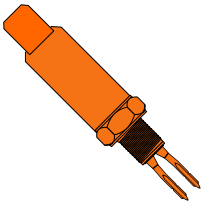
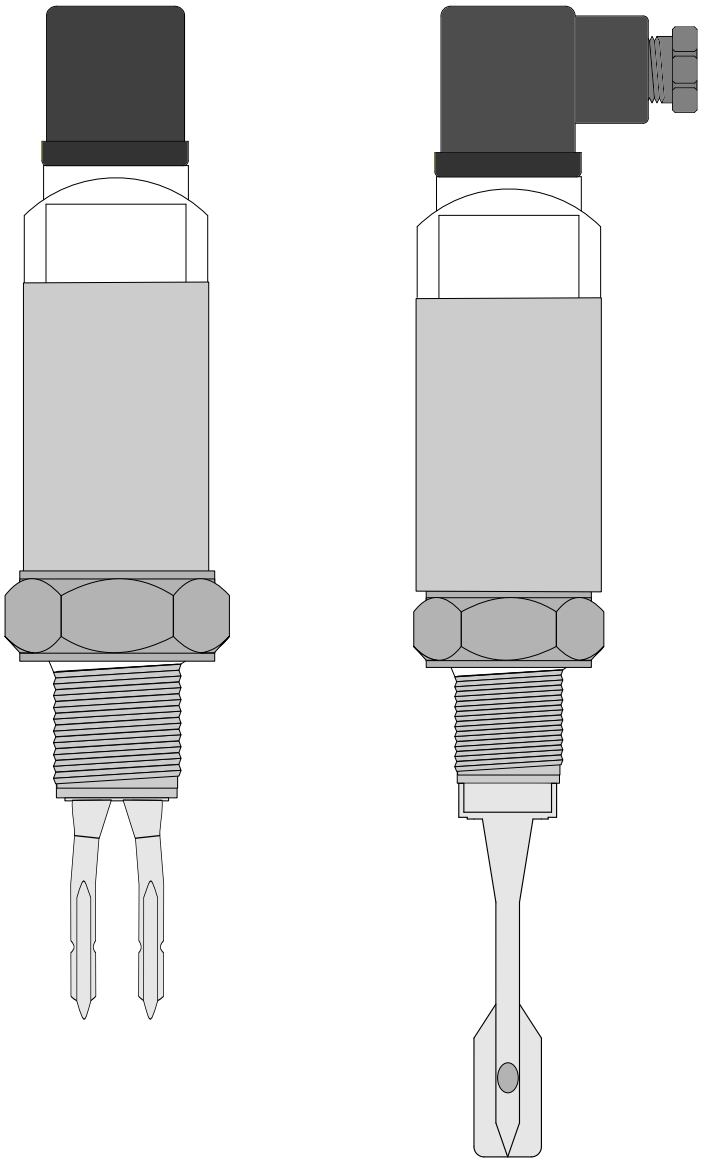


LFV12 / LFV11
Compact Vibrating Fork
Level Switch for Liquids

Trumen®
sensing matters

Instruction Manual



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List of content

Introduction - LFV12 / LFV11

The Compact Vibrating Fork Level Switch LFV12 / LFV11 is a level limit switch for all kinds of fluids and is used in tanks, containers and pipelines. It is used in cleaning and filtering systems and coolant and lubricant tanks as an overflow protection or as a pump protector.

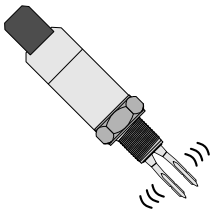
LFV12 / LFV11 is ideal for applications which previously used float switches and condctive, capacitive and optical sensors. It also works in applications which are unsuitable for these measuring methods due to conductivity, build-ups, turbulence, flows or air bubbles.

LFV12 / LFV11 is not suitable for hazardous areas and areas where the medium temperature is above 200 °C. LFV12 is available with various process connection like threaded, Tri Clover, Flush mout etc.

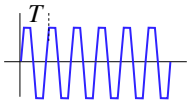
Your benefits -

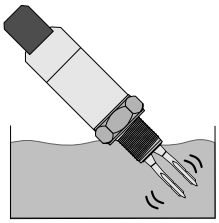
- Operational safety, reliability and universal
- Applicability through use of the tuning fork measuring principle
- External test option using test magnet
- On-site control using external LED display
- Easy to install even at points difficult to access due to compact construction
- Rugged stainless steel housing (316)
- Service-friendly plug-in connections
- For medium temperature up to 200 °C
- LFV11 can be used in solid also

Operating Principle



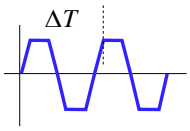
Electronics of LFV12 / LFV11 excites the piezo-electric-crystals inside the tuning fork, which makes the fork tines vibrate at their natural resonance frequency in free air.





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

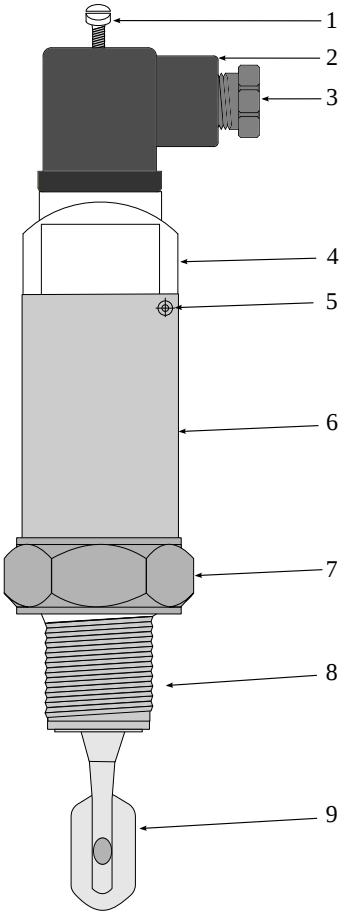
This change in frequency is detected by the electronic circuit.



Liquid presence is thus detected.

Installation - LFV12 / LFV11

Installation Precaution



1. Tighten the "Top screw" after plug in the connector

2. "Plug-in connector" do proper power connections inside the connector

3. Tighten the "cable entries" properly

4. "Polycarbonate cover" with alarm & power indicator LED

5. "Magnet testing point" for external system testing

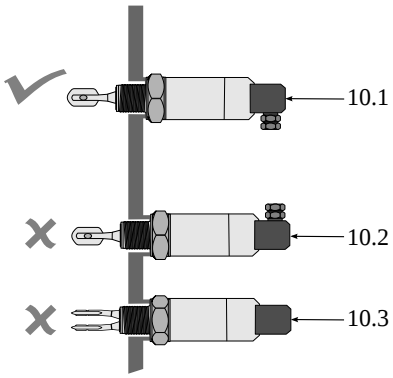
6. SS Tubular Housing

7. Always tighten the "process connection" using proper wrench never try to tight by SS Tubular housing

8. Make sure process connection threads are same as that in hopper/tank

9. Compact Vibrating fork tines:-
9.1 Should never be bent closer
9.2 Should never be bent apart
9.3 Should never be cut or machined in any way
9.4 Should never be extended by welding or machining
9.5 Insure tines should not be touched any solid object inside the tank

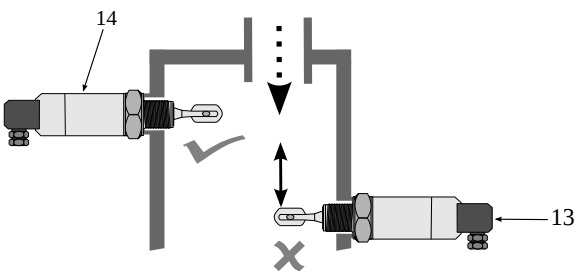
Installation Procedure



10.1. Cable entries must face downwards only
10.2 Cable entries should never be face upwards
10.3 Cable entries should never be towards horizontal

11. Never climb either by gripping or stepping over either the fork tines or its SS Tubular housing

12. Obeserve other safety precautions as required at the place of application



13. Material flow should not fall directly on fork tines

14. Install the instrument away from direct fall of material

Technical Specification

Features

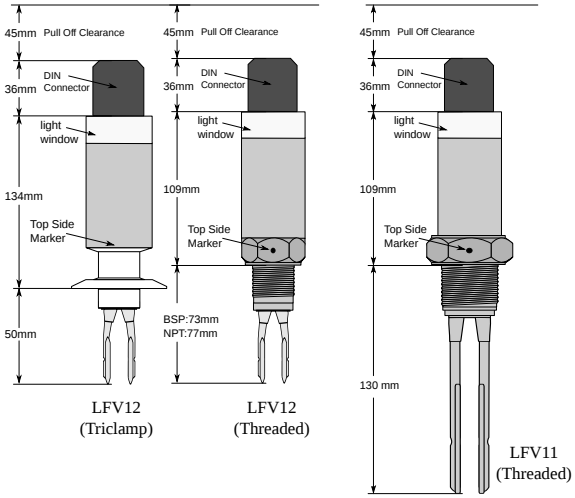
1. Fast Switching Response 1 sec
2. Minimum ½" (LFV12) process connections
3. High pressure up-to 15 bar
4. High Temperature up-to 150 °C available
5. No Calibration Required
6. Integral LED indication
7. Threaded & Hygienic process connections
8. External magnetic key test point for simulation
9. IP-65 Stainless Steel Enclosure as per IS-13947
10 Compact size
11. Low power consumption

Applications

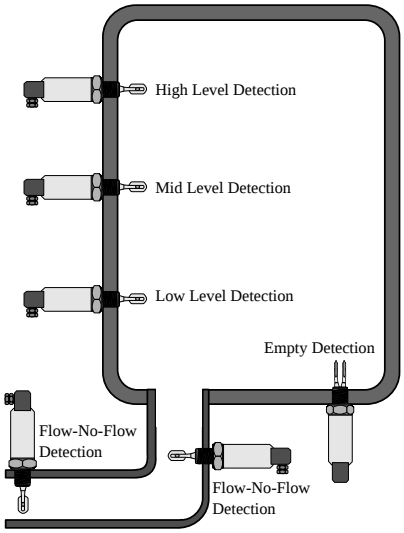
Vibrating fork level limit switch used as a full, empty and demand alarm in fluid containers, tanks containing liquids of various types, including milk & milk products, edible oil, fuel oil, lube oil, brewery, pharmaceutical fluids etc. LFV11 can be used in solid also.

Also for Flow-No-Flow/Empty Pipe Detection.

Dimensions



Typical Mounting Positions



Specifications

Electronics Type : OP/OS	DC Supply with Source or Sink Output OP : PNP DC, OS :NPN DC
Supply	12 to 60 VDC
Output Limit	250mA max. Short Circuit Safe.
Electronics Type : OL	Loop Powered Two Wire DC 8 / 16 mA
Supply	15 to 60 VDC
Output Limit	8mA (-1mA max) / 16mA (+1mA max)
Electronics Type : OR	Two Wire AC for series Relay
Supply	18 to 260 VAC
Output Limit	not less than 5mA to release external relay maximum 150mA to magnetize relay Use relays/contactors will more than 5mA holding current
Electronics Type : ON/OM	Two Wire NAMUR 1 / 2 mA ON : LH-edge, OM : HL-edge
Supply	8.2 VDC (NAMUR)
Output Limit	(1.2 mA max) / (2 mA min / 2.1mA min)
Max. Viscosity	10,000 cStokes (= cPose/(g/cm3)) (Higher viscosity available on request)
Ambient Temp.	-20°C ... 70°C (-4°F ... 158°F)
Process Temp.	-20°C ... 80°C (-4°F ... 176°F)
Extended Process Temperature	-30°C ... 150°C (-22°F ... 302°F) (extensions & heat sinks required)
Process Pressure	absolute / max. 15 bar
Wetted Parts	SS 316 or SS 316L
Process Connections LFV12 (Material SS316)	Threaded NPT / BSP ½", ¾", 1" Tri-Clamp 1"...1½", SMS Union 1" Flush Mounting 1", 1½"
Process Connections LFV11 (Material SS316)	Threaded NPT / BSP 1", Tri-Clamp 1½", Tri-Clamp 2"
Enclosure Material	SS316
Enclosure Protection Class	IP-65 as per IS-13947
External Indication	Green LED : Power On Indicator Red LED : Alarm Indicator
Sensor Insertion Length	LFV12 : 50 mm excluding threads LFV11 : 128 mm including threads

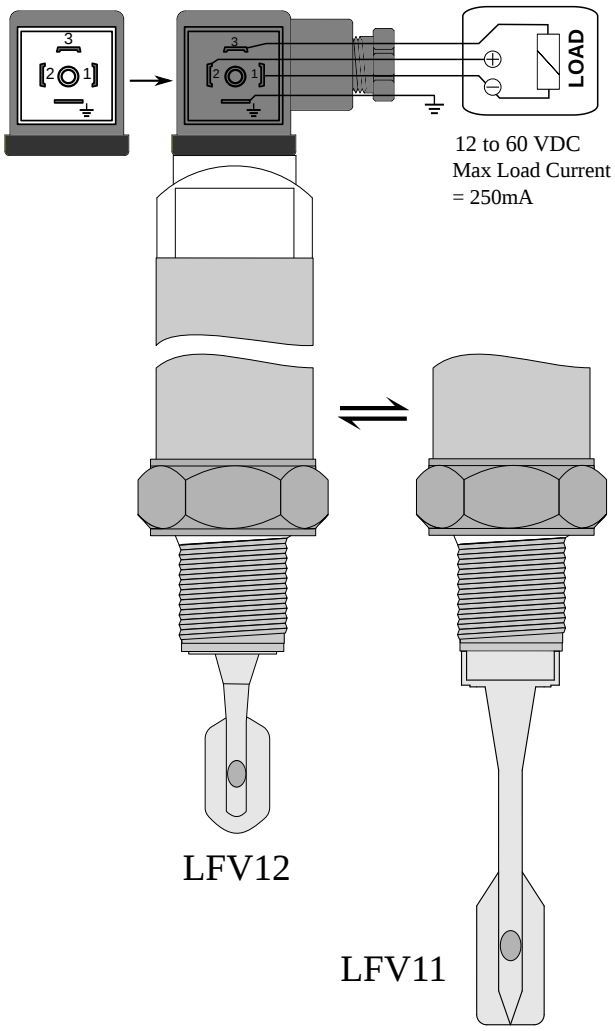
Specifications are subject to change without prior notice

Annexure-1

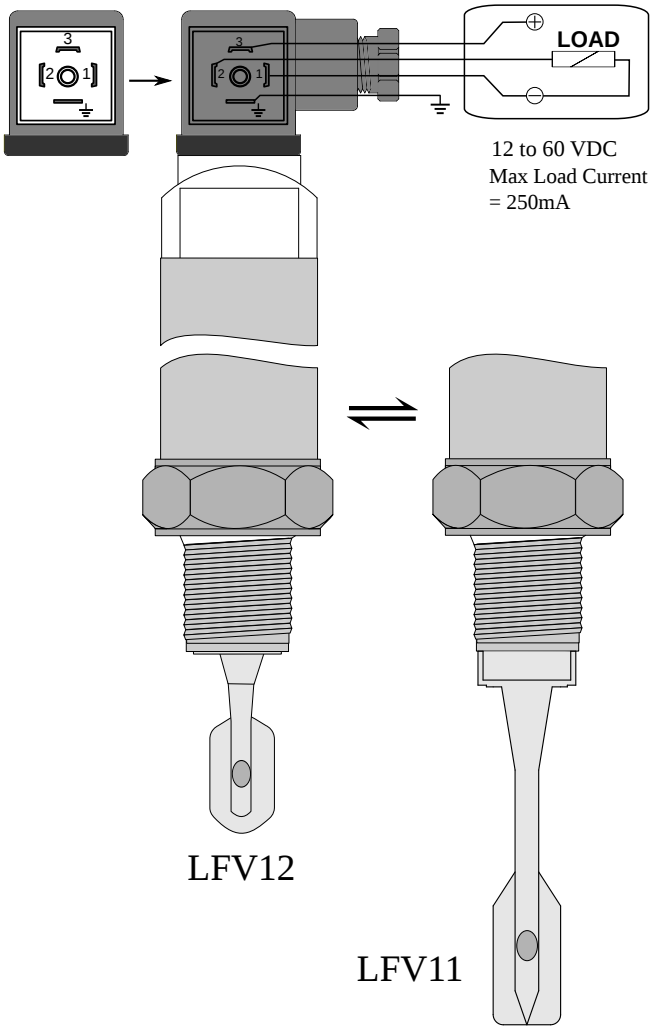
LFV12 DC PNP (LFV12-XX-XXX-OP)
LFV11 DC PNP (LFV11-XX-XXX-OP)

Electrical Connections

High Level Detection
Failsafe High
(High level alarm)



Low Level Detection
Failsafe Low
(Low level alarm)



Connection Terminals

For High Level Alarm Detection

1	- of DC Supply input minus
2	+ of DC Supply input high plus Supply: 12 to 60VDC
3	+ Output when liquid level is low (Max. Load = 250mA) Float when liquid level is high
4	Supply earth terminal for safety

For Low Level Alarm Detection

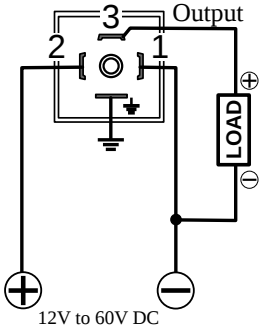
1	- of DC Supply input minus
2	+ Output when liquid level is high (Max. Load = 250mA) Float when liquid level is low
3	+ of DC Supply input plus Supply between terminal 1 & 3 = 12 to 60VDC
4	Supply earth terminal for safety

Annexure-1

Operation Matrix - LFV12 DC / LFV11 DC (XX-XXX-OP)

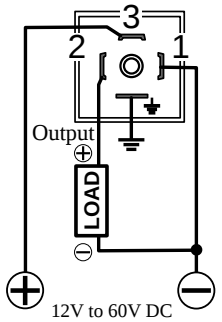
Failsafe defines that the alarm and power failure / device failure conditions are same to the external system. Failsafe operation is best understood with the type of installation.

High Level Failsafe Mode

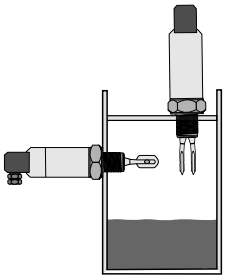
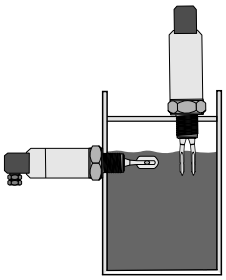
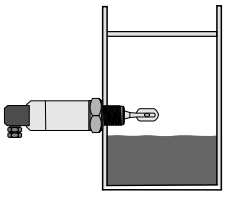
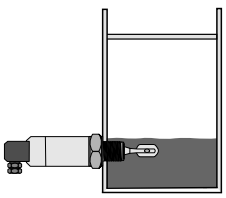


12V to 60V DC
Max Load Current: 250mA
Relay / PLC etc.

Low Level Failsafe Mode



12V to 60V DC
Max Load Current: 250mA
Relay / PLC etc.

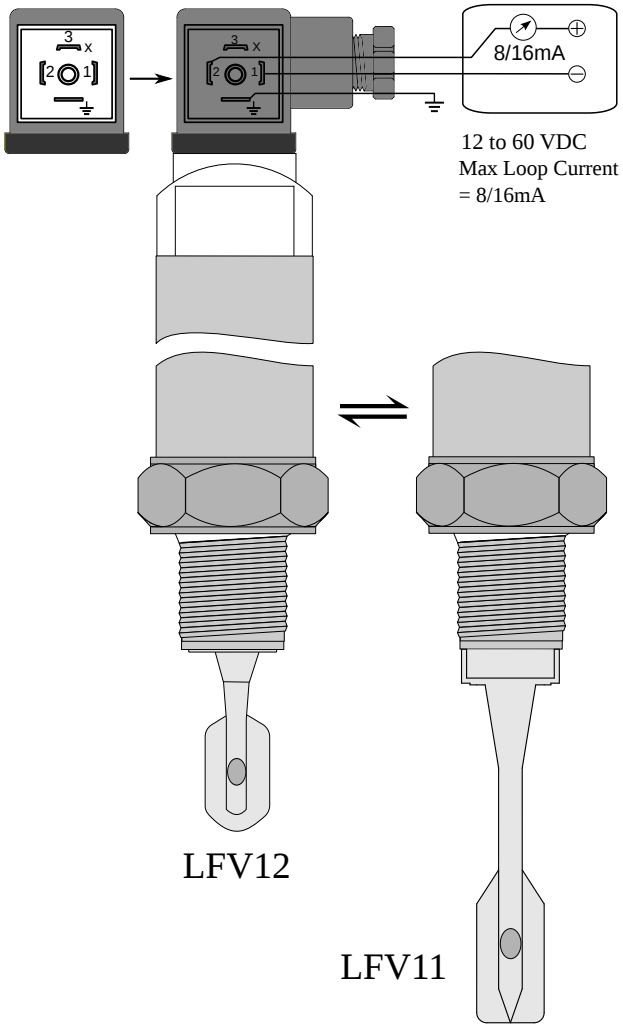
Material & Installation	Failsafe connection & material status	High Level Failsafe LED Status		Low Level Failsafe LED Status		Load Status	
		alarm LED	power LED	alarm LED	power LED	Power ON	Power Fail
	Connections made for failsafe high. When fork tines are not immersed in liquid, it means their is no material at switch point.	**LED Red Off** ○ Normal	**LED Green On** ☼			**Active** (output gives +ve voltage as per given supply	**Float** (output will be zero)
	Connections made for failsafe high. When fork tines are immersed in liquid, it means liquid level is above the switch point.	**LED Red On** ☼ Alarm	**LED Green On** ☼			**Float** (output will be zero)	**Float** (output remain zero)
	Connections made for failsafe low. When fork tines are not immersed in liquid, it means their is no material at switch point.			**LED Red On** ☼ Alarm	**LED Green On** ☼	**Float** (output will be zero)	**Float** (output remain zero)
	Connections made for failsafe low. When fork tines are immersed in liquid, it means liquid level is above the switch point.			**LED Red Off** ○ Normal	**LED Green On** ☼	**Active** (output gives +ve voltage as per given supply	**Float** (output will be zero)

Annexure-2

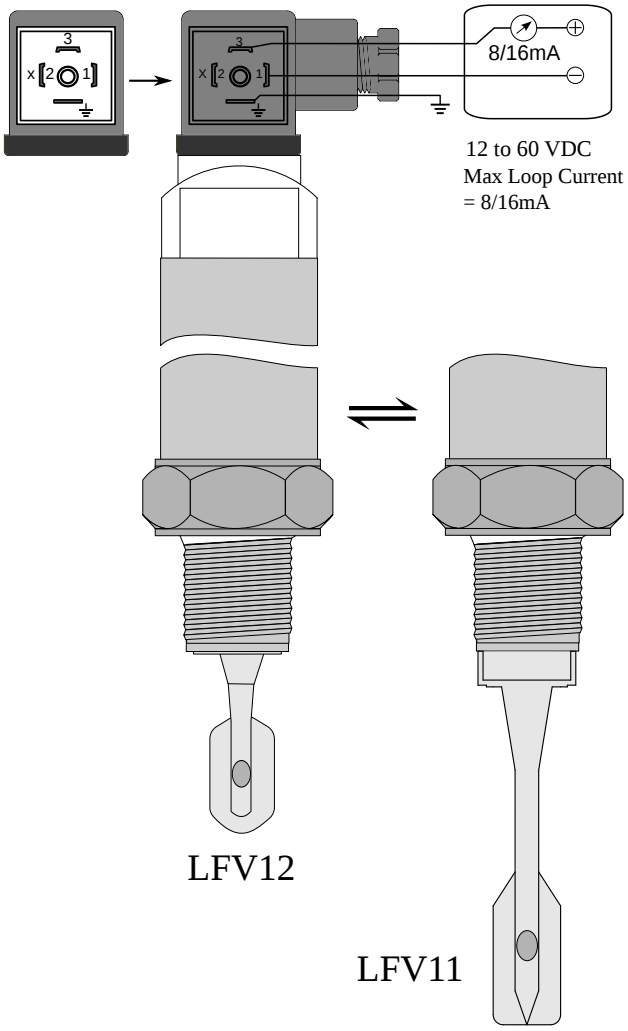
LFV12 DC Loop Powered 8/16mA 2 Wire (LFV12-XX-XXX-OL)
LFV11 DC Loop Powered 8/16mA 2 Wire (LFV11-XX-XXX-OL)

Electrical Connections

High Level Detection
Failsafe High
(High level alarm)



Low Level Detection
Failsafe Low
(Low level alarm)



Connection Terminals

For High Level Alarm Detection

1	- of DC Supply input minus
2	+ of DC Series Loop Supply plus Supply: 12 to 60VDC (Loop current will be 16mA when fork tines are free from liquid. Loop current will be 8mA when fork tines are immersed in liquid.)
3	Not in use for failsafe high
4	Supply earth terminal for safety

For Low Level Alarm Detection

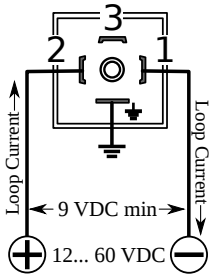
1	- of DC Supply input minus
2	Not in use for failsafe low
3	+ of DC Series Loop Supply plus Supply: 12 to 60VDC (Loop current will be 8mA when fork tines are free from liquid. Loop current will be 16mA when fork tines are immersed in liquid.)
4	Supply earth terminal for safety

Annexure-2

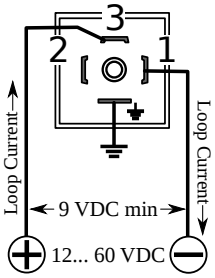
Operation Matrix - LFV12 - 8/16mA O/P (LFV12-XX-XXX-OL)
LFV11 - 8/16mA O/P (LFV11-XX-XXX-OL)

Failsafe defines that the alarm and power failure / device failure conditions are same to the external system. Failsafe operation is best understood with the type of installation.

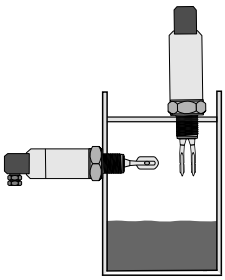
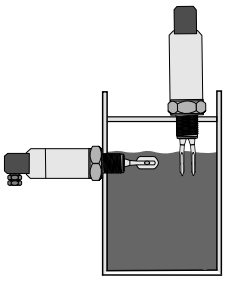
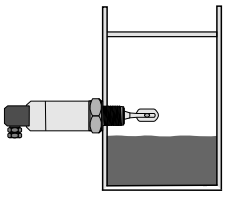
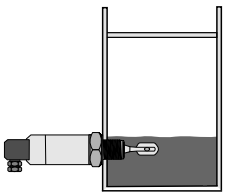
High Level Failsafe Mode



Low Level Failsafe Mode



Voltage across terminals must be atleast 9V DC

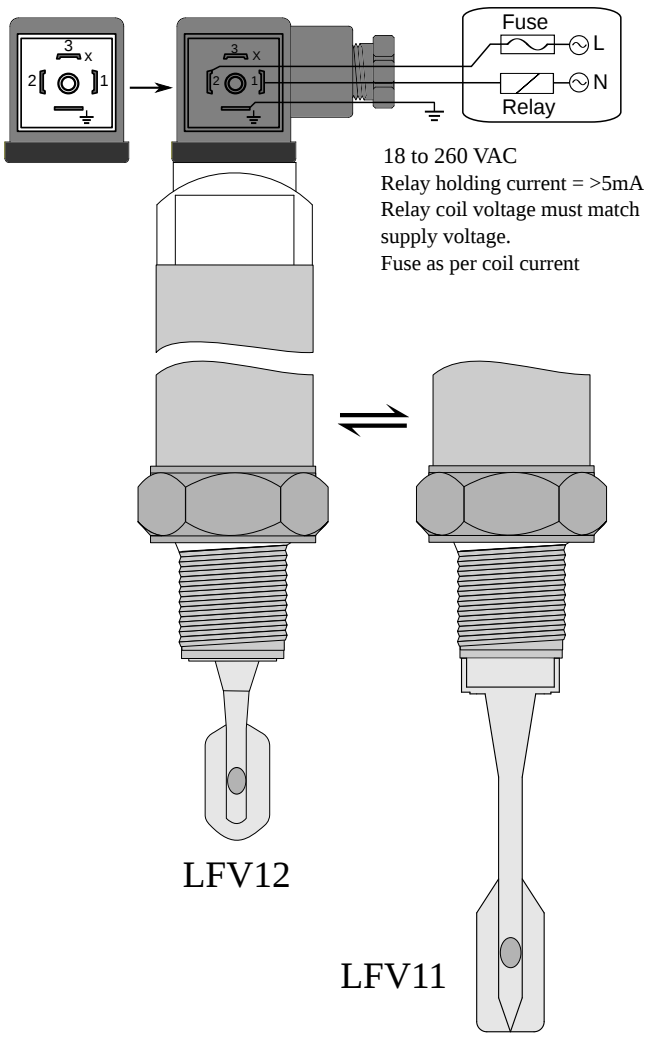
Material & Installation	Failsafe connection & material status	High Level Failsafe LED Status		Low Level Failsafe LED Status		Loop Current Status (8/16mA)	
		alarm LED	power LED	alarm LED	power LED	Power ON	Power Fail
	Connections made for failsafe high. When fork tines are not immersed in liquid, it means their is no material at switch point.	**LED Red Off** ○ Normal	**LED Green On** ☼			**< 16mA** (status normal)	**< 8mA** (status alarm)
	Connections made for failsafe high. When fork tines are immersed in liquid, it means liquid level is above the switch point.	**LED Red On** ☼ Alarm	**LED Green On** ☼			**< 8mA** (status alarm)	**< 8mA** (status alarm)
	Connections made for failsafe low. When fork tines are not immersed in liquid, it means their is no material at switch point.			**LED Red On** ☼ Alarm	**LED Green On** ☼	**< 8mA** (status alarm)	**< 8mA** (status alarm)
	Connections made for failsafe low. When fork tines are immersed in liquid, it means liquid level is above the switch point.			**LED Red Off** ○ Normal	**LED Green On** ☼	**< 16mA** (status normal)	**< 8mA** (status alarm)

Annexure-3

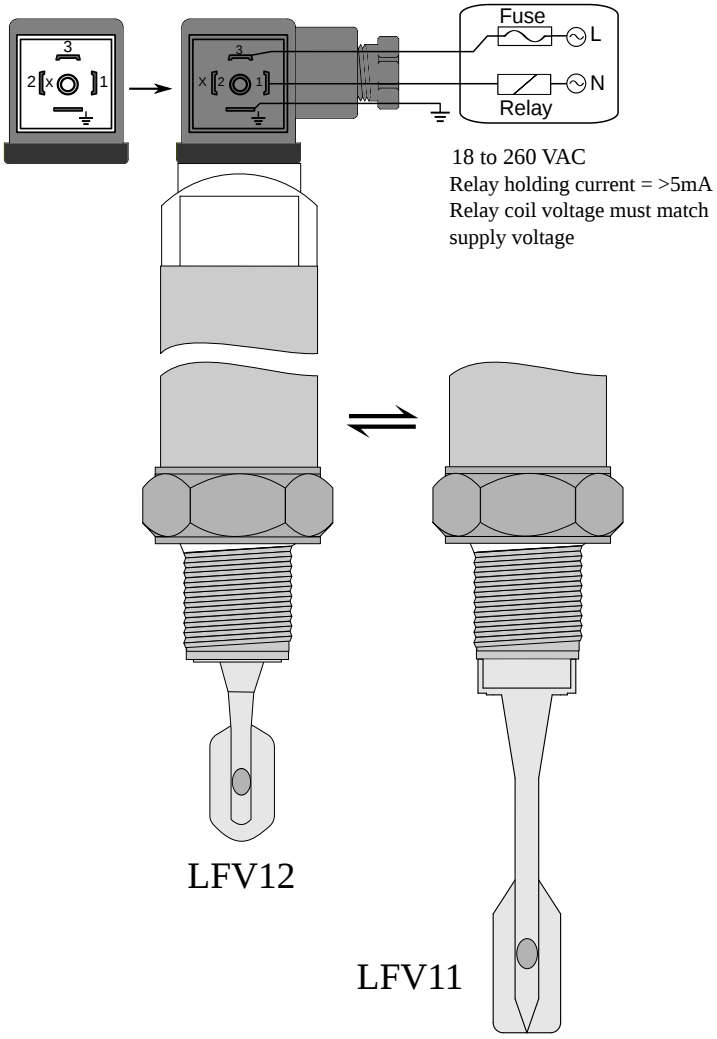
LFV12 AC Series Relay 2 Wire (LFV12-XX-XXX-OR)
LFV11 AC Seires Relay 2 Wire (LFV11-XX-XXX-OR)

Electrical Connections

High Level Detection
Failsafe High
(High level alarm)



Low Level Detection
Failsafe Low
(Low level alarm)



Connection Terminals

For High Level Alarm Detection

1 Neutral of AC Supply via Series Relay
2 Line of AC Supply via Fuse as per relay coil current
Supply: 18 to 260V AC
Via Series Relay which holding current must be >5mA.
Relay coil voltage must match supply voltage
3 Not in use for failsafe high
4 Supply earth terminal for safety

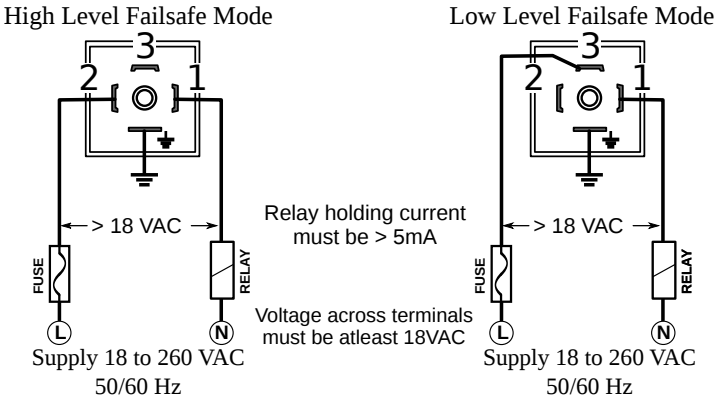
For Low Level Alarm Detection

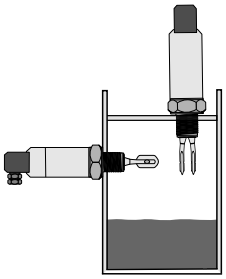
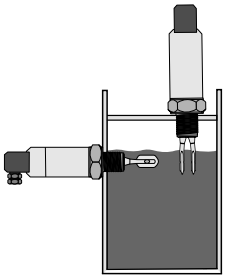
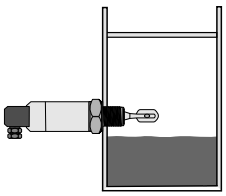
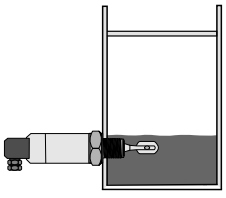
1 Neutral of AC Supply via Series Relay
2 Not in use for failsafe low
3 Line of AC Supply via fuse as per relay coil current
Supply: 18 to 260V AC
Via Series Relay which holding current must be >5mA.
Relay coil voltage must match supply voltage
4 Supply earth terminal for safety

Annexure-3

Operation Matrix - LFV12 AC Series Relay 2 Wire (LFV12-XX-XXX-OR)
LFV11 AC Series Relay 2 Wire (LFV11-XX-XXX-OR)

Failsafe defines that the alarm and power failure / device failure conditions are same to the external system. Failsafe operation is best understood with the type of installation.

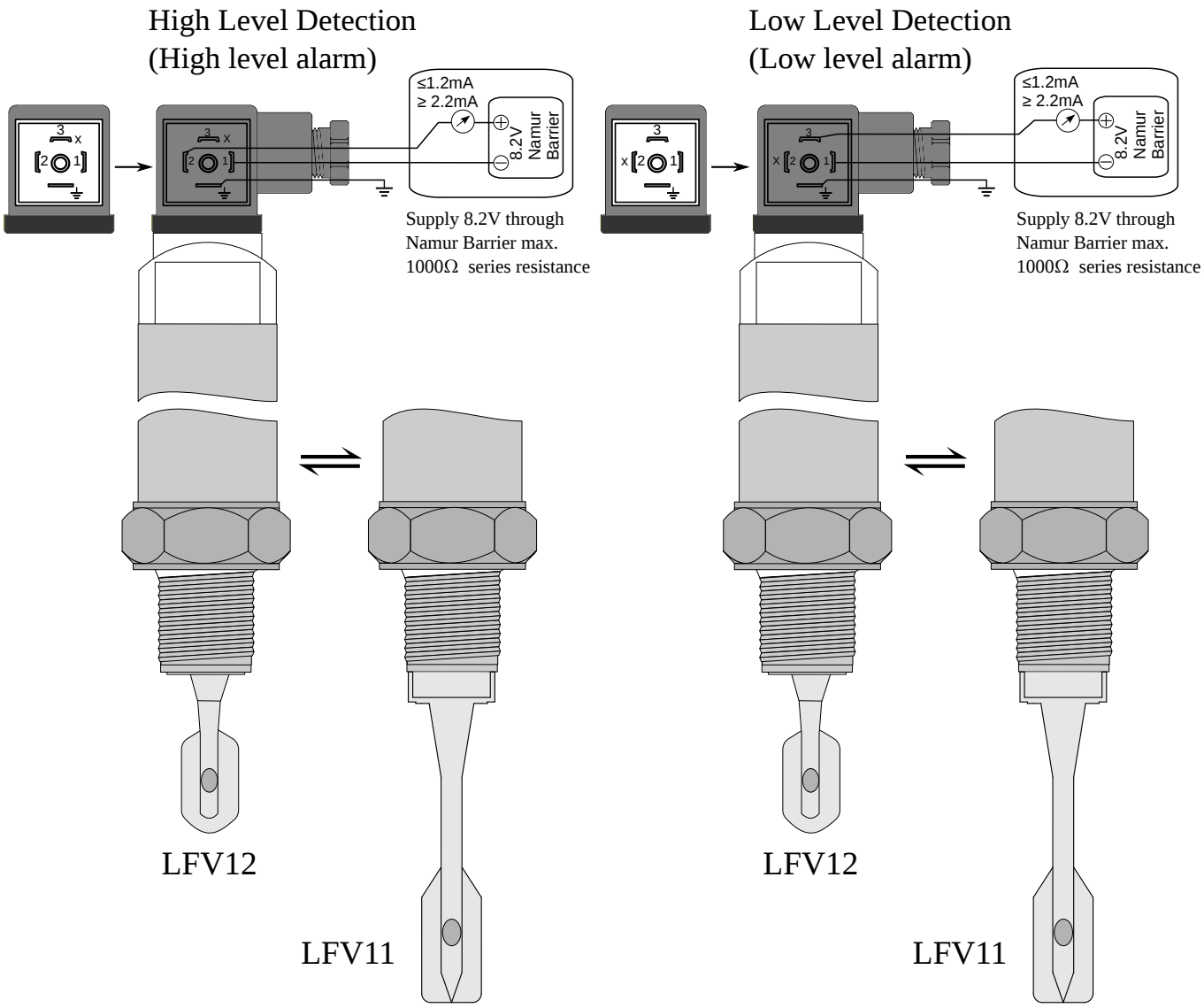


Material & Installation	Failsafe connection & material status	High Level Failsafe LED Status		Low Level Failsafe LED Status		Series Relay Status	
		alarm LED	Normal LED	alarm LED	power LED	Power ON	Power Fail
	Connections made for failsafe high. When fork tines are not immersed in liquid, it means their is no material at switch point.	**LED Red Off** ○ Normal Status	**LED Green On** ☼ Normal Status			**Relay** ON Normal Status	**Relay** OFF Alarm Status (due to power failure)
	Connections made for failsafe high. When fork tines are immersed in liquid, it means liquid level is above the switch point.	**LED Red On** ☼ Alarm Status	**LED Green Off** ○ Alarm Status			**Relay** OFF Alarm Status	**Relay** OFF Alarm Status
	Connections made for failsafe low. When fork tines are not immersed in liquid, it means their is no material at switch point.			**LED Red On** ☼ Alarm Status	**LED Green Off** ○ Alarm Status	**Relay** OFF Alarm Status	**Relay** OFF Alarm Status
	Connections made for failsafe low. When fork tines are immersed in liquid, it means liquid level is above the switch point.			**LED Red Off** ○ Normal Status	**LED Green On** ☼ Normal Status	**Relay** ON Normal Status	**Relay** OFF Alarm Status (due to power failure)

Annexure-4

LFV12 NAMUR (LFV12-XX-XXX-ON)
LFV11 NAMUR (LFV11-XX-XXX-ON)

Electrical Connections



Connection Terminals

For High Level Alarm Detection

1 - of DC Supply input minus
2 + of DC Supply input plus
Supply: 8.2VDC
Through certified Namur Barrier only
Max. Load: 2.8mA
3 Not in use for high level alarm
4 Supply earth terminal for safety

For Low Level Alarm Detection

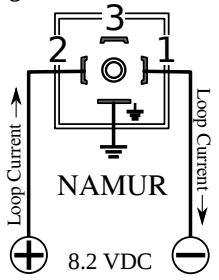
1 - of DC Supply input minus
2 Not in use for low level alarm
3 + of DC Supply input plus
Supply: 8.2VDC
Through certified Namur Barrier only
Max. Load: 2.8mA
4 Supply earth terminal for safety

Annexure-4

Operation Matrix - LFV12 NAMUR (LFV12-XX-XXX-ON)
LFV11 NAMUR (LFV11-XX-XXX-ON)

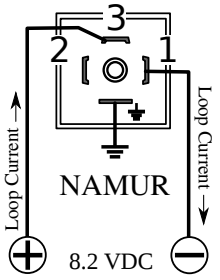
This device is meant to be operated through a NAMUR barrier or amplifier. Device can endure 16 VDC but it is meant to be operated solely at 8.2V NAMUR Supply. Connections can be made for High level alarm as well as Low level alarm.

High Level Failsafe Mode

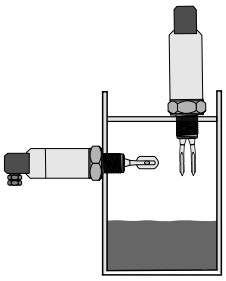
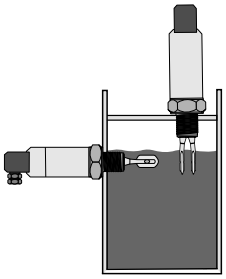
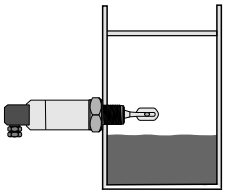
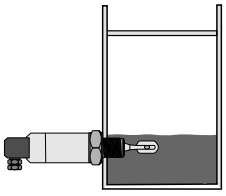


through NAMUR barrier
max 1000 Ohm series resistance

Low Level Failsafe Mode



through NAMUR barrier
max 1000 Ohm series resistance

Material & Installation	Failsafe connection & material status	High Level Alarm LED Status	Low Level Alarm LED Status	Loop Current (mA)
	Connections made for failsafe high. When fork tines are not immersed in liquid, it means their is no material at switch point.	**Alarm LED Red** ○ **Off**		**< 1.2 mA** (min. 1.1mA)
	Connections made for failsafe high. When fork tines are immersed in liquid, it means liquid level is above the switch point.	**Alarm LED Red** ☼ **On**		**> 2.2 mA** (max. 2.8mA)
	Connections made for failsafe low. When fork tines are not immersed in liquid, it means their is no material at switch point.		**Alarm LED Red** ☼ **On**	**> 2.2 mA** (max. 2.8mA)
	Connections made for failsafe low. When fork tines are immersed in liquid, it means liquid level is above the switch point.		**Alarm LED Red** ○ **Off**	**< 1.2 mA** (min. 1.1mA)