

SC38 Multi-Functional Tuning Fork Level Switch (8/16mA Type) Operation Manual

WORKING PRINCIPLE

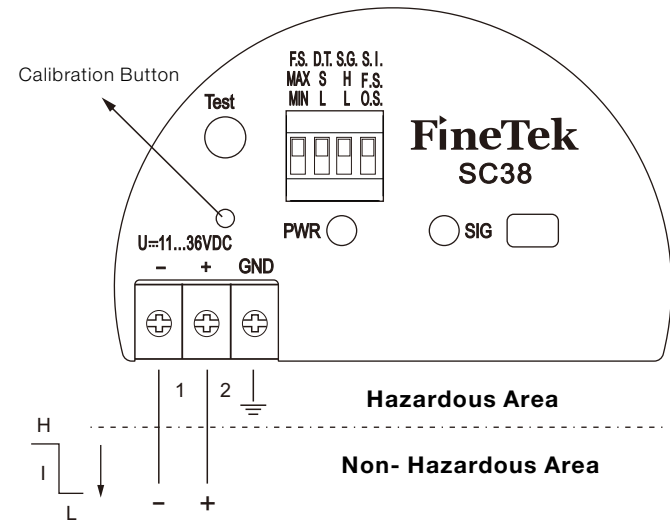
The working principle is based on the changes in vibration frequency of the tuning fork driven by the piezoelectric crystals and relayed feedback by the signal. When it comes into the material, the tuning fork frequency will change due to the damping effect of having the tuning fork covered. Then, after the frequency judgment pocessed by the CPU, it will output 8/16mA as the on/off signal.

SPECIFICATION

Power supply	11~36 Vdc
Power consumption	<600 mW
Input protection	Reverse protection function
OVP	Overvoltage category III
Max. measurement error	Max. ±1 mm
Repeatability	0.5mm
Hysteresis band	Approx. 2 mm
Storage temp.	-40~85°C
Environment temp.	-40~85°C
Operating temp.	-40~150°C
Material viscosity	Max. 10000 mm ² /s (10000 cst)
Particle size in liquid	Max. ϕ5 mm
General cable	ϕ6~10 mm
Operating pressure	Max. 40 Bar
Protection grade	IP 66/67
Intrinsically safe parameters	Ui(V)=36V , li=100mA , Pi=1W Ci(nF)=0 , Li(uH)=0

PANEL AND ELECTRICAL

With PLC programmable control apparatus meeting the output signal from high current jump to low current

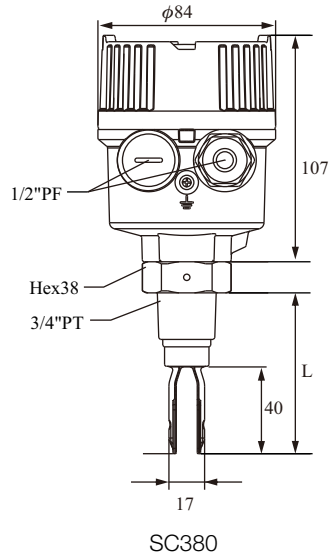


FEATURES

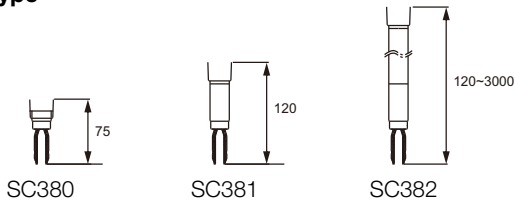
- 8/16mA output can be applied to safety explosion-proof area.
- All-in-one design, 3/4" thread is suitable to the installation of a small tube.
- A maximum length of 3m for the ultra-extension type .
- Sensitivity adjustment is available for different density of media.
($\rho > 0.5 \text{ g/cm}^3$ or $\rho > 0.7 \text{ g/cm}^3$)
- High/low failure safe mode, safe and reliable.
- Self-diagnosis can detect the fork abrasion.
- Switch delay function
- Equipment tested can be processed by the button test after finishing installing.
- Calibration of the operation points for different density of media by the customer if required
- Products designed to meet explosion-proof certification standards.

DIMENSIONS

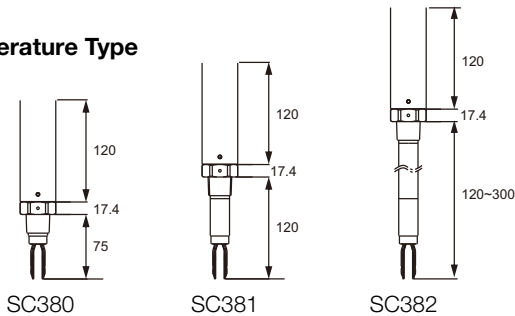
(Unit:mm)



Common Type



High-Temperature Type



DESCREPTION OF FEATURES

Abbr.	Function	Options clear	Notes
Test	Test Bottom	It can reverse output signal	Supply methods to test the equipment after finishing installing
F.S.	Fail Safe	MAX: high MIN: low	Supply high and low level stop power-off protection
D.T.	Delay Time	S: general settings L: 5 s delay	Covered by material: Approx. 0.5s Not covered by material: Approx. 1.s Switch to L to set it as 5 seconds for being covered or not covered by the material.
S.G.	Specific Gravity	H: 0.7 g/cm ³ L: 0.5 g/cm ³	Specific gravity setting switch
S.I.	Signal Indicator	F.S.:Fail-Safe mode O.S.: Output mode	Turn ON/OFF the red indicator based on the output status or the fail-safe status.

OUTPUT MODE

SC38 is the loop power with 2 wires and can output 8/16mA electric current, it provides Max./Min. operation modes, and has the corresponding indicators and output status according to the functional settings and whether it is covered by the material. The working status is detailed in the figure below:

Failure Mode	Material Level	Output Signal	LED Indicator
MAX		+ ~16mA 2 → 1	O.S. F.S.
		+ ~8mA 2 → 1	O.S. F.S.
MIN		+ ~16mA 2 → 1	O.S. F.S.
		+ ~8mA 2 → 1	O.S. F.S.
Instrument failure		+ <3.6mA 2 → 1	

~16mA= 16mA ±5%

~8mA= 8mA ±5%

Connectable load

• R=(U-11V): 16.8mA

• U=connection voltage: DC 11 to 36V

Example: PLC with 250Ω with 2-wire version

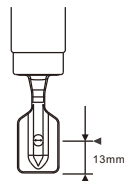
250Ω=(U-11V)/16.8mA 4.2[Ω / A]=U-11V

U=15.2V

FORK TRIGGER POINT

SC38 tuning fork series of vibrators sensor position depends on the installation location as shown in the following graph:
(With water as the reference for detection, its specific gravity = 1 g/cm³, temperature is 23°C , and the working pressure is 0bar). If the specific gravity of object to be detected is lower than 1g/cm³, the detecting point will move upward; conversely, if it is higher than 1g/cm³, the detecting point will move downward. Namely, the moving range is depended on the S.G.

※Operating point position: ◀



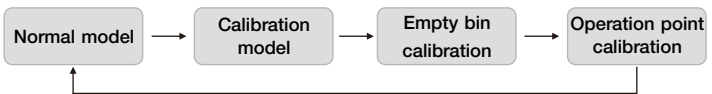
Top Installation

BUTTON TEST INSTRUCTION

It can mainly be used to testify the function of the output after installing. After pressing, it will output the electric current (8mA<->16mA) and light reverse (ON<->OFF), and it will recover after releasing the button.

FUNCTION OF SELF-SET OPERATING POINT POSITION

SC38 has the function of setting by itself the operating point, and it can be changed in accordance with the requests of the users.



Setting Methods

1. Keep pressing the “Calibration Button” for 3 seconds. When the red and green LED indicators flash in turn every 0.5 second, it enters the calibration mode. Press the calibration button again to enter the Empty Bin Calibration mode.

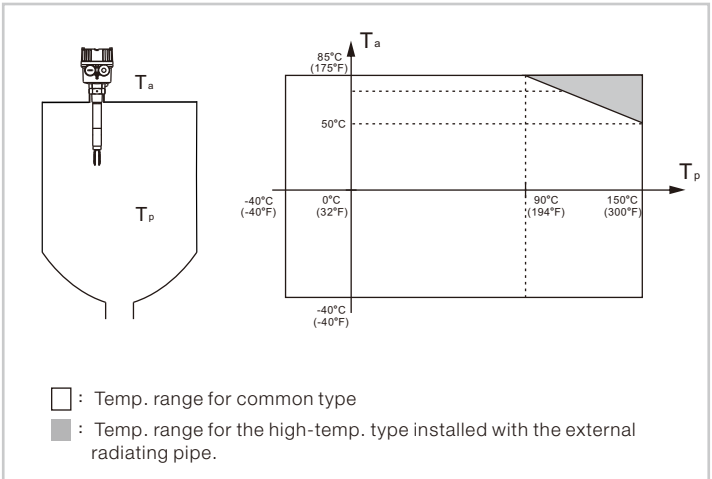
[Empty Bin Calibration]

2. Calibration state: the red LED light flashes every 0.5s, and the output electricity current changes every 0.5s (8<->16mA)
3. This mode is to calibrate the vibration frequency of the tuning fork in the air. Thus, it shall press “Calibration Button” when the tuning fork doesn’t sense any material. In this case, it will write the vibration frequency in the air, and enter the operation point calibration mode.

[Operation point calibration]

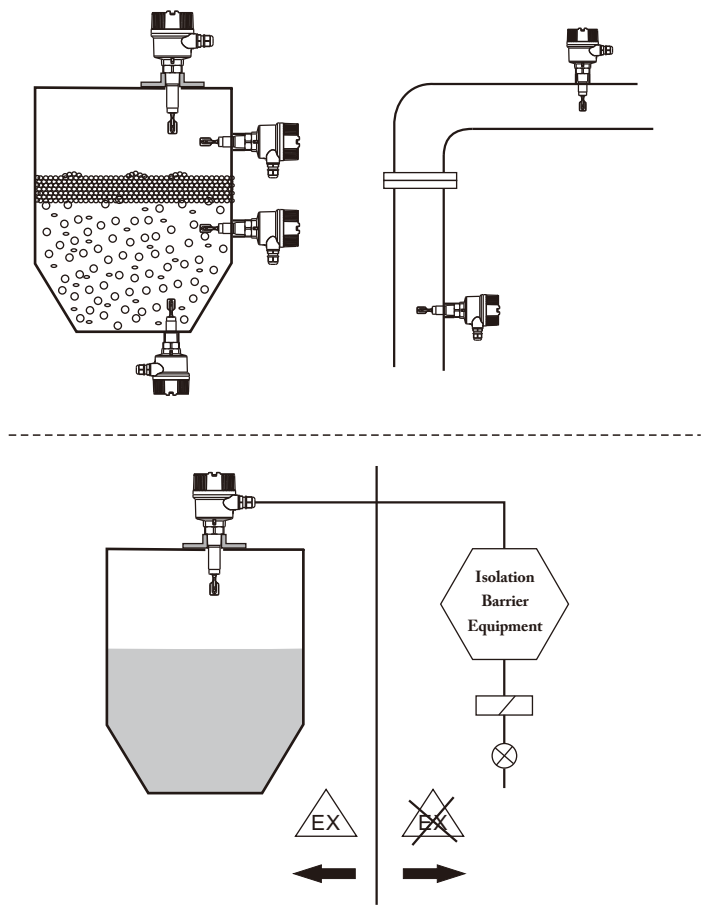
1. Calibration state: red LED light flashes every 0.25s and the output electrical current switches every 0.25s. (8<->16mA) ° .
2. Under this model, cover the material in the expected position, and press the “Calibration button” to adjust the relevant position based on the H/L of S.G.

ENVIRONMENT/MEDIUM TEPERATURE LIMITATION



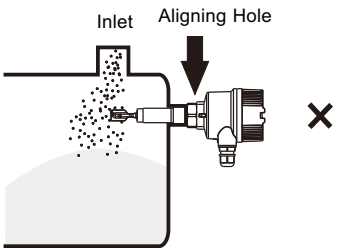
INSTALLATION FOR TUNING FORK

The product can detect the high/low level of the medium in the tank or the tube, which is applicable to various liquids, in explosive hazardous areas such as in the food and pharmaceuticals industry.

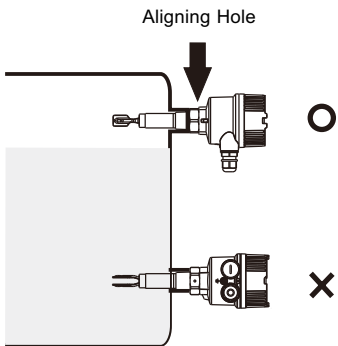


Horizontal installation

1. Do not install near or around the material inlet



2. When installing, adjust the cable gland to face downward. If the aligning hole is not installed upward, the floating material in the bin may squeeze the tuning fork, which will possibly cause product failure.



CAUTIONS

1. Relations between the Temp class. and permitted medium temp.

Temp. Class	T6	T5	T4	T3
Medium temp.	≤85°	≤100°	≤135°	≤150°

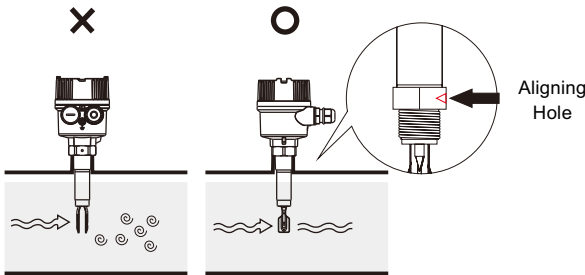
2. Intrinsically safe parameters

Max. Input voltage Ui(V)	Max. output A Li(mA)	Max. Power output Pi(W)	Max. parameters	
36	100	1	Ci(nF)	Li(μH)
			0	0

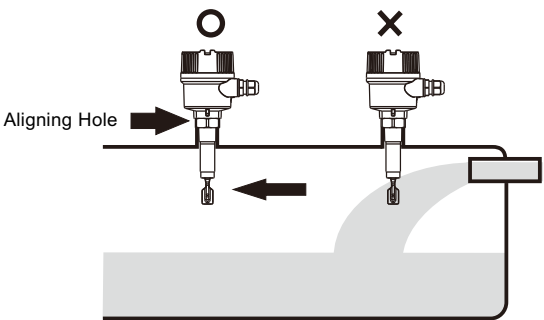
- The following regulations should be accepted by the users when installing, adjusting or maintaining.
 - Qualified and experienced.
 - Explosion- proof training experience.
 - Familiar with national regulations
- Be familiar with the instructions of the manufacturers and the standards to install the equipment.
- When operating the equipment, pay attention to the parameters of the power and electrical equipment.
Please correctly install the cover and cable gland to maintain IP66/67
- ingress protection.
- Use the plug to block off the unused cable entrance.
Please follow the operating instructions and pay attention to the extreme operating conditions.
- External ground connection should be reliable.
The connecting standard between the equipment and switch should be as follows:
 $U_o \leq U_i$, $I_o \leq I_i$, $P_o \leq P_i$, $C_o \leq C_i + C_c$, $L_o \leq L_i + L_c$
(Cc: cable capacitance, Lc: cable inductance)

Vertical installation

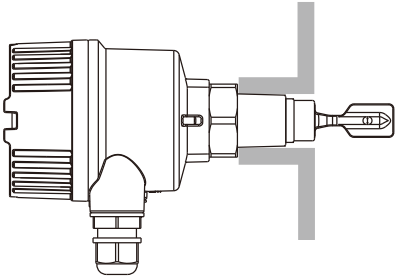
1. It is installed in the tube filled with liquid, and it shall keep consistent with the liquid's flowing direction in the middle between two triggers.



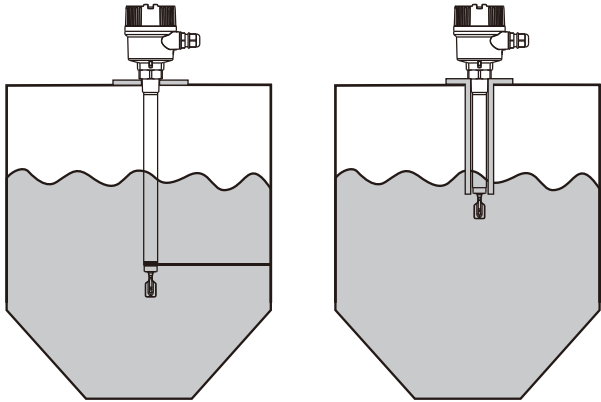
2. Do not install near or around the material inlet



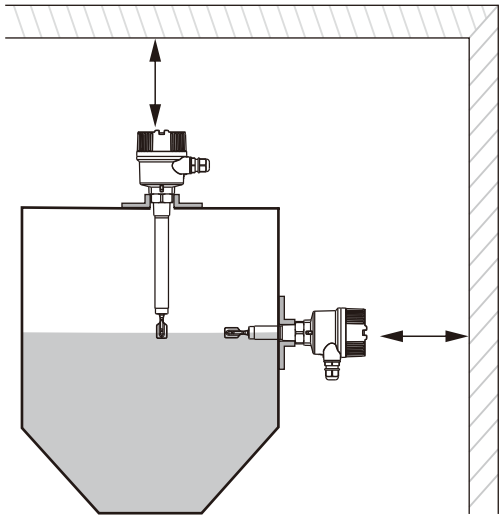
3. When installing the standard tuning fork, please make sure it is in flush with the sidewall.



4. The protective tube shall be installed when the liquid fluctuates frequently.



5. Enough space should be kept during installation for connection and verification.



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