

## Warranty, Service & Repair

To register your product with the manufacturer, fill out the enclosed warranty card and return it immediately to:

Flowline Inc.  
10500 Humbolt Street  
Los Alamitos, CA 90720.

If for some reason your product must be returned for factory service, contact Flowline Inc. to receive a Material Return Authorization number (MRA) first, 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.

# **FLOWLINE®**

## **Symprobe™ RF Capacitance Level Transmitter Model LP75 Owner's Manual**



Version 4.1A

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Manual # LC900006

05/05

## 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 are 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.

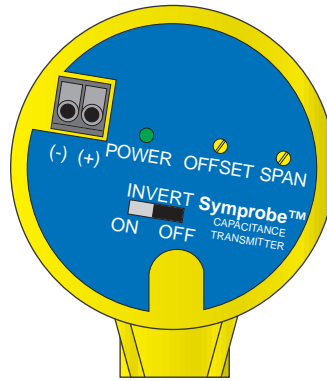
THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE OF THIS WARRANTY. This warranty and the obligations and liabilities of Flowline under it are exclusive and instead of, and the original purchaser hereby waives, all other remedies, warranties, guarantees or liabilities, express or 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.

# SPECIFICATIONS

## Step One

Range:	1 to 10' (30 cm to 3 m)
Accuracy:	± 1% of full span
Resolution:	± 0.125" (3 mm)
Conductivity range:	> 100 micro-mhos
Dielectric range:	> 20 constants
Probe pF range:	100 to 1000 pF
LED indication:	Power status
Supply voltage:	14-36 VDC
Loop resistance:	600 ohms @ 36 VDC
Signal output:	4-20 mA, two-wire
Signal invert:	4-20 mA or 20-4 mA
Adjustments:	Potentiometer
Temperature rating:	F: -40° to 158° C: -40° to 70°
Electronics temp.:	F: -40° to 140° C: -40° to 60°
Pressure rating:	75 psi (5 bar) @ 25 °C., derated @ 1.667 psi (.113 bar) per °C. above 25 °C.
Enclosure rating:	NEMA 4X (IP65)
Installed height:	4.8" (12.2 cm) above tank process mount
Enclosure material:	Polypropylene, U.L. 94VO
Probe material:	FEP
Process mount.:	3/4" NPT (3/4" G)
Mounting gasket:	Viton (3/4") metric only
Conduit entrance:	1/2" NPT
Classification:	General purpose
CE Compliance:	EN 61326 EMC



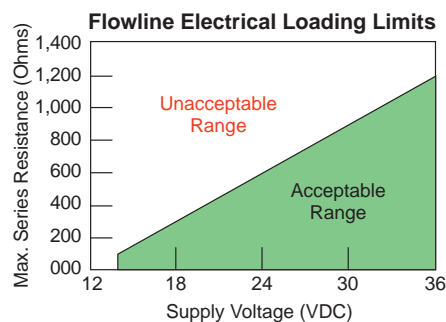
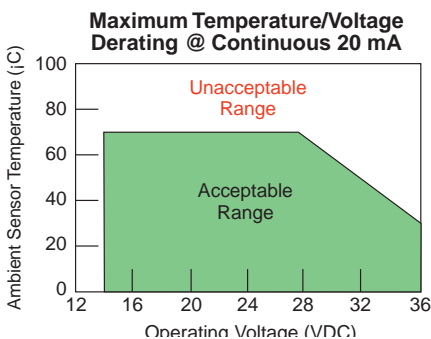
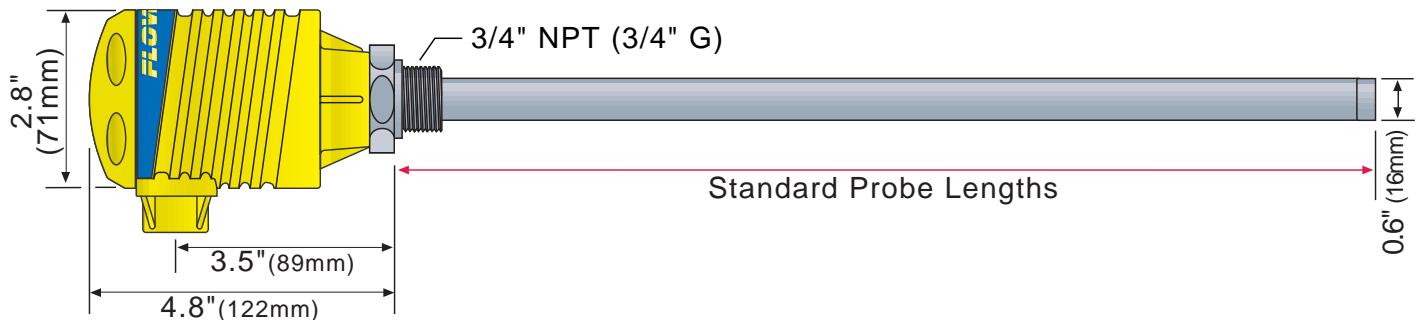
## Capacitance Transmitter

LP75 - 20 1 -

**Mounting Thread**  
0 - 3/4 NPT  
6 - 3/4 G

**Sensor Length**  
012 - 12 Inches  
018 - 18 Inches  
024 - 24 Inches  
036 - 36 Inches  
048 - 48 Inches  
060 - 60 Inches  
072 - 72 Inches  
084 - 84 Inches  
096 - 96 Inches  
108 - 108 Inches  
120 - 120 Inches

050 - 50 Centimeters  
100 - 100 Centimeters  
150 - 150 Centimeters  
200 - 200 Centimeters  
250 - 250 Centimeters  
300 - 300 Centimeters



# SAFETY PRECAUTIONS

## Step Two

### ⚠ About this Manual:

PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on all versions of the Symprobe™ RF capacitance level transmitter from FLOWLINE: LP75-20\_1. Please refer to the part number located on the sensor label to verify the exact model which you have purchased.

### ⚠ User's Responsibility for Safety:

FLOWLINE manufactures a wide range of liquid level sensors and technologies. While each of these sensors are designed to operate in a wide variety of applications, it is the user's responsibility to select a 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.

### ⚠ Proper Installation and Handling:

Because this is an electrically operated device, only properly-trained staff should install and/or repair this product. Use a proper sealant with all installations. Note: *Always install the 3/4" Viton gasket with the LP75-2061. The G threaded version of the Symprobe will not seal unless the gasket is installed properly.* Never overtighten the transmitter within the fitting. Always check for leaks prior to system start-up.

### ⚠ Material Compatibility:

The Symprobe™ enclosure is made of Polypropylene (PP). The probe is coated with Fluorinated Ethylene Propylene (FEP). Make sure that the model which you have selected is chemically compatible with the application liquids it will contact. 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.

### ⚠ Wiring and Electrical:

A supply voltage of 14-36 VDC is used to power the LP75 transmitter. The system should never exceed a maximum of 36 volts DC. Electrical wiring of the sensor should be performed in accordance with all applicable national, state, and local codes.

### ⚠ Enclosure:

While the transmitter housing is liquid-resistant when installed properly, it is not designed to be immersed. It should be mounted in such a way that the enclosure does not come into contact with fluid.

### ⚠ Flammable, Explosive and Hazardous Applications:

The LP75 transmitter systems should not be used within flammable or explosive applications.

### ⚠ WARNING ⚠

*The Symprobe™ is shipped factory calibrated with 4 mA set at the end of probe. To reverse setting with 20 mA at the end, set invert to On and re-calibrate transmitter.*

*Avoid installing the Symprobe™ within 6" of any metallic object. Metal will adversely affect the dielectric sensitivity of the transmitter.*

*The FEP coating for the Symprobe™ is a thin sheath. Extreme caution is recommended at installation. Breaking the seal would damage the probe.*

*Always install the 3/4" Viton gasket with the LP75-2061. The G threaded version of the Symprobe will not seal unless the gasket is installed properly.*

# INTRODUCTION

## Step Three

### Make a Fail-Safe System:

Design a fail-safe system that accommodates the possibility of transmitter or power failure. In critical applications, FLOWLINE recommends the use of redundant backup systems and alarms in addition to the primary system.

### About RF capacitance technology:

An revolutionary self grounding probe features two electrode plates and a guard wire which are completely encapsulated in FEP. The Symprobe generates a 1 MHz pulse-wave radio frequency signal from the continuous capacitance probe. When liquid comes into contact along the length of the probe, the capacitance as measured by the system electronics changes. These changes in capacitance are based on the length of the probe which is in the liquid, and the dielectric constant of the liquid. FLOWLINE's sophisticated electronics convert the capacitance value into a simple two-wire, 4-20 mA output which indicates the level of the liquid in the tank.

The transmitters operation may vary based on the dielectric properties of different application liquids. The LP75 series transmitter is designed for use with liquids having a dielectric value between 20 and 80 and factory calibrated in tap water. For example, if the application liquid is acetol (with a dielectric constant of about 3.6), the transmitter will not measure its presence when it is wet. However, if the application liquid is glycol (with a dielectric constant of about 35) the transmitter will reliably measure its presence when wet.

***FLOWLINE's LP75 is not recommended for use with electrically charged application liquids. For most reliable operation, the liquid being measured may need to be electrically grounded.***

### Table of Common Dielectric Constants:

**NOTE:** The Symprobe is best applied with conductive liquids greater than 100 micro-mhos and/or nonconductive liquids with dielectric constant greater than 20.

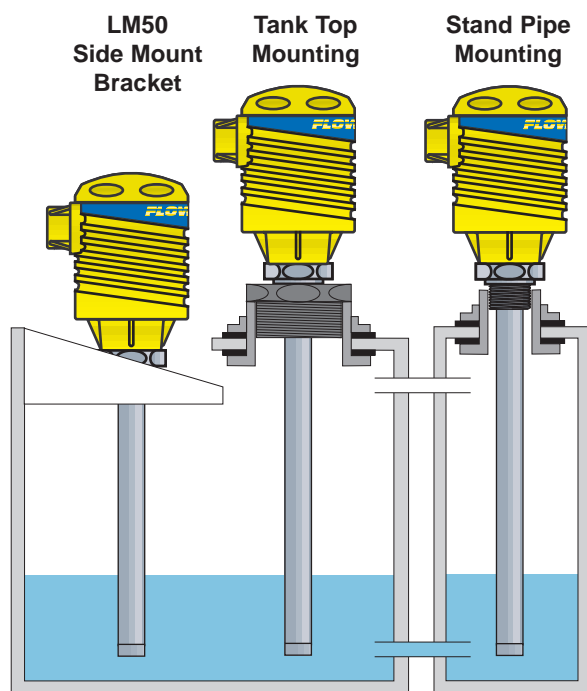
Acetone	21	Ethylene dichloride		N-butyl formate	2.4
Acetaldehyde	22.2		11 to 17	Nitrobenzene	26 to 35
Acetyl methyl hexyl ketone	28	Ethylene chloride	10.5	Nitrotoluene	25
Alcohol	16 to 31	Ethyl acetate	6.4	Naphthalene	2.3 to 2.5
Ammonia	15 to 25	Ethyl salicylate	8.6	Oils, vegetable	2.5 to 3.5
Acetic acid	4.1 to 6.2	Ethyl stearate	2.9	Oils, mineral	2.3 to 2.4
Butyl chloride	9.6	Ethyl silicote	4.1	Oils, petroleum	
Barium chloride	9 to 11	Formic acid	59		1.8 to 2.2
Benzene	2.3	Ferric oleate	2.6	Oleic acid	2.5
Benzine	2.3	Freon	2.2	Propane, liquid	
Barium nitrate	5.6	Glycerine	47		1.8 to 1.9
Bromine	3.1	Glycol	30	Potassium nitrate	
Chlorobenzene	4.7 to 6	Glycol nitrite	27		5.0 to 5.9
Chlorotoluene	4.7	Gasoline	2 to 2.2	Potassium chloride	5.0
Chloroform	4.5 to 5.0	Hydrochloric acid	4.6	Stearic acid	2.3
Chlorine, liquid	2.0	Isobutyric acid	2.7	Toluene	2.4
Carbon tetrachloride	2.2	Isobutyl methyl ketone	13	Trichloroethylene	3.4
Cyan	2.6	Jet fuel	1.7	Trichloroacetic acid	4.5
Cyclohexane	2.6	Lead carbonate	18	Terephthalic acid	
	3.7	Lead nitrate	38		1.5 to 1.7
D.I. Water	20	Methyl salicylate	9.0	Thinner	3.7
Ethyl toluene	2.2	Methanol	33	Urea	3.5
Ethyl alcohol	23	Methyl alcohol	33 to 38	Vinyl chloride	2.8 to 6
Ethylene glycol	37	Margarine, liquid		Vinyl alcohol	1.8 to 2.0
Ethylene oxide	14		2.8 to 3.2	Water, 20°C	80
		Methyl acetate	7.3	Water, 100°C	48

# INSTALLATION

## Step Four

FLOWLINE's LP75 transmitter may be installed through the tank top, through a stand pipe top or to the side of a tank. Tank top and stand pipe installations require a 3/4" NPT (3/4" G) fitting or blind flange. Side wall installations require a side mount bracket from FLOWLINE, model LM50-1001, and a 2" to 3/4" NPT reducer bushing or equivalent.

1. Install the appropriate 3/4" fitting in the top wall of the tank or stand pipe. Prior to installation, make sure that the fitting has been installed properly and checked for leaks. Use a proper sealant at the time of installation to ensure a liquid-tight seal. Secondly, make sure that the fitting's threads are not damaged or worn.
2. Insert the Transmitter into the fitting by hand and rotate by the wrench flat until the body is hand tight. Be careful not to scratch or cut the FEP coating on the probe during installation. Using a 15/16" wrench, tighten the transmitter a 1/2 turn or up to a maximum 80 inch-pounds torque. Be careful not to over tighten transmitter into fitting.
3. Always check for leaks prior to system start-up. To ensure proper installation, a complete leak test and simulation of actual process conditions should be preformed.



### WARNING

Do not install the LP75 transmitter within 6 inches of any metallic object. Metal will adversely affect the dielectric sensitivity of the capacitance transmitter.

Before installation, remove the 3/4" PVC pipe used for shipping.

The LP75 transmitter is not recommended for use with electrically charged application liquids. In extreme applications, the liquid being measured may need to be electrically grounded.

Always tighten Symprobe from the wrench flat.

Always install the 3/4" Viton gasket with the LP75-2061. The G threaded version of the Symprobe will not seal unless the gasket is installed properly.

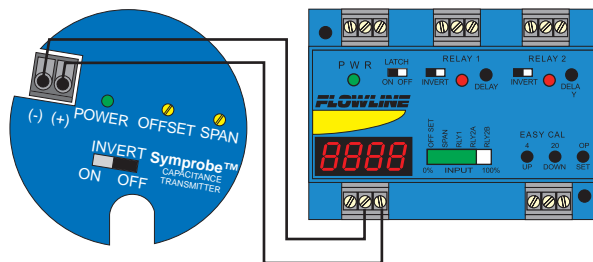
# WIRING

## Step Five

Remove the cap of the LP75 transmitter enclosure. The terminals of the transmitter are visible from the top of the enclosure.

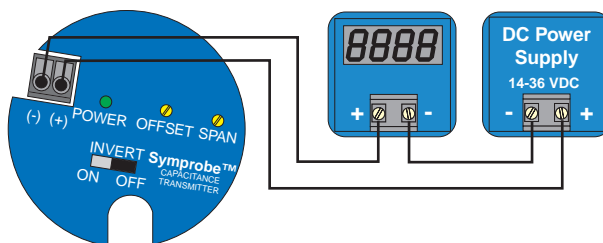
### 1. Wiring to a FLOWLINE Continuous Controller (LC52):

Connect the (+) terminal to the positive 24 VDC, 4-20 mA terminal on the LC52 controller. Connect the (-) terminal to the GND terminal on the LC52 continuous controller (See illustration below). Check LC52 instruction manual for additional information.



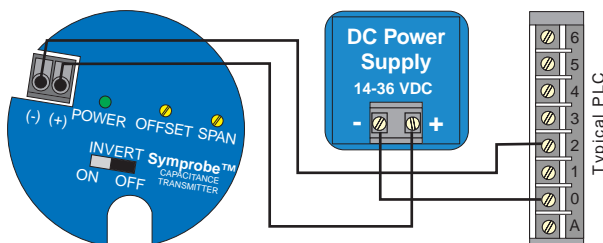
### 2. Wiring to a Two-Wire Loop Indicator:

The LP75 requires a loop indicator that receives a 4-20 mA current input. A 14-36 VDC power supply is required for the system. Connect the (+) terminal of the LP75 transmitter to the positive VDC terminal on the power supply. Connect the (-) terminal on the LP75 to the (+) terminal on the loop indicator. Connect the (-) of the loop indicator to the (-) of the power supply (See illustration below).



### 3. Wiring to a PLC:

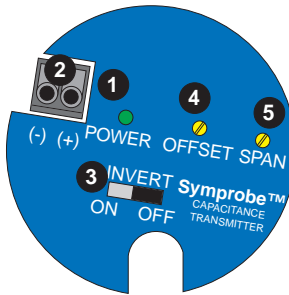
The LP75 requires a PLC which provides a 14-36 VDC excitation and receives a 4-20 mA current input. Connect the (+) terminal of the LP75 transmitter to the (+) VDC power terminal. Connect the (-) terminal on the LP75 to the (+) channel on the PLC. Connect the (-) of the PLC to the (-) of the power terminal (See illustration below).



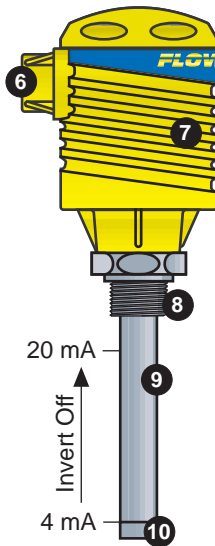
## CALIBRATION

### Step Six

- Power LED:** This Green LED lights when DC power is On.
- Input terminal:** Connect the output device to this terminal. Note the polarity of the terminal. If polarity is not reversed, the transmitter will not operate.
- Invert:** This switch reverses the logic of the 4-20 mA output. With the Invert Off, the 4 mA setting will be at the bottom of the probe and the 20 mA setting will be at the top of the probe. With the Invert On, the 20 mA setting will be at the bottom of the probe and the 4 mA setting will be at the top of the probe.
- Offset potentiometer:** This potentiometer controls the offset (typically 4 mA) setting for the probe.
- Span potentiometer:** This potentiometer controls the span (typically 20 mA) setting for the probe.



- Conduit Connection:** 1/2" NPT for direct electrical connection.
- NEMA 4X Enclosure:** Housing containing the electronics for the transmitter. The housing is rated NEMA 4X (IP 65) with a material of construction of Polypropylene (PP), U.L. 94 VO.
- Mounting Threads:** Provides 3/4" NPT (3/4" G) threads for mounting the Symprobe. Material of construction for the threads is FEP.
- Probe:** Measuring portion of the Symprobe. Material of construction for the probe is FEP.
- End Cap:** Dead band for the Symprobe. Length of end cap is 9/16". Material of construction for the end cap is FEP.



## CALIBRATION

### Step Seven

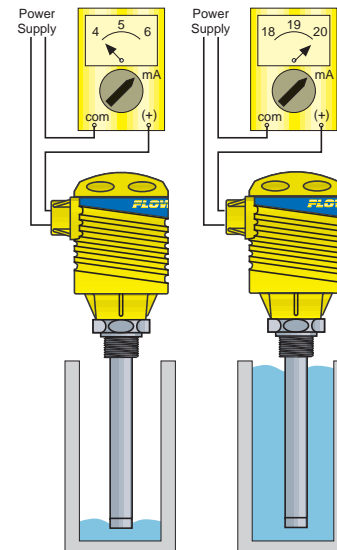
The Symprobe™ is factory calibrated over the entire range of the probe. Use steps 1 - 8 for the standard calibration (4 mA at bottom, 20 mA at top). Only continue on to steps 9-15 for reverse operation (20 mA at bottom, 4 mA at top).

#### Standard Calibration

- Connect a multimeter in series to read current.
- Keep the Invert switch set to OFF.
- Set level to lowest point. A small container of liquid or a dry probe may be used as a substitution for a low level setting.
- Turn Offset until current reads above 5 mA. Note: Turning pot counterclockwise will decrease the current and turning the pot clockwise will increase the current.
- Turn Offset until current reads 4.0 mA. Do not pass 4.0 mA. If you do, increase current to 5.0 and start again.
- Set level to highest point. A 6" nonmetallic pipe filled with liquid may be used as a substitution for a high level setting.
- Turn Span until current reads 20.0 mA. Note: Turning pot counterclockwise will decrease the current and turning the pot clockwise will increase the current.
- Symprobe is now calibrated with 4 mA at bottom of probe and 20 mA at top of probe. Please test unit by increasing and decreasing level. If any adjustments are required, go back to step 3. To reverse current, continue on to step 9.

#### Reverse Operation (20-4 mA operation ONLY)

- Set Invert switch to ON.
- Set level to highest point. A 6" nonmetallic pipe filled with liquid may be used as a substitution for a high level setting.
- Turn Offset until current reads above 5 mA. Note: Turning pot counterclockwise will increase the current and turning the pot clockwise will decrease the current.
- Turn Offset until current reads 4.0 mA. Do not pass 4.0 mA. If you do, increase current to 5.0 and start again.
- Set level to lowest point. A small container of liquid or a dry probe may be used as a substitution for a low level setting.
- Turn Span until current reads 20.0 mA. Note: Turning pot counterclockwise will decrease the current and turning the pot clockwise will increase the current.
- Symprobe is now calibrated with 20 mA at the bottom of the probe and 4 mA at the top of the probe. Please test unit by increasing and decreasing level. If any adjustments are required, go back to step 10.



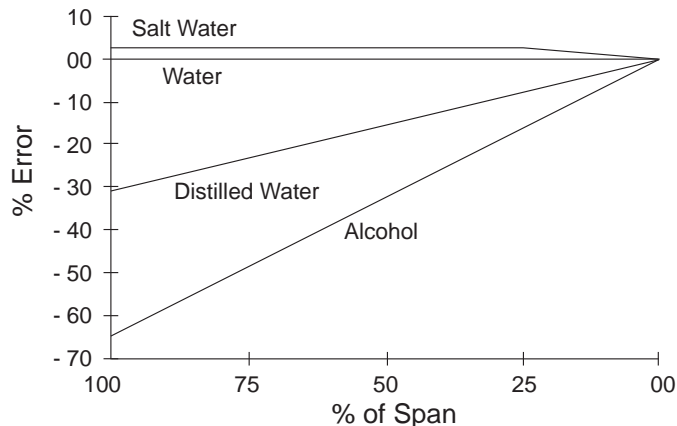


## CALIBRATION

### Step Eight

#### Dielectric Shift

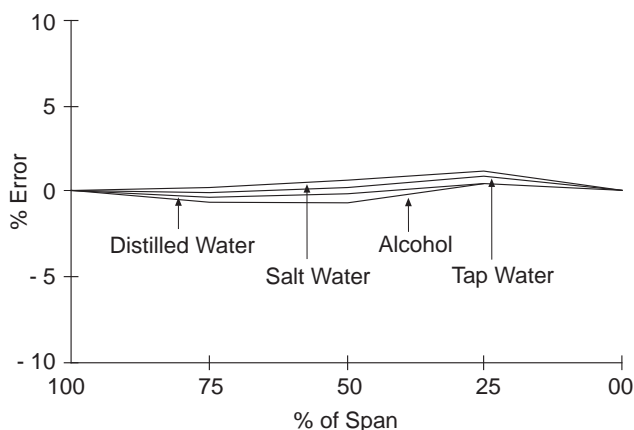
The LP75 transmitter is factory calibrated in normal city water. When the transmitter is applied in a highly conductive medium, such as salt water, the percentage of error realized is minimal. When the transmitter is applied in a medium with a low conductivity such as distilled water, the percentage of error realized can be significant across the entire span of measurement. The potential for error becomes even greater in a medium with both a low conductivity and low dielectric value such as alcohol.



FLOWLINE recommends re-calibrating the LP75 transmitter when:

- 1) the application medium has a low conductivity or dielectric value;
- 2) the product will be applied in several different mediums with widely differing conductivity and/or dielectric values.

In either situation, the transmitter/probe should be re-calibrated to the medium with the lowest conductivity and/or dielectric value.



## MAINTENANCE

### Step Nine

#### General:

It is the responsibility of the user to determine the appropriate maintenance schedule, based upon 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. **Cleaning the sensor:** Using a soft bristled brush and mild detergent, carefully wash the LP75. Do not use harsh abrasives such as steel wool or sandpaper, which might damage the surface of the transmitter. Do not use incompatible solvents which may damage the FEP probe or the PP housing.
3. **Sensor installation:** Follow the appropriate steps of installation as outlined in the installation section of this manual.