Mercoid®

# Series 215, 225 - 217, 227 - 218, 228 Liquid Level Controls
with Sealed Mercury or Snap Action Switches

## Installation and Operating Instructions

### Operating Characteristics
These controls incorporate magnetically actuated switch mechanisms which are operated by a magnetic armature placed by float action into or out of the magnetic field of the switch magnet. The armature operates within a non-magnetic tube within the switch enclosure. The switch mechanism (including the electrical contact switches) are mounted on the armature tube. Poles of the switch magnets face the armature tube and when float action moves the armature into position to attract the magnet, actuation of the electrical contact switches takes place. As the armature is moved out of position, the magnetic attraction is broken and the electrical contact switches return to their original position. The armature tube and armature structures are designed so that two switch mechanisms may be stacked on the tube, each responsive to different float levels for individual two stage operation.
The float slides on a rod between two adjustable stops. With stops set at the desired position, the float travels up and down on the rod due to changes in liquid level.

### Explanation of Type and Code Numbers
Example: TYPE 215-1G-4820-C-1-60.
215-1 is the type number of the control; letter "G" denotes enclosures; 4820 designates circuit arrangement; C1 denotes materials of construction; 60 indicates pressure rating and specific gravity.

### Enclosures
General Purpose enclosures are identified by the letter "G" in type number as in 215-1G.
Weather Resistant enclosures are identified by the letter "W" in type number as in 225-1W.
Explosion Proof enclosures are identified by the letter "E" in type number as in 215-1E.
Vapor Proof - Explosion Proof enclosures are identified by the letters "EV" in type number as in 225-2EV.
Water tight enclosures are identified by the letters "WT" in type number as in 225-1WT.

### Wiring
Wire in accordance with local electrical codes and follow equipment manufacturer's instructions.
Align wiring block to face conduit opening and tighten clamp screw of switch assembly.
The 3/4" NPT conduit connection (on all types) can be rotated 360° to facilitate wiring.
Do not overload electrically. See rating stamped on nameplate.

### Operating Adjustments
Remove flange bolts and lift flange with operating mechanism from lower bowl as shown in illustration No. 1. Set stops for upper and lower operating levels as shown in illustrations on page 3.

### Location - Mounting
Select location recommended by equipment manufacturer. Mount all controls vertically and be sure that control switch mechanism is level.

### To Remove Switch Operating Assembly
The switch mechanism is easily removed. Remove retainer ring and loosen the clamp screw and lift up entire assembly. (illustration No.1) When reassembling be sure switch mechanism is positioned at the bottom of the armature tube within the control case. Note: Where two switch assemblies are used (I.E: 215-2) the lower switch assembly must be positioned at the bottom of the armature tube and follow this by positioning upper switch assembly on top of the lower one - upper assembly must also be as far down on the armature tube as possible. This is important as incorrect positioning can result in operating failures. The switch magnets must assume their proper relationship to the armature within the armature tube as it is raised and lowered by float action.

Align wiring block to face conduit opening and tighten clamp screw to secure switch mechanism into place.

**For Pressurized or Non-Pressurized Tanks or Sumps**

**Series 215-1 and 225-1** - Single Stage Operation - Adjustable high and low operating levels.

**Series 215-2 and 225-2** - Two Stage Operation - Adjustable operating levels plus high level alarm or trip.

**Series 215-3 and 225-3** - Two Stage Operation - Adjustable operating levels plus low level alarm or trip.

**Series 215-4 and 225-4** - Two Stage Operation - High and low alarm or trip with adjustable spread between stages.

### Materials of Construction
### Standard on all Types

| Type | 215 | 225 |
|---|---|---|
| Float Chamber | Steel | Steel |
| Aramture | 430 SS | 430 SS |
| Float | 304 SS | 316 SS |
| Recessed Gasket | Carbon | SS CLAD |
| Trim | 303 SS | 303 SS |

### Flange and Float Specifications

**Type 215, 225:** (1) Vertical and (1) Horizontal 1" NPT pipe connection.
**Type 217, 227:** (1) Flange Vertical and (1) Flange Horizontal 1" R.F. Forged Steel.
**Type 218, 228:** Both Flanges Vertical 1" R.F. Forged Steel.

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| Type | Minimum Specific Gravity | Pressure Rating At 100°F | 500°F | 475°F | Flange Class PSI | Code |
|---|---|---|---|---|---|---|
| 215 | 0.6 | 450 | 300 | --- | --- | C1-60 |
| 217<br>218 | 0.6 | 275 | 150 | --- | 150 | C1-160 |
| 217<br>218 | 0.6 | 450 | 300 | --- | 300 | C1-360 |
| 217<br>218 | 0.6 | 450 | 300 | --- | 600 | C1-660 |
| 225 | 0.75 | 600 | --- | 550 | --- | C1-75 |
| 227<br>228 | 0.75 | 275 | --- | 150 | 150 | C1-175 |
| 227<br>228 | 0.75 | 600 | --- | 550 | 300 | C1-375 |
| 227<br>228 | 0.75 | 600 | --- | 550 | 600 | C1-675 |
| 225 | 0.80 | 1000 | --- | 850 | --- | C1-80 |
| 227<br>228 | 0.80 | 275 | --- | 150 | 150 | C1-180 |
| 227<br>228 | 0.80 | 720 | --- | 625 | 300 | C1-380 |
| 227<br>228 | 0.80 | 1000 | --- | 850 | 600 | C1-680 |

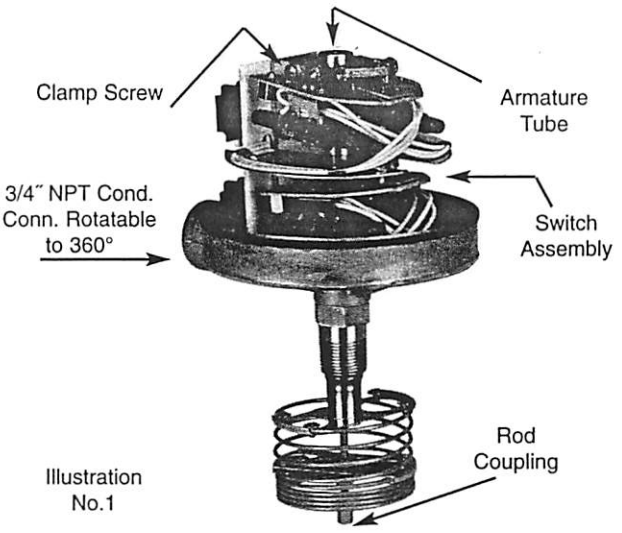



Illustration No.1

**Two Stage Operation**

| | Lower Stage | Upper Stage |
|---|---|---|
| Types 215-2 or 225-2 | Operating Circuit | Alarm or Trip |
| Types 215-3 or 225-3 | Alarm or Trip | Operating Circuit |
| Types 215-4 or 225-4 | Low Level Alarm or Trip | Hi Level Alarm or Trip |

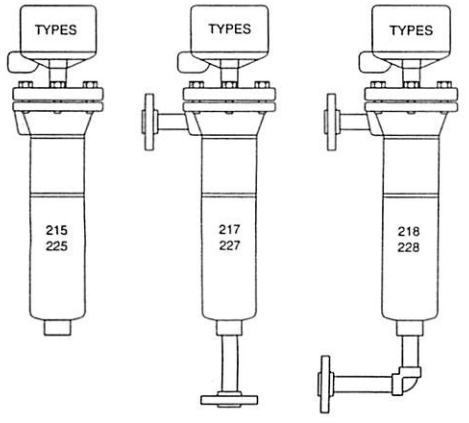
| Switch Type | Switch Action | Electrical Ratings in AMPs AC 120V | AC 240V | AC 440V† | DC 125V | DC 250V | 215-1 or 225-1 Single Stage | Two Stage Lower | Two Stage Upper |
|---|---|---|---|---|---|---|---|---|---|
| Mercury Contacts | SP-ST Open on level Fall | 10 | 5 | 3† | 10 | 5 | -4820 | -4820 | -21 |
| | SP-ST Open on level Rise | 10 | 5 | 3† | 10 | 5 | -4821 | -4821 | -20 |
| | SP-DT One switch | 4 | 2 | 1† | 4 | 2 | -4810 | -4810 | -10 |
| | SP-DT Two switches E.I.* | 10 | 5 | 3† | 10 | 5 | -4815 | -4815 | -15 |
| | DP-ST Two switches E.I.* Open on level Fall | 10 | 5 | 3† | 10 | 5 | -4814 | -4814 | -13 |
| | DP-ST Two switches E.I.* Open on level rise | 10 | 5 | 3† | 10 | 5 | -4813 | -4813 | -14 |
| | DP-DT Two SP-DT switches | 4 | 2 | 1† | 4 | 2 | -4806 | -4806 | -06 |
| Snap-Action Contacts | SP-DT One switch | 12 | 5 | 3† | 0.5** | 0.25** | -7810 | -7810 | -10 |
| | DP-DT Two SP-DT switches | 12 | 5 | 3† | 0.5** | 0.25** | -7806 | - 7806 | -06 |
| | DP-DT Two SP-DT switches | 10 | 3 | | 10• | 3• | -9806 | -9806 | -06 |
| | SP-DT One switch | 10 | 3 | | 10• | 3• | -9810 | -9810 | -10 |

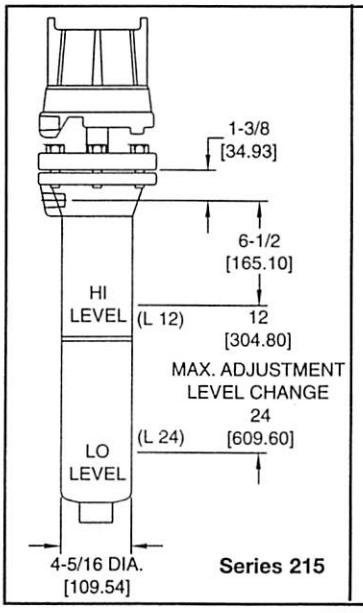
*Electrically Independent
•10 Amp Inductive (Polarized) at 125V DC
**Resistive

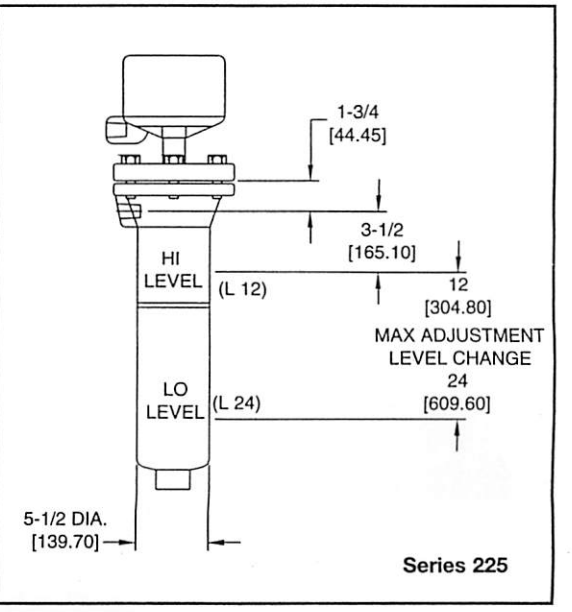
†Available on special order. Change 1st digit in Ordering Code from 4 to 5 or 7 to 8-- i.e. -4820 becomes -5820; -7810 becomes -8810; etc.

**IMPORTANT** - On two-stage units the upper and lower switch assemblies are not interchangable unless the last two numbers of the lower stage are the same as the suffic numbers of the lower stage are the same as the suffix number for the upper stage (I.E. 4821-21). Interchanging two-stage units will reverse switch action from that obtained in its original position - see circuit response table for respective upper and lower units under each specific type number. Note: Any operating circuit can be combined with an alarm or trip circuit, i.e. - 4821-20.

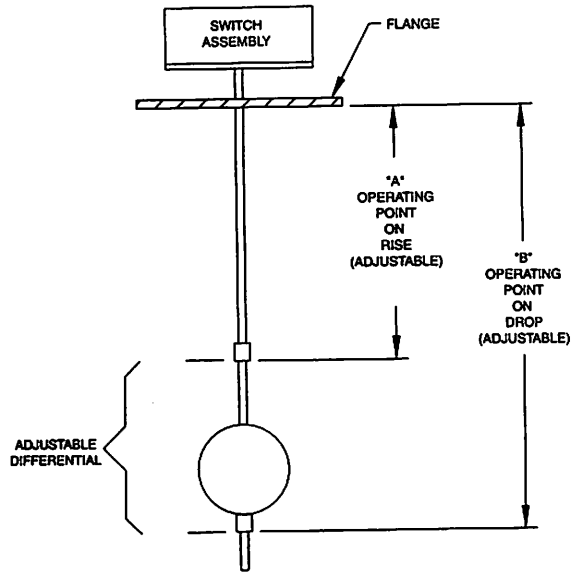
**Note:** Cold shock or water hammer must be avoided, as this condition may damage the float and prevent proper operation of the control.



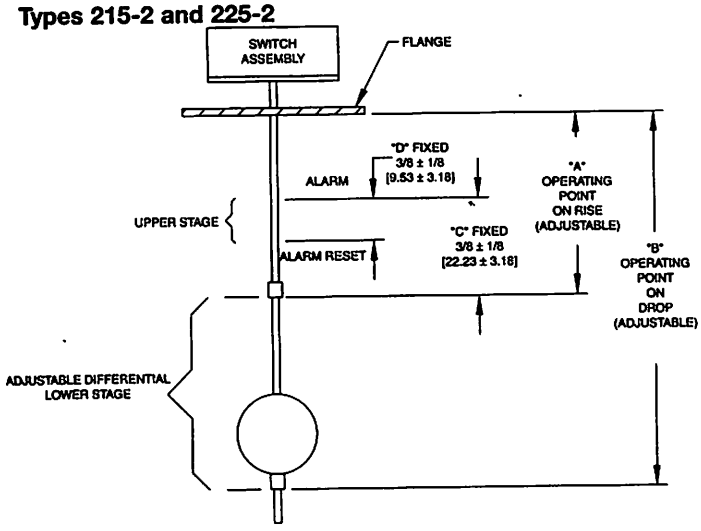
### Types 215-1 and 225-1




**Types 215-1 and 225-1 Single Stage Operation**
**Adjustable High and Low Operating Levels**

For the initial settings of float stops for operating levels, it may be assumed that level line on float is at center of float. Stop may be poitioned to locate center of float at the desired level distances from top of mounting flange. Float level line will vary somewhat in operation and with respect to differences in floats and specif gravities.

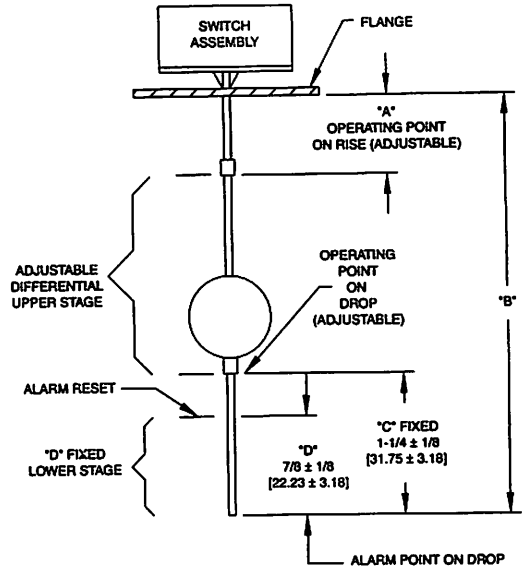
### Types 215-2 and 225-2




**Types 215-2 and 225-2 Two Stage Operation**
**Adjustable Operating Levels Plus High Level Alarm or Trip**

For the initial settings of float stops for operating levels, it may be assumed that level line on float is at center of float. Stop may be positioned to locate center of float at the desired level distances from top of mounting flange. Float level line will vary somewhat in operation and with respect to differences in floats and specific gravities. Note: The top and bottom float stops determine the operating levels "A" and "B" for the lower switch unit. The top switch unit operates upon a fixedd level rise above "A". (See dimensions "C").

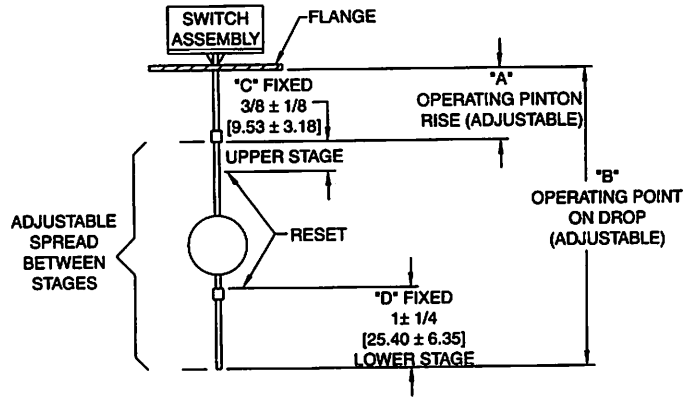
### Types 215-3 and 225-3




**Types 215-3 and 225-3 Two Stage Operation**
**Adjustable Operating Levels Plus Low Level Alarm or Trip**

For the initial settings of float stops for operating levels, it may be assumed that level line on float is at center of float. Stop may be positioned to locate center of float at the desired level distance from top of flange mounting. Float level line will vary somwhat in operation and with respect to differences in floats and specific gravities. The top and bottom float stops determine the operating levels of "A" and "B" for the upper switch mechanism. The lower switch mechanism operates upon a fixed level drop below level "B" (see dimension "C").

### Types 215-4 and 225-4




**Types 215-4 and 225-4 Two Stage Operation**
**High and Low Alarm or Trip with Adjustable Spread Between Stages**

For the purpose of estimating level position of float for setting float stops, assume liquid level at center of float. Stops should be positioned to locate center of float at the desired level distances from top of mounted flange.

Float level line will vary somewhat in operation and with respect to differences in floats and specific gravity. The top and bottom float determine the operating levels "A" (upper switch assembly) and "B" (lower swich assembly). Each switch assembly has a fixed operating differential "C" and "D".