Of Sense VFL Series Vibration Fork Liquid Level Switches

ProSense Vibration Fork Liquid Level Switches

overfill protection, and pump protection in a wide variety of liquid level applications.

The ProSense VFL Series of Vibration Fork Level Switches is designed using tuning fork technology for reliable liquid point level detection for monitoring, alarming, and control applications. The device's electronics cause its tuning forks to vibrate at their natural frequency. When the forks come in contact with the medium, the fork vibration frequency will change and trigger the switch output to change state. Suitable for use in tanks, vessels, and pipes, the VFL series is an ideal alternative for applications where other liquid point level technologies such as float switches or conductive, optical and capacitance sensors are not suitable due to conductivity, turbulence, buildup, air bubbles, foam, pressure, temperature, and viscosity changes. The ProSense VFL Series is offered in two process connection sizes with short and extended insertion lengths, standard and high temperature constructions, and a 3-wire DC switch output for connection to controller inputs or a 2-wire AC/DC switch suitable for control of valves and pumps, making the VFL Series perfect for high and low point level alarms,

Part No. VFL75-100L-3H



Part No. VFL50-100S-3D

Features

- 1/2" or 3/4" male NPT process connection
- Short or extended insertion lengths
- Standard or high temperature constructions
- 3-wire DC output for PLC inputs or 2-wire AC/DC output for control of valves and pumps

Applications

 Ideal for applications not suitable for other liquid point level technologies due to conductivity, turbulence, buildup, air bubbles, foam, pressure,

temperature, and viscosity changes

- M12 quick disconnect or DIN style electrical connectors
- Robust stainless steel construction
- LED indication provides visual function check
- External function test with test magnet
- Use in tanks, vessels, and pipes for: - Overfill protection
 - Overfill protection
 - High and low point level alarmsPump control or limit detection
 - Pump control or limit detecti
- Valve control
- Run dry or pump protection
- High-temperature applications

VFL Series Vibration Fork Liquid Level Switch Selection								
Model	Insertion Length	Process Connection	Output Type	Operating Voltage	Electrical Connection	Process Temperature	Price	Weight (lbs)
<u>VFL50-100S-3H</u>	1.89 in (48mm) (Short Length)	1/2 in Male NPT	Switch PNP,		4-pin M12 quick- disconnect	-40°F to 212°F (-40°C to 100°C)	\$045h0:	0.64
<u>VFL75-100S-3H</u>		3/4 in Male NPT	complementary	10-30 VDC			\$045h1:	0.71
<u>VFL50-100S-3D</u>		1/2 in Male NPT	Switch PNP,		EN 175301- 803-A connector		\$045h2:	0.75
VFL75-100S-3D		3/4 in Male NPT	N.O. or N.C.				\$045h3:	0.82
VFL50-150S-3H		1/2 in Male NPT	Switch PNP,		4-pin M12 quick- disconnect	-40°F to 302°F (-40°C to 150°C)	\$045h4:	0.68
<u>VFL75-150S-3H</u>		3/4 in Male NPT	N.O./N.C. complementary				\$045h5:	0.75
<u>VFL50-150\$-3D</u>		1/2 in Male NPT	Switch PNP,		EN 175301- 803-A connector		\$045h6:	0.77
<u>VFL75-150S-3D</u>		3/4 in Male NPT	N.O. or N.C.				\$045h7:	0.84
VFL50-100L-3H		1/2 in Male NPT	Switch PNP, 3-wire, N.O./N.C. complementary		4-pin M12 quick- disconnect	-40°F to 212°F (-40°C to 100°C)	\$045h8:	0.69
<u>VFL75-100L-3H</u>	3.44 in (87.4 mm) (Extended Length)	3/4 in Male NPT					\$045h9:	0.76
<u>VFL50-100L-3D</u>		1/2 in Male NPT	Switch PNP,		EN 175301- 803-A connector		\$045ha:	0.80
VFL75-100L-3D		3/4 in Male NPT	N.O. or N.C.				\$045hb:	0.87
VFL75-100S-2D	1.89 in (48mm) (Short Length)	3/4 in Male NPT	AC/DC, 2-wire,	20-253 VAC/DC			\$045hc:	0.85
<u>VFL75-150S-2D</u>		3/4 in Male NPT	N.O. or N.C.			-40°F to 302°F (-40°C to 150°C)	\$045hd:	0.85

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Properties VFL Series Vibration Fork Liquid Level Switches

	VFL Series Vibration Fork Liquid Level Switch Specifications			
	Output			
Switch Output	Switching behavior: On/Off 3-wire DC-PNP: Positive voltage signal at the switch output of the electronics (PNP), switching capacity 200mA* 2-wire AC/DC-L and switching in the power supply line (see Wiring section for Load Beautrements), switching capacity 250mA*			
	2-wire AC/DC: Load switching in the power supply line (see wiring section for Load Requirements), switching capacity 250mA The device has two operating modes: maximum safety (MAX) and minimum safety (MIN). By choosing the corresponding operating mode, the user ensures that the device also switches in a safety-oriented manner even in an alarm condition, e.g. if the power supply line is disconnected. Maximum safety (MAX)			
Operating Modes	The device keeps the electronic switch closed as long as the liquid level is below the fork. Sample application: overfill prevention Minimum safety (MIN) The device keeps the electronic switch closed as long as the fork is immersed in liquid. Sample application: Dry running protection for pumps The electronic switch opens if the limit is reached if a fault occurs or the power fails (quiescent current principle)			
	Electrical			
Supply Voltage	DC-PNP: 10 to 30 V DC, 3-wire AC/DC: 20 to 253 V AC/DC, 2-wire			
Power Consumption	DC-PNP: < 975mW AC/DC: < 850mW			
Current Consumption	DC-PNP: < 15mA AC/DC: < 3.8 mA			
Residual Ripple	DC-PNP: 5Vss 0 to 400Hz AC/DC: N/A			
Electrical Connection	Electronic version 3-wire DC-PNP with M12 plug or valve plug connection Electronic version 2-wire AC/DC with valve plug connection A fine-wire fuse is necessary for operation: 500mA slow-blow. Electronic version 3-wire DC-PNP 3-wire DC-PNP is preferably used in conjunction with programmable logic controllers (PLC) Voltage source: non-hazardous contact voltage or Class 2 circuit (North America).			
Cable Specification	- Cable cross-section: max. 1.5 mm2 (16AWG) - Ø 3.5 to 8mm (0.14 to 0.26 in) M12 connector: IEC 60947-5-2			
Overvoltage Protection	Overvoltage category II			
Reverse Polarity Protection	2-wire AC/DC: AC mode: the device reverse polarity protection does not apply. DC mode: in the event of reverse polarity the maximum safety mode is always detected. Check the wiring and perform a function check before commissioning. The device is not damaged in the event of reverse polarity. 3-wire DC-PNP: Integrated In the event of reverse polarity the device is deactivated automatically.			
	2-wire AC/DC:			
Short-Circuit Protection	During switching the sensor checks whether a load, e.g. relay or contactor, is present (load check). If an error occurs, the sensor is not damaged. Smart monitoring: normal operation is resumed once the error is fixed. 3-wire DC-PNP:			
	Overload protection/snort-circuit protection at 1 > 250 mA; the sensor is not destroyed. Intelligent monitoring: lesting for overload at intervals of approx. 1.5 s; normal operation resumes once the overload/short-circuit has been rectified.			
	Ambient temperature: +25°C (+77°F)			
Reference Operating Conditions	Process pressure: 1 bar (14.5 psi) Fluid: Water (density: approx. 1 g/cm³, viscosity 1 mm2/s) Medium temperature: 25°C (77°F) Density setting: > 0.7 g/cm³			
Switch Point	Switching time delay: Standard (U.S.S, TS)			
Hvsteresis	max. 3mm (0.12 in)			
Non-Repeatability	±1 mm (0.04 in) in accordance with DIN 61298-2			
Influence of Ambient Temperature	Negligible			
Influence of Medium Temperature	–25 μm (984 μin) / °C			
Influence of Medium pressure	–20 μm (787 μin) / bar			
Switching Delay	0.5 s when tuning fork is covered 1.0 s when tuning fork is uncovered			
Switch-On Delay	max. 3s			
Measuring Frequency	approx. 1,100 Hz in air			
Measured Error	In event of device change: ± 2mm (0.08 in) as per DIN 61298-2			

*50°C (122°F) ambient maximum. See Operating Instructions for Derating Curve for ambient temperatures to 70°C (158°F).

DrSense VFL Series Vibration Fork Liquid Level Switches

VFL Series Vibration Fork Liquid Level Switch Specifications Continued					
Process					
Process Temperature Range	-40 to +100°C (-40 to +212°F) -40 to +150°C (-40 to +302°F)				
Process Pressure Range	Max1 to +40 bar (-14.5 to +580psi)				
Density	> 0.7 g/cm ³				
State of Aggregation	Liquid				
Viscosity	1 to 10,000 mPa·s, dynamic viscosity				
Solids Contents	ø < 5mm (0.2 in)				
Lateral Loading Capacity	Lateral loading capacity of the tuning fork: maximum 200 N				
Environment					
Ambient Temperature Range	-40 to +70°C (-40 to +158°F)				
Storage Temperature	-40 to +85°C (-40 to +185°F)				
Climate Class	DIN EN 60068-2-38/IEC 68-2-38: test Z/AD				
Altitude	Up to 2,000 m (6,600 ft) above sea level				
Degree of Protection	IP65/67 NEMA Type 4X Enclosure (M12 connector) IP65 NEMA Type 4X Enclosure (valve plug)				
Shock Resistance	a = 300 m/s ² = 30 g, 3 planes x 2 directions x 3 shocks x 18 ms, as per test Ea, prEN 60068-2-27:2007				
Vibration Resistance	a(RMS) = 50 m/s², ASD = 1.25 (m/s²)²/Hz, f = 5 to 2,000 Hz, t = 3 x 2 h, as per test Fh, EN 60068-2-64:2008				
Electromagnetic Compatibility	Electromagnetic compatibility in accordance with all relevant requirements of the EN 61326 series and NAMUR recommendation EMC (NE21).				
Approvals					
CSA	File# 600062				
CE	EMC; LVD; RoHS II				



Orsense VFL Series Vibration Fork Liquid Level Switches

Wiring

The device has two operating modes: maximum safety (MAX) and minimum safety (MIN). By choosing the corresponding operating mode, the user ensures that the device also switches in a safety-oriented manner even in an alarm condition, e.g. if the power supply line is disconnected.

• Maximum safety (MAX)

The device keeps the electronic switch closed as long as the liquid level is below the fork. Sample application: overfill prevention

• Minimum safety (MIN)

The device keeps the electronic switch closed as long as the fork is immersed in liquid. Sample application: Dry running protection for pumps

The electronic switch opens if the limit is reached, if a fault occurs or the power fails (quiescent current principle).

3-Wire DC-PNP Output - M12 Connector



Function Monitoring

Function monitoring with M12 connector

Using a two-channel analysis, function monitoring of the sensor can be implemented in addition to level monitoring, e.g. per relay switch, PLC, I/O module,

When both outputs are connected, the MIN and MAX outputs assume opposite states when the device is operating fault-free (XOR). In the event of an alarm condition or a line break, both outputs are deenergized.



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Wiring Continued 3-Wire DC-PNP Output - Valve Plug



2-Wire AC/DC Output



Load Requirements

Mada	Supply voltage	Rated power			
Mode	Supply voltage	min	max		
AC mode	24 V	> 1.3 VA	< 6 VA		
	110 V	> 1.5 VA	< 27.5 VA		
	230 V	> 2.5 VA	< 57.5 VA		
DC mode	24 V	> 0.7 W	< 6 W		
	48 V	> 0.9 W	< 12 W		
	60 V	> 1.5 W	< 15 W		

Not suitable for connection to PLC inputs!

Refer to Operating Instructions document for additional information.

1-800-633-0405 Sense VFL Series Vibration Fork Liquid **Level Switches**

Dimensions mm [inches]



Dimens	ions mm	i [inches	
Part No.	L1	L2	ØD
VFL75-150S-2D	187.5 [7.38]	139.6 [5.50]	3/4
VFL75-100S-2D	162.9 [6.41]	115.0 [4.53]	3/4
VFL50-100L-3D	202.3 [7.96]	115.0 [4.53]	1/2
VFL75-100L-3D	202.3 [7.96]	115.0 [4.53]	3/4
VFL50-150S-3D	187.5 [7.38]	139.6 [5.50]	1/2
VFL75-150S-3D	187.5 [7.38]	139.6 [5.50]	3/4
VFL50-100S-3D	162.9 [6.41]	115.0 [4.53]	1/2
VFL75-100S-3D	162.9 [6.41]	115.0 [4.53]	3/4



-M12, IP65/67, NEMA TYPE 4X



13.7 0.54

Dimensions mm [inches]				
Part No.	L1	L2	ØD	
<u>VFL50-100L-3H</u>	172.3 [6.78]	85.0 [3.35]	1/2	
<u>VFL75-100L-3H</u>	172.3 [6.78]	85.0 [3.35]	3/4	
<u>VFL50-150S-3H</u>	157.5 [6.20]	109.6 [4.31]	1/2	
<u>VFL75-150S-3H</u>	157.5 [6.20]	109.6 [4.31]	3/4	
<u>VFL50-100S-3H</u>	132.9 [5.23]	85.0 [3.35]	1/2	
<u>VFL75-100S-3H</u>	132.9 [5.23]	85.0 [3.35]	3/4	

See our website www.AutomationDirect.com for complete Engineering drawings.