

Switch-Pro™

w/ Compact Junction Box



AU18 & AZ18 Series Owner's Manual



Intended for side wall installation, the general-purpose level switch package provides reliable liquid level detection with single 60 VA relay and a compact junction box for integral wiring termination. Offered in two level sensor technologies, select the type and material based upon your application media. This liquid level switch package is widely applied in bulk storage and process tank level applications for high level control or low-level control.

FEATURES

- Rugged Polypropylene, Ryton® or PFA sensor for corrosive liquids applications.
- 60 VA relay selectable NO or NC via power supply polarity
- Polypropylene enclosure rated NEMA 4X with swivel base for conduit alignment.
- Offered in two sensing technologies for broad application coverage: ultrasonic and vibration.

TABLE OF CONTENTS

Specifications:.....3

Dimensions:4

Components:5

 Standard Configuration:6

Technology:7

 Vibration:7

 Ultrasonic:8

Safety Precautions:.....9

 Make a Fail-Safe System:10

Getting Started:.....11

 Guide to Controls:11

Electrical:12

 Connecting Switch to Input Terminals:12

 VAC Power Input Wiring:12

 Changing from 120 to 240 VAC:12

 Relay Input Wiring:.....13

 Strobe Alert Output:13

Installation:.....14

 Install in a dry location:14

Application Examples:15

 High Alarm:15

 Low Alarm:15

Appendix:.....16

 Controller Logic:.....16

 Troubleshooting:16

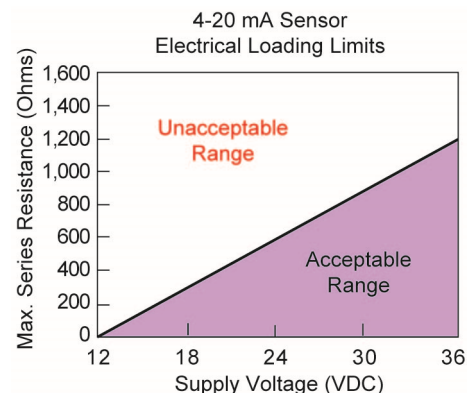
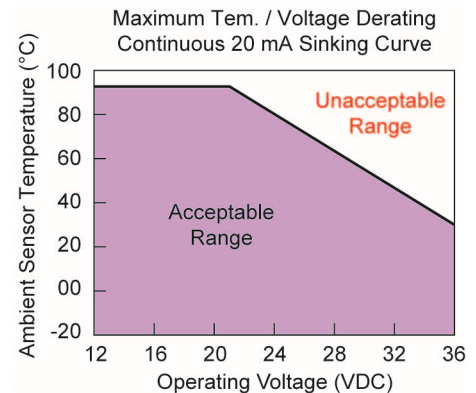
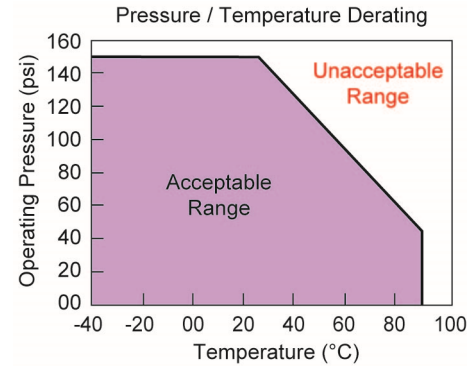
Maintenance:17

 Cleaning Procedure:17

 Current test (sensor alone):17

Warranty, Returns and Limitations:18

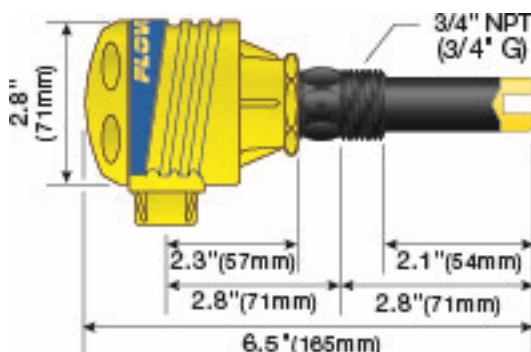
Accuracy:	± 1mm in water
Repeatability:	± 0.5mm in water
Supply voltage:	AZ18: 12-30 VDC AU18: 12-36 VDC
Consumption:	25mA maximum
Contact type:	(1) SPST Relay
Contact rating:	60VA, 1A max.
Contact output:	Selectable NO or NC
Process temp.:	F: -40°to 176° C: -40°to 80°
Ambient temp.:	F: -40°to 140° C: -40°to 60°
Pressure:	150 psi (10bar) @ 25 °C, derated @ 1.667 psi (0.113 bar) per °C above 25 °C.
Enclosure rating:	NEMA 4X (IP65)
Enclosure material:	PP (U.L. 94 VO)
Terminal strip:	6-pole, socket
Conduit entrance:	Single, 1/2" NPT
Wetted material:	AZ18-113_: Ryton® AU18-113_: PP AU18-113_: PFA
Enclosure mount.:	3/4" NPT (G)
Enclosure rotation:	300°swivel base
Mount. Gasket:	Viton® (G version only)
Classification:	General purpose
CE compliance:	EN 61326 EMC EN 61010-1 Safety



DIMENSIONS

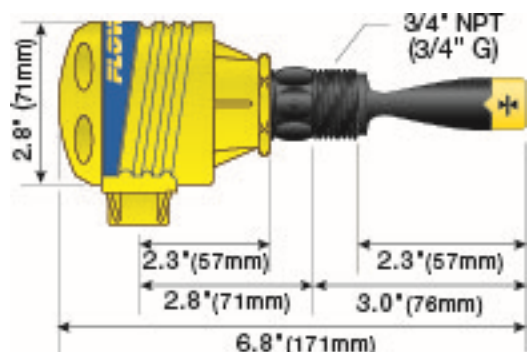
Ultrasonic Switch

AU18-113_ & AU18-213_ Series



Vibration Switch

AZ18-113_ Series



ABOUT SWITCH-PRO™

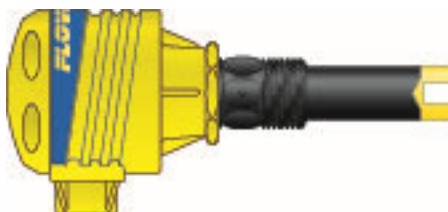
Flowline's Switch-Pro™ with Compact Junction Box is a single-point mounting system for installing through the sidewall of a tank. The compact junction box features termination for the various wires (6-pin terminal block) from the level switch as well as a 1/2" conduit connection.

Part Number	Thread	Sensor Material	Sensor Technology
AU18-1130	NPT	PP	Ultrasonic
AU18-1134	G		
AU18-2130	NPT	PVDF	
AU18-2134	G		
AZ18-1130	NPT	PP-Ryton®	Vibration
AZ18-1134	G		

- Owner's Manual

STANDARD CONFIGURATION

AU18-_13 _ or AZ18-113 _



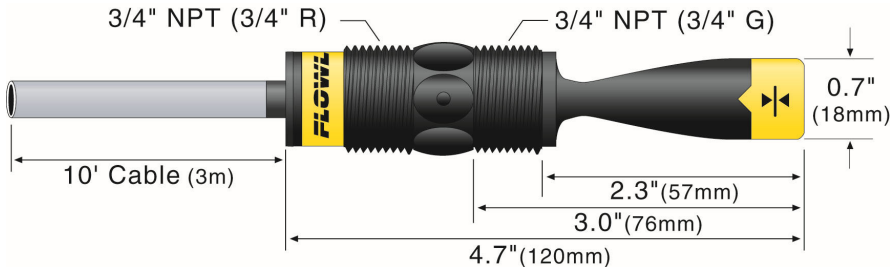
AU18-1130 Shown

	Ultrasonic		Vibration
	PP	PFA	PP-Ryton®
3/4” NPT	<u>AU18-1130</u>	<u>AU18-2130</u>	<u>AZ18-1130</u>
	1 x LU10-1405	1 x LU10-2405	1 x LZ12-1405
	1 x LC06-1001	1 x LC06-1001	1 x LC06-1001
3/4” G	<u>AU18-1134</u>	<u>AU18-2134</u>	<u>AZ18-1134</u>
	1 x LU10-1425	1 x LU10-2425	1 x LZ12-1425
	1 x LC06-1051	1 x LC06-1051	1 x LC06-1051

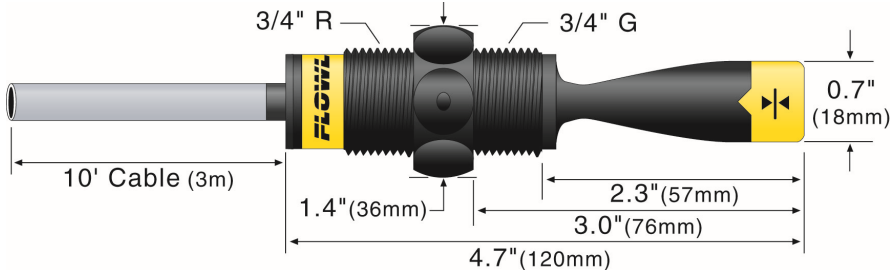
VIBRATION SWITCH (AZ18-113 _ SERIES)

The vibration switch (tuning fork) operates at a nominal frequency of 400 Hz. As the switch becomes immersed in a liquid or slurry, a corresponding frequency shift occurs. When the measured frequency shift reaches the set point value, the switch changes state indicating the presence of a liquid or slurry medium. For optimum performance and proactive maintenance, the sensor automatically adjusts for coating, and if necessary, outputs a preventative maintenance alarm.

Vibration Switch NPT Version



Vibration Switch G Version



⚠ Do not squeeze the forks together. Doing so could damage or break the sensor and void the warranty.

When powering up the AZ13-113_ series, the start-up procedure requires the switch to cycle through a wet condition for 1/2 second to determine an initial resonance. The relay within the controller will switch between open and close during this sequence.

LZ12 SPECIFICATIONS

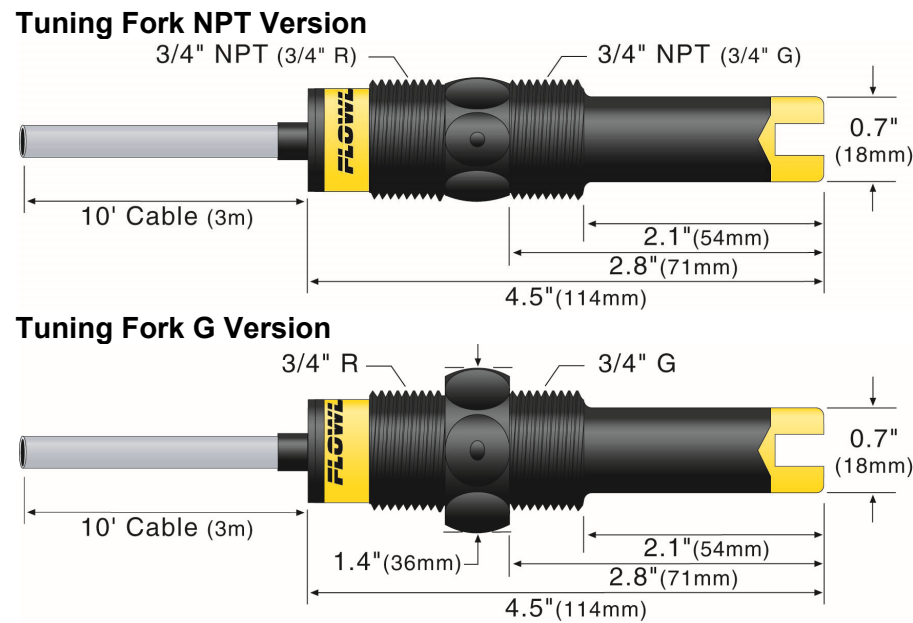
Sensor material:	Ryton® (glass fill) Viton® cable grommet	Cable jacket mat'l:	PP
		Cable type:	5-conductor, #24 AWG (shielded)

CONFIGURATIONS

Part Number	Material (body)	Material (cable)	Threads (Inside x outside)
LZ12-1405	Ryton	Polypropylene	3/4" NPT x 3/4" NPT
LZ12-1425			3/4" R x 3/4" G

ULTRASONIC SWITCH (AU18-113 _ & AU18-213 _ SERIES)

The Ultrasonic level switch generates a 1.5 MHz ultrasonic wave from a miniature piezoelectric transducer located on one side of the gap within its sensing tip. Another piezo transducer, located on the other side of the gap, acts as a microphone, picking up the sound wave. When liquid enters the gap, there is a change in the speed the wave crosses the gap. This change in the speed of sound identifies whether the sensor is in liquid or in air.



⚠ The sensor should be installed so that the liquid will drip out of the gap when the sensor becomes dry.

LU10 SPECIFICATIONS

Sensor material:	1__5: PP	Cable jacket mat'l:	1__5: PP
	2__5: PFA		2__5: PFA

CONFIGURATIONS

Part Number	Length	Material (body)	Material (cable)	Threads
				cable side x sensor side
LU10-1405	Long (4.5")	Polypropylene	Polypropylene	(3/4" NPT) x (3/4" NPT)
LU10-1425				(3/4" R) x (3/4" G)
LU10-2405		PFA	PFA	(3/4" NPT) x (3/4" NPT)
LU10-2425				(3/4" R) x (3/4" G)

⚠ About This Manual: PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on the Switch-Pro™ with Compact Junction Box from Flowline: AU18-113_, AU18-213_ & AZ18-113_. The units are identical except for the material of construction and sensing technology of the sensor.

⚠ User's Responsibility for Safety: Flowline manufactures a wide range of liquid sensors, controllers, and mounting systems. It is the user's responsibility to select components that are appropriate for the application, install them properly, perform tests of the installed system, and maintain all components. The failure to do so could result in property damage or serious injury.

⚠ Proper Installation and Handling: Use a proper sealant with all installations. Never over-tighten the components. Always check for leaks prior to system start-up.

⚠ Material Compatibility:

- **Polypropylene** (PP, a polyolefin): Sensor (AU18-113_ series only), Junction Box.
- **Ryton**: Sensor (AZ18-113_ series only).
- **Perfluoroalkoxy** (PFA): Sensor (AU18-213_ series only).
- Make sure that the application liquids are compatible with the materials that will be wetted. To determine the chemical compatibility between the components and its application liquids, refer to the Compass Corrosion Guide, available from Compass Publications (phone 858-589-9636).

⚠ Electrical Shock Hazard: It is possible to contact components on the controller that carry high voltage, causing serious injury or death. All power to the controller and the relay circuit(s) it controls should be turned OFF prior to working on the controller. If it is necessary to make adjustments during powered operation, use extreme caution and use only insulated tools. Adjusting powered controllers is not recommended. Wiring should be performed by qualified personnel in accordance with all applicable national, state and local electrical codes.

⚠ Flammable or Explosive Applications: DO NOT USE THE AU18-213_, AU18-213_ or AZ18-113_ Switch-Pro™ GENERAL PURPOSE SENSOR WITHIN CLASSIFIED HAZARDOUS ENVIRONMENTS.

⚠ Warning ⚠

⚠ *Flowline's Switch-Pro™ level switches are not recommendable for use with electrically charged application liquids. For most reliable operation, the liquid being measured may need to be electrically grounded.*

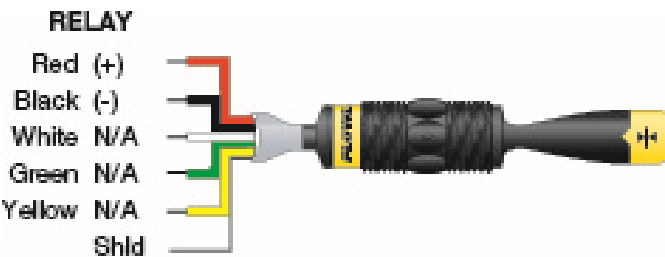
⚠ Make a Fail-Safe System: Design a fail-safe system that accommodates the possibility of system or power failure. In critical applications, Flowline recommends the use of redundant backup systems and alarms in addition to the primary system.

While this manual offers some examples and suggestions to help explain the operation of FLOWLINE products, such examples are for information only and are not intended as a complete guide to installing any specific system.

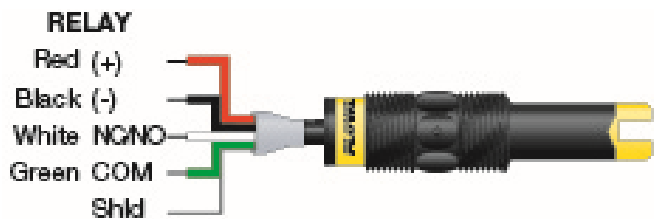
About Switch-Pro™: Flowline’s Switch-Pro™ with Compact Junction Box Assembly is a single-point mounting system for installing one level sensor horizontally within a tank. The compact junction box features termination for the various wires from each level switch as well as a 1/2” conduit connection. Switch-Pro™ mounts horizontally through a standard 3/4” adapter.

Level Switches: Switch-Pak™ includes a single level switch used to identify its own unique wet / dry condition. The technologies used to indicate level are either Ultrasonic or Vibration. Each technology features a unique wiring/power configuration (Ultrasonic requires 12-36 VDC power for operation and Vibration require 12 to 30 VDC power for operation, see below). The switch is terminated in the Compact Junction Box. The Compact Junction Box provides a 1/2” Conduit connection and 6 poles for wire termination.

VIBRATION (LZ12-1405) WIRE CONFIGURATION:



ULTRASONIC (LU10-_405 OR LU10-_425) WIRE CONFIGURATION:



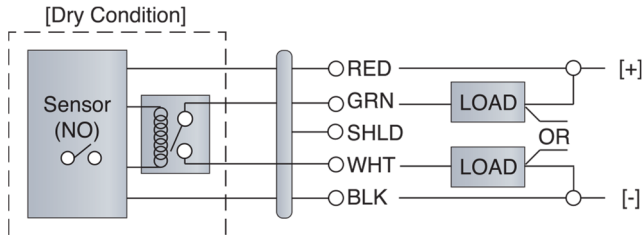
Compact Junction Box
(Inside shown)

ULTRASONIC AND VIBRATION SWITCHES

The LU10-14_5 and LZ12-14_5 switch can be wired normally open or normally closed for your application requirement. Each ultrasonic switch requires 12 - 36 VDC power while each vibration switch requires 12-30 VDC power to operate the sensor and switch the relay. The relay output can be wired as a dry contact. All illustrations below identify a Dry switch state as the normal position of the relay.

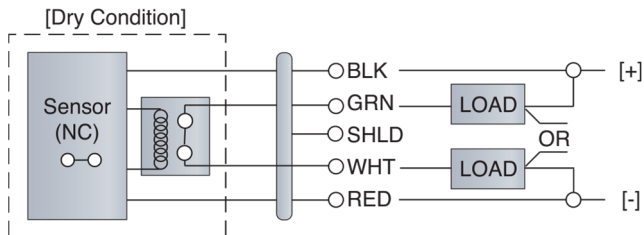
SWITCHING A NORMALLY OPEN DC LOAD:

The Red wire connects to Positive (+) of the power supply and the Black wire connects to Negative (-). The LOAD can be attached to either the Green or White wires. Complete the circuit by either connecting the Green to (+) VDC power or White to (-) VDC power (see illustration below).



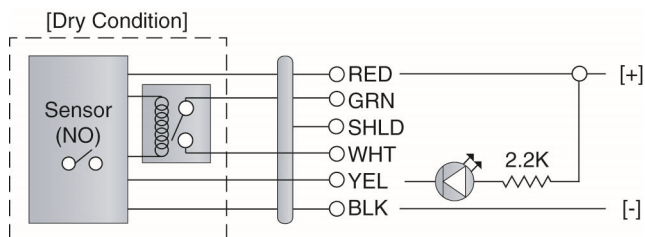
SWITCHING A NORMALLY CLOSED DC LOAD:

The Black wire connects to Positive (+) of the power supply and the Red wire connects to Negative (-). The LOAD can be attached to either the Green or White wires. Complete the circuit by either connecting the Green to (+) VDC power or White to (-) VDC power (see illustration below).



MAINTENANCE ALARM (LZ12 VIBRATION ONLY):

For optimum performance and proactive maintenance, the sensor automatically adjusts for coating, and if necessary, outputs a preventative maintenance alarm. The Yellow wire is a NPN transistor designed to switch when a build-up of material prevents the vibration switch from operating at its operational frequency. Use the Yellow wire to identify when the Vibration switch requires cleaning (see the LZ12 manual for wiring information).



Sensor Power

[RED & BLK wires] / 30 VDC max.

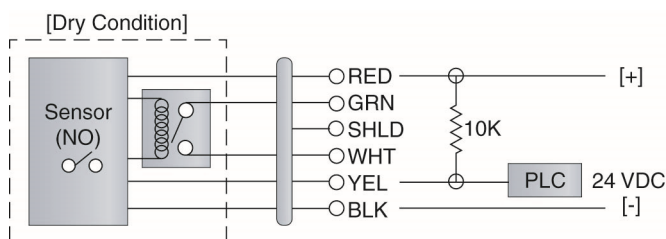
8mA ±1mA Dry / 22 ±mA Wet

Relay Rating

[GRN & WHT wires] / 60VA

Maintenance Alarm

[YEL wire] / NPN Transistor / 10mA Max.



Sensor Power

[RED & BLK wires] / 30 VDC max.

8mA ±1mA Dry / 22 ±mA Wet

Relay Rating

[GRN & WHT wires] / 60VA

Maintenance Alarm

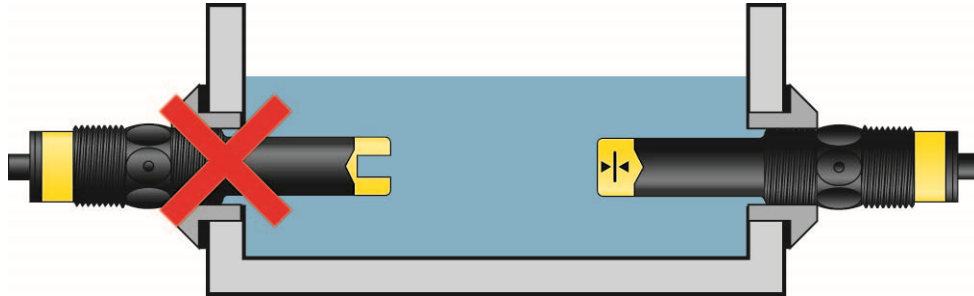
[YEL wire] / NPN Transistor / 10mA Max.

THROUGH WALL INSTALLATION

Flowline's Switch-Pro™ A_18 series may be installed through the side wall of a tank. The sensor has male 3/4" NPT (3/4" G) threads on one side of a 15/16" wrench flat. This enables the user to select the sensor's mounting orientation, installed outside of the tank in.

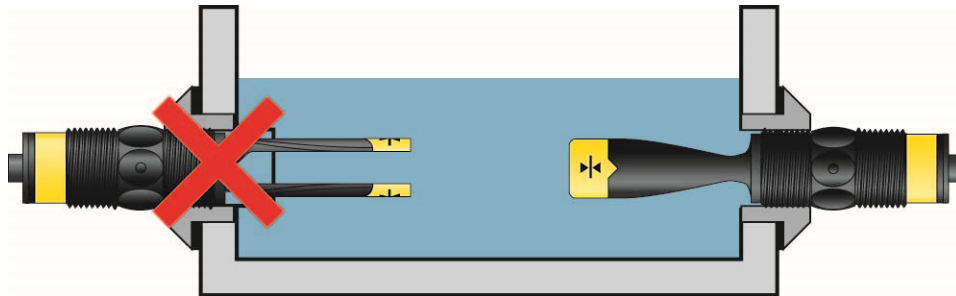
ULTRASONIC ORIENTATION

Install the switch such that the gap is aligned up and down, allowing for liquid to easily leave the gap. Avoid aligning the gap horizontally. This could allow material to collect on one of the flat surfaces in the gap. See the illustrations below for further information.



VIBRATION ORIENTATION

Install the switch such that the forks are aligned up and down, allowing for liquid to easily leave the space between the forks. Avoid aligning the gap horizontally. This could allow material to collect on one of the forks. See the illustrations below for further information.



⚠ Warning

- ⚠ Do not squeeze the forks together. Doing so could damage or break the sensor and void the warranty.
- ⚠ Always install the Viton gasket with all versions of the AU18-_134 or AZ18-1134. The G threaded version will not seal unless the gasket is properly installed.

INSTALL IN A DRY LOCATION

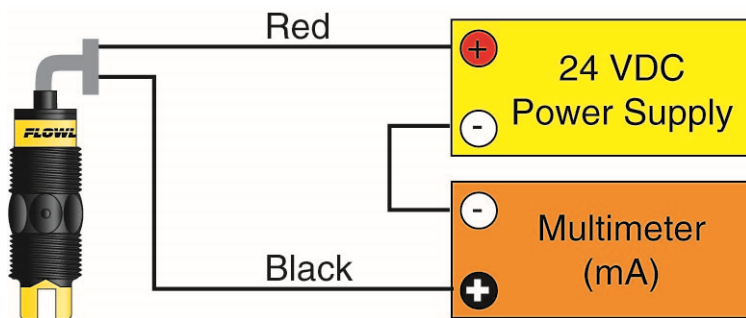
The controller housing is liquid-resistant and made of Polypropylene (PP). When installed properly, the controller is not designed to be immersed. It should be mounted in such a way that it does not normally encounter fluid. Refer to an industry reference to ensure that compounds that may splash onto the controller housing will not damage it. Such damage is not covered by the warranty.

GENERAL

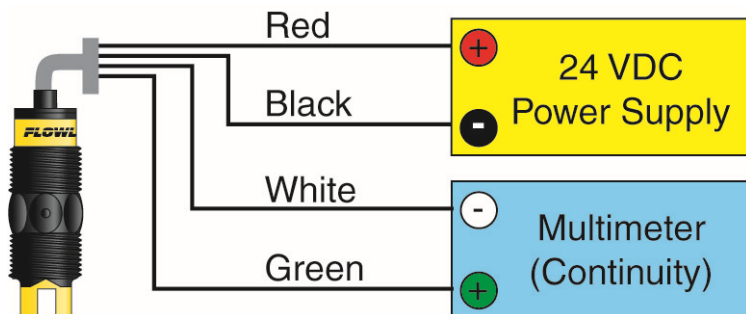
The Switch-Pro™ level switch requires no periodic maintenance except to clean off any deposits or scaling from the sensor tip, as necessary. It is the responsibility of the user to determine the appropriate maintenance schedule, based on the specific characteristics of the application liquids.

CLEANING PROCEDURE

1. **Power:** Make sure that all power to the sensor, controller and/or power supply is completely disconnected.
2. **Sensor Removal:** *Make sure that the liquid level is below the location of the sensor and the tank is not pressurized.* Carefully, remove the sensor from the installation. Replace the sensor with a 3/4" NPT plug to ensure that liquid does not leak out during this procedure. **Do not re-install the Switch-Pro™ if the threads are damaged.**
3. **Cleaning the Sensor:** Use a soft bristle brush and mild detergent, carefully wash the Switch-Pro™ level switch. Do not use harsh abrasives such as steel wool or sandpaper, which might damage the surface sensor. Do not use incompatible solvents which may damage the sensor's PP, Ryton or PVDF plastic body.
4. **Sensor Installation:** Follow the appropriate steps of installation as outlined in the installation section of this manual.

CURRENT TEST (SENSOR ONLY)

Use to verify if the sensor indicates a wet or dry condition. A power supply (typically 12 to 28 VDC) and a multimeter [set to read current (mA)] are required. This test uses only two wires (Red and Black). The sensor draws 5 mA (ultrasonic) or 8 mA (vibration) when it is dry, and 22 mA when wet. The White and Green wires are not used.

RELAY CONTACT TEST (SENSOR ONLY):

Used to verify if the relay contact is switching between dry (open) and wet (closed). Test requires Red wired to Positive (+) and Black wired to Negative (-) on a 12 to 36 VDC power supply. Check for continuity across Green and White (open for dry and closed for wet). Reversing Red and Black wires will result in a closed when dry and open when wet condition.

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 in accordance with instructions furnished by Flowline for a period of two years from the date of manufacture of such products. 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, which Flowline's examination determines to its satisfaction to be defective in material or workmanship within the warranty period. Flowline must be notified pursuant to the instructions below of any claim under this warranty within thirty (30) days of any claimed lack of conformity of the product. Any product repaired under this warranty will be warranted only for the remainder of the original warranty period. Any product provided as a replacement under this warranty will be warranted for the full two years from the date of manufacture.

RETURNS

Products cannot be returned to Flowline without Flowline's prior authorization. To return a product that is thought to be defective, go to www.flowline.com, and submit a customer return (MRA) request form and follow the instructions therein. All warranty and non-warranty product returns to Flowline must be shipped prepaid and insured. Flowline will not be responsible for any products lost or damaged in shipment.

LIMITATIONS

This warranty does not apply to products which: 1) are beyond the warranty period or are products for which the original purchaser does not follow the warranty procedures outlined above; 2) have been subjected to electrical, mechanical or chemical damage due to improper, accidental or negligent use; 3) have been modified or altered; 4) anyone other than service personnel authorized by Flowline have attempted to repair; 5) have been involved in accidents or natural disasters; or 6) are damaged during return shipment to Flowline. Flowline reserves the right to unilaterally waive this warranty and dispose of any product returned to Flowline where: 1) there is evidence of a potentially hazardous material present with the product; or 2) the product has remained unclaimed at Flowline for more than 30 days after Flowline has dutifully requested disposition. This warranty contains the sole express warranty made by Flowline in connection with its products. **ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY DISCLAIMED.** The remedies of repair or replacement as stated above are the exclusive remedies for the breach of this warranty. **IN NO EVENT SHALL FLOWLINE BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING PERSONAL OR REAL PROPERTY OR FOR INJURY TO ANY PERSON. THIS WARRANTY CONSTITUTES THE FINAL, COMPLETE AND EXCLUSIVE STATEMENT OF WARRANTY TERMS AND NO PERSON IS AUTHORIZED TO MAKE ANY OTHER WARRANTIES OR REPRESENTATIONS ON BEHALF OF FLOWLINE.** This warranty will be interpreted pursuant to the laws of the State of California. If any portion of this warranty is held to be invalid or unenforceable for any reason, such finding will not invalidate any other provision of this warranty.

For complete product documentation, video training, and technical support, go to www.flowline.com.
For phone support, call 562-598-3015 from 8am to 5pm PST, Mon - Fri.
(Please make sure you have the Part and Serial number available.)