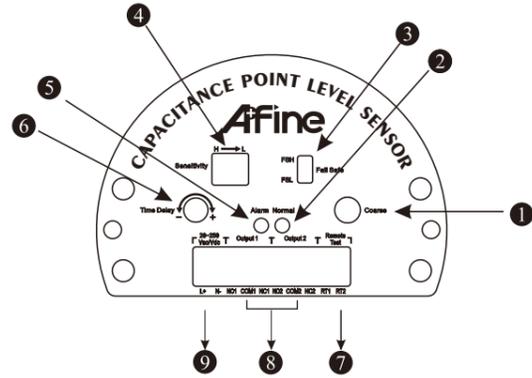


SCL Series Capacitance Point Level Sensor Operation Manual

Operating Principle

The SCL capacitance point level sensor is designed to operate by generating an electrostatic field between the wall of the bin/tank (GND) and the active sensing portion of the probe through the target material, and detecting the change of capacitance within this field caused by the presence or absence of the target material. As the target material approaches the active sensing portion of the probe, the capacitance in the field increases. When the capacitance reaches a predetermined threshold the output circuit of the sensor is triggered and changes state. The SCL capacitance point level sensor is used for high, low and intermediate level monitoring.

Operating Panel



- 1 Coarse: Turn Clockwise – DECREASE sensitivity;
Turn Counter-Clockwise – INCREASE sensitivity
- 2 Normal: Green LED illuminates to indicate SCL unit is in Normal condition
- 3 Fail-Safe: FSH for high level use; FSL for low level use
- 4 Sensitivity: 4 step DIP switch adjustment
- 5 Alarm: Red LED illuminates to indicate SCL unit is in Alarm condition
- 6 Time Delay: Adjust delay time 0~6sec
- 7 Remote Test: Contact closure across RT1/RT2 simulates alarm
- 8 Output 1 / Output 2: Wiring connections for SCL output
- 9 Power Supply: Wiring connections for 20~250Vac/Vdc supply

Fail Safe Function

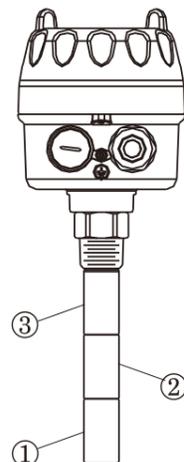
Operation mode	Indicator LED	NPN/PNP Output	Relay Output
FSH	Normal/Green	COM. — N.O.	COM. — N.O.
	Alarm/Red	COM. — N.O.	COM. — N.C.
FSL	Normal/Green	COM. — N.O.	COM. — N.O.
	Alarm/Red	COM. — N.O.	COM. — N.C.

Specifications

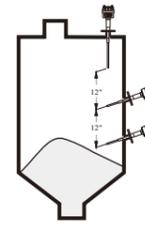
Supply voltage	20~250Vac/Vdc, 50/60Hz
Power consumption	Max.25VA
Output rating	1. ONE Relay Output: 5A@240Vac/28Vdc (Option: TWO Relay) 2. ONE NPN/PNP Output: 400mA@60Vac/Vdc (Option: TWO NPN/PNP)
Fail safe	FSH/FSL
Delay time	0~6sec
Ambient temp.	-40°F~176°F(-40°C~80°C)
Process temp.	-40°F~176°F(-40°C~80°C) (Type A, B, D, G, J, L) -40°F~248°F (-40°C~120°C) (Type C) -40°F~392°F(-40°C~200°C) (Type E, F, H, K)
Pressure	290psi(20bar)
Normal indicator	Green LED
Alarm indication	Red LED
Housing material	Diecast Aluminum (powder coated)
Probe material	Type A, B, E, J, K and L; 304SS/316SS/316LSS Type C; PVDF Coated 304SS Type D; UPE Coated 304SS/316SS/316LSS Type F; PTFE Coated 304SS/316SS/316LSS Type G and H; 304SS
Insulator material	Type A, B, C, D, G, J and L; UPE Type E and H; PEEK Type F and K; PTFE

Structure

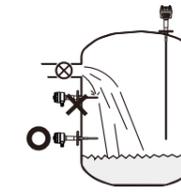
- Active sensing portion: 304SS, 316SS or 316LSS
- Main insulation section: Low dielectric material, e.g. UPE or PTFE
- Grounding section: 304SS, 316SS or 316LSS



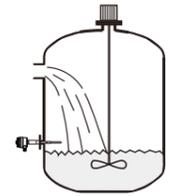
Pre-installation



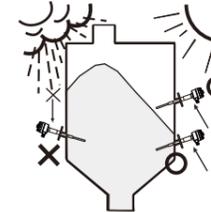
Make sure to observe minimum distance between probes is 12".



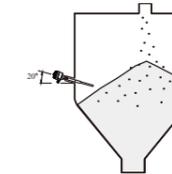
X: Do not mount the level sensor under the filling inlet so it will not be in the path of incoming material.
O: Mount the sensor away from incoming material or use top mount away from fill inlet.



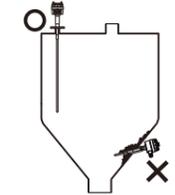
When using the sensor to monitor fluid level when waves exist ensure that the sensor time delay is activated and properly set in order to eliminate nuisance switching action.



X: Incorrect enclosure orientation or loose conduit/cord fitting can cause moisture leaks into sensor and cause damage.
O: Make sure that the conduit entrance is pointed down and all fittings are tight.

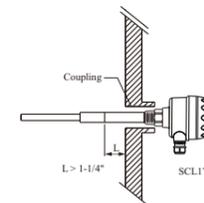


When mounting from the side of the vessel, best performance the sensor should be mounted at a downward angle of 20°. This side mounting orientation reduces the possibility of damage due to inadvertent falling material and optimizes sensitivity and durability.

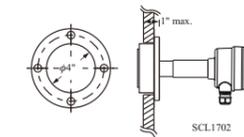


Use top mount installations of low level monitoring for slowly flowing materials.

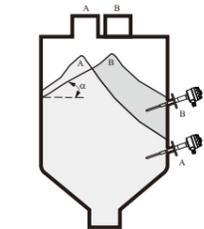
Installation



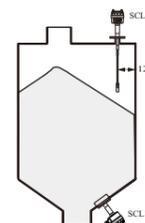
To install SCL1700 standard type probe ensure that a minimum length of 1-1/4" of the insulation section is kept inside of the vessel or else incorrect sensitivity adjustment can occur resulting in false signaling due to a build-up of material in the coupling or sensing of the coupling or vessel wall.



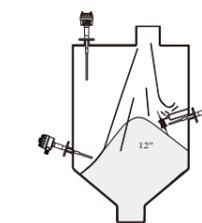
For installation of a Low Profile Type SCL probe please ensure that the maximum vessel wall thickness is 1" or the sensor may falsely indicate material presence due to detecting of the vessel wall.



If the vessel fill inlet is not in the Center of the vessel for a bulk solid material ensure that the material angle of repose, caving and arching is taken into consideration. For best performance the sensor should be mounted at a downward angle that exceeds the angle of repose of the material.



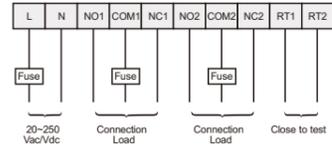
Top mounted cable extended units should be at least 12" or more away from vessel walls. Always consider caving or arching of bulk solid materials when choosing a mounting position relative to the required switching point. The low profile unit can be bottom mounted so long as the mounting allows all material to shed away and off of the sensor.



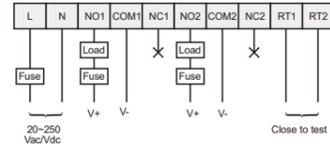
Mount the sensor away from the fill inlet so it will not be in the path of incoming material. Direct falling material can damage the probe. The installation of a protective baffle or shield 8" above the sensor is recommended if the sensor might be exposed to falling material.

Wiring

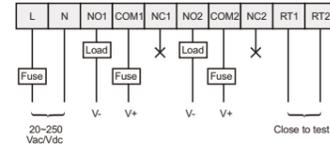
■ Relay:



■ NPN:



■ PNP:



*FUSE: 0.5A recommended for NPN/PNP output

Fuse rating for Relay output should be based on the lower of Load current draw or according to relay maximum current load specification.

Adjusting Time Delay

A potentiometer is provided for setting the "on" time delay between 0~6sec, labeled "-" (minimum) and "+" (maximum). The time delay is the time between when the material is sensed by the SCL capacitance point level sensor and when the relay and LED's change state. There is no delay adjustment for "off" delay.

Simulating Alarm Test

The SCL capacitance point level sensor includes an alarm test function that can be used to check the control function of your level control setup. The test function simulates detection of the target material at the probe and uses terminals RT1 and RT2. To simulate a material detection condition perform the following steps:

1. Set the FSH/FSL Fail Safe switch to the FSH position.
2. Set the coarse adjustment to full counter-clockwise.
3. Set the Time Delay potentiometer to minimum (all the way counterclockwise to "-")
4. Adjust the Sensitivity selection to 1P per Sensitivity Adjustment table.
5. Short circuit terminals RT1 and RT2. Relay contact between COM and NC will be closed, COM and NO will be open. Red alarm LED will illuminate, green will be off. Or, transistor (NPN/PNP output) will be enabled.
6. Open the circuit between RT1 and RT2. Relay contact between COM and NC will be open, COM and NO will be closed. Green LED will illuminate, red will be off. Or, transistor (NPN/PNP output) will be disabled.

Calibration

The SCL capacitance point level sensor is tested and calibrated at the factory before shipment. Adjustment should not be necessary for general operation. If required calibration should be set after the mechanical and electrical installation is completed using the Sensitivity 4 step DIP switch and the coarse adjustment potentiometer (if necessary).

1. Make sure the bin is empty of material before calibrating the SCL sensor.
2. With the sensor powered with 20-250VAC/VDC, 50/60Hz, either the green or red LED will be illuminated.
3. The Sensitivity DIP switch is set with switch 3 ON and switches 1, 2 and 4 OFF (70%; Figure 1); Fail Safe switch is set to FSL. Based on these settings and calibration at the factory the red Alarm LED should be illuminated and the green Normal LED will be off. The NC output contacts should be closed and the NO contacts should be open. Transistor outputs should be enabled. Next, set the Sensitivity DIP switch with 1, 2, 3 and 4 OFF. The red Alarm LED should be off and the green Normal LED should be illuminated. The NC output contacts should be open, the NO contacts should be closed and the transistor disabled. The Sensitivity DIP switches should be set according to the material dielectric constant.

If after the above adjustments the red Alarm LED does not illuminate (material absent with FSL set) then follow the below steps:

1. Set the Sensitivity DIP switch 1-4 to the OFF position as shown in Figure 2.
2. Use a small instrument screwdriver to adjust the coarse potentiometer counter-clockwise until the red Alarm LED is on and the green Normal LED is off.
3. Set the Sensitivity DIP switch 1 to ON and 2-4 to OFF (90%) position (Figure 3). If working properly the red Alarm LED should be on and the green LED will be off. Repeat these steps several times to make sure LED operation is correct.

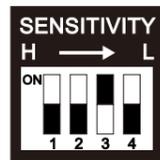


Fig. 1

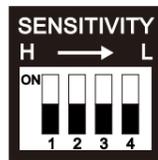


Fig. 2

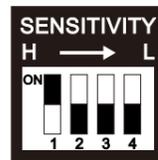


Fig. 3

Maintenance

No periodic or preventive maintenance is required when the SCL capacitance point level sensor is properly applied and installed. Follow the below guidelines for periodic inspection:

1. Clean electrical connection terminals if necessary.
2. Inspect for any broken or damaged parts, replace or repair if necessary.
3. Maintain tight and sealed conduit connections in the proper orientation as previously discussed.

Sensitivity DIP witch Adjustment

Sensitivity Adjustment	4 Step DIP Switch				Adjust Mode
	(1)	(2)	(3)	(4)	
1pF	●				Switch (1) ON ; Switch (2+3+4) OFF
2pF		●			Switch (2) ON ; Switch (1+3+4) OFF
3pF			●		Switch (3) ON ; Switch (1+2+4) OFF
4pF				●	Switch (4) ON ; Switch (1+2+3) OFF
5pF		●	●		Switch (2+3) ON ; Switch (1+4) OFF
6pF	●	●	●		Switch (1+2+3) ON ; Switch (4) OFF
7pF			●	●	Switch (3+4) ON ; Switch (1+2) OFF
8pF	●		●	●	Switch (1+3+4) ON ; Switch (2) OFF
9pF		●	●	●	Switch (2+3+4) ON ; Switch (1) OFF
10pF	●	●	●	●	Switch (1+2+3+4) ON

Example Dielectric Constants

Liquid Material	Dielectric Constants	Performance	Powder/Solid Material	Dielectric Constants	Performance
Water	81	Good	Rice	3	Good
Sulfuric Acid	84	Good	Flour	2.4	Good
Glycerol	37	Good	Corn	1.8	Good
Methanol	30	Good	Milk Powder	1.8	Good
Butanol	11	Good	Talcum Powder	1.8	Good
Ethanol	2.5	Good	Rice Bran	1.7	Good
Edible Oil	2.4	Good	Plastic Pellet	1.5	Good
Diesel Fuel	2.1	Good			
Pentane	1.8	Good			

Aplus Fine
<http://www.aplusfine.com>

Aplus Finetek Sensor, Inc.

California, U.S.

355 S. Lemon Ave, Suite D, Walnut, CA 91789; Tel : 1 909 598 2488

Illinois, U.S.

1741 Industrial Drive, Unit #3, Sterling, IL 61081; Tel : 815-632-3132

Email: info@aplusfine.com