

FLOWLINE

**Switch-Tek
Horizontal and Vertical
And Float-Point
Float Switches
LV20, LV21, LV35, LV36, LH25,
LH29, LH35, AV_6 Series
22AUG 08
Rev A**



Flowline, Inc.
10500 Humbolt Street
Los Alamitos, CA 90720
Tel: (562) 598-3015
Fax: (562) 431-8507
www.flowline.com

**Preface**

This manual explains how to use the Switch-Tek series of horizontal and vertical floats.

Warranty, Service & Repair

To register your product with the manufacturer, go to the Flowline website for on-line registration. The website address is as follows:

www.flowline.com

On-line Warranty Registration can be found under Contact Us in the Navigation Bar along the side of the home page. If for some reason your product must be returned for factory service, contact Flowline Inc. at (562) 598-3015 to receive a Material Return Authorization number (MRA), providing the following information:

1. Part Number, Serial Number
2. Name and telephone number of someone who can answer technical questions related to the product and its application.
3. Return Shipping Address
4. Brief Description of the Symptom
5. Brief Description of the Application

Once you have received a Material Return Authorization number, ship the product prepaid in its original packing to:

Flowline Factory Service
MRA_____

10500 Humbolt Street
Los Alamitos, CA 90720

To avoid delays in processing your repair, write the MRA on the shipping label. Please include the information about the malfunction with your product. This information enables our service technicians to process your repair order as quickly as possible.

Warranty

Flowline warrants to the original purchaser of its products that such products will be free from defects in material and workmanship under normal use and service for a period which is equal to the shorter of one year from the date of purchase of such products or two years from the date of manufacture of such products.

This warranty covers only those components of the products which have non-moving and not subject to normal wear. Moreover, products which are modified or altered, and electrical cables which are cut to length during installation are not covered by this warranty.

Flowline's obligation under this warranty is solely and exclusively limited to the repair or replacement, at Flowline's option, of the products (or components thereof) which Flowline's examination proves to its satisfaction to be defective. FLOWLINE SHALL HAVE NO OBLIGATION FOR CONSEQUENTIAL DAMAGES TO PERSONAL OR REAL PROPERTY, OR FOR INJURY TO ANY PERSON.

This warranty does not apply to products which have been subject to electrical or chemical damage due to improper use, accident, negligence, abuse or misuse. Abuse shall be assumed when indicated by electrical damage to relays, reed switches or other components. The warranty does not apply to products which are damaged during shipment back to Flowline's factory or designated service center or are returned without the original casing on the products. Moreover, this warranty becomes immediately null and void if anyone other than service personnel authorized by Flowline attempts to repair the defective products.

Products which are thought to be defective must be shipped prepaid and insured to Flowline's factory or a designated service center (the identity and address of which will be provided upon request) within 30 days of the discovery of the defect. Such defective products must be accompanied by proof of the date of purchase.

Flowline further reserves the right to unilaterally waive this warranty and to dispose of any product returned to Flowline where:

- a. There is evidence of a potentially hazardous material present with product.
- b. The product has remained unclaimed at Flowline for longer than 30 days after dutifully requesting disposition of the product.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE OF THIS WARRANTY. This warranty and the obligations and liabilities of Flowline under it are exclusive and instead of, and the original purchaser hereby waives, all other remedies, warranties, guarantees or liabilities, express or implied. EXCLUDED FROM THIS WARRANTY IS THE IMPLIED WARRANTY OF FITNESS OF THE PRODUCTS FOR A PARTICULAR PURPOSE OR USE AND THE IMPLIED WARRANTY OF MERCHANTABILITY OF THE PRODUCTS.

This warranty may not be extended, altered or varied except by a written instrument signed by a duly-authorized officer of Flowline, Inc.

FLOWLINE

Table of Contents

Introduction.....	6
Technology	6
Installation.....	7
Vertical Mounted Switches.....	7
Horizontal Mounted Switches.....	7
Environmental.....	8
Dimensions	8
Material Compatibility.....	9
Electrical interface	10
Typical Current and Voltage Ratings	10
AV_6 Series Float and Wire key	11
Specification	12
Maintenance.....	13
Cautions	13
Testing the Installations	13
Cleaning Procedure.....	14

Introduction

1. Switches should be installed rigidly so the float or floats are free to move as the liquid level changes.
2. Switches should be mounted in a tank area free of severe turbulence or protected from such turbulence by appropriate and adequate slosh shields.
3. Vertical switch stems should be vertical for best results, but satisfactory operation is possible in most liquids with the stem at up to a 30° angle from vertical.
4. Side mount switch stems must be mounted with the arrow vertically either up or down depending on switch operation.
5. Care should be taken that switches are always operated within electrical ratings.
6. Orientation for standard Vertical switches can be changed from normally open to normally closed dry or vice versa by removing the float and reversing it in the stem, except with the LV20-2101, LV20-2201, LV21-1101 and LV21-1201.

Technology

Float switches consist of a float, magnet, reed switch and body/stem with mounting threads. When the probe is dry, the float rests on the bottom of the stem such that the magnet does not influence the reed switch. As the probe becomes immersed in liquid, the float becomes buoyant and the magnet elevates causing the reed switch to change state.

FLOWLINE

Installation

Operation is stated in the tank dry position.

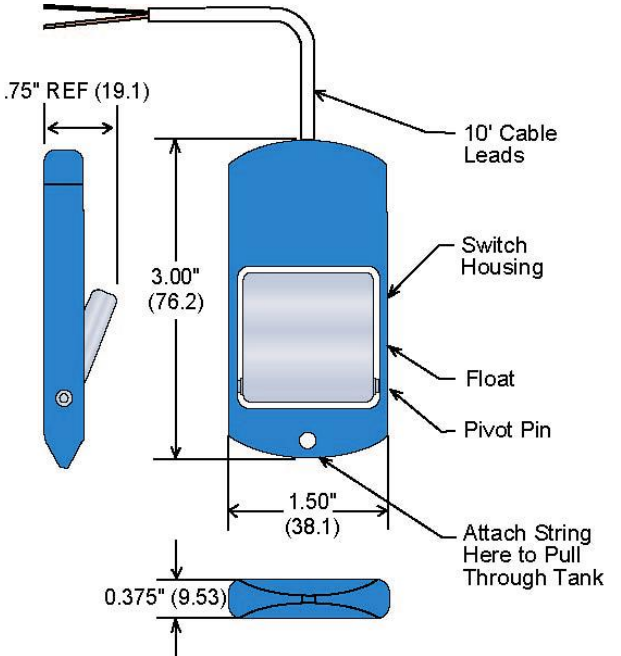
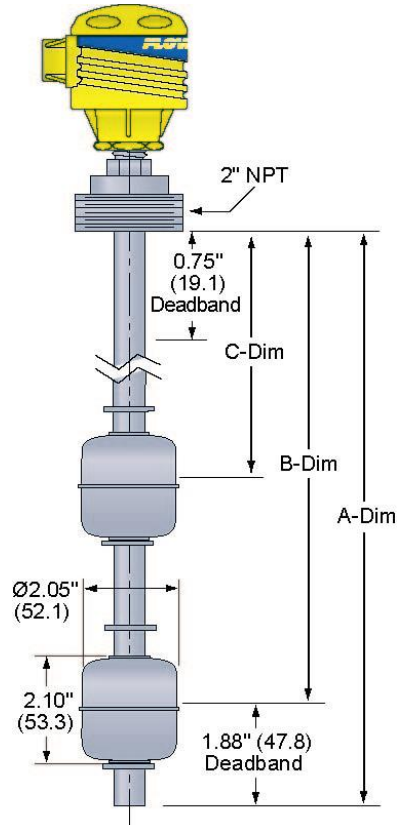
- Vertical Mounted Switches:
 - o NC Operation:
 - SS Floats: Witness mark (round circle) down.
 - Plastic Floats: Magnets up.
 - o NO Operation:
 - SS Floats: Witness mark (round circle) up.
 - Plastic Floats: Magnets down.
 - *Note: LV20-2101, LV20-2201, LV21-1101 and LV21-1201 are not reversible. The LV20-2101 and LV21-1101 are Normally Closed. The LV20-2201 and LV21-1201 are Normally Open
- Horizontal Mounted Switches:
 - o NC Operation:
 - Arrow mounted vertically pointed down.
 - o NO Operation:
 - Arrow mounted vertically pointed up.

Environmental Dimensions

LV35-S201 1/8" NPT 1.63" (41.4) 2.25" (57.1) 1.19" (30.2) 1.13" (28.7) max.	LV35-S401 1.90" dia. max. (48.2 mm)	LV36-S201 1/4" NPT 3.38" (85.8) 2.63" (66.8) 2" (50.8) 2.13" (54.1) dia. max.
LV36-S401 2.38" dia. max. (60.4 mm)	LV36-S501 1/4" NPT 3.38" (85.8) 2.63" (66.8) 2" (50.8) 2.13" (54.1) dia. max.	LV20-1501 1/8" NPT 1.63" (41.4) 2.25" (57.1) 1" (25.4) 1" (25.4)
LH35-S201 0.91" min. (20.6) 1.22" max. (31.0) .10" (2.5) 1.15" max. (29.2) 4.00" max. (101.6) 1/2-14 NPT 1/2-14 NPT Wire Leads Fitting Centerline Approximate Actuation Level	LH25-1201 1/2" NPT 2.75" (69.8) max.	LH25-1401 2.84" (73.1) max. 1" NPT
LV20-2101 & LV20-2201 1/8" NPT 1.62" (41.3) 2.70" (68.6) 1.25" (31.8) 1.12" (28.6)	LV21-1101 & LV21-1201 3/8-16 THD .63" (16.0) 1.85" (47) 1.25" (31.7) .58" (14.7) "O" Ring	

FLOWLINE

Dimensions (continued)

LH29-1001	AV16-S243, AV26-S243, AV36-S243, AV46-S243 and AV56-S243
 Diagram of the LH29-1001 float switch assembly. It shows a side view of the float housing with a switch housing inside. Dimensions include: .75" REF (19.1) for the cable lead offset, 3.00" (76.2) for the float height, 1.50" (38.1) for the float width, and 0.375" (9.53) for the float thickness. Labels include: 10' Cable Leads, Switch Housing, Float, Pivot Pin, and Attach String Here to Pull Through Tank.	 Diagram of the AV26-S243 float switch assembly. It shows a side view of the float switch with a yellow switch housing. Dimensions include: 2" NPT for the top connection, 0.75" (19.1) Deadband, C-Dim for the cable length, B-Dim for the float height, A-Dim for the total assembly height, Ø2.05" (52.1) for the float diameter, 2.10" (53.3) for the float height, and 1.88" (47.8) Deadband for the bottom connection. The label AV26-S243 Shown is at the bottom.

Material Compatibility:

- o The LV36-S201, LV36-S401, LV35-S201, LV35-S401, LH35-S201 and LV36-S501 are made of 316 stainless steel (316 SS) with 22 AWG, Teflon 24" wire.
- o The LH25-1201, LH25-2401, LV21-1101, LV21-1201 and LV20-1501 are made of Polypropylene (PP) with 22 AWG, Teflon 24" wire.
- o The LV20-2101 and LV20-2201 are made of Polytetrafluoroethylene (PTFE) with 22 AWG, Teflon 24" wire.
- o The LH29-1001 is made of Polypropylene (PP) with a Valox 420 stem and 22 AWG, HALAR jacketed 120" wire.
- o The AV16-S243, AV26-S243, AV36-S243, AV46-S243 and AV56-S243 are made of 316 Stainless Steel (316 SS) with a Polypropylene (PP) enclosure.
- o Make sure that the switch is compatible with the application liquids. To determine the chemical compatibility between the sensor and its application liquids, refer to the Compass Corrosion Guide, available from Compass Publications (858-589-9636).

Electrical Interface

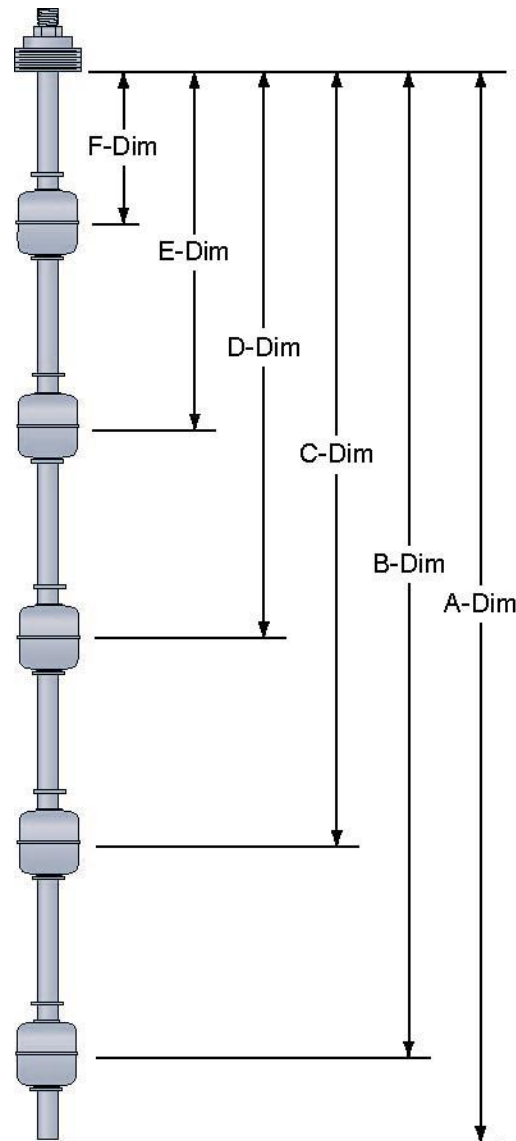
Typical Current and Voltage Ratings

Watts	Voltage	Current Amps
15	240 AC	-
	120 AC	0.12
	100 DC	0.10
	24 DC	0.30
30	240 AC	0.14
	120 AC	0.28
	100 DC	0.07
	24 DC	0.28
60	240 AC	0.40
	120 AC	0.50
	100 DC	0.20
	24 DC	0.50
100	240 AC	0.40
	120 AC	1.00
	100 DC	0.40
	24 DC	1.00

- Note: The ratings at right are for resistive loads only. For inductive loads, maximum switch life will be achieved if appropriate arc suppression is used.
- The following part numbers; LV36-S201, LV36-S401, LV35-S201, LV35-S401, LV20-2101, LV20-2201, LV21-1101, LV21-1201, LH35-S201, LH25-1201, LH25-1401 and LH29-1001, are all two wire reed switch outputs where polarity does not matter.
- Part numbers LV36-S501 and LV20-1501 are reed switch outputs with two additional wires that are used to output the 100-ohm RTD used to measure the temperature of the environment.

FLOWLINE

AV_6 Series Float and Wire Key



SPST Switches	AV16-S243 (1) Switch	AV26-S243 (2) Switches	AV36-S243 (4) Switches	AV46-S243 (4) Switches	AV56-S243 (5) Switches
F-Dim					RED
E-Dim				RED	WHITE
D-Dim			RED	WHITE	BLUE
C-Dim		RED	WHITE	BLUE	GREEN
B-Dim	BLACK	BLACK	BLACK	BLACK	BLACK
A-Dim	Total Stem Length				

- **Note:** Each float will have a pair of colored wires for each level. For example, With a AV56-S243, the B-Dim float will have two black wires as the switch contact.

Specifications

Part Number	Description	Float Mat'l	Stem Mat'l	Max. Oper. Temp (°C)	Max Pressure (PSIG)	Float SG	Nominal VA	Fitting
Standard Full-Size Vertical								
LV36-S201	Vertical small	316 SS	316 SS	200	500	0.70	100	¼" NPT
LV36-S401	Vertical small w/ slosh shield	316 SS	316 SS	200	500	0.70	100	¼" NPT
LV35-S201	Vertical large	316 SS	316 SS	200	300	0.70	30	1/8" NPT
LV35-S401	Vertical large w/ slosh shield	316 SS	316 SS	200	300	0.70	30	1/8" NPT
LV20-2101	Teflon, NC	PFTE	PFTE	150	25	0.69	60W SPST	1/8 – 27 NPT
LV20-2201	Teflon, NO	PFTE	PTFE	150	25	0.69	60W SPST	1/8 – 27 NPT
LV21-1101	Sub-miniature, NC	PP	PP	105	50	0.85	15	3/8 – 16 NPT
LV21-1201	Sub-miniature, NO	PP	PP	105	50	0.85	15	3/8 – 16 NPT
Standard Horizontal								
LH35-S201	Horizontal side mount	316 SS	316 SS	200	500	0.60	30	½" NPT
LH25-1201	Horz. side mount	PP	PP	105	100	0.60	30	½" NPT
LH25-1401	Horz. side mount w/ slosh shield	PP	PP	105	100	0.60	30	½" NPT
Vertical Floats with 100 Ohm RTD								
LV36-S501	Vertical SS	316 SS	316 SS	200	500	0.70	100	¼" NPT
LV20-1501	Vertical PP	PP	PP	105	100	0.85	30	1/8" NPT
Configured (Multi-Level) Vertical Assembly								
AV16-S243	1-point float system	316 SS	316 SS	200	200	0.55	60	2" NPT
AV26-S243	2-point float system	316 SS	316 SS	200	200	0.55	60	2" NPT
AV36-S243	3-point float system	316 SS	316 SS	200	200	0.55	60	2" NPT
AV46-S243	4-point float system	316 SS	316 SS	200	200	0.55	60	2" NPT
AV56-S243	5-point float system	316 SS	316 SS	200	200	0.55	60	2" NPT
Interstitial Switch								
LH29-1001		PP	Valox 420	105	50	N/A	30W SPST	N/A

Notes:

- Also applies to models with slosh shields
- The LV20-2101 and LV21-1101 are Normally Closed. The LV20-2201 and LV21-1201 are Normally Open.

FLOWLINE

Maintenance

Maintenance should consist of inspection to see that the float is free to move and not coated with any substance, which would change its weight or volume significantly. If this occurs, the float should be cleaned. This is easily accomplished without disturbing the installation. In addition, the stem may be wiped down to remove any build-up. The only repair possible in the field is replacement of either the float or stem. Dents or nicks on the float are usually of no consequence to operation.

Cautions

FLOWLINE manufactures a wide range of liquid level switches and technologies. While each of these switches are designed to operate in a wide variety of applications, it is the user's responsibility to select a switch model that is appropriate for the application, install it properly, perform tests of the installed system, and maintain all components. The failure to do so could result in property damage or serious injury.

1. The pressure, temperature and electrical limitations shown for the specified level switches must not be exceeded.
2. The pressures and temperatures must take into consideration possible surges in the temperature and pressure of the system.
3. The liquids used must be compatible with the materials of construction. Specifications of materials will be given upon request.
4. Life expectancy of the switch varies with applications. Contact the factory if life cycle testing is required.
5. Ambient temperature changes can affect switch set points, since specific gravities of liquids vary with temperature. Consult factory for assistance.
6. Level switches have been designed to be shock and vibration resistant. For maximum life, both shock and vibration should be minimized. Consult factory for assistance.
7. Excessive contaminants in fluid may inhibit float operation, and occasional wipe down may be necessary.
8. Level switches must not be field repaired
9. Physical damage to product may render product unserviceable.
10. Installation in a vessel made from magnetic materials may affect operation.

Testing the installation:

1. Power: Turn on power to the controller and/or power supply.
2. Immersing the switch: Immerse the sensing tip in its application liquid, by filling the tank up to the switches point of actuation. An alternate method of immersing the switch during preliminary testing is to hold a cup filled with application liquid up to the switch's tip.
3. Test: With the switch being fluctuated between wet and dry states, the switch indicator light in the controller should turn on and off. If the controller doesn't have an input indicator, use a voltmeter or ammeter to ensure that the switch produces the correct signal.
4. Point of actuation: Observe the point at which the rising or falling fluid level causes the switch to change state, and adjust the installation of the switch if necessary.

Cleaning procedure:

1. Power: Make sure that all power to the switch, controller and/or power supply is completely disconnected.
2. Switch removal: If necessary, make sure that the tank is drained well below the switch prior to removal. Carefully, remove the sensor from the installation. Remove the outer screen by pushing on the screen and turning it slightly to disconnect it from the bayonet connector so that the float is exposed.
3. Cleaning the switch: Using a soft bristle brush and mild detergent, carefully wash the switch. Do not use harsh abrasives such as steel wool or sandpaper, which might damage the surface of the sensor. Do not use incompatible solvents, which may damage the sensor's PP or PVDF plastic body. Take particular care to remove any scaling from the float body and make sure that it moves freely.
4. Sensor installation: Follow the appropriate steps of installation as outlined in the Installation section of this manual.