# Technical Specification

# LFV

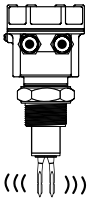
## Vibrating Fork Level Switch for Liquids

Trumen®
sensing matters

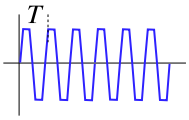
## Product Overview

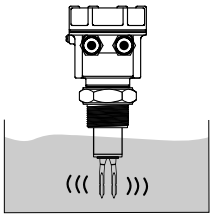
Trumen vibrating fork point level switch model LFV is suitable for free flowing liquids use in all process industries like food and beverages, chemical, pharma, oil & gas, water treatment plant and many more. Trumen vibrating fork gives reliable measurement values and is not affected by flow, vibrations, change in the media properties and material build-up.

## Operating Principle



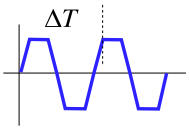
Electronics of LFV excites the piezo-electric-crystals inside the tuning fork, which makes the fork tines vibrate at their natural resonance frequency in free air.



When fork tines are immersed in liquid, the frequency of fork vibration falls due to the density of liquid.

This change in frequency is detected by electronic circuit of LFV.

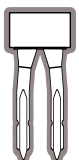



Presence of liquid is thus detected.

## Applications

- Vibrating fork liquid level switch is used in different applications like
  - Water
  - Milk
  - Diesel
  - Edible Oil
  - Paints
  - WFI water
  - Beverages
  - Hydraulic oil
  - Liquid LPG
  - Honey
  - Chemical
- Flow/no-flow detection in pipelines

## Acid Safe Coatings



PTFE
PFA
HALAR
TEFZEL ... etc

## Features

- Compact size
- Fast switching response 0.5 to 2 sec
- Low power consumption
- Calibration-less operation
- Durable Construction
- Immune to External Vibrations
- Suitable for side as well as top mounting
- Minimum and maximum failsafe field selectable
- External indication LED available
- NAMUR (L-H / H-L) as per IEC-60947-5-6
- Ingress protection : IP 67/68 (as per IS/IEC 60529:2001)
- Process temperature max 250°C
- Process pressure max.20 bar
- 1/2" threaded mountings available
- Threaded / flanged / customized process connections
- Remote electronics with standard 10 meters cable length

# **LFV:** Vibrating Fork Level Switch for Liquids

## Performance Specifications

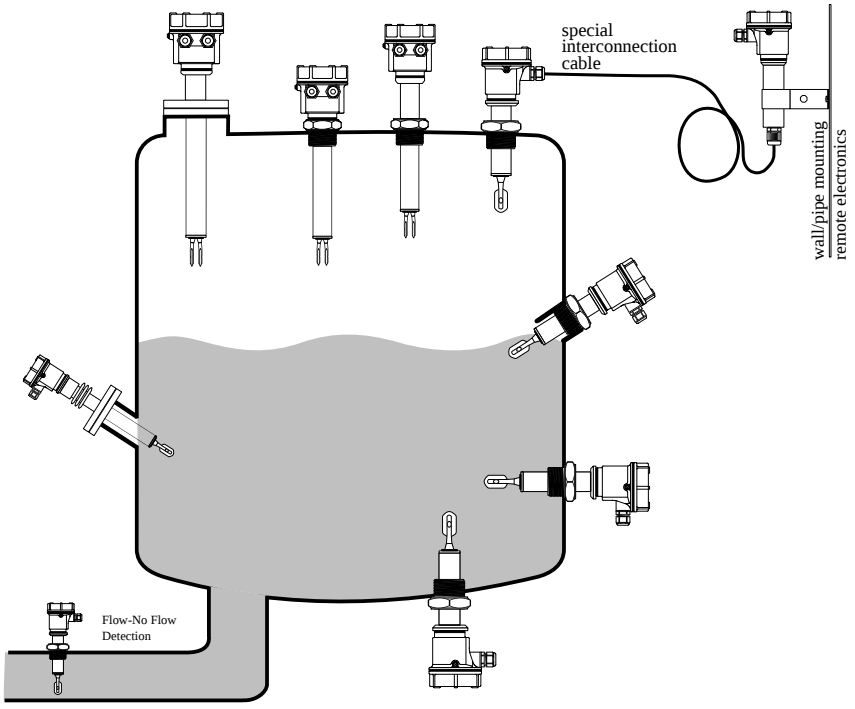
| Parameter | Description |
|---|---|
| **General** | |
| Max. Viscosity | 10,000 cStokes (= cPose/(g/cm$^3$)), (Higher viscosity available on request) |
| Maximum measured error | Max. ±1 mm (at reference operating conditions) |
| Switching response | 0.5 to 2 sec |
| Repeatability | 0.1 mm |
| Hysteresis | Approx. 2 mm |
| Influence of medium temperature | Max +2 to -3 mm (-20 to +150 °C) |
| Influence of medium density | Max +5 to -4 mm (1.0 to 2.5 g/cm$^3$) |
| Influence of medium pressure | Max 0 to -3 mm (-1 to 20 bar) |
| Sensor Cable | Remote electronics require special cable from fork to controller, 10 meter standard length (Longer length max. upto 15m) |
| **Process** | |
| Ambient Temperature | -20°C ... 70°C (-4°F ... 158 °F) |
| Process Temperature | -20°C ... 80°C (-4°F ... 176 °F) |
| Extended Process Temperature | -30°C ... 250°C (-22°F ... 482 °F), (extensions & heat sinks required) |
| Process Pressure | Absolute / max. 20 bar |
| **Physical Specifications** | |
| Wetted Parts | SS 316 or SS 316L, PTFE, PFA, TEFZEL, HALAR |
| Process Connections | NPT / BSP / Hygienic ½", ¾", 1", 1-1⁄4", 1-1⁄2", 2" & Triclover 1-1/2", 2" and Flanged ANSI / JIS / DIN / ASA / custom |
| Extensions Tube & Material | SS 304, SS 316, SS 316L |
| Insertion Length | 50mm to 3,000mm |

## Approvals & Certifications

| | |
|---|---|
| ISO Certification | ISO 9001:2015 |
| CE certification | All product comply as per directives 2014/35/EU Low Voltage Directive & 2014/30/EU Electromagnetic Compatibility Directive |
| RoHS Certification | RoHS Compliance as per RoHS Directive (2011/65/EU); Certificate No. RoHS-TTPL-2021-0305 |
| Ingress Protection | IP67/68 as per IS/IEC 60529:2001 |
| Ex-proof (Ex d T6 IIC) | Flameproof as per IS/IEC 60079-1:2014, Ingress Protection (IP-67) as per IS/IEC 60529:2001 Suitable for Gas Group: IIC, Suitable for Zone 1 & 2 atmospheres and Dust hazardous area Zone 21 & 22 |
| Ex-ia Approval | Intrinsically safe according to the requirement of IS/IEC 60079-0:2011, IS/IEC 60079-11:2006 & IS/IEC 60529: 2001 |
| EMC Certification | EMC Certified as per Standard IEC 61000-4-3, IEC 61000-4-2, IEC 61000-4-6, IEC 61000-4-29, IEC 61000-4-4, IEC 61000-4-5, CISPR 11 |
| Vibration Test Certificate | Vibration complied as per IEC 60068 part 2-6 sinusoidal, 10-55Hz, 0.15mm |

Specifications are subject to change without prior notice

## Typical Installation



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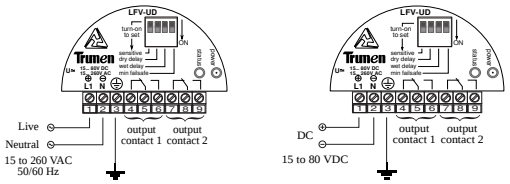
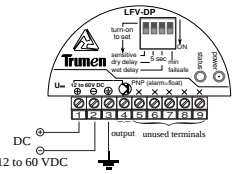
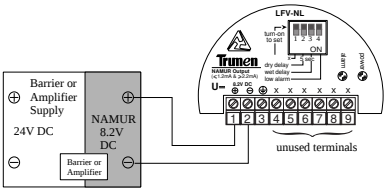
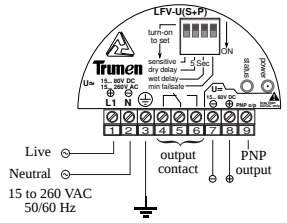
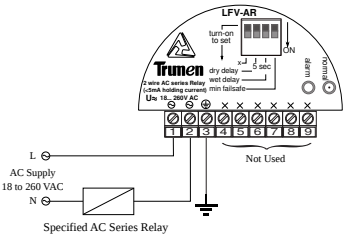
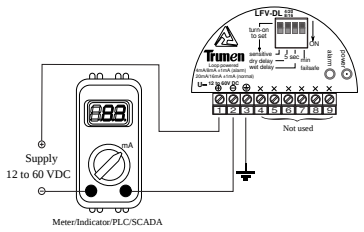
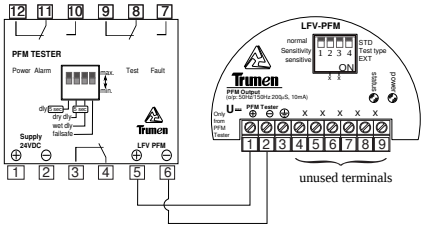
## Performance Specifications

| Parameter | Description | Electrical Connection |
|---|---|---|
| **Electrical** | | |
| **EIUD / ERUD**<br>Supply<br><br>Output<br>Relay Rating | Integral / Remote Electronics<br>Universal Power Supply 15 to 80 VDC & 15 to 260 VAC 50/60Hz<br>1 DPDT potential free relay contact output<br>5 A each @ 24VDC or 220VAC |  |
| **EIDP / ERDP**<br>Supply<br>Output<br>Output Limit | Integral / Remote Electronics<br>12 to 60 VDC<br>PNP Output<br>250mA max. Short Circuit Safe |  |
| **EINL/EINH**<br>Supply<br>Output | NAMUR (L-H / H-L) as per IEC-60947-5-6<br>8.2 VDC<br>⩽1.2mA & ⩾2.1mA NAMUR output, 1KΩ series resistance |  |
| **EIUSP / ERUSP**<br>Supply<br><br>Output<br>Relay Rating<br>DC Supply<br>PNP Output | Integral / Remote Electronics<br>Universal Power Supply 15 to 80 VDC & 15 to 260 VAC 50/60Hz<br>Potential free SPDT relay contact output<br>5 A each @ 24VDC or 220VAC<br>15 to 60 VDC for PNP output<br>250mA max. Short Circuit Safe |  |
| **EIAR**<br>Supply<br>Output<br><br>Output Limit | Integral Electronics<br>18 to 260 VAC<br>Two Wire AC series relay not less than 4mA to release external relay maximum 150mA to magnetize relay<br>Use relays / contactors will more than 4mA holding current |  |
| **EIDL**<br>Supply<br>Output<br>Output Limit | Integral Electronics 4-20mA Loop Powered<br>15 to 60 VDC<br>Two Wire 8 / 16mA & 4 / 20mA output<br>8mA (±1mA max) / 16mA (±1mA max)<br>4mA (±1mA max) / 20mA (±1mA max) |  |
| **EIPFM**<br>Supply<br>Output<br>Output Limit | Integral Electronics<br>From PFM tester device < 30VDC<br>PFM sourced powered output<br>PFM 50Hz / 150Hz 200$\mu$S, 10mA |  |
| **EIFS / ERFS** | Integral / Remote Electronics Specially designed with special output | Electrical connection depends on selected model code. |

# **LFV:** Vibrating Fork Level Switch for Liquids

## Ordering Information

**LFV** **Hxx** – **Tx** – **Sx** – **Gx** – **Px** – **Cx** – **Exxx** – **Dx** – **Lxxxx**

**Enclosure**
**HAN:** Aluminum Non-Hazardous IP-67/68
**HAX:** Aluminum Flameproof IIa, IIb and IIc
**HSN:** Stainless steel
**HPN:** Polycarbonate (Plastic)
**HES:** Specially designed as per customer requirement

**Material Temperature**
**T1:** max 80°C
**T2:** max 200°C
**T3:** max 250°C
**TS:** Customer Specified Special designed

**Sensing Surface Material**
**S6:** SS 316
**SL:** SS 316L
**ST:** PTFE Coated
**SF:** PFACoated
**SZ:** TEFZEL Coated
**SH:** HALAR Coated
**SS:** Special Surface

**Sensor Extension Material**
**G4:** SS 304
**G6:** SS 316
**GL:** SS 316L
**GT:** PTFE Coated
**GF:** PFA Coated
**GZ:** TEFZEL Coated
**GH:** HALAR Coated
**GS:** Special Surface

**Process Connection Type**
**PB1:** 1" BSP
**PB2:** 1-1/2" BSP
**PB3:** 3/4" BSP
**PB4:** 1-1/4" BSP
**PB5:** 1/2" BSP
**PB6:** 2" BSP
**PN1:** 1" NPT
**PN2:** 1-1/2" NPT
**PN3:** 3/4" NPT
**PN4:** 1-1/4" NPT
**PN5:** 1/2" NPT
**PN6:** 2" NPT
**PT1:** 1",1-1/2" Triclover/Triclamp
**PT2:** 2" Triclover/Triclamp
**PS1:** 1" SMS Union
**PS1:** 2" SMS Union
**PD:** Dairy Coupling
**PFL:** Flanged Type (Fxxx)
**F001:** 1/2" B16.5 ANSI/ASA 150#RF
**F002:** 3/4" B16.5 ANSI/ASA 150#RF
**F003:** 1" B16.5 ANSI/ASA 150#RF
**F004:** 1-1/4" B16.5 ANSI/ASA 150#RF
**F005:** 1-1/2 " B16.5 ANSI/ASA 150#RF
**F006:** 2" B16.5 ANSI/ASA 150#RF
**F007:** 2-1/2" B16.5 ANSI/ASA 150#RF
**F008:** 3" B16.5 ANSI/ASA 150#RF
**F009:** 4" B16.5 ANSI/ASA 150#RF
**F010:** 5" B16.5 ANSI/ASA 150#RF
**F011:** 6" B16.5 ANSI/ASA 150#RF
**PCS:** Special Process Connection

**Insertion Length**
50mm to 3000mm

**Fork Length**
**D1:** 100mm (OD-30mm, suitable for 1" and above)
**D2:** 40mm (OD-22mm, suitable for 3/4" and above)
**D3:** 40mm (OD-18mm, suitable for 1/2" and above)

**Electronics (Refer page 3 for detail description)**
**EIUD:** 1 DPDT relay O/P
**EIDP:** PNP O/P
**EINL:** ⩽1.2mA NAMUR (L-H) O/P
**EINH:** ⩾2.1mA NAMUR (H-L) O/P
**EIUSP:** 1 SPDT relay+PNP O/P
**EIAR:** Two Wire AC series relay O/P
**EIDL:** 8/16mA & 4-20mA O/P
**EIPFM:** PFM sourced powered O/P
**EIFDS:** Special O/P
**ERUD:** Remote Electronics with 1 DPDT relay O/P
**ERDP:** Remote Electronics with PNP O/P
**ERUSP:** Remote Electronics with 1 SPDT relay+PNP O/P
**ERFS:** Remote Electronics with special O/P

**Process Connection Material**
**C4:** SS 304
**C6:** SS 316
**CL:** SS 316L
**CT:** PTFE Coated
**CF:** PFA Coated
**CS:** Special Surface

Trumen Technologies Pvt. Ltd.
*(an ISO 9001:2015 company)*
39 Mangal Nagar, B/H Sai Ram Plaza, Nr. Rajiv Gandhi Circle, AB Road, Indore, MP, 452 001, India
Phone: +91-731-497 2065, 8109062425
email: sales@trumen.in web:www.trumen.in