembly.

IMPORTANT: Many model 75 controls are specially tailored to meet specific customer specifications and therefore may contain special parts. When ordering, always give Serial Number of control.

IMPORTANT

SERVICE POLICY

Owners of Magnetrol products 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. Magnetrol International will repair or replace the control, at no cost to the purchaser, (or owner) ***other than transportation cost*** if:

a. Returned within the warranty period; and,
b. The factory inspection finds the cause of the malfunction to be defective material or workmanship.

If the trouble is the result of conditions beyond our control; or, is **NOT** covered by the warranty, there will be charges for labour 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, labour, direct or consequential damage will be allowed.

RETURNED MATERIAL PROCEDURE

So that we may efficiently process any materials that are returned, it is essential that a “Return Material Authorisation” (RMA) form will be obtained from the factory. It is mandatory that this form will be attached to each material returned. This form is available through Magnetrol’s local representative or by contacting the factory. Please supply the following information:

1. Purchaser Name
2. Description of Material
3. Serial Number
4. Desired Action
5. Reason for Return
6. Process details

All shipments returned to the factory must be by prepaid transportation. Magnetrol **will *not* accept** collect shipments.

All replacements will be shipped FOB factory.

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