SERIES 301

MERCOID LIQUID LEVEL CONTROLS WITH SEALED MERCURY SWITCHES OR WITH SNAP-ACTION SWITCHES

FOR PRESSURIZED OR NON-PRESSURED TANKS OR SUMPS

BULLETIN IN–420

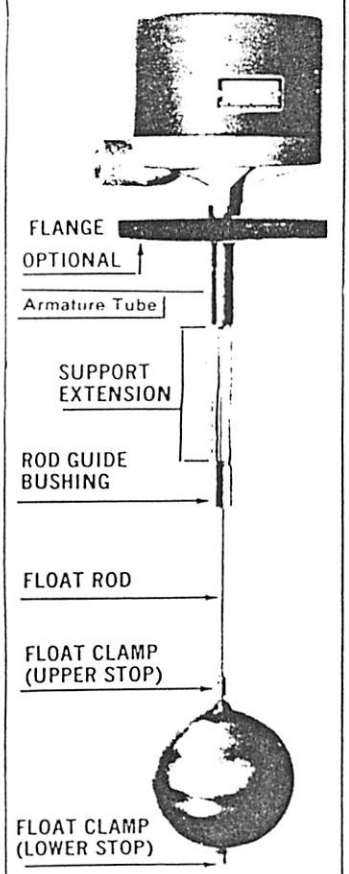


ILLUSTRATION No. 1

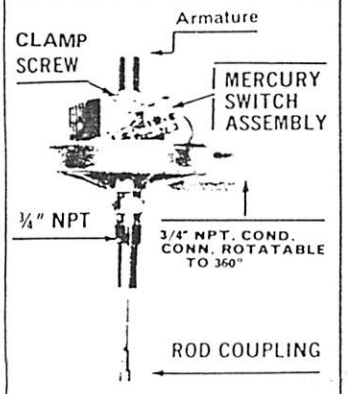


ILLUSTRATION No. 2

MATERIALS OF CONSTRUCTION

FLOATS—304SS or copper;
FLOAT ROD—303SS or 316SS;
FLOAT STOPS—Brass or 304SS;
SUPPORT EXTENSION—Steel (galvanized) or 304SS;

ROD GUIDE—303SS with Teflon bushing;
Armature Tube—304SS;
Armature—430SS.

Max. Temp. inside control 250°F.

OPERATING CHARACTERISTICS

A float is fixed (with rod clamps (stops) above and below the float) on a float rod connected to a magnetic armature at its upper end. The armature is moved up and down inside a tube in a switch enclosure. The switch operating assemblies are mounted on the armature tube. As the float is raised or lowered by liquid level changes, the armature is moved into or out of the field of the switch magnet, operating the switch assembly to open or close the switch. Float does not move up and down on the float — it is in a fixed position on rod. Float position on rod determines switch operation.

EXPLANATION OF TYPE & CODE NUMBERS

Example: Type 301G-4820
301 is the type number; letter "G" identifies type of enclosure 4820; designates circuit.

ENCLOSURES

GENERAL PURPOSE - NEMA 1 enclosures are identified by the letter 'G' in type number as in 301G.

WEATHER RESISTANT - NEMA 3R enclosures are identified by the letter 'W' in type number as in 301W.

WATERTIGHT - NEMA 4 enclosures are identified by the letter 'WT' in type number as 301WT.

EXPLOSION-PROOF - NEMA 7, 9 enclosures are identified by the letter 'E' in type number as in 301E.

VAPOR PROOF—EXPLOSION PROOF - NEMA 7,9 enclosures are identified by the letters 'EV' in type number as in 301EV.

SPECIAL FEATURES

SEMI-AUTOMATIC (with manual reset) operates automatically on level fall only—manual reset required on level rise. This operation identified by the letters "RU" in type number as in 301GRU, 301ERU.

WIDE DIFFERENTIAL (single stage only) available only for controls with mercury switch contacts. Provides approximately double the fixed level change ("D" in Liquid Level Change Table) between on and off switch operation. Identified by the letter "D" in type number as in 301GD.

440 VOLT SERVICE for controls with mercury switch contacts only. Identified by the digit 5 in circuit specification number such as in 5820, 5821. On two stage operation, 440V. is limited to SP-ST in each stage.

FLOATS—(PRESSURE & TEMPERATURE RATINGS)

4-1/2" Copper	150 PSI @ 300°F. MAX.	(NO. 45-43-1)
4-1/2" 304 S.S.	300 PSI @ 500°F. MAX. 600 PSI @ 100°F. MAX.	(NO. 45-30)
3-1/2 x 6" S.S.	300 PSI @ 500°F. 450 PSI @ 100°F.	(NO. 45-60)
7" Copper	150 PSI @ 300°F. MAX.	(NO. 45-49)
7" 304 S.S.	450 PSI @ 100°F. MAX. 425 PSI @ 200°F. MAX. 300 PSI @ 500°F. MAX.	(NO. 45-50)

LOCATION AND MOUNTING

All controls must be mounted vertically with switch mechanism in a level position. All piping including flange if used, must be installed to provide level control mounting.

When a flange is not required, the control may be installed by using a 3/4" tapping, provided a hand hole or suitable opening is available for installing the float.

WHERE TURBULENCE OR FAST FLOWING LIQUIDS PREVAIL and insertion depth is over 16" or more, use a support extension with a rod guide—see illustration No. 1. Support extensions of specified lengths may be obtained from The Mercoid Corporation or made from 3/8" pipe, threaded at each end.

On installations where the control is to operate in a standpipe, no support extension is necessary and the float may be positioned at any point over the entire length of float rod.

HOW TO ASSEMBLE FLOAT, ROD, STOPS

If support extension is required, insert rod through rod guide bushing and support extensions. Attach float rod to coupling (illustrations No. 1 and 2) protruding from armature tube. Fasten support extension to armature tube by means of the threaded section inside of armature tube. Fasten rod guide bushing (with Teflon insert) to bottom of support extension. Place top float clamp (stop) on rod and fasten it at the desired position. Insert rod through float and secure to float rod by means of bottom float clamp (stop). Be sure that float is secured in position by both top and bottom clamps (stops) with no play between them. Location of float on the rod determines level effecting switch operation.

If support extension is not used, attach the float rod to the rod coupling and install float as described above.

FOR OPERATING LEVELS AND DIFFERENTIALS SEE TABLES ON OPPOSITE PAGE

WIRING

Wire in accordance with local electrical codes or follow equipment manufacturers instructions.

On single stage controls, once the float has been positioned, the operating point can be adjusted slightly by loosening the **CLAMP** screw and raising or lowering the switch assembly.

To remove or position switch assembly, loosen **CLAMP** screw (illustration No. 2). Align wiring block to face conduit opening and tighten **CLAMP** screw of switch assembly. Note that the 3/4" NPT conduit connection (on all types) can be rotated 360° to facilitate wiring.

CAUTIONS

Keep cover on control mechanism at all times. Do not oil any parts. Do not overload electrically—see rating stamped on nameplate.

	FLOAT	SIZE	STEAM	COLD NON-SHOCK
ASA FLANGES	4-1/2"	5" Cl 125# 5" Cl 250# 5" Cl 300#	125# 200# 300#	175# 400# 600#
	7"	Same as above for 8" flange.		

ELECTRICAL CIRCUITS & RATINGS — CONTROLS USING MERCURY SWITCH CONTACTS

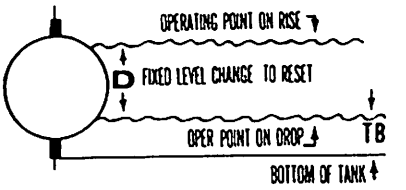
Operating Circuit Spec. No. Single Stage	Two-Stage Lower	Two-Stage Upper	SWITCH ACTION	Electrical Ratings In Amps. AC 120V	AC 240V	AC 440V†	DC 125V	DC 250V
-4821	-4821	-21	SP-ST Open on level FALL	10	5	3†	10	5
-4820	-4820	-20	SP-ST Open on level RISE	10	5	3†	10	5
-4810	-4810	-10	SP-DT One switch	4	2	1	4	2
-4815	-4815	-15	SP-DT Two switches E.I.*	10	5	3	10	5
-4813	-4813	-13	DP-ST Two switches E.I.* Open on level DROP	10	5	3	10	5
-4814	-4814	-14	DP-ST Two switches E.I.* Open on level RISE	10	5	3	10	5
-4806	-4806	-06	DP-DT Two SP-DT switches	4	2	1	4	2
CONTROLS USING SNAP-ACTION CONTACTS								
-7810	-7810	-10	SP-DT One switch	12	5	3	0.5**	0.25**
-7806	-7806	-06	DP-DT Two SP-DT switches	12	5	3	0.5**	0.25**
-9806	-9806	-06	DP-DT Two SP-DT switches	10	3		10‡	3‡
-9810	-9810	-10	SP-DT One switch	10	3		10‡	3‡

*Electrically Independent
‡10 Amp Inductive (Polarized) at 125V DC
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8 — i.e. -4820 becomes -5820; SP-ST Only.
**Resistive

LIQUID LEVEL CHANGES IN INCHES FOR SWITCH OPERATION

SINGLE STAGE

SPECIFIC GRAVITY	FLOAT C – COPPER SS – STAINLESS STEEL	MINIMUM HIGH LEVEL OPERATING POINT (ON RISE) FROM TOP OF FLANGE	MAXIMUM LOW LEVEL OPERATING POINT (ON DROP) FROM TOP OF FLANGE	FIXED LEVEL CHANGE "D" BETWEEN ON AND OFF	MINIMUM TANK DEPTH REQUIRED BELOW LOW OPERATING POINT "TB"
1.0	4-1/2" C	9"	96"	3/1"	5-3/4"
	4-1/2" SS	9-3/8"	144"	3/1"	5-3/4"
	7" C	10-1/8"	286"	1/2"	6"
	7" SS	10-3/4"	286"	1/2"	6"
	3-1/2 x 6" SS	9-7/8"	144"	7/3"	7-5/8"
.90	4-1/2" C	8-3/4"	108"	7/3"	6-1/8"
	4-1/2" SS	9-1/4"	144"	1"	6-1/8"
	7" C	10"	286"	1/2"	6-1/4"
	7" SS	10-5/8"	286"	1/2"	6-1/4"
	3-1/2 x 6" SS	9-3/8"	96"	1-1/8"	7-7/8"
.82	4-1/2" C	8-1/2"	72"	1"	6-1/4"
	4-1/2" SS	8-3/4"	108"	7/8"	6-1/4"
	7" C	9-7/8"	286"	1/2"	6-3/4"
	7" SS	10-1/2"	286"	1/2"	6-3/4"
	3-1/2 x 6" SS	9-1/8"	72"	1-1/4"	8"
.75	4-1/2" C	7-1/2"	16"	1-3/8"	6-1/8"
	4-1/2" SS	8-3/8"	72"	1"	6-1/2"
	7" C	9-5/8"	286"	5/8"	6-7/8"
	7" SS	10-3/8"	286"	5/8"	6-7/8"
	3-1/2 x 6" SS	8-7/8"	48"	1-1/2"	8"
.62	7" C	8-3/4"	190"	3/4"	6-3/4"
	7" SS	9-3/4"	286"	3/4"	6-3/4"
.50	7" SS	9-1/4"	286"	3/4"	6-3/4"



NOTE

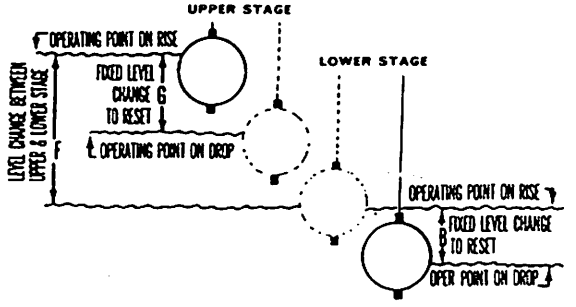
Float travel is limited by the lower extremity of the armature tube, or when provided, by the end of the support extension. Float rods and extensions may be altered to obtain the minimum and maximum operating levels shown in the tables.

If control has been furnished for specified operating levels, the float rod supplied will provide ± 2" adjustment of such levels.

If tank depth is critical a section of float rod below lower clamp (stop) may be cut off.

TWO STAGE OPERATION

SPECIFIC GRAVITY	FLOAT C – COPPER SS – STAINLESS STEEL	UPPER STAGE: MINIMUM OPERATING POINT FROM TOP OF FLANGE (ON RISE)	UPPER STAGE: FIXED LEVEL CHANGE "C" TO RESET ON DROP	LOWER STAGE: MAXIMUM OPERATING POINT FROM TOP OF FLANGE (ON DROP)	LOWER STAGE: FIXED LEVEL CHANGE "B" TO RESET ON RISE	LEVEL CHANGE BETWEEN STAGE OPERATIONS "F"	MINIMUM TANK DEPTH REQUIRED BELOW LOW OPERATING POINT "TB"
1.0	4-1/2" C	8"	1-1/4"	73"	3/4"	2-1/4"	5-3/4"
	4-1/2" SS	7-1/4"	1-3/8"	145"	3/4"	2-1/4-3"	5-3/4"
	7" C	9"	3/4"	286"	1/2"	2-1/8"	6"
	7" SS	10"	3/4"	286"	1/2"	2-1/16"	6"
	3-1/2 x 6" SS	8"	1-1/2"	108"	7/8"	2-1/4"	7-5/8"
.90	4-1/2" C	7-3/8"	1-3/8"	66"	3/4"	2-1/4"	6-1/4"
	4-1/2" SS	7-1/8"	1-1/4"	96"	3/4"	2-1/4-3"	6-1/4"
	7" C	9"	3/4"	286"	1/2"	2-1/8"	6-1/4"
	7" SS	10"	3/4"	286"	1/2"	2-1/8"	6-1/4"
	3-1/2 x 6" SS	7-1/8"	1-1/2"	72"	1"	2-1/4"	8"
.82	4-1/2" C	7"	1-1/2"	48"	7/8"	2-1/4"	6-3/8"
	4-1½" SS	7"	1-1/4"	72"	7/8"	2-1/4-3"	6-3/8"
	7" C	9"	7/8"	286"	5/8"	2-1/8"	6-5/8"
	7" SS	10"	7/8"	286"	5/8"	2-1/8"	6-5/8"
	3-1/2 x 6" SS	7"	1-5/8"	48"	1-1/4"	2-1/4"	8"
.75	4-1/2" SS	7"	1-1/8"	49"	3/4"	2-1/4-3"	6-3/4"
	7" C	8"	7/8"	286"	5/8"	2-1/8"	6-7/8"
	7" SS	10"	7/8"	286"	5/8"	2-1/8"	6-7/8"
	3-1/2 x 6" SS	7"	1-3/4"	24"	1-1/4"	2-1/4"	8-1/4"
.62	7" C	7-1/4"	1"	215"	3/4"	2-1/4"	7-3/4"
	7" SS	9"	1"	286"	5/8"	2-3/16"	7-3/4"
.50	7" SS	8-1/4"	1"	269"	3/4"	2-1/4"	7-3/4"



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If control has been furnished for specified operating levels, the float rod supplied will provide ± 2" adjustment of such levels.

If tank depth is critical a section of float rod below lower clamp (stop) may be cut off.

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