

SAL Series RF Admittance Point Level Sensor

Operation Manual

Operating Principle

The SAL Series is an RF admittance point level sensor comprising an active probe section, guard section and grounding section with insulation sleeves between the sections. The SAL is designed to monitor for the presence or absence of a target material by detecting the change of admittance between the active and grounding sections, which is caused by the change from material presence to absence or the reverse. The SAL Series features automatic build-up immunity which is especially helpful with target materials that are sticky or pack between the vessel wall and the probe. The guard section is used to provide this immunity and is activated with the same RF signal as the active probe section. Since current cannot flow between the same potentials, the guard section effectively blocks the current flow from the active probe through the build-up to the grounding section at the vessel wall. Therefore, the guard section eliminates the sensing of the material build-up, ensuring the accuracy and application reliability of the sensor.

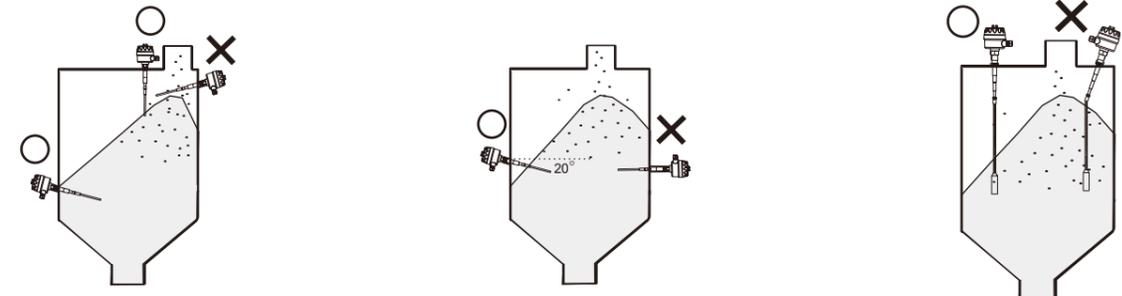
Specifications

Supply voltage	20~250Vac/Vdc, 50/60Hz
Output rating	- ONE Relay Output: 5A @ 240Vac/28Vdc (Option: TWO Relay Output) - ONE NPN/PNP Output: 400mA @60Vac/Vdc (Option: TWO NPN/PNP)
Fail safe mode	FSH/FSL
Delay time	0~30sec
Ambient temp.	-40°F~176°F (-40°C~80°C)
Process temp.	Type A, D and F: -40°F~302°F (-40°C~150°C) Type B and E: -40°F~450°F (-40°C~232°C) Type C: -40°F~842°F (-40°C~450°C)
Pressure	Type A, B, D, E and F: 290psi (20bar) Type C: Ambient
Normal indicator	Green LED
Alarm indicator	Red LED
Power consumption	Max. 15VA
Housing material	Diecast Aluminum (powder coated)
Probe material	Type A, B, C and F: 304SS/316SS/316LSS Type D and E: 304SS
Insulator material	Type A, D, E and F: PTFE Type B: PEEK Type C: Ceramic

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.

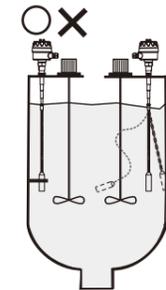
Pre-installation



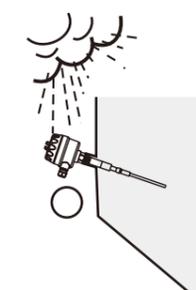
X: Do NOT mount the sensor probe in the path of the incoming material flow
O: For best performance it is recommended to use top mounting for high level and side mounting for low level applications

X: Do NOT mount the sensor probe horizontally
O: For best performance it is recommended to mount side mounted probes at 20° downward angle

X: In top mounted installations, do not install at any angle as this can damage the cable extended probe
O: In top mounted installations mount the cable extended probe plumb

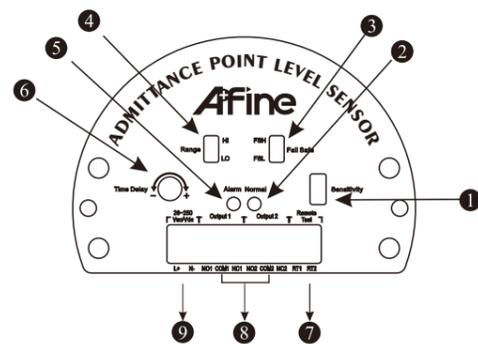


X: Cable extended probes can become tangled with mixing equipment, exercise caution when choosing a mounting location
O: For best performance it is recommended to secure cable extended probes using an insulated bracket



O: When installing any probe make sure the conduit entrances are pointing down to eliminate potential damage to sensor from conduit draining into enclosure or in case conduit is loose

Operating Panel



- Sensitivity: Turn Clockwise – DECREASE sensitivity; Turn Counter-Clockwise – INCREASE sensitivity
- Normal: Green LED illuminates to indicate SAL unit is in Normal condition
- Fail-Safe: FSH for high level use; FSL for low level use
- Range: Sets coarse adjustment for sensitivity, Hi/Lo
- Alarm: Red LED illuminates to indicate SAL unit is in Alarm condition
- Time Delay: Adjust delay time 0~30sec
- Remote Test: Contact closure across RT1/RT2 simulates alarm
- Output 1 / Output 2: Wiring connections for SAL output
- Power Supply: Wiring connections for 20~250Vac/Vdc supply

Pre-installation



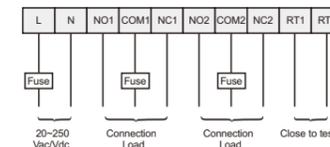
X: Do NOT use enclosure to thread probe into its process connection
O: Thread probe into process connection by the hexagon neck using a wrench

X: Do NOT mount the sensor on a slanting wall like a bin cone section as shown
O: For best performance in low level installations mount the probe in vertical bin walls

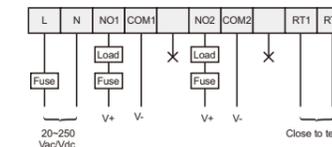
X: Avoid mounting the probe in the direct path of falling material
O: Installation of a protective baffle above the probe is recommended, especially with heavy material or when material might come in contact with the probe from above

Electrical Connection

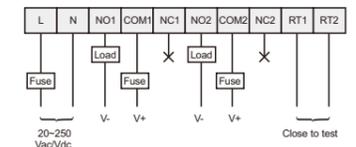
Relay:



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 0~30sec, labeled "-" (minimum) and "+" (maximum). The time delay is the time between when the material is sensed by the SAL RF point level sensor and when the relay and LED's change state. There is no delay adjustment for "off" delay.

Simulating Alarm Test

- Set the FSH/FSL Fail Safe switch to the FSH position.
- Set the Range switch to LO
- Set the Time Delay potentiometer to minimum (all the way counterclockwise to "-")
- Adjust the Sensitivity potentiometer Clockwise until the Green LED is illuminated (Red LED is off), then rotate the Sensitivity potentiometer one full rotation Counter-Clockwise.
- 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.
- 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.

Calibration

The SAL RF admittance point level sensor calibration is set after the mechanical and electrical installation is completed using the Range switch and the Sensitivity potentiometer. The best calibration can be achieved by adjustment with the sensor probe exposed to free air (no material present at or near the probe) and then while exposed to the target material (target material completely covering the probe). However, should this method be too difficult then an alternative method exists where the SAL calibration is adjusted and set with the sensor probe only exposed to air (material not present or near the probe). These two methods are described below.

1. 2-Step Calibration (SAL probe exposed to air and material):

- a. The Range switch should be set based on the target material dielectric constant. If the target material has a dielectric constant ≤ 9.0 then the Range switch should be set to the LO position. If the material dielectric constant is > 9.0 then set the Range switch to the HI position.
- b. Make sure the FSH/FSL fail safe switch is set in the FSH position for the calibration process. This will be adjusted to the correct position for your application after completing the calibration process.
- c. While the SAL sensor probe is NOT covered with material (free in air), rotate the sensitivity potentiometer Counter-Clockwise until the red Alarm LED is illuminated (green LED turns off). NOTE: If the red LED is already on when you apply power to the SAL, then before you begin this process rotate the Sensitivity potentiometer Clockwise one complete rotation past the point where the red LED turns off and the green LED turns on.
- d. Permit the target material to cover the active probe section of the SAL sensor.
- e. While counting the number of complete revolutions, rotate the Sensitivity potentiometer Clockwise until the green LED is turned on and the red LED turns off.
- f. Rotate the Sensitivity potentiometer Counter-Clockwise one-half the number of rotations counted in step e. above. The Sensitivity potentiometer should be at the halfway point between the red LED being off and on (green LED being on and off).
Example: is it takes 2 complete revolutions Clockwise for the red LED to turn off (green LED turns on), then turn the Sensitivity potentiometer 1 full rotation Counter-Clockwise.
- g. This completes the 2-step calibration procedure exposing the SAL probe to both air and then the target material. To place the SAL RF sensor into operation set the FSH/FSL Fail Safe switch to the proper position for your application, e.g. FSH for a high level application (Alarm = material present) and FSL for a low level application (Alarm = material absent).

2. 2-Step Calibration (SAL probe exposed to air ONLY):

- a. The Range switch should be set based on the target material dielectric constant. If the target material has a dielectric constant ≤ 9.0 then the Range switch should be set to the LO position. If the material dielectric constant is > 9.0 then set the Range switch to the HI position.
- b. Make sure the FSH/FSL fail safe switch is set in the FSH position for the calibration process. This will be adjusted to the correct position for your application after completing the calibration process.
- c. While the SAL sensor probe is NOT covered with material (free in air), rotate the sensitivity potentiometer Counter-Clockwise until the red Alarm LED is illuminated (green LED turns off). NOTE: If the red LED is already on when you apply power to the SAL, then before you begin this process rotate the Sensitivity potentiometer Clockwise one complete rotation past the point where the red LED turns off and the green LED turns on.
- d. Reposition the Sensitivity potentiometer the number of revolutions Clockwise based upon the below table. The recommended adjustment shown in the table is a range. You can estimate the exact number of turns by prorating it based on the dielectric constant of the target material. For example, if the material dielectric constant = 2.0 then the adjustment should be approximately 1/3 revolution (since 2.0 is 1/3 greater than 1.5, 2/3 less than 3.0).

Sensitivity	Adjustment	Dielectric	Example Materials
High	0 – 1 Turns	1.5-3.0	Plastics, Soaps, Oils, Rubber, Cement
Medium	1 – 3 Turns	3.1-9.0	Grains, Fertilizers, Feed, Salt
High	> 3 Turns	> 9.0	Wastewater, Slurries, Water-Based Solutions

- e. Depending on your specific application it may be desirable or necessary to reposition the Sensitivity potentiometer according to the procedure for a 2-step calibration with the SAL probe exposed to the target material
- f. Materials with high dielectric constants or conductivity may require further adjustment Clockwise than those with a low dielectric constant or the Range switch may need to be changed from the LO to HI position if you have attempted calibration with the Range switch in the LO position, and the calibration procedure repeated.
- g. This completes the 2-step calibration procedure exposing the SAL probe to only. To place the SAL RF sensor into operation set the FSH/FSL Fail Safe switch to the proper position for your application, e.g. FSH for a high level application (Alarm = material present) and FSL for a low level application (Alarm = material absent).



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