



# KLAY-INSTRUMENTS

## INSTRUCTION MANUAL

### Vibra Switch S

LEVEL SWITCH



*Read the recommendations and warnings in this manual before the instrument is installed. For personal safety, optimal use and maintenance of the VSS, these instructions should be studied carefully.*

**Manufactured by:**

**KLAY-INSTRUMENTS**

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## CONTENTS

	<b>SECTION</b>	<b>PAGE</b>
1	Introduction	3/10
2	Technical data	3/10
2.1	General	3/10
2.2	Dimensional drawing	4/10
2.3	3 Wire DC output, Relays PLC-S	5/10
2.4	Accessories	5/10
2.5	Ordering code	6/10
2.6	Pressure- and temperature diagrams	6/10
2.7	Response time to free state	6/10
3	Installation	7/10
3.1	Switching point and Switch differential	7/10
4	Electrical connections	8/10
4.1	Connection Terminal output 3 (PNP)	8/10
4.2	Description: Terminal output, Dipswitch and Status LED	8/10
5	Adjustment	9/10
6	Maintenance	9/10
7	Precautions and Warnings	10/10

## 1. Introduction

The Vibra-Switch S is a robust microprocessor controlled level switch based on the *Tuning fork* principle. The piezoelectric crystal is brought into vibration, and records the difference in resonance frequency, the output status changes when there is a significant difference in the resonance frequency. When the tuning fork is covered by product, the frequency changes. This change is detected by the electronics and converted into a switching command.

**i** The Vibra Switch S is compact and robust and is suitable for all liquids. The unique frequency of the vibrating fork level switch creates an insensitivity for vibrations in the process.

The density on which the level switch has to operate is selectable by a switch. If the level switch is used on high viscosity fluids, the mounting position is very important. The position of the tuning forks have to be in such way the fluid can easily drop of the tuning fork.

A marking above the process connection shows the position of the tuning fork. The stainless steel electronics housing can be turned independently from the tuning forks.

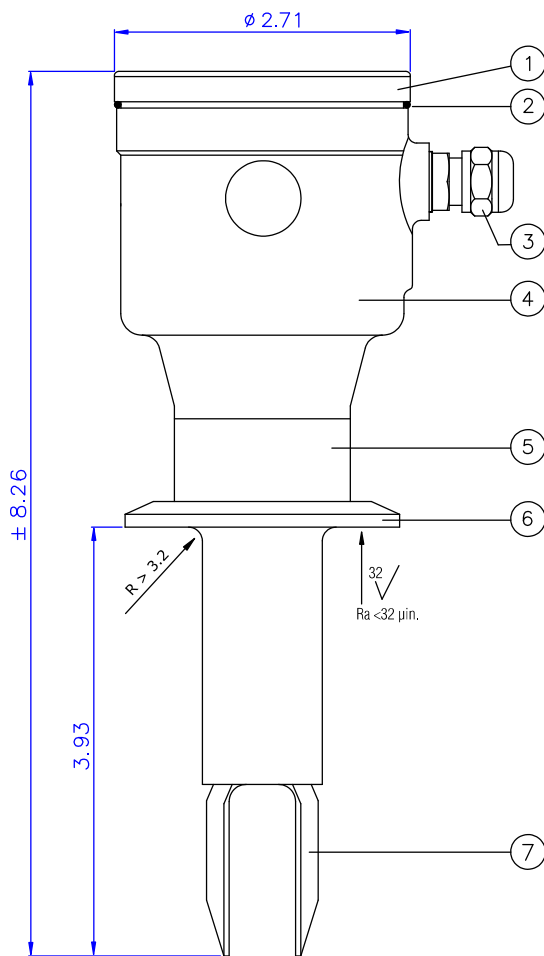
## 2 TECHNICAL DATA

### 2.1 GENERAL

Vibra-Switch S	
Maximum pressure	580 psi
Probe length	19.7 till 118 inch
Material wetted parts	AISI 316
Liquid temperature range	See table in 2.6 and diagram
Ambient temperature	See table in 2.6 and diagram
Process temperature	-40 till +194°F
Ambient temperature	-40 till +158°F
Liquid density	$\geq 0.7 \text{ kg/dm}^3$ $\geq 1.0 \text{ kg/dm}^3$
Liquid viscosity	$\leq 10.000 \text{ mm}^2/\text{s}$ (c St)
Response time	2 seconds
Output mode indication	Status LED

## 2.2 DIMENSIONAL DRAWING

### DIMENSIONAL DRAWING - VSS-04-L(2)-100-G153



#### PART DESCRIPTION

#### MATERIAL

PART DESCRIPTION	MATERIAL
1. Cover	AISI 304
2. O-Ring (55,25 x 2,62)	EPDM
3. PG9 Cable Gland	
4. Electronics housing	AISI 304
5. Extension	AISI 316
6. Process connection, Tri Clamp 2"	AISI 316 L
7. Tuning fork (acc. to drawing no. : 5110)	AISI 316 L

3A-TRI-CLAMP

The packing material we supply with our transmitters are made by a special compound (No: 55650), EPDM 70 PC.

The transmitters will be delivered with a material certificate for all the wetted parts (Tuning fork, process connections and electronic housing). These material certificates are fully traceable and stored for at least 12 years.

Edges and the welds must be polished after welding to make sure that the roughness is  $< 32 \mu\text{in.}$

### 2.3 3-WIRE DC OUTPUT, TO DRIVE RELAYS OR PLC-S

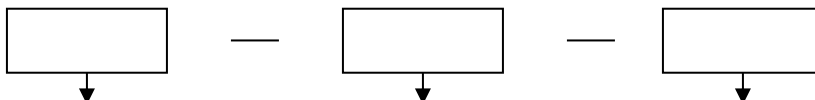
Version		3 wire DC Output	
Cable gland		PG 9	(Optional M12 connector)
Protection Grade		IP66	(Optional IP68)
High/low mode setting		Switch selectable	
Density		Switch selectable	
Output		PNP	
Output protection		Reverse polarity, overvoltage and short circuit protection	
Supply voltage		12 - 40 Vdc	
Consumption		< 0,6 W	
Voltage drop in switched-on state		< 4,5 Vdc	
Current load	max. continuous	$I_{max} = 350 \text{ mA DC} / U_{max} = 40 \text{ Vdc}$	
Residual current (switched-off state)		< 100 $\mu\text{A}$	

### 2.4 ACCESSORIES

Various hygienic process connections are available (Milk coupling, Tri-Clamp and more). The standard process connection is 1" BSP thread. Various weld-on adaptor, including the standard 1" BSP weld- on adaptor are available on request. The 1" BSP hygienic weld-on adaptor is available in two versions: Diameter  $\varnothing$  65 mm (Article no. 10197) and  $\varnothing$  48 mm (Article no. 10189)

### 2.5 ORDERINGCODE

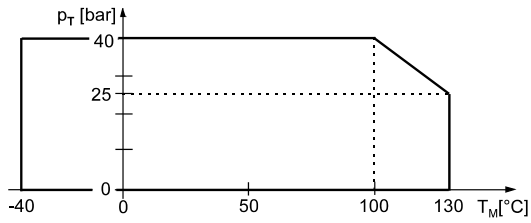
**VIBRA SWITCH S**



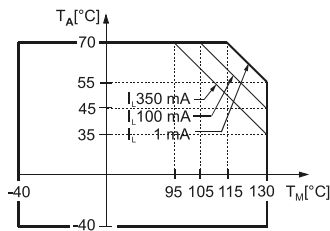
VSS	PROCESCONNECTION	CODE	LENGTH	CODE	OUTPUT	CODE
	1" BSP (Standard)	S	Short (47 mm)	47	3-wire (PNP)	3
	Milk coupling DN 40 (DIN11851)	M(40)	Standard (100 mm)	100		
	Milk coupling DN 50 (DIN11851)	M(50)	0,2 till 3 meter	200..3000		
	Tri clamp (2")	L(2")				
	Flange (Specify size)**	F				
	Other connections	X (...)				

M40, M50, L(2") and flanged versions are standard screwed into the 1" BSP process connection. Welded versions can be delivered on request.

## 2.6 PRESSURE AND TEMPERATURE DIAGRAMS

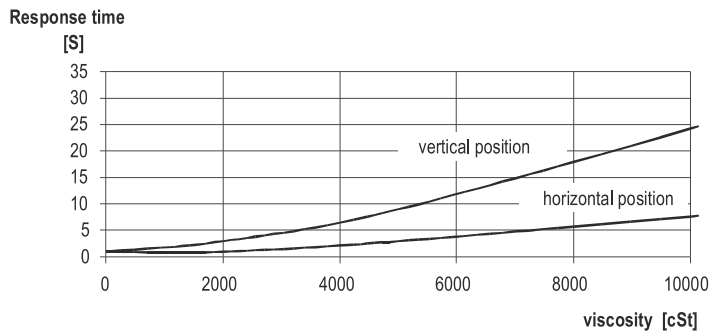


For all models



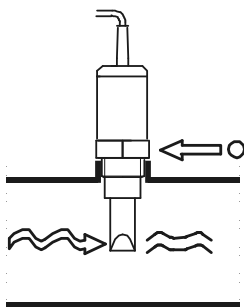
For 3-wire DC models (IL) resistance current

## 2.7 RESPONSE TIME DIAGRAM WHEN GETTING FREE

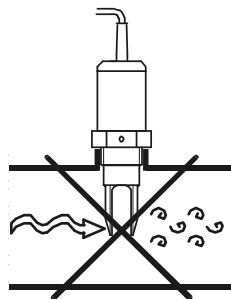


## 3. INSTALLATION

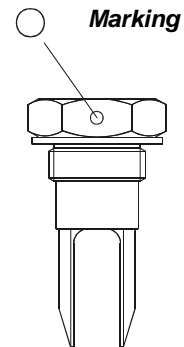
For positioning the tuning forks, use the marking on the hexagonal neck. Use a Teflon (PTFE) tape to aid the positioning of the fork-tine. If the fork-tine position is irrelevant, use the sealing ring provided. To mount in the mandrel use the provided O-ring and possibly the sealing ring.

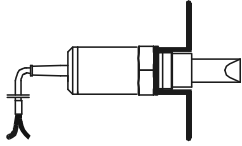


Correcte installation

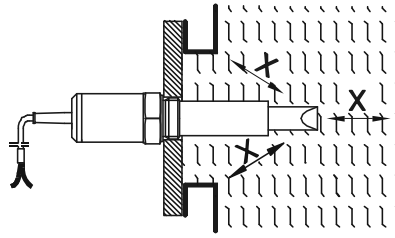


Wrong installation





**Threaded version**

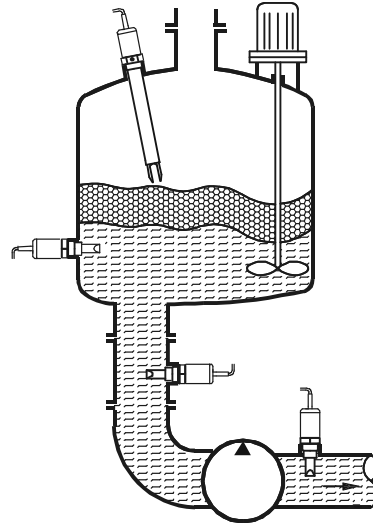


**Critical distances ( $X_{\min} > 5 \text{ mm}$ )**

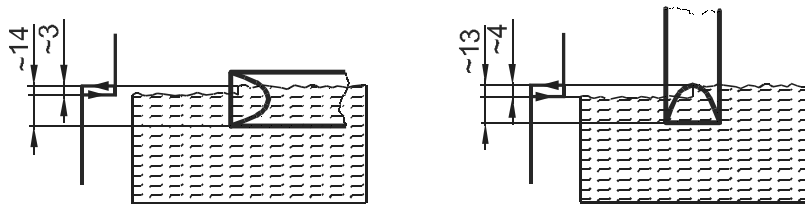
### Installing options

For applications with a medium with a relative normal density, all mounting positions are shown to the right as possible.

For applications with a high density, it is recommended to mount the tuning forks only vertically (top mount).



### 3.1 SWITCHING POINT AND SWITCH DIFFERENTIAL (HYSTERESIS)



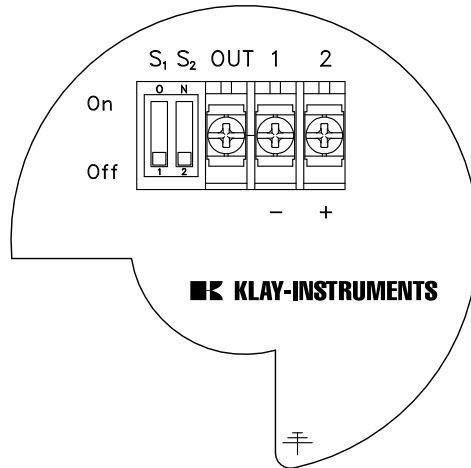
#### For water at 25°C

Both the switching point and the switching differential are light depending on the density of the fluid and the mounting position. Be aware of the mounting position of the tuning forks with respect to the direction of flow of the liquid.

## 4 ELECTRICAL CONNECTIONS

### 4.1 CONNECTION TERMINAL OUTPUT 3 (PNP)

Power Supply: 12 - 40 Vdc

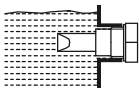
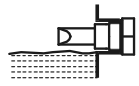


#### 4.2 DESCRIPTION CONNECTION TERMINAL, DIPSWITCH AND STATUS LED

Terminal 2	+
Terminal 1	-
Terminal out	PNP
S1 (on)	Output N.C.
S1 (off)	Output N.O.
S2 (on)	High density
S2 (off)	Low density
Led green	Output N.O.
Led red	Output N.C.

#### 5. ADJUSTMENT

Check the connection of the wires and the position of vibrating probes. After connection and power up the level switch is operational. Operating diagram of the Vibra Switch S:

Power supply	Probe	Function	Status LED	S1	Output
ON	 Immersed	High level	Red	Off	24 Vdc
		Low level	Green	On	0 Vdc
	 Free	High level	Green	Off	0 Vdc
		Low level	Red	On	24 Vdc

#### 6 MAINTENANCE

The Vibra-Switch S is maintenance free. If the tuning forks needs to be cleaned of residual medium, this should be done very carefully without exerting mechanical force on the tuning fork.



## PRECAUTIONS and WARNINGS

- Check if the specifications of the VSS meets the process conditions.
- In order to obtain an as accurate as possible to operate VSS, the location of the tuning fork is very important. DO NOT use the tuning fork in- or near filling or discharging pipes, but place it in the tank wall, because currents caused by a pump, may affect the accuracy.
  - Also make sure that automatic cleaning (spray ball cleaning) or hand cleaning of tanks, the water cannot damage the tuning fork or bend.
  - The tuning fork will not work correctly if there are air bubbles present in the system.

**Damaging the tuning fork is not covered under warranty.**

- When the tuning fork is placed in pipelines , then it is necessary to take following into account:
- Rapid closing valves in combination with high flow velocity will cause water hammer(spikes) and can damage the tuning fork. Do not mount a tuning fork near such valves, always place a few pipe bends away up or down stream (avoid suction).
- Remove the tuning fork out of the package only just before installation to prevent damage to the instrument. Do not hold or carry the instrument on the side of the tuning fork.
- Prevent any bending and damaging to the tuning fork.
- As soon as the wiring is brought inside through the PG cable gland and connected to the terminal board, make sure the cable gland is tightly fixed, so that moisture cannot enter into the electronic housing.
- Do not remove or adjust the venting.  
If the ambient conditions are very wet, we advise to use a venting through the cable. A special vented cable can be delivered on request. (The normal venting will be removed)
- Prevent direct exposure to waterjets (cleaning)
- The cover must be fully engaged, so that moisture cannot ingress into the electronic housing. The cover must only be capable of being released or removed with the aid of a tool.
- The warranty is 1 year from delivery date. Klay Instruments B.V. does not accept liability for consequential damage of any kind due to use or misuse of the VSS. Warranty will be given, to be decided by the manufacturer. Equipment must be shipped prepaid to the factory on manufacturers authorization.
- Klay Instruments B.V. reserves the right to change its specifications at any time, without notice. Klay Instruments B.V. is not an expert in the customers process (Technical field) and therefore does not warrant the suitability of its product for the application selected by the customer.

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