

Tuning Fork Level Switch





Ekskluzivni distributer za zemlje bivše Jugoslavije: FEED TEC D.O.O.

Svetogorska 22/V, 11103 Beograd, Srbija

TEL: +381-11-3240-422 FAX: +381-11-3244-364 e-mail: office@feedtec.rs http://www.feedtec.rs



PRODUCT INTRODUCTION

WORKING PRINCIPLE

The FineTek tuning fork level switch is suitable level control switch for liquids, sludges, petroleums as well solid level detection of almost any granular, sandy, chip like, powdery, low bulk density materials.

The working principle is based on the changes of vibration frequency of the tuning fork when it comes into contact with a liquid or solid material..

The Tuning fork contains piezoelectric crystals built into the vibration tube that produces vibrations/resonations at specific frequencies. One element acts as a transmitter of the signal and the other receives the signal and converts it to electrical output.

When the fork comes in contact with material the vibration is weakened/dampened and results in frequency change which triggers the switch. It's ideal for applications where: the dielectric constant is low (where capacitance level switches can't be used); when material moisture content changes easily; low viscosity liquids; there is a combination of differing materials in the container/tank.

The tuning fork level switch provides a reliable & maintenance-free means of process control for bulk solids. Easy mounting at almost any angle and calibration procedures will provide reliable functioning and less required monitoring. This device can withstand tough lateral loads and static electricity. Also, it is equipped with a Fail-safe that prevents malfunctioning caused by power shortage.

FEATURE

- Glass window, to review power supply and output directly without having to take off enclosure cover (SC 3 series).
- Dual insulation can reduce damage on PCB board caused by temperature, humidity, and condensation effects.
- Wide voltage supply range 20~250, 50~60Hz Vac/ Vdc.
- SPDT Relay output, SSR MOSFET output.
- No calibration required, easy use, sturdy and durable design.
- High / Low failure safe modes.
- Sensitivity adjustment is abailable for different density of media. Fine power can be detected.
- Suitable for liquid, power, solid applications.

APPLICATION

- Most materials in powder can be measurable, includes the grounded coffee, milk power, chocolate, coal ash, bulk, sugar, salt, wheat, grains, glass debris, plastic pellet, cement
- Sludge level detection in waste water

The SC series detects the min. and max of level in bins, silos and hoppers, filled with powdered materials. The following list shows its applications.

SOLID LEVEL DETECTION

- * Powdered milk
- * Frozen potato chips
- * Beans
- * Sugar
- * Sweets
- * Coffee beans
- * Coffee Powder
- * Tea
- * Salt
- * Flour (in a flour mill)
- * Foundry sand
- * Spices
- * Animal food
- * Pellets

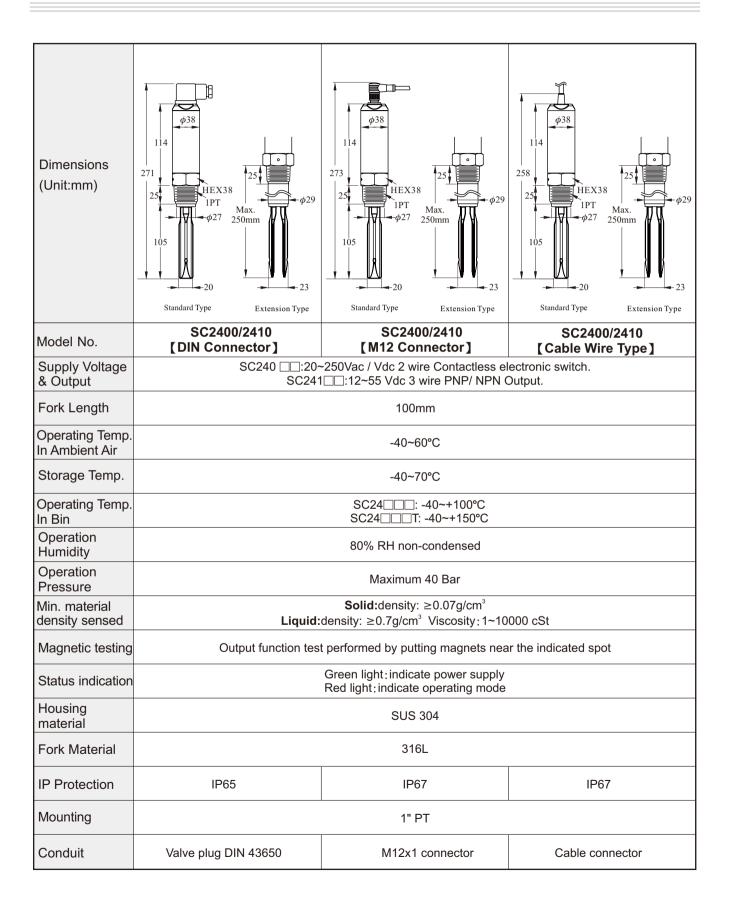
- * Peanuts
- * Tobacco
- * Wood shavings
- * Chalk
- * Stearin chips
- * Powdered cellulose
- * Glass fine power
- * Granular plastics
- * Gravel
- * Powdered clay
- * Polystyrene powder
- * Styrofoam
- * Soda
- * Soot dry

FOR LIQUID

- * Water & Solutions
- * General Purpose Solvent
- * Petroleum
- * Oil
- * Heavy oil

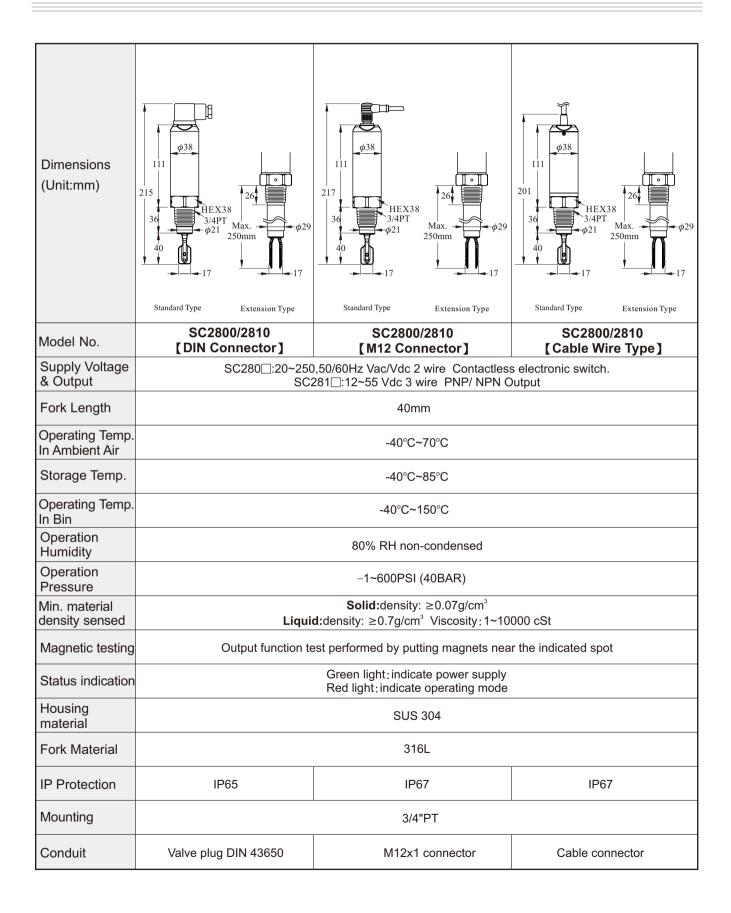
- * Ink
- * Corrosive liquid
- * Cream
- * Drink & Beverage







MINI TUNING FORK LEVEL SWITH





Dimensions (Unit:mm)	108 1/2"NPT 20 1/2"NPT 25 1" PT 427	φ27.2- 250mm~3M φ27- 105	φ113 φ29 1"PT φ27 130~250mm φ27		
Model No.	SC1400 [Standard Type]	SC1410 [Tuning Fork Ultra Extension Type]	SC1420 【Tuning Fork Extension Type】		
Level Sensor Housing		Aluminum / IP65			
Probe Construction	316L				
Mounting	1"PT				
Conduit	1/2"NPT×2				
Max. Vertical load on rod.	177in.Lbs(20Nm)				
Operating Pressure.	-1~600PSI (40BAR)				
Power Supply	20~250,50/60Hz Vac/Vdc				
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/cm³, Liquid: ≥0.7g/cm³				
Time Delay	0.6 Second / Operate; 1~3 Seconds / Reset				
Vibrating Frequency.	350~370Hz				
Selectable Fail-safe	Hi./ Lo.				
Selectable Sensitivity	Hi./ Lo.				



Dimensions (Unit:mm)	φ113 108 107 1/2"NPT	108 1/2"NPT	
Model No.	SC1540 【Corrosion Proof Type】	SC1600 [Sanitary Type]	
Level Sensor Housing	Aluminu	m / IP65	
Probe Construction	316L Coating TEFLON	316L	
Mounting	Flange 1"(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		
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/cm³, Liquid: ≥0.7g/cm³		
Time Delay	0.6 Second / Operate; 1~3 Seconds / Reset		
Vibrating Frequency.	350~370Hz		
Selectable Fail-safe	Hi./ Lo.		
Selectable Sensitivity	Hi./ Lo.		

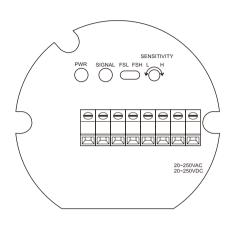


Dimensions (Unit:mm)	108 1/2"NPT 20 105 105	φ27.2 — 250mm~3M φ27- 105 Bx REPS EX		
Model No.	SC1740 [Standard Type]	SC1741 [Tuning Fork Ultra Extension Type]		
Level Sensor Housing	Aluminum / NEPSI Ex d IIC T3~T6 / 🐼 II 2G Ex d IIB T4			
Probe Construction	316L			
Mounting	1"PT	1-1/4"PT		
Conduit	1/2"NPT×2			
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	-40°C~60°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/cm³, Liquid: ≥0.7g/cm³			
Time Delay	0.6 Second / Operate; 1~3 Seconds / Reset			
Vibrating Frequency.	350~370Hz			
Selectable Fail-safe	Hi./ Lo.			
Selectable Sensitivity	Hi./ Lo.			



TERMINAL / SENSITIVITY ADJUSTMENT (SPDT TYPE)

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



TERMINALI FUNCTION

• L+, N-: Power Supply

• NC, COM, No: Relay Output

• RT1, RT2: Remote-Test

• ್ಫ್ : SSR(MOSFET) Output

FAIL-SAFE HIGH / LOW PROTECTION

FSH (Fail-Safe High) Protection:

Switch to FSH mode.

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

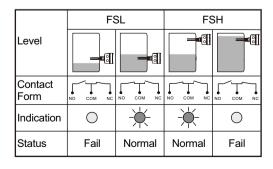
Failure: When the power shuts down, the signal lamp is off. It means that the tuning fork switch is voided and the relay is not conductive.

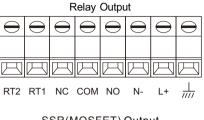
FSL (Fail-Safe Low) Protection:

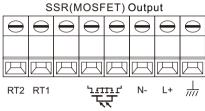
Switch to FSL mode.

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.







PANEL FUNCTION

- 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

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. 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 tip of tuning fork switch.

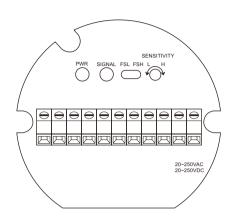
The switching point position will be changed by the sensitivity value. If the sensitivity adjusts to lower value, the switching point position is moving backward; if the sensitivity adjusts to high value, the switching point position is moving forward. The changing range of switching point is about 60mm.

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 case, it is no need for sensitivity adjustment.



TERMINAL / SENSITIVITY ADJUSTMENT (DPDT TYPE)

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



TERMINAL FUNCTION

• L+, N-: Power Supply

• NC1, COM1, NO1: Relay Output

NC2, COM2, NO2: Relay Output

• RT1, RT2: Remote-Test

• 'ಸ್ಟ್ಸ್': 1st SSR(MOSFET) Output 'ಸ್ಟ್ಸ್': 2st SSR(MOSFET) Output

FAIL-SAFE HIGH / LOW PROTECTION

FSH (Fail-Safe High) Protection:

Switch to FSH mode.

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

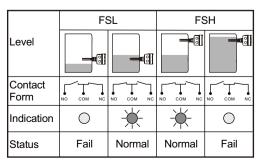
Failure: When the power shuts down, the signal lamp is off. It means that the tuning fork switch is voided and the relay is not conductive.

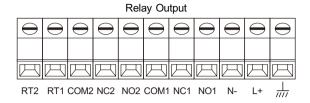
FSL (Fail-Safe Low) Protection:

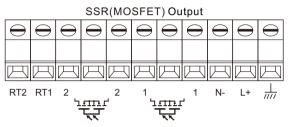
Switch to FSL mode.

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.







PANEL FUNCTION

- 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

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. 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 tip of tuning fork switch.

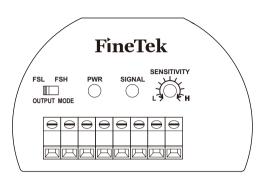
The switching point position will be changed by the sensitivity value. If the sensitivity adjusts to lower value, the switching point position is moving backward; if the sensitivity adjusts to high value, the switching point position is moving forward. The changing range of switching point is about 60mm.

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 case, it is no need for sensitivity adjustment.



TERMINAL / SENSITIVITY ADJUSTMENT (MULTI-FUNCTION TYPE)

SC3400X, SC3410X, SC3420X, SC3450X



TERMINAL FUNCTION

• L+, N-: Power Supply

• NC, COM, No: Relay Output

• RT1, RT2: Remote-Test

• ್ಫ್ : SSR(MOSFET) Output

FAIL-SAFE HIGH / LOW PROTECTION

FSH (Fail-Safe High) Protection:

Switch to FSH mode.

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

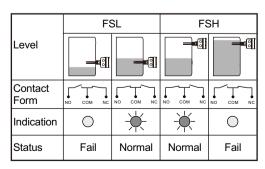
Failure: When the power shuts down, the signal lamp is off. It means that the tuning fork switch is voided and the relay is not conductive.

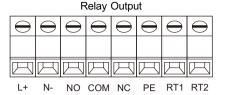
FSL (Fail-Safe Low) Protection:

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.





SSR(MOSFET) Output							
\ominus	\ominus	\ominus	\bigcirc	\ominus	\bigcirc	\bigcirc	\ominus
四	四	因	K	囚	K	K	四
L+	N-	نظر	<u> </u>	NG	PE	RT1	RT2
		1	₹				

PANEL FUNCTION

- 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

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. 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 tip of tuning fork switch.

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. 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 case, it is no need for sensitivity adjustment.



WIRING DIAGRAM DETAILS

SC240X (Two wires) WIRING

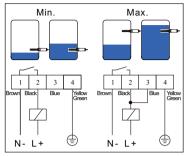
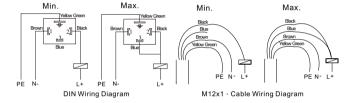


Figure 1 Two wires wiring



Wiring

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

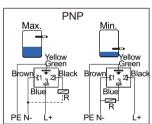
Low (Min.) Mode:

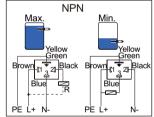
Pin 1 (Brown) is connected to N-. Pin 2 (Black) is connected to L+ with relay. Pin 4 (Yellow Green) connects to tank ground.

High (Max.) mode:

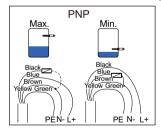
Pin 1 (Brown) is connected to N-. Pin 3 is connected to pin 2 (Black) to L+ with Relay . Pin 4 (Yellow Green) connects to tank ground.

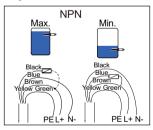
SC240X (Two wires) WIRING





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:

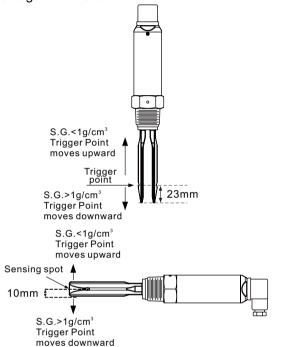
Pin1 (Brown) connects to L+. Pin 2 (Black) connects to N-. To output Pin 3 (Blue) connects to L+ with relay. Pin 4 (Yellow Green) should contact to tank ground.



TUNING AND INDICATION DETAILS

FORK TRIGGER POINT

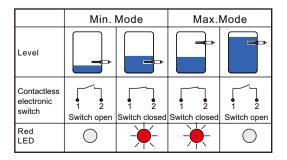
SC2409 fork trigger point is shown as Figure 3 below. The testing medium is water(S.G.=1 g/cm³), and its trigger point is about 23mm from the fork tip. If testing medium with S.G (specific gravity) lower than 1g/cm³ (water), the trigger point would increase. Similarly, the trigger point will downward 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.

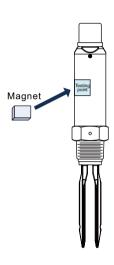
High(Max.) Mode: Tuning fork switch will be active after 3 seconds while the power on. Relay is on NC status and red LED indication is on. When tuning fork covered by testing medium, the vibration stops and relay becomes NO status. Red LED indication is on.



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.

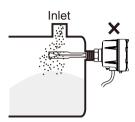
	Min. Mode		Max.Mode	
Level				
PNP/ NPN Output	1 2 Switch open	1 2 Switch closed	1 2 Switch closed	1 2 Switch open
Red LED	0	-	-	0



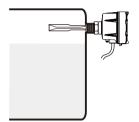
INSTALLATION FOR TUNING FORK

Horizontal Installation:

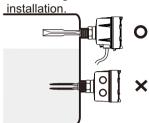
 Can be applied for high viscosity fluid and power Do not install near around material inlet.



2. Wiring port faces downward recommended.

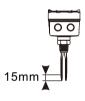


3.Consistence of the wiring port direction and always in downward direction for multi-tuning fork

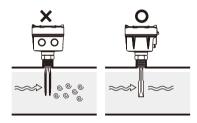


Vertical Installation:

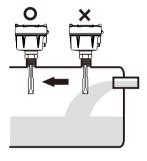
 Depends on the sensitivity tuning, user should note the switching point is triggered around 15mm from the tip of fork.



3. Consistence of the wiring port direction for multituning fork installation

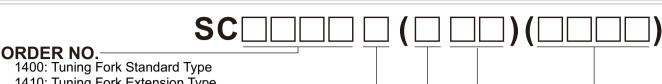


3. Do not install near material inlet.





ORDER INFORMATION



1410: Tuning Fork Extension Type

1420: Tuning Fork Ultra 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

3400: Multi-Function Tuning Fork Standard Type

3410: Multi-Function Tuning Fork Extension Type

3420: Multi-Function Tuning Fork Ultra Extension Type

3440: Multi-Function Tuning Fork Corrosion Proof Type

3450: Multi-Function Tuning Fork Sanitary Type

3800: Multi-Function Mini 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

Multion Funtion version can choose R \(\) N only

MATERIAL (Wetted Part) -

0: SUS304 6: SUS316 L: SUS316L

CONNECTION -

Dimension	Specification		
D1"(25A) 31-1/4"(32A) E1-1/2"(40A) F2"(50A) G2-1/2"(65A) H3"(80A) I4"(100A) J5"(125A) K6"(150A) Sothers	M5kg/cm ² YPN 25 N10kg/cm ² ZPN 40 O150 Lbs Sothers P300 Lbs 9Sanitary QPT RPF(G) TBSP UNPT WPN 10 XPN 16		

LENGTH (L) (UNIT: mm)

0500: below 500mm 1000: 501~1000mm

* 500mm per Unit 1500: 1001~1500mm

We use English letter as first code for probe length over 10m.

Metal 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for probe length over 10m.

We use English letter as first code for problemant of the proble A150 represents 15m, A200 represents 20m. * The Probe Length of SC3800 is Fixed.

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.



ORDER INFORMATION

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

MODEL -

0: Standard 1: Extended

(High temp. 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		
C3/4"(20A)SC28 only D1"(25A) E1-1/2"(40A) F2"(50A) G2-1/2"(65A) H3"(80A) I4"(100A) J5"(125A) K6"(150A) SSpecial	M5kg/cm ² N10kg/cm ² O150 Lbs P300 Lbs QPT RPF(G) TBSP UNPT WPN10	XPN16 YPN25 ZPN40 SSpecial	

PROBE LENGTH (UNIT: mm) -

Max Length: 250mm EX 0205 : 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.

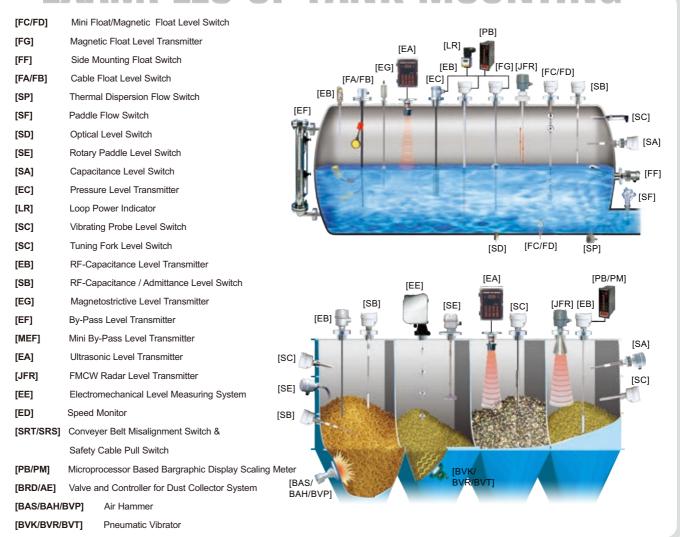
Tolerance of the total product length is±5mm

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

Please contact your nearest distributing office for further information.



EXAMPLES-OF-TANK-MOUNTING







Ekskluzivni distributer za zemlje bivše Jugoslavije: FEED TEC D.O.O.

Svetogorska 22/V, 11103 Beograd, Srbija

TEL: +381-11-3240-422 FAX: +381-11-3244-364 e-mail: office@feedtec.rs http://www.feedtec.rs