



Tuning Fork Level Switch



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PRODUCT INTRODUCTION

WORKING PRINCIPLE

The piezoelectric component is used to drive the tuning fork and feedback signal, which produces the resonance on the fork. When the fork comes into contact with a material, the fork will release some frequency signal as feedback. It will be converted into the output of the contact signal when the circuit detects the frequency decrease of the signal.

The product relies on the damping effect by covering the testing material on the tuning fork which reduces the vibration frequency of the tuning fork and outputs a switch signal. Therefore, there is no signal amplification circuit inside, which can eliminate the trouble of frequent sensitivity adjustment due to the material change.

FEATURE

- A maximum length of 3m for the ultra-extension type.
- SPDT Relay output, SSR MOSFET output.
- Wide voltage supply range 20~250 Vac/Vdc, 50/60Hz
- No frequent calibration required, easy-to-use, sturdy and durable design. High/low failure safe mode, safe and reliable.
- Sensitivity adjustment is available for different densities of media. Fine powder can be detected.
- Suitable for liquid, powder, and solid application.
- Dual insulation can reduce damage on the PCB board caused by great changes in temperature and humidity, as well as condensation effects (SC3□series).
- It can be tested by pressing the test button after installation (SC3□series).
- Output switch delay function (SC3□series).
- Self-diagnosis mechanism can detect the abnormality such as the abrasion of the tuning fork or the material viscosity (SC3□series).
- The compact built-in wiring box can save the installation space (SC3□series).
- The wiring box can rotate 270 degrees, facilitating adjustment of the inlet direction (SC3□series).
- The minimum measurable specific gravity can reach 0.01 g/cm³ (SC35 series).
- Ultra protection mechanism can set the secondary output contact point as alarm output (SC35 series).
- Support the function of detecting underwater sediments (SC35 series).
- All-in-one design, 3/4"mm thread is suitable for the installation of a small tube (SC38 series).
- Adjustment setting for different densities of media $\rho > 0.5 \text{ g/cm}^3$ or $\rho < 0.7 \text{ g/cm}^3$ (SC38 series).
- Switch delay setting function (SC3□series).
- Alarm indicators based on failure status or output status selected according to the customer's habits (SC3□series).
- Automatic calibration of the operation points for different densities of media as required by the customer (SC38 series).

APPLICABLE MATERIALS

The tuning fork level switch can be widely applied to detect the min. and max. level in tanks, silos and hoppers filled with materials of different densities and state. The following list shows its applications.

POWDER

- | | |
|------------------------|------------------------|
| 1. Powdered milk | 15. Pellets |
| 2. Frozen potato chips | 16. Peanuts |
| 3. Beans | 17. Tobacco |
| 4. Sugar | 18. Wood shavings |
| 5. Sweets | 19. Chalk |
| 6. Coffee beans | 20. Stearin chips |
| 7. Coffee powder | 21. Powdered cellulose |
| 8. Frozen dry coffee | 22. Glass fine power |
| 9. Tea | 23. Granular plastics |
| 10. Salt | 24. Gravel |
| 11. Flour | 25. Powdered clay |
| 12. Foundry sand | 26. Polystyrene powder |
| 13. Spices | 27. Styrofoam |
| 14. Animal food | 28. Soda |

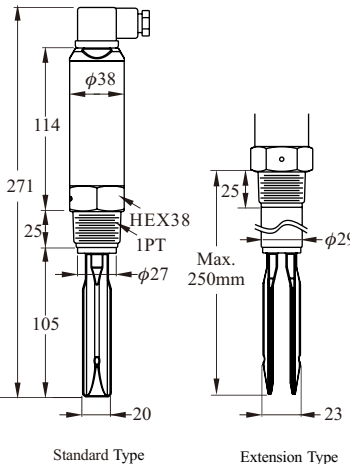
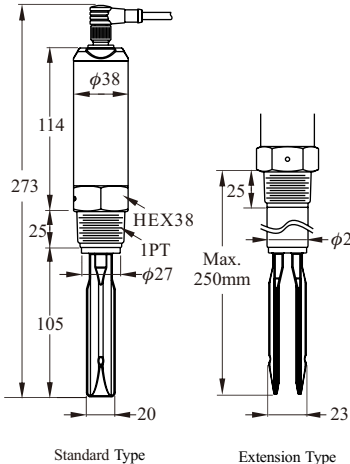
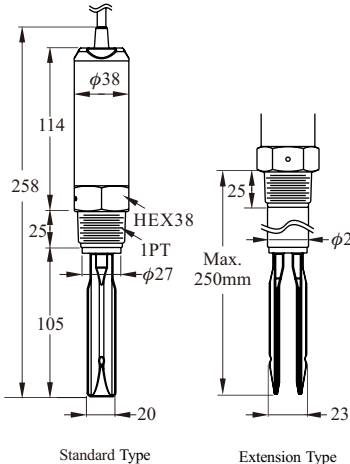
LIQUID

1. Water & Solutions
2. General Purpose Solvent
3. Soy sauce
4. Heavy oil
5. Petroleum
6. Oil
7. Ink
8. Cream
9. Drink & Beverage
10. Corrosive liquid

APPLICATION SCOPE

It is applicable to the max. and min. level detection of the tanks or tubes filled with various solid/liquid media. The product has a variety of applications, such as in the chemical fiber industry, rubber industry, tire industry, cement industry, steel industry, food industry, pharmaceutical industry, and animal feed factories in terms of the level detection for the bins of the raw material/process/finished products.

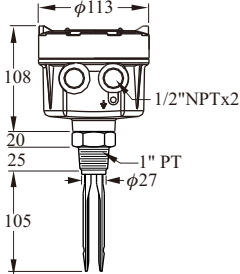
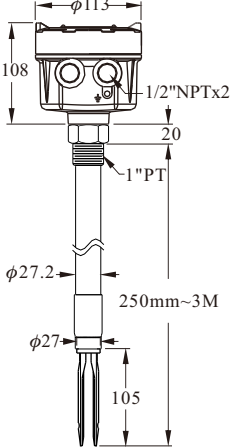
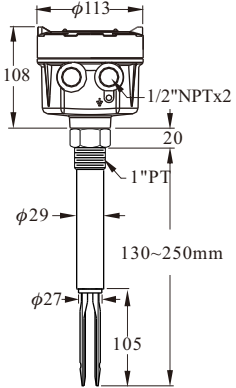
LITE-TYPE

Dimensions (Unit:mm)						
Model no.	SC2400/2410 【DIN Connector】		SC2400/2410 【M12 Connector】		SC2400/2410 【Cable Wire Type】	
Supply voltage & output	SC240 □□:20~250Vac / Vdc 2 wire Contactless electronic switch. SC241□□:12~55 Vdc 3 wire PNP/ NPN Output.					
Fork length	100mm					
Operating temp. in ambient air	-40~80℃					
Storage temp.	-40~85℃					
Operating temp. in bin	SC24□□□: -40~+100℃ SC24□□□T: -40~+150℃					
Operation humidity	80% RH non-condensed					
Operation pressure	Maximum 40 Bar					
Min. material density sensed	Solid: density: ≥0.07g/cm ³ Liquid: density: ≥0.7g/cm ³ Viscosity: 1~10000 cSt					
Magnetic testing	Output function test performed by putting magnets near the indicated spot					
Vibrating frequency	350~370Hz					
Status indication	Green light:indicate power supply Red light:indicate operating mode					
Housing material	SUS304					
Fork material	SUS304, SUS316, SUS316L					
IP protection	IP65		IP67		IP67	
Mounting	1" more					
Conduit	Valve plug DIN 43650		M12x1 Connector(180° / 90°)		Cable connector	

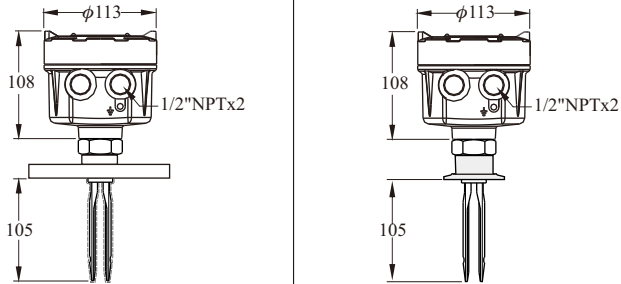
MINI-TYPE

Dimensions (Unit:mm)						
Model no.	SC2800/2810 【DIN Connector】		SC2800/2810 【M12 Connector】		SC2800/2810 【Cable Wire Type】	
Supply voltage & output	SC280□:20~250,50/60Hz Vac/Vdc 2 wire Contactless electronic switch. SC281□:12~55 Vdc 3 wire PNP/ NPN Output					
Fork length	40mm					
Operating temp. in ambient air	-40°C~80°C					
Storage temp.	-40°C~85°C					
Operating temp. in bin	SC28□□□: -40°C~100°C SC28□□□T: -40°C~150°C					
Operation humidity	80% RH non-condensed					
Operation pressure	-1~600PSI (40BAR)					
Min. material density sensed	Solid: density: $\geq 0.07\text{g/cm}^3$ Liquid: density: $\geq 0.7\text{g/cm}^3$ Viscosity: 1~10000 cSt					
Magnetic testing	Output function test performed by putting magnets near the indicated spot					
Vibrating frequency	1 KHz \pm 10%					
Status indication	Green light:indicate power supply Red light:indicate operating mode					
Housing material	SUS304					
Fork material	SUS304, SUS316, SUS316L					
IP protection	IP65		IP67		IP67	
Mounting	3/4"more					
Conduit	Valve plug DIN 43650		M12x1 Connector(180° / 90°)		Cable connector	

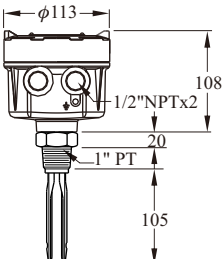
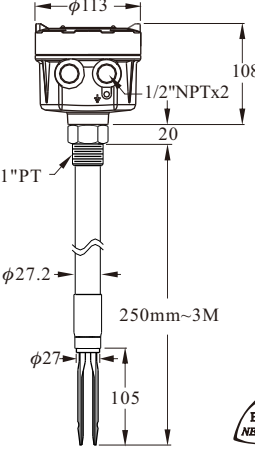
STANDARD TYPE

Dimensions (Unit:mm)			
Model No.	SC1400 【Standard Type】	SC1410 【Tuning Fork Ultra Extension Type】	SC1420 【Tuning Fork Extension Type】
Level sensor housing	Aluminum / IP65		
Probe construction	SUS 304 / 316 / 316L		
Mounting	1"PT		
Conduit	1/2"NPT × 2		
Max. vertical load on rod.	177in.Lbs(20Nm)		
Operating pressure.	-1~600PSI (40BAR)		
Power supply	20~250Vac/Vdc,50/60Hz		
Power consumption	10VA		
Operating temp. in ambient air	-40°C~60°C		
Operating temp. in bin	-40°C~130°C		
Signal output	Relay, SPDT, 5A/250Vac/ 28Vdc, 1 set or 2 set SSR(MOSFET) 400mA/60 Vac/ Vdc, 1 set or 2 set		
Min. material density sensed	Solid: ≥0.07g/cm ³ , Liquid: ≥0.7g/cm ³		
Time delay	0.6 Second / Operate; 1~3 Seconds / Reset		
Vibrating frequency.	350~370Hz		
Selectable Fail-safe	Hi./ Lo.		
Selectable sensitivity	Hi./ Lo.		

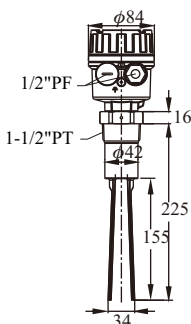
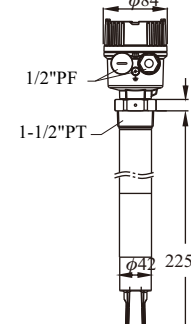
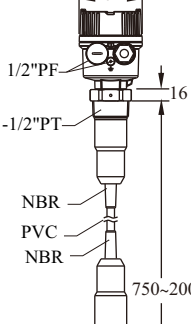
STANDARD TYPE

Dimensions (Unit:mm)		
Model No.	SC1540 【Corrosion Proof Type】	SC1600 【Sanitary Type】
Level sensor housing	Aluminum / IP65	
Probe construction	316L Coating TEFLON	316L
Mounting	1" Flange (min.)	2" Sanitary
Conduit	1/2"NPT × 2	
Max. vertical load on rod.	177in.Lbs(20Nm)	
Operating pressure.	-1~600PSI (40BAR)	
Power supply	20~250Vac/dc, 50/60Hz	
Power Consumption	10VA	
Operating temp. in ambient air	-40°C~60°C	
Operating temp. In bin	-40°C~130°C	
Signal output	Relay, SPDT, 5A/250Vac/ 28Vdc, 1 set or 2 set SSR(MOSFET) 400mA/60 Vac/ Vdc, 1 set or 2 set	
Min. material density sensed	Solid: $\geq 0.07\text{g/cm}^3$, Liquid: $\geq 0.7\text{g/cm}^3$	
Time delay	0.6 Second / Operate; 1~3 Seconds / Reset	
Vibrating frequency.	350~370Hz	
Selectable Fail-safe	Hi./ Lo.	
Selectable sensitivity	Hi./ Lo.	

EX-PROOF TYPE

Dimensions (Unit:mm)		
Model No.	SC1740 【Standard Type】	SC1741 【Tuning Fork Ultra Extension Type】
Level sensor housing	Aluminum	
Probe construction	SUS 304 / 316 / 316L	
Mounting	1"PT	1"PT
Conduit	1/2"NPT×2	
Max. vertical load on rod.	177in.Lbs(20Nm)	
Operating pressure.	-1~600PSI (40BAR)	
Power supply	20~250,50/60Hz Vac/Vdc	
Power consumption	10VA	
Operating temp. in ambient air	-20°C~70°C	
Operating temp. in bin	-40°C~130°C	
Signal output	Relay, SPDT, 3A/250Vac/ 28Vdc, 1 set or 2 set SSR(MOSFET) 400mA/60 Vac/ Vdc, 1 set or 2 set	
Min. material density sensed	Solid: ≥0.07g/cm ³ , Liquid: ≥0.7g/cm ³ , viscosity : 1~10000 cst	
Time delay	0.6 Second / Operate; 1~3 Seconds / Reset	
Vibrating frequency.	350~370Hz	
Selectable Fail-safe	Hi./ Lo.	
Selectable sensitivity	Hi./ Lo.	

SC35 TUNING FORK LEVEL SWITCH

Dimensions (Unit:mm)			
Model No.	SC350 【Standard Type】	SC351 【Extension Type】	SC352 【Cable Type】
Level sensor housing	Built-in box, aluminum coating IP66/IP67		
Power supply	19 ~253 Vdc / Vac, 50/60 Hz		
Probe construction	Max. 1.5 W		
Voltage endurance capability	3.7 kV		
Overvoltage protection	overvoltage category II		
Storage temp.	-40~85 °C		
Operating temp. in ambient air	-40~85 °C		-40~75 °C
Medium temp.	-40~150 °C	-40~150 °C	-40~80 °C
Material density	$\geq 0.01 \text{ g/cm}^3$ or $\geq 0.05 \text{ g/cm}^3$		
Measuring frequency	140 Hz \pm 5 Hz		
Material dimension	Max.10 mm		
Conduit	1/2"PF / 1/2"NPT(Ex-proof type only supports 1/2"NPT)		
External diameter of cable applicable to conduit	$\phi 6 \sim \phi 10 \text{ mm}$		
Pressure resistance	25 Bar		2 Bar
Output signal	2 sets of SPDT relay output/2 sets of transistor output		
Contact capacity	Relay: 6A / 250Vac , 6A / 28Vdc Transistor: 350mA , 60Vac / Vdc		
Ex-proof certification	Dust ex-proof (DIP A20/21 T _A , T ₂ ~T ₆ IP66/67, optional)		

SC35 TUNING FORK LEVEL SWITCH

Dimensions (Unit:mm)		
Model No.	SC350 【 High-temp. Type 】	SC351 【 High-temp. Extension Type 】
Level sensor housing	Built-in box, aluminum coating IP66/IP67	
Power supply	19 ~253 Vdc / Vac, 50/60 Hz	
Probe construction	Max. 1.5 W	
Voltage endurance capability	3.7 kV	
Overvoltage protection	overvoltage category II	
Storage temp.	-40~85 °C	
Operating temp. in ambient air	-40~85 °C	
Medium temp.	-40~280 °C	
Material density	$\geq 0.01 \text{ g/cm}^3$ or $\geq 0.05 \text{ g/cm}^3$	
Measuring frequency	140 Hz \pm 5 Hz	
Material dimension	Max.10 mm	
Conduit	1/2"PF / 1/2"NPT(Ex-proof type only supports 1/2"NPT)	
External diameter of cable applicable to conduit	$\phi 6 \sim \phi 10 \text{ mm}$	
Pressure resistance	25 Bar	
Output signal	2 sets of SPDT relay output/2 sets of transistor output	
Contact capacity	Relay: 6A / 250Vac , 6A / 28Vdc Transistor: 350mA , 60Vac / Vdc	
Ex-proof certification	Dust ex-proof (DIP A20/21 T _A , T2~T6 IP66/67, optional)	

SC38 MULTI-FUNCTIONAL TUNING FORK LEVEL SWITCH

NEPSI PROOF No.GYB14.1796X
Ex ia IIC T3~T6 Ga

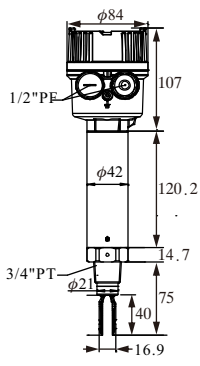
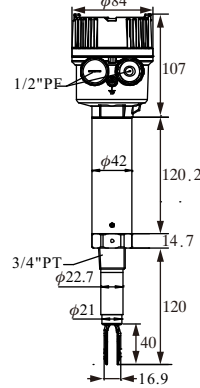
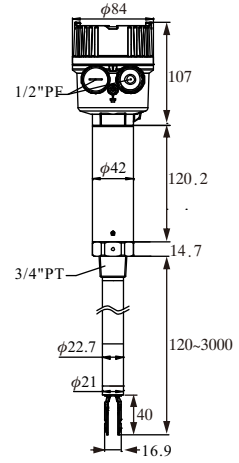
※ Output type is 8/16mA current output type has certified by NESI Explosion

Dimensions (Unit:mm)			
	SC380 【Standard Type】	SC381 【Extension Type】	SC382 【Ultra Extension Type】

Output type	8/16mA output type	3 wires (NPN/PNP) output type	Dual-relay output type
Working voltage	11 ~36 Vdc	10 ~55 Vdc	19~253Vac/dc,50/60Hz
Power consumption	< 600mW	< 830mW	Max. 1.3W
Input protection	Reversed power supply protection function		NA
Overvoltage protection	overvoltage category III		
Measuring error	Max.±1mm		
Repeatability	0.5mm		
Hysteresis band	Approx.2mm		
Storage temp.	-40~85 °C		
Operating temp. in ambient air	-40~85 °C		
Medium temp.	-40~150 °C (Refernce operation manual)		
Applicable density liquid	$\geq 0.5 \text{ g/cm}^3$ or $\geq 0.7 \text{ g/cm}^3$		
Liquid viscosity	Max.10000mm ² / S(10000cst)		
Granule size contained in the liquid	Max. $\phi 5 \text{ mm}$		
External diameter of cable applicable to conduit	$\phi 6 \sim \phi 10 \text{ mm}$		
Pressure resistance	Max.40 Bar		
Output signal	Intrinsically safe signal 8/16mA	Transistor output (NPN/PNP)	2 sets of SPDT relay output
Contact capacity	NA	350mA , 55Vdc	6A / 250Vac , 6A / 28Vdc
Protection level	IP66/67		
Intrinsically safe parameters	Ui(V)=36V , Ii=100mA,Pi=1W Ci(nF)=0 , Li(uH)=0	NA	NA

※ It shall combine with the ex-proof fence meeting level Ex ia to form the intrinsically safe system. Please refer to page 23 for more details.

SC38 MULTI-FUNCTIONAL TUNING FORK LEVEL SWITCH

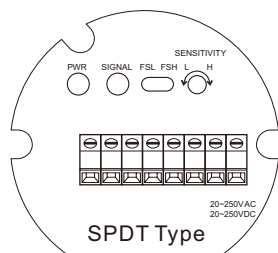
Dimensions (Unit:mm)	 <p>SC380 【 High-temp. Type 】</p>	 <p>SC381 【 High-temp. Extension Type 】</p>	 <p>SC382 【 High-temp. Extension Type 】</p>
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Output type	8/16mA output type	3 wires (NPN/PNP) output type	Dual-relay output type
Working voltage	11 ~36 Vdc	10 ~55 Vdc	19~253Vac/dc,50/60Hz
Power consumption	< 600mW	< 830mW	Max. 1.3W
Input protection	Reversed power supply protection function		NA
Overvoltage protection	overvoltage category III		
Measuring error	Max.±1mm		
Repeatability	0.5mm		
Hysteresis band	Approx.2mm		
Storage temp.	-40~85 °C		
Operating temp. in ambient air	-40~85 °C		
Medium temp.	-40~150 °C		
Applicable density liquid	$\geq 0.5 \text{ g/cm}^3$ or $\geq 0.7 \text{ g/cm}^3$		
Liquid viscosity	Max.10000mm ² / S(10000cst)		
Granule size contained in the liquid	Max. $\phi 5 \text{ mm}$		
External diameter of cable applicable to conduit	$\phi 6 \sim \phi 10 \text{ mm}$		
Pressure resistance	Max.40 Bar		
Output signal	Intrinsically safe signal 8/16mA	Transistor output (NPN/PNP)	2 sets of SPDT relay output
Contact capacity	NA	350mA , 55Vdc	6A / 250Vac , 6A / 28Vdc
Protection level	IP66/67		
Intrinsically safe parameters	Ui(V)=36V , li=100mA,Pi=1W Ci(nF)=0 , Li(uH)=0	NA	NA

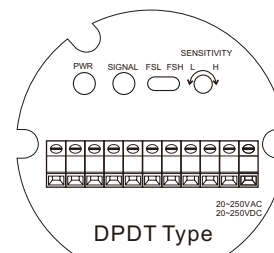
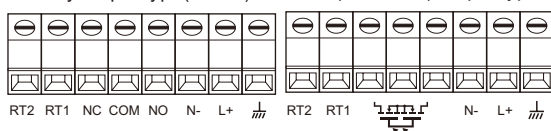
※ It shall combine with the ex-proof fence meeting level Ex ia to form the intrinsically safe system. Please refer to page 23 for more details.

WIRING INSTRUCTIONS (STANDARD TYPE)

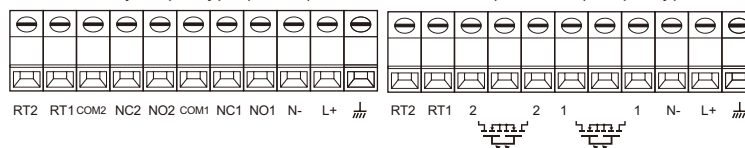
SC1400X, SC1410X, SC1420X, SC1540X, SC1600X, SC1740X, SC1741X



Relay output type(SPDT)



Relay output type (DPDT)



FUNCTIONAL DESCRIPTION

Description of terminal functions

- L+, N-: Power Supply
- NC, COM, NO: Relay Output
- RT1, RT2: Remote-Test
- : Ground Connection
- : SSR(MOSFET) Output
- : The second set of SSR (MOSFET) output (Optional)

DESCRIPTION OF PANEL FUNCTIONS

- PWR: Power Supply (Green Light)
- SIGNAL: Output Indication (Red Light)
- FSH: Power On. The signal lamp is on and the relay is conductive. While the tuning fork switch senses the material, the signal lamp is off and relay is not conductive.
- FSL: Power On. The signal lamp is off and the relay is not conductive. While the tuning fork switch senses the material, the signal lamp is on and relay is conductive.
- SENSITIVITY L: Low Sensitivity
- SENSITIVITY H: High Sensitivity

FAIL-SAFE HIGH / LOW PROTECTION

FSH (Fail-Safe High) Protection:

Switch to FSH mode.

Normal Status: The signal lamp is on. It indicates that the tuning fork switch does not sense the material and the relay is conductive.

Failure: When the power shuts down, the signal lamp is off. It indicates that the tuning fork switch is voided and the relay is not conductive.

FSL (Fail-Safe Low) Protection:

Switch to FSL mode.

Normal Status: The signal lamp is on.

The tuning fork switch senses the material and the relay is conductive.

Failure: When the power shuts down, the signal lamp is off. The tuning fork switch is voided and the relay is not conductive.

SENSITIVITY ADJUSTMENT

The SENSITIVITY is located on the right side of the panel. The user is able to do the minor adjustment by the screw driver when it rotates for 22 turns. If it turns to H position clockwise, the sensitivity increases; if it turns to L position anti-clockwise, the sensitivity decreases. The sensitivity is originally set at max. value. The switching point is at 15mm from the tip of the tuning fork. The switching point position will be changed by the sensitivity value. If the sensitivity adjusts to lower value, the switching point position is moving backward; if the sensitivity adjusts to high value, the switching point position is moving forward. User may change the switching point position by adjusting the sensitivity. The changing range of switching point is about 60mm. For example, if the switching point needs to be moved backward by 30mm, the user needs to adjust SENSITIVITY anti-clockwise by 10 turns. In general cases, there is no need for sensitivity adjustment.

	FSL		FSH	
Level				
Contact form	NO COM NC	NO COM NC	NO COM NC	NO COM NC
Indication				
Status	Fail	Normal	Normal	Fail

WIRING INSTRUCTIONS (LITE-TYPE/MINI-TYPE)

SC240X/SC280(Two wires) WIRING

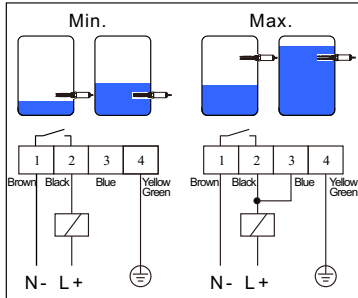
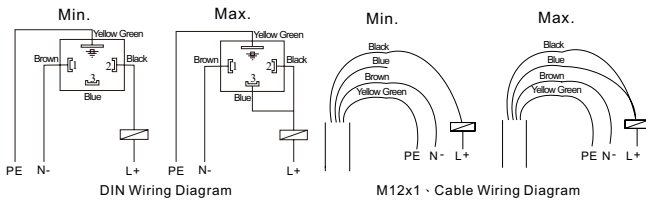


Figure 1 Two wires wiring



Wiring

Power can be AC/DC switching. Two wires are connected with terminals (L+/N-) as in Figure 1.

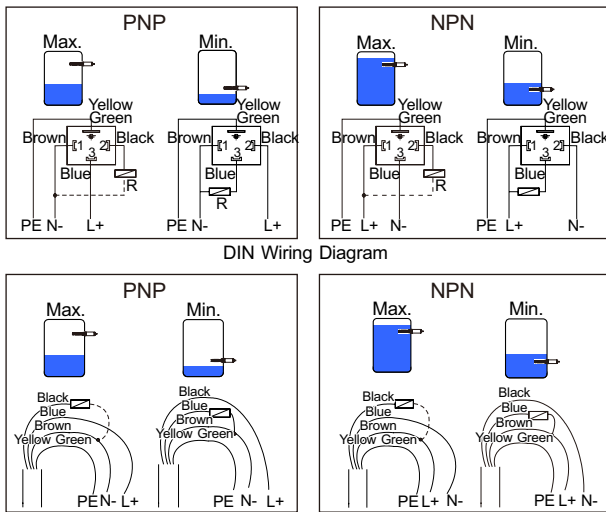
Low (Min.) Mode:

Pin 1 (Brown) is connected to N-. Pin 2 (Black) is connected to L+ with relay. Pin 4 (Yellow Green) connects to tank ground.

High (Max.) mode:

Pin 1 (Brown) is connected to N-. Pin 3 is connected to pin 2 (Black) to L+ with Relay. Pin 4 (Yellow Green) connects to tank ground.

SC241X/SC281(Three wires) WIRING



DIN Wiring Diagram

M12x1 Cable Wiring Diagram

Figure 2 PNP / NPN Output Wiring Diagram

Wiring

Power supply is for DC only. Output is PNP / NPN. Please see Figure 2.

PNP wiring :

High(Max.) Mode:

Pin 1(Brown) connects to N-. Pin 3 (Blue) connects to L+. To output, it is pin 2. (Black) connects to N- with relay. Pin 4 (Yellow Green) connects to tank ground.

Low(Min.)Mode:

Pin 1 (Brown) connects to N-. Pin 2 (Black) connects to L+. To output, Pin 3 (Blue) connects to N- with relay. Pin 4 (Yellow Green) should contact to tank ground.

NPN wiring :

High(Max.) Mode:

Pin 1 (Brown) connects to L+. Pin 3 (Blue) connects to N-. To output, Pin 2 (Black) connects to L+ with relay. Pin 4(Yellow Green) should contact to tank ground.

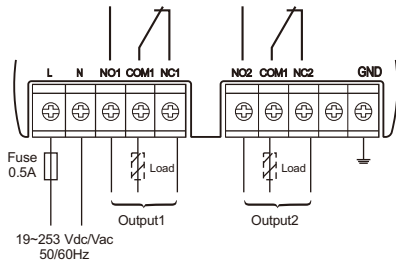
Low(Min.)Mode:

Pin1 (Brown) connects to L+. Pin 2 (Black) connects to N-. To output Pin 3 (Blue) connects to L+ with relay. Pin 4 (Yellow Green) should contact to tank ground.

WIRING INSTRUCTIONS (SC35)

WIRING CONFIGURATION DIAGRAM AND INTRODUCTION OF FEATURES

Dual-relay output



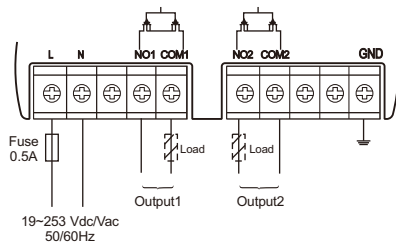
Load: External load

$U \sim \text{max. } 250\text{Vac}@I_L \sim \text{max. } 6\text{A}$

$U \sim \text{max. } 28\text{Vdc}@I_L \sim \text{max. } 6\text{A}$

Failure mode	Material level	Output signal			LED indicators		
		output1	output2		Power Green	Status Yellow	Alarm Red
MAX		 NO1 COM1 NC1	 NO2 COM2 NC2	 NO2 COM2 NC2		 O.S.	
		 NO1 COM1 NC1	 NO2 COM2 NC2	 NO2 COM2 NC2		 F.S.	
MIN		 NO1 COM1 NC1	 NO2 COM2 NC2	 NO2 COM2 NC2		 O.S.	
		 NO1 COM1 NC1	 NO2 COM2 NC2	 NO2 COM2 NC2		 F.S.	
Viscous material		Maintain the previous state		 NO2 COM2 NC2		 O.S. F.S.	
Wear of tuning fork		 NO1 COM1 NC1	 NO2 COM2 NC2	 NO2 COM2 NC2			

Dual-transistor output



Load: External load

$U \sim \text{max. } 60\text{Vac}@I_L \sim \text{max. } 350\text{mA}$

$U \sim \text{max. } 60\text{Vdc}@I_L \sim \text{max. } 350\text{mA}$

※ External load R must be connected

Failure mode	Material level	Output signal			LED indicators		
		output1	output2		Power Green	Status Yellow	Alarm Red
MAX		 NO1 I_L COM1	 NO2 I_L COM2	 NO2 I_L COM2		 O.S.	
		 NO1 $<100\mu\text{A}$ COM1	 NO2 $<100\mu\text{A}$ COM2	 NO2 I_L COM2		 F.S.	
MIN		 NO1 I_L COM1	 NO2 I_L COM2	 NO2 I_L COM2		 O.S.	
		 NO1 $<100\mu\text{A}$ COM1	 NO2 $<100\mu\text{A}$ COM2	 NO2 I_L COM2		 F.S.	
Viscous material		Maintain the previous state		 NO2 $<100\mu\text{A}$ COM2		 O.S. F.S.	
Wear of tuning fork		 NO1 $<100\mu\text{A}$ COM1	 NO2 $<100\mu\text{A}$ COM2	 NO2 $<100\mu\text{A}$ COM2			
Output1>350mA		 NO1 $<100\mu\text{A}$ COM1	Maintain the previous state				
Output2>350mA		Maintain the previous state		 NO2 $<100\mu\text{A}$ COM2			
Output1 & Output2>350mA		 NO1 $<100\mu\text{A}$ COM1	 NO2 $<100\mu\text{A}$ COM2	 NO2 $<100\mu\text{A}$ COM2			

※ When output is off, there will be no error current status

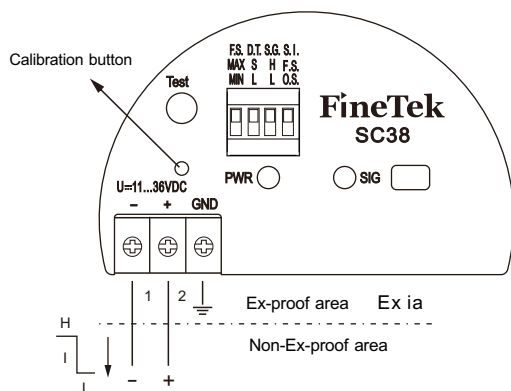
: ON : Flash : OFF

: Relay ON : Relay OFF I_L : Load current

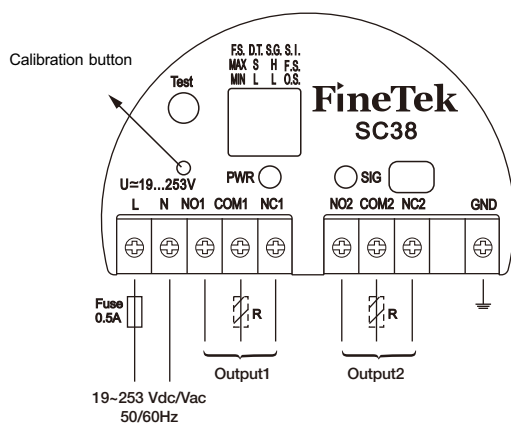
WIRING INSTRUCTIONS (SC38)

WIRING CONFIGURATION DIAGRAM AND INTRODUCTION OF FEATURES

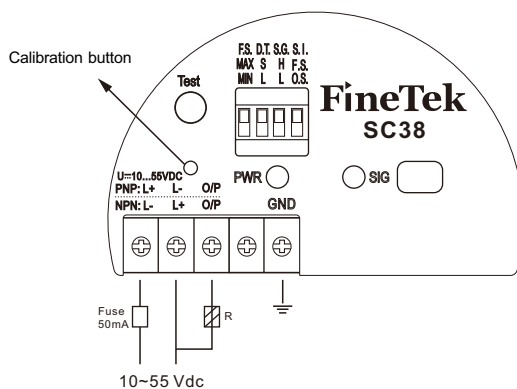
8/16mA output



Dual Relay output



PNP/NPN Output



Failure mode	Material level	Output signal	LED indicators
MAX		+ ~16mA → 1	<div> O.S. </div> <div> F.S. </div>
		+ ~8mA → 1	<div> O.S. </div> <div> F.S. </div>
MIN		+ ~16mA → 1	<div> O.S. </div> <div> F.S. </div>
		+ ~8mA → 1	<div> O.S. </div> <div> F.S. </div>
Instrument failure		+ <3.6mA → 1	<div> </div> <div> </div>

~16mA=16mA ±5%

~8mA=8mA ±■%

: ON : Flash : OFF

Failure mode	Material level	Output signal	LED indicators	
			PWR	SIG
MAX		NO1 COM1 NC1 NO2 COM2 NC2	<div> O.S. </div> <div> F.S. </div>	
		NO1 COM1 NC1 NO2 COM2 NC2	<div> O.S. </div> <div> F.S. </div>	
MIN		NO1 COM1 NC1 NO2 COM2 NC2	<div> O.S. </div> <div> F.S. </div>	
		NO1 COM1 NC1 NO2 COM2 NC2	<div> O.S. </div> <div> F.S. </div>	
Instrument failure		NO1 COM1 NC1 NO2 COM2 NC2	<div> </div> <div> </div>	

R: External load

U ~ max. 250Vac@I_L ~ max. 6A

U = max. 28Vdc@I_L = max. 6A

: ON : Flash : OFF

Failure mode	Material level	Output signal	LED indicators
MAX		□ → I _L → □	<div> O.S. </div> <div> F.S. </div>
		□ → <100μA → □	<div> O.S. </div> <div> F.S. </div>
MIN		□ → I _L → □	<div> O.S. </div> <div> F.S. </div>
		□ → <100μA → □	<div> O.S. </div> <div> F.S. </div>
Instrument failure		□ → <100μA → □	<div> </div> <div> </div>
Over Load(I _L >350mA)		□ → <100μA → □	<div> </div> <div> </div>

I_L : Load current

R : External load

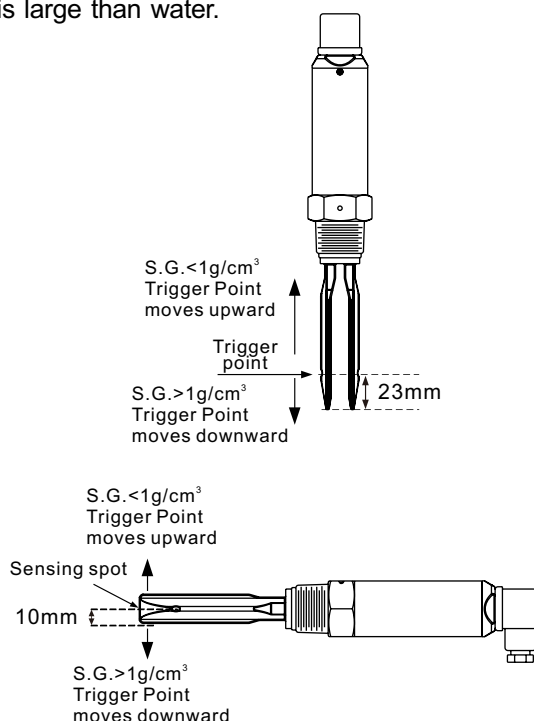
U = max. 55Vdc@I_L = max. 350mA

: ON : Flash : OFF

TUNING AND INDICATION DETAILS

FORK TRIGGER POINT

SC24XX fork trigger point is shown as below figure. The testing medium is water(S.G.=1 g/cm³), and its trigger point is about 23mm from the fork tip. If testing medium with S.G (specific gravity) lower than 1g/cm³ (water), the trigger point would increase. Similarly, the trigger point will downward while the S.G is large than water.



Output Status for Relay

Low (Min.) Mode: Tuning fork switch will be active after 3 seconds while power on. Relay is on NO status and red LED indication is off. When tuning fork is covered by testing medium, the vibration will stop and relay becomes NC status. Red LED indication then is on.

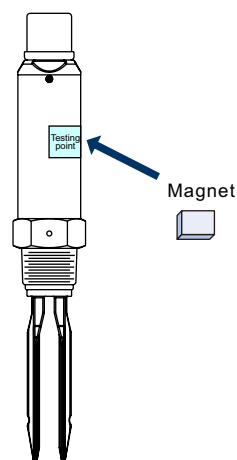
High(Max.) Mode: Tuning fork switch will be active after 3 seconds while the power on. Relay is on NC status and red LED indication is on. When tuning fork covered by testing medium, the vibration stops and relay becomes NO status. Red LED indication is on.

	Min. Mode		Max. Mode	
Level				
Contactless electronic switch				
Red LED				

MAGNETIC TEST

After the switch has installed and power tested, magnetic switch can be performed accordingly. Output status will switch from status of NO. to NC. or NC to NO. and red LED would indicate the vibration status by on / off.

When magnet is pulled away from the housing, red LED would return as default while fork continues to vibrate. By this verification, user can confirm the wiring and function are correct or not.



Output Status for PNP / NPN Transistor

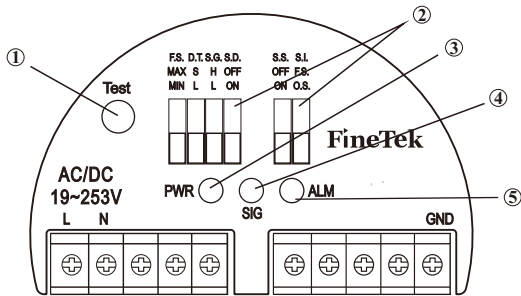
Low(Min.) Mode : Tuning fork switch will be active after 3 seconds while power on. Output transistor is on NO status and red LED indication is off. When tuning fork covered by testing medium, vibration will stop and output transistor becomes NC status. Red LED indication is on.

High(Max.) Mode: Tuning fork switch will be active after 3 seconds while power on. Output transistor is on NC status and red LED indication is on. When tuning fork covered by testing medium, vibration will stop and output transistor becomes NO status. Red LED indication is off.

	Min. Mode		Max. Mode	
Level				
PNP/ NPN Output				
Red LED				

DESCRIPTION OF FEATURES (SC35)

PANEL INTRODUCTION

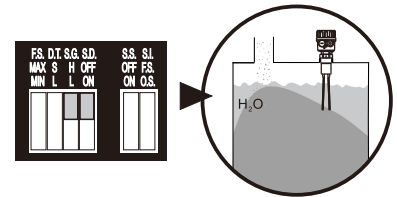


- ①: Test button
- ②: Function adjustment button
- ③: Power indicator
- ④: Status indicator
- ⑤: Alarm indicator

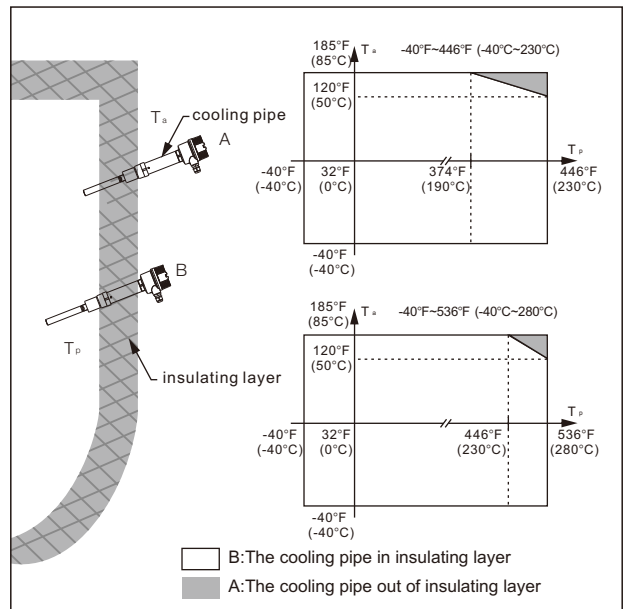
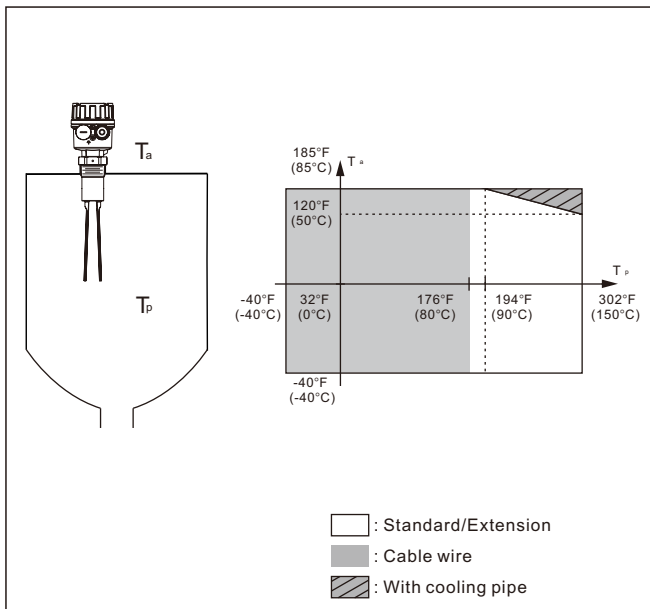
Abbreviation	Function	Option Description	Remarks
Test	Test button	Reverse the signal output	It is for the test after the installation is completed.
F.S.	Fail-Safe	MAX: High MIN: Low	It is for the high and low Fail-Safe mode.
D.T.	Delay Time	S: General setting L: Delay for 5 seconds	Covered by material: 0.5s Not covered by material: 150°C: ≤1.5s 230°C/280°C: ≤2s Switch to L to set it at 5 seconds for either covered or not covered by material.
S.G.	Specific Gravity	H: ≥0.05 g/cm ³ L: ≥0.01 g/cm ³	The switch to set the material density.
S.D.	Self Diagnosis	OFF: Disabled ON: Enabled	Detect the wear of the tuning fork or the viscous material and control the ON/OFF of the alarm indicator
S.S.	Super Switch	OFF: Disabled ON: Enabled	Switch the second set of output switch to the alarm indicator of the wear of the tuning fork or the viscous material for output
S.I.	Signal Indication	F.S.: Fail-Safe mode O.S.: Output mode	Turn ON/OFF the yellow indicator based on the output status or the fail-safe status.

SEDIMENT DETECTION

- It is only used to detect the sediment under the water, but can't be used for the level detection of the liquid or the doped liquid.
- S.G. (Specific Gravity) shall be adjusted to H position.
- S.D. (Self Diagnosis) shall be switched to OFF position.
- SC352 cable type is inapplicable to this working environment



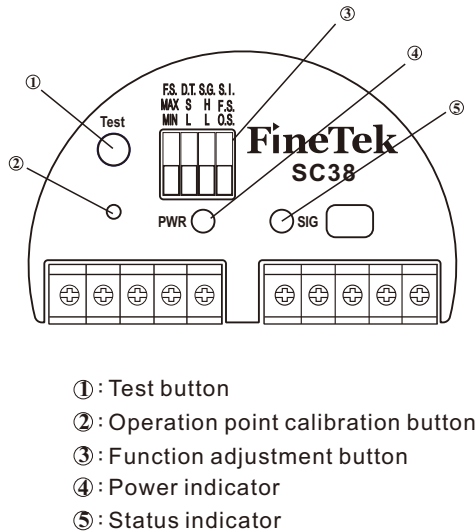
ENVIRONMENT/MEDIUM TEMPERATURE LIMITATION



- ※ ETFE coating: T_p max. = 150°C
- ※ PTFE coating: T_p max. = 230°C

DESCRIPTION OF FEATURES (SC38)

PANEL INTRODUCTION



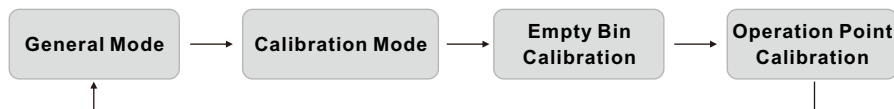
Abbreviation	Function	Option Description	Remarks
Test	Test button	Reverse the signal output	It is for the test after the installation is completed.
F.S.	Fail-Safe	MAX: High MIN: Low	It is for the high and low Fail-Safe mode.
D.T.	Delay Time	S: General setting L: Delay for 5 seconds	Covered by material: Approx. 0.5s Not covered by material: Approx. 1s Switch to L to set it at 5 seconds for either covered or not covered by material.
S.G.	Specific Gravity	H: $\geq 0.7 \text{ g/cm}^3$ L: $\geq 0.5 \text{ g/cm}^3$	The switch to set the material density.
S.I.	Signal Indication	F.S.: Fail-Safe mode O.S.: Output mode	Turn ON/OFF the yellow indicator based on the output status or the fail-safe status.

DESCRIPTION OF THE TEST BUTTON

This button is mainly provided for the user to check whether the output operation works normally after the installation is completed. When the button is pressed, the output current (8mA \leftrightarrow 16mA) and indicator (ON \leftrightarrow OFF) will be reversed. Once the button is released, it will recover the original status.

FUNCTION OF CUSTOMIZED OPERATION POINT POSITION

SC38 provides the function of customizing the operation point position according to what is required by the user.



Settings

1. Keep pressing "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 status: The red LED indicator flashes every 0.5 second, and the output current switches to operate every 0.5 second (8 \leftrightarrow 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 status: The red LED indicator flashes every 0.25 second, and the output current switches to operate every 0.25 second (8 \leftrightarrow 16mA).

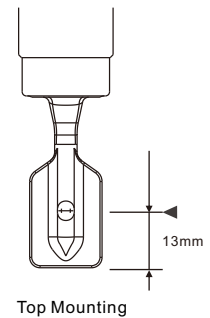
2. Cover the material to the desired operating point position under this mode, and then press "Calibration Button". It will be adjusted to the corresponding operating point position according to the H/L setting of the S.G.

DESCRIPTION OF FEATURES (SC38)

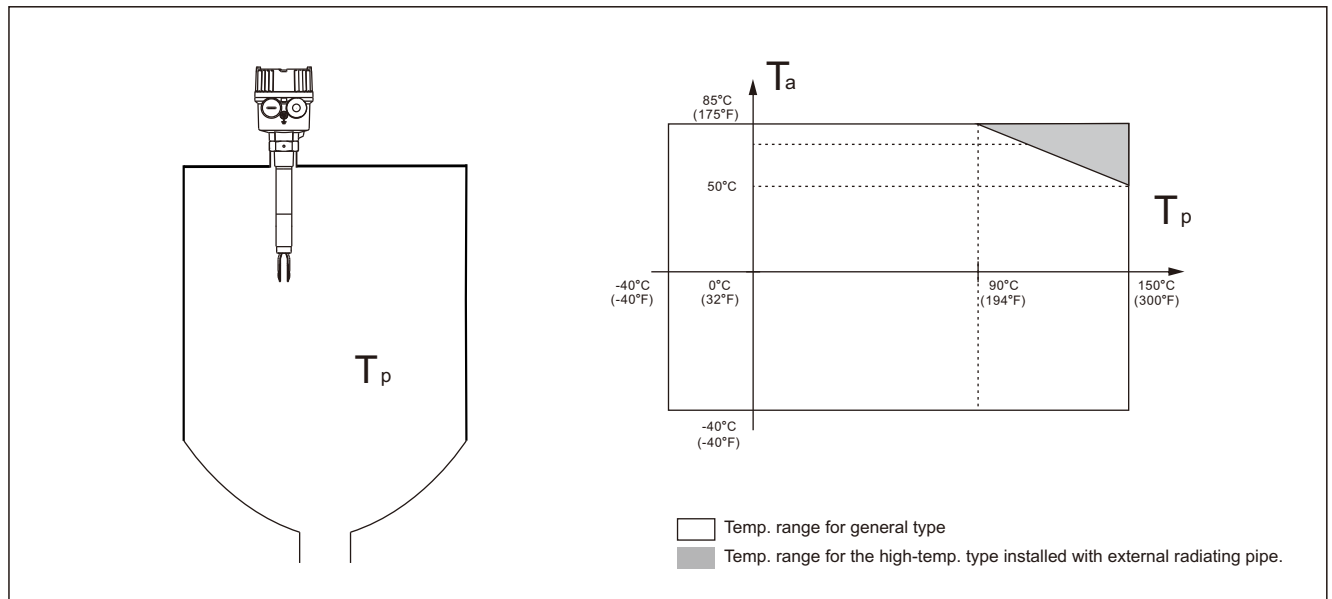
FORK TRIGGER POINT

The position of the SC38 fork trigger point depends on the mounting position as shown in the figure below: (When the testing medium is water, S.G.=1 g/cm³, temperature is 23°C, and working pressure is 0 Bar). If the testing medium has an S.G lower than 1g/cm³, the trigger point would rise. Similarly, the trigger point will move downward while the S.G is greater than water. The moving distance is subject to the S.G.

※Operating point position: ◀



ENVIRONMENT AND OPERATING TEMPERATURE LIMITATION



ORDER INFORMATION

SC () ()

Order No.

1400: Tuning Fork Standard Type
 1410: Tuning Fork Ultra Extension Type
 1420: Tuning Fork Extension Type
 1540: Tuning Fork Corrosion Proof Type
 1600: Tuning Fork Sanitary Type
 1740: Explosion Proof Tuning Fork Standard Type
 1741: Explosion Proof Tuning Fork Ultra Extension Type

Power & output module

20~250Vac/ Vdc, 50/60Hz R: Relay O/P-EuroType
 N: SSR(MOSFET) EuroType
 Q: Relay O/P x 2 -EuroType
 M: SSR(MOSFET) x 2 -EuroType

Material (wetted part)

0: SUS304 6: SUS316 L: SUS316L
 A: Stainless steel+PFA E: Stainless steel+ECTFE(black)

Connection

Dimension	Specification
D---1"(25A)	M---5kg/cm ² Y---PN 25
3---1-1/4"(32A)	N---10kg/cm ² Z---PN 40
E---1-1/2"(40A)	O---150 Lbs S---others
F---2"(50A)	P---300 Lbs 9---Sanitary
G---2-1/2"(65A)	Q---PT
H---3"(80A)	R---PF(G)
I---4"(100A)	T---BSP
J---5"(125A)	U---NPT
K---6"(150A)	W---PN 10
S---others	X---PN 16

Probe length (l) (unit: mm)

0500: below 500mm
 1000: 501~1000mm
 1500: 1001~1500mm ※ 500mm per Unit

⋮

Before you order

1. Please affirm the voltage.
2. Please affirm the mounting positions.
3. Please affirm the material specific gravity (S.G.) value.
4. Please affirm whether any bridge block or vibrating motor are attached onto the silo wall.

Tolerance of the total product length is ±5mm

Characteristics, specifications and dimensions are subject to change without notice.

Please contact your nearest distributing office for further information.

※ Material Code A and E, limited to SC1410, SC1741, SC1740 these products.

ORDER INFORMATION

SC (T) - ()

Order No. _____

24: 100mm 28: 40mm

Power & output module _____

0: 20~250Vac / Vdc 2 wire Contactless electronic switch.

1: 12~55 Vdc 3 wire PNP/ NPN Output.

Material (wetted part) _____

0: SUS304

6: SUS316

L: SUS316L

A: Stainless steel+PFA

E: Stainless steel+ECTFE(black)

Model _____

0: Standard 1: Extended

High temperature (150°C) _____

Electrical connection _____

A: M12x1(180°) B: M12x1(90°)

C: CABLE D: Valve plug DIN43650

(M12x1/ CABLE Wire length are 2M,PVC 24AWG)

Connection _____

Dimension	Specification	
C---3/4"(20A)SC28 only	M---5kg/cm ²	X ---PN16
D---1"(25A)	N---10kg/cm ²	Y ---PN25
E---1-1/2"(40A)	O---150 Lbs	Z ---PN40
F---2"(50A)	P ---300 Lbs	S ---Special
G---2-1/2"(65A)	Q---PT	
H---3"(80A)	R---PF(G)	
I---4"(100A)	T ---BSP	
J---5"(125A)	U---NPT	
K---6"(150A)	W---PN10	
S---Special		

Probe length (unit: mm) _____

Max Length:250mm

EX: 0250 :250mm

Before you order

1. Please affirm the voltage.
2. Please affirm the mounting positions.
3. Please affirm the material specific gravity (S.G.) value.
4. Please affirm whether any bridge block or vibrating motor are attached onto the silo wall.

Tolerance of the total product length is±5mm

Characteristics, specifications and dimensions are subject to change without notice.

Please contact your nearest distributing office for further information.

※ Material Code A and B,limited to SC1710, SC2120 these products.

ORDER INFORMATION (SC35)

SC35

0

Probe type

0: Standard 1: Extended 2: Cable

Power & output module

C: 19~253Vdc/Vac 50/60Hz
Two relay output: 6A 250Vac/6A 28Vdc
D: 19~253Vdc/Vac 50/60Hz
Two transistor output: 350mA 60Vac/Vdc

Certification

00: None certification, 1/2"PF
01: None certification, 1/2"NPT
31: NEPSI dust and ex-proof, 1/2"NPT

Connection

	Dimension		Specification	
Threaded	E---1-1/2"(40A)	J---5"(125A)	Q---PT(R)threaded tub	U---NPT threaded tub
	F---2"(50A)	K---6"(150A)	R---PF(G)threaded tub	S---Special
	G---2-1/2"(65A)	S---Special	T---BSP threaded tub	
	H---3"(80A)			
Flange	I---4"(100A)		M---5 kg/cm ²	P---300 Lbs
			N---10 kg/cm ²	L---600 Lbs
			O---150 Lbs	W---PN 10
			X---PN 16	Y---PN 25
			Z---PN 40	

Medium temperature limitation

Type	SC350 Standard Type	SC351 Extension Type	SC352 Cable Type
Tp			
80°C			4
150°C	0	2	
230°C(High-temp type)	1	3	
280°C(High-temp type)	5	6	

※Tp: Medium temperature

Fork length and measurable powder density range

0: 155mm min. $\geq 0.01 \text{ g/cm}^3$

Material and surface roughness

0: SUS316L, $Ra \leq 3.2\mu\text{m}$ 1: SUS316, $Ra \leq 3.2\mu\text{m}$ 2: SUS304, $Ra \leq 3.2\mu\text{m}$

Surface coating material

0: No coating 2: ECTFE 3: PTFE

※The max probe length is 3m

Probe length (unit: mm)

xx: Standard length A0: 9501~10000 mm
05: 500 mm or below A1: 10001~11000 mm
10: 501~1000 mm :
: A9: 18001~19000 mm
95: 9001~9500 mm B0: 19001~20000 mm

SS: Length for special specification

Standard Type: It only supports xx standard length

Extension Type: Max length is 4m

Cable Type: Max length is 20m

ORDER INFORMATION (SC38)

SC38 0

Probe type

0: Standard 1: Extended 2: Ultra Extended

Power & output module

C: 19 ~253Vdc/Vac, 50/ 60Hz
Two Relay output 6A 250Vac/ 6A 28Vdc
F: 10~55Vdc PNP/NPN output
G: 11~36Vdc 8/16mA output

Certification code

0: None 2: Ex ia ex-proof

Conduit specification

0: 1/2"PF 1: 1/2"NPT

Connection

	Dimension		Specification		
Threaded	C--- 3/4"(20A)	H---3"(80A)	Q---PT(R)threaded tub	U---NPT threaded tub	
	D---1"(25A)	I---4"(100A)	R---PF(G)threaded tub	S---Special	
	3---1-1/4"(32A)	J---5"(125A)	T---BSP threaded tub		
Flange	E---1-1/2"(40A)	K---6"(150A)	M---5 kg/cm²	P---300 Lbs	X---PN 16
	F---2"(50A)	S---Special	N---10 kg/cm²	L---600 Lbs	Y---PN 25
	G---2-1/2"(65A)		O---150 Lbs	W---PN 10	Z---PN 40

Medium temperature limitation

Type	SC380 Standard Type	SC381 Extension Type	SC382 Ultra Extension
90°C@85°C Standard type (150°C@50°C)	0	1	2
150°C@85°C High temp. type	3	4	5

※Tp: Medium temp. Ta: Operating temp in ambient air

Material and surface roughness

0: SUS304, Ra≤0.3um 1: SUS304, Ra≤0.8um 2: SUS304, Ra≤1.5um
A: SUS316, Ra≤0.3um B: SUS316, Ra≤0.8um C: SUS316, Ra≤1.5um
D: SUS316L, Ra≤0.3um E: SUS316L, Ra≤0.8um F: SUS316L, Ra≤1.5um

Surface coating material

0: No coating 2: ECTFE 3: PTFE 4: PFA

Probe length (unit: mm)

XX : Standard length 25: 2001~2500 mm
05: Below 500 mm 30: 2501~3000 mm
10: 501~1000 mm
15: 1001~1500 mm
20: 1501~2000mm SS: Length for special specifications

※Extension Type: Max length is 3m

(For other lengths, please consult the sales representative of the company)

OVERVIEW OF THE TX10 ISOLATED SAFETY BARRIER

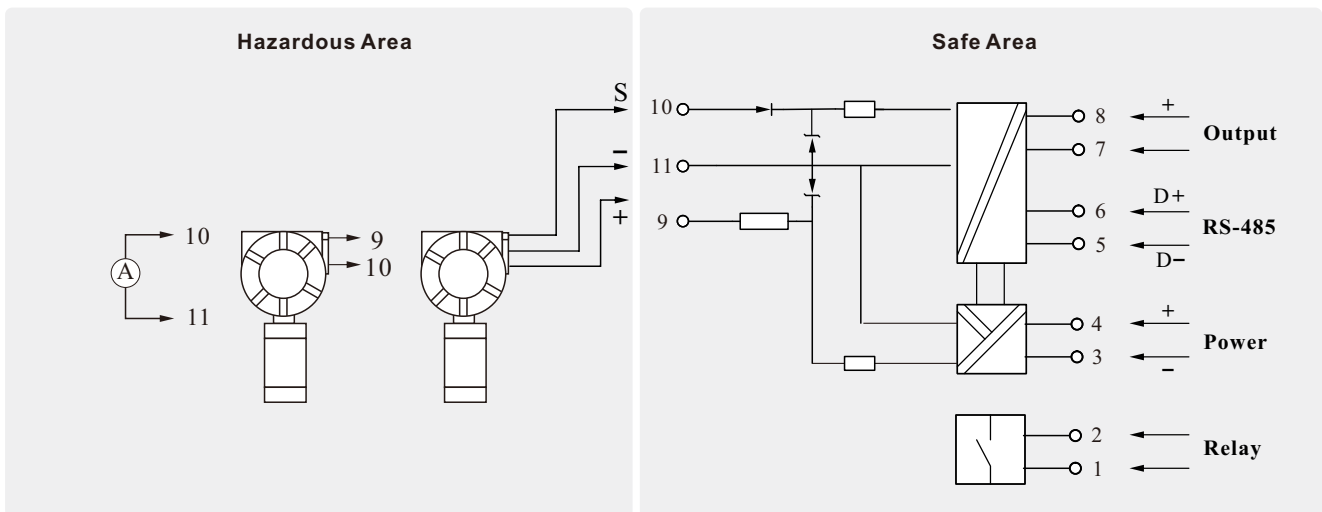
WORKING PRINCIPLE

The barrier is provided to isolate the power supply of the transmitter in the hazardous area, which also isolates and transmits the current signal generated by the transmitter to the safe side. The maximum input is 0~20mA, and the conversion is the analogue output such as 0~20mA/4~20mA/0~5V/0~10V.

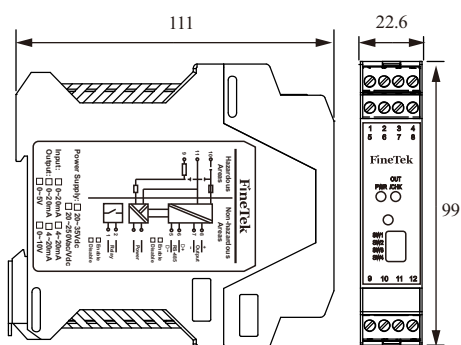
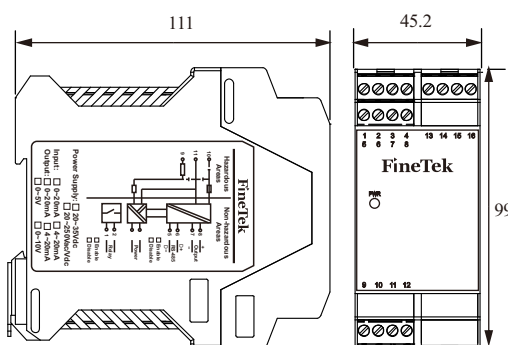
FEATURES

- 1 set of current input can be connected to the current conduction or current output product, and can be applied in the hazardous area.
- The 3 output sets are Relay output, current output and RS485. Simple user interface allows the user to judge the current device status through the LED indicators.
- Different functions can be selected with the DIP switch.
- The settings can be made upon shipment/delivery according to the customer's requirements.
- The self-diagnosis function can detect whether the system works normally any time.
- Set Relay output as Alarm mode, provide the customer with the external alarming device.
- RS485 interface is provided to set the device parameters and read the current power value.
- The new product design conforms to the ex-proof standards.
- The 2 sets of dual-color LED indicators are described as below
PWR LED: Green LED indicates system works normally, while red LED indicates system fault.
OUT/CHK LED: Yellow LED indicates Relay is in operation, while red flashing LED indicates input current error.

WIRING



STANDARD SPECIFICATIONS

Dimensions (Unit:mm)		
Model No.	TX100R	TX101F
Supply voltage	20~35 Vdc	20~250 Vdc/Vac, 50/60 Hz
Power supply protection	Reversed power supply protection	Non-directional input
Power consumption	< 100 mA @24 V, Load 20mA	< 200 mA @24 V, Load 20mA
Hazardous Area		
Current input	0~20/4~20	
Open-circuit voltage	< 28 Vdc	
Distribution voltage	> 15 Vdc (Load 20 mA)	
Safe Area		
Output	Current: 0~20/4~20 mA Load impedance: <550 ohm or Voltage: 0~5/0~10 V Load impedance: <20k ohm	
Reaction time	5 ms (Reach 90% of the final value)	
Transmission precision	0.1 % F.S.,0.5%@<0.3V (20°C)	
Temp. coefficient	< 100 ppm/°C	
Insulation strength	2500 Vac : Leakage current <1 mA : 1min 1. Intrinsically safe end and non-intrinsically safe end 2. Non-intrinsically safe power supply end and output end	
Operating temp. in ambient air	-20~60 °C	
Application environment	Area 0 , Area 1, Area 2, IIA、IIB、IIC T4~T6	
Field equipment	1. Two-wire sensor 2. Three-wire sensor 3. Current output sensor	

ORDER INFORMATION



TX10 ☐☐☐☐☐☐☐☐☐☐☐

Casing and power supply type

- 0R: Wide 22.5mm, 20~35 Vdc
- 1F: Wide 45mm, 20~250 Vdc/Vac 50/60 Hz

Input type

- 2: 4~20mA
- 3: 0~20mA

Output type

- CR - 0: Current output 0~20mA
- CR - 1: Current output 4~20mA
- CV - 0: Voltage output 0~5V
- CV - 1: Voltage output 0~10V
- CRG0: Current output 0~20mA+ Relay
- CRG1: Current output 4~20mA+ Relay
- CVG0: Voltage output 0~5V+ Relay
- CVG1: Voltage output 0~10V+ Relay

Digital output

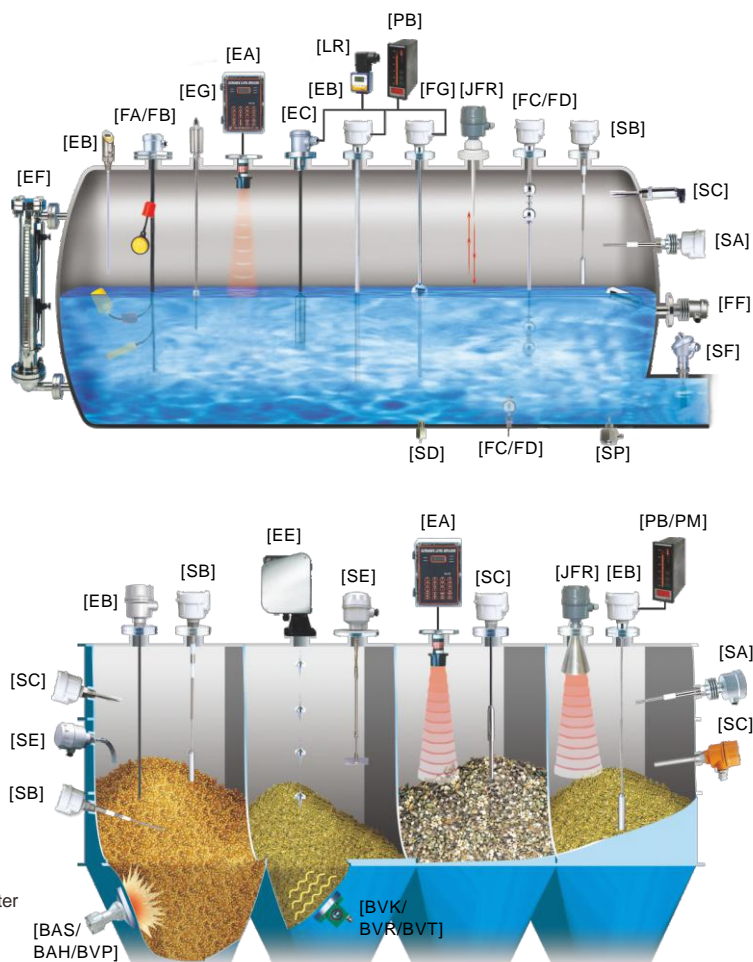
- 0: None
- 3: RS-485

Explosion certification

- EX1:NEPSI

EXAMPLES OF TANK MOUNTING

- [FC/FD] Mini Float/Magnetic Float Level Switch
- [FG] Magnetic Float Level Transmitter
- [FF] Side Mounting Float Switch
- [FA/FB] Cable Float Level Switch
- [SP] Thermal Dispersion Flow Switch
- [SF] Paddle Flow Switch
- [SD] Optical Level Switch
- [SE] Rotary Paddle Level Switch
- [SA] Capacitance Level Switch
- [EC] Pressure Level Transmitter
- [LR] Loop Power Indicator
- [SC] Vibrating Probe Level Switch
- [SC] Tuning Fork Level Switch
- [EB] RF-Capacitance Level Transmitter
- [SB] RF-Capacitance / Admittance Level Switch
- [EG] Magnetostrictive Level Transmitter
- [EF] By-Pass Level Transmitter
- [MEF] Mini By-Pass Level Transmitter
- [EA] Ultrasonic Level Transmitter
- [JFR] FMCW Radar Level Transmitter
- [EE] Electromechanical Level Measuring System
- [ED] Speed Monitor
- [SRT/SRS] Conveyor Belt Misalignment Switch &
Safety Cable Pull Switch
- [PB/PM] Microprocessor Based Bargraphic Display Scaling Meter
- [BRD/AE] Valve and Controller for Dust Collector System
- [BAS/BAH/BVP] Air Hammer
- [BVK/BVR/BVT] Pneumatic Vibrator



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