

# SC174X Series Tuning Fork Level Switch Operation Manual



NEPSI PROOF NO.GYJ111212 Ex d IIC T3~T6  
PTB PROOF NO.09 ATEX 1058 Ex II 2G Ex d IIB T4 Gb  
Ex II 2D Ex tb IIIC T80°C ~T130°C  
Db IP65

## Introduction

The tuning fork level switch is a mechanical resonant device which excited by piezoelectric (PZT) elements. When the measured medium comes into contact with the tuning fork, it will change the feedback resonant frequency due to the damping resonances between the exciting PZT and receiving PZT. By detecting the frequency and appropriately tuning the sensitivity of tuning fork level switch on measured material, such device can easily operate for monitoring the alarm level of measured material.

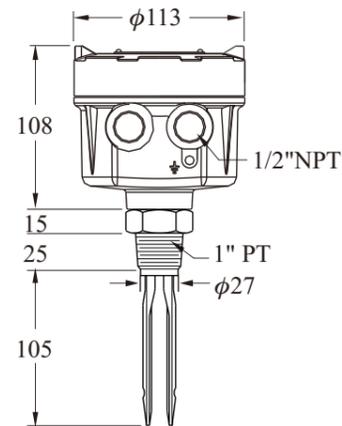
## Feature

1. Providing a universal power supply for operating in voltage range of 20 to 250 (Vac / Vdc).
2. No calibration or complex setting procedure are needed, robust, free of maintenance and operated in diversity abominable environments.
3. High / Low fail safe modes provide user the safety monitoring and real time communication.
4. Equipped with Remote Self-Testing function (RST) to diagnostic the hardware connection with peripherals

## Specification

Item	Specification
Power Supply	20~250, 50/60 Hz Vac/Vdc
Power Consumption	Power consumption ≤ 10 VA
Diagnostic Frequency	350~370 Hz
Fork Length	100 mm Max extension length: 4 m
Operating Humidity	20%~80% RH non-condensed
Operating Pressure	-1~600PSI (40BAR)
Act Time Lag	3 second
Medium Density	Solid:density: ≥ 0.07g/cm <sup>3</sup> Liquid:density: ≥ 0.7g/cm <sup>3</sup> Viscosity: 1~10000 cSt
Time Delay	0.6 s since the measured material contacted 1-3 s react to the measured material fall off
Output	Relay, SPDT, 3A/250Vac Max. PNP/NPN 400mA/60 Vac/ Vdc
Input	Remote-test
Status	Green light: indicate power supply Red light: indicate operating mode
Fail-safe	High / Low
Electrical safety	Over Voltage category III
Housing Material	Aluminum (ADC-12)
Probe Material	316L/316/304
Enclosure Rating	Ex d IIC T3~T6
Connection	1"PT(standard)or PF thread Flange 1"~6" JIS/DIN/ANSI standard or special specification
Mounting	1/2"NPTX2

## Dimensions



## Terminals Arrangement :

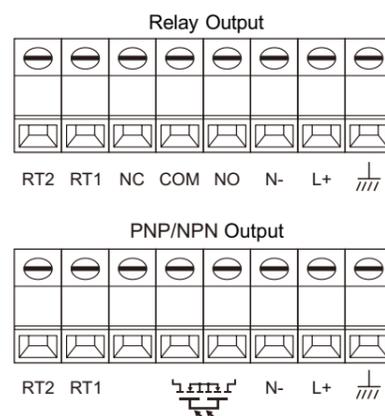
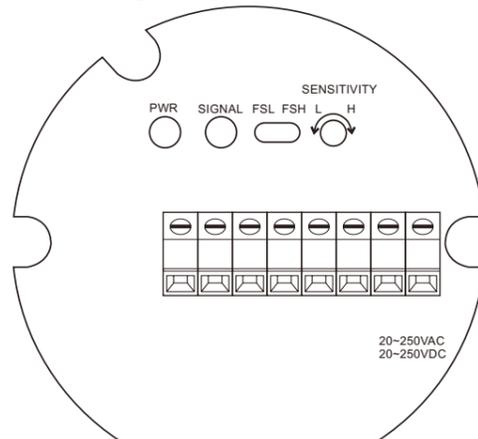


Fig-1. SPDT contact output model

## Terminal Description

- L+, -: Power Supply
- NC, COM, NO: Relay Output
- RT1, RT2: Remote Test
- : Ground Connection
- : PNP/NPN Output

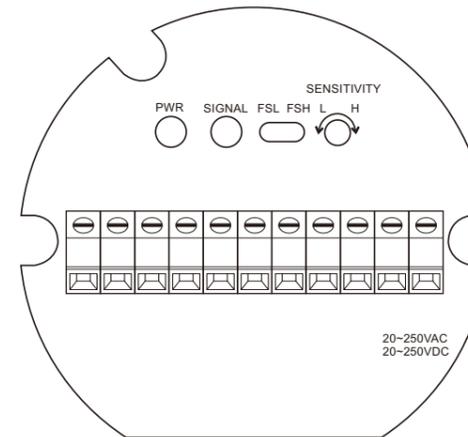


Fig-2. DPDT contact output model

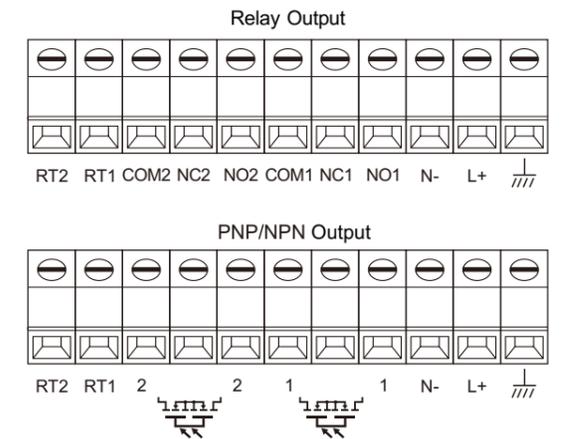
## Terminal Function

- L+, N-: Power Supply
- NC1, COM1, NO1: Relay Output
- NC2, COM2, NO2: Relay Output
- RT1, RT2: Remote-Test
- : Ground Connection
- : 1<sup>st</sup> PNP/NPN Output
- : 2<sup>nd</sup> PNP/NPN Output

Refer to the Fig.1-Fig.2, all the wiring should adopt the 18 AWG standard isolation cable and it is compulsory to keep from the dust in the housing and avoid of electric short. To prevent the water or moisture penetrating into the housing, please rotate the top lid in clockwise direction and make sure it is tightly lock.

## Output Description

1. Make sure provide power supply (L+/N-) in range of 20~250 (Vac or Vdc,50/60Hz) and output relay (Relay or PNP/NPN) before wiring. Detail please see Fig-1 and Fig-2.
2. RT1 and RT2 are the testing points that easy user to verify the situation. When the RT1 and RT2 are in electric short, it means the measured material is in contact with the tuning fork level switch. The Relay or PNP/NPN should be activated. In examining the tuning fork level switch, user will find it keep vibrating.



## Panel Function

- PWR: Power Supply (Green Light)
- SIGNAL: Output Indication (Red Light)
- FSH: Power on. The signal LED is on and the relay acts. While the tuning fork level switch contacts with measured material, the signal LED is off and the relay is in not act.
- FSL: Power on. The signal LED is off and the relay is in not act. While the tuning fork level switch contacts with measured material, the signal LED is on and the relay is in act.
- SENSITIVITY L: Low Sensitivity
- SENSITIVITY H: High Sensitivity

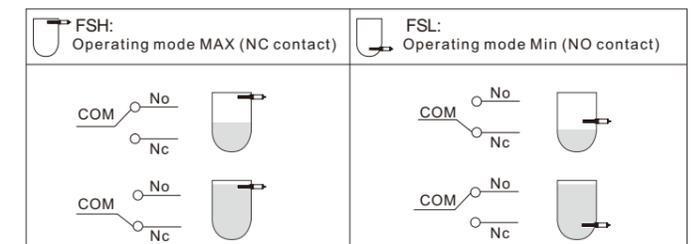


Fig-3. Diagram of Relay contact output

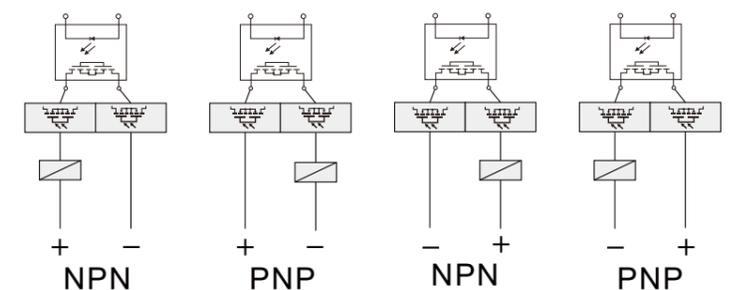


Fig-4. Diagram of PNP/NPN transistor output

### FSH (FAIL-SAFE HIGH) PROTECTION:

On the OUTPUT MODE, select Fail-Safe High Mode (FSH) and install the tuning fork switch at the high position. Please refer to Fig-3 - Fig-4.

#### Relay Output:

**Normal Status:** NO & COM contact of the relay are conducted and the Signal Lamp lights up when tuning fork level switch doesn't sense any materials.  
**Failure:** NC & COM contact of the relay are conducted and the Signal Lamp is out when tuning fork level switch senses the material or when there is power breakdown.

#### PNP/NPN Output:

**Normal Status:** Output is conducted and the Signal Lamp lights up when tuning fork level switch doesn't sense any materials.  
**Failure:** Output is not conducted and the Signal Lamp is out when tuning fork level switch senses the material or when there is power breakdown.

### Sensitivity Adjustment/Calibration

Sensitivity knob located on the right side of the PCB board. It approximately allows 22 turns for sensitivity adjustment. For higher sensitivity need, user please turn the knob clockwise toward H and counterclockwise toward L for lower sensitivity. Factory default is set in high. The physical contact point is located at 15mm from the tip of the fork and it will slightly moving upward or downward along the axis of fork while the sensitivity is changed. For example, the point will move downward for L sensitivity and vice versa. The total range of the physical contact point can be adjusted around 60mm. For instance, turning the SENSITIVITY 10 turns counterclockwise gets the contact point at 30 mm from the tip of the fork.

### FSL (FAIL-SAFE LOW) PROTECTION:

On the OUTPUT MODE, select Fail-Safe Low Mode (FSL) and install the tuning fork switch at the low position. Please refer to Fig-3 - Fig-4.

#### Relay Output:

**Normal Status:** NO & COM contact of the relay are conducted and the Signal Lamp lights up when tuning fork level switch senses the materials.  
**Failure:** NC & COM contact of the relay are conducted and the Signal Lamp is out when tuning fork level switch does not sense the material or when there is power breakdown.

#### PNP/NPN Output:

**Normal Status:** Output is conducted and the Signal Lamp lights up when tuning fork level switch senses materials.  
**Failure:** Output is not conducted and the Signal Lamp is out when tuning fork level switch does not sense the material or when there is power breakdown.

Level	FSL		FSH	
Contact Form	NO COM NC	NO COM NC	NO COM NC	NO COM NC
Indication	○	☀	☀	○
Status	Fail	Normal	Normal	Fail

### Installation Tips

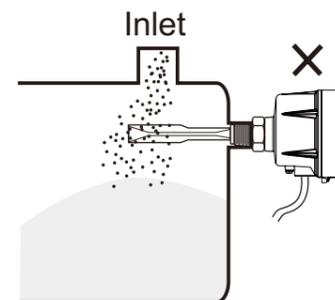
1. There is an internal/external ground terminal in the housing. Please be sure to ground terminals when you use.
2. When install or maintain in the field, to comply with the caution "Open after power off"
3. Cable conduit should equip with explosion approval device (AD105DS). It can't be revised arbitrarily and have to lock well.
4. Be sure to obey the safe regulation of electric appliance for dangerous field when install and maintain.
5. Corrosive gas or liquid application isn't available for Aluminum & Stainless (SUS) material.
6. The level of temperature class for explosion sign and its maximum allowed temperature relating to the medium.

Temp. categories	T1	T2	T3	T4	T5	T6
Max. surface temp.	≤ 450°C	≤ 300°C	≤ 200°C	≤ 135°C	≤ 100°C	≤ 85°C
Medium temp.	≤ 440°C	≤ 295°C	≤ 195°C	≤ 130°C	≤ 95°C	≤ 80°C

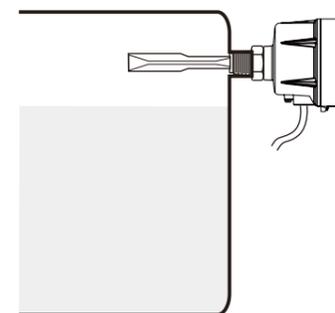
7. Customers can't change the internal components and have to check the outer.

#### Horizontal Installation:

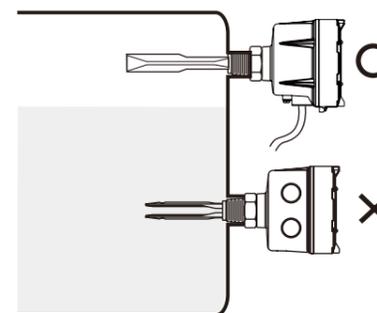
1. Can be applied in viscosity, powder, and liquid. Do not install near substance inlet.



2. Conduit faces downward at installation.

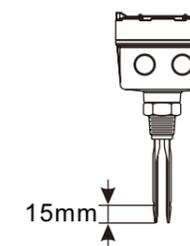


3. To be installed with the surface of two fork blades facing each other horizontally.

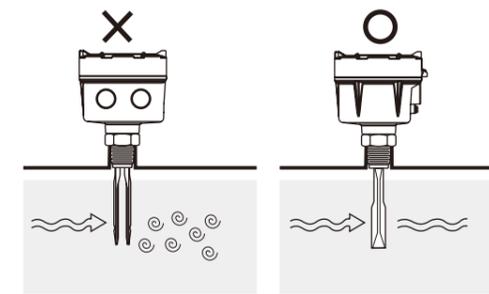


#### Vertical Installation:

1. With high sensitivity, switching point is distanced 15mm away from the tip of fork.



2. Opening of the two fork blades is to be as the flow direction.



3. Do not install near substance inlet.

