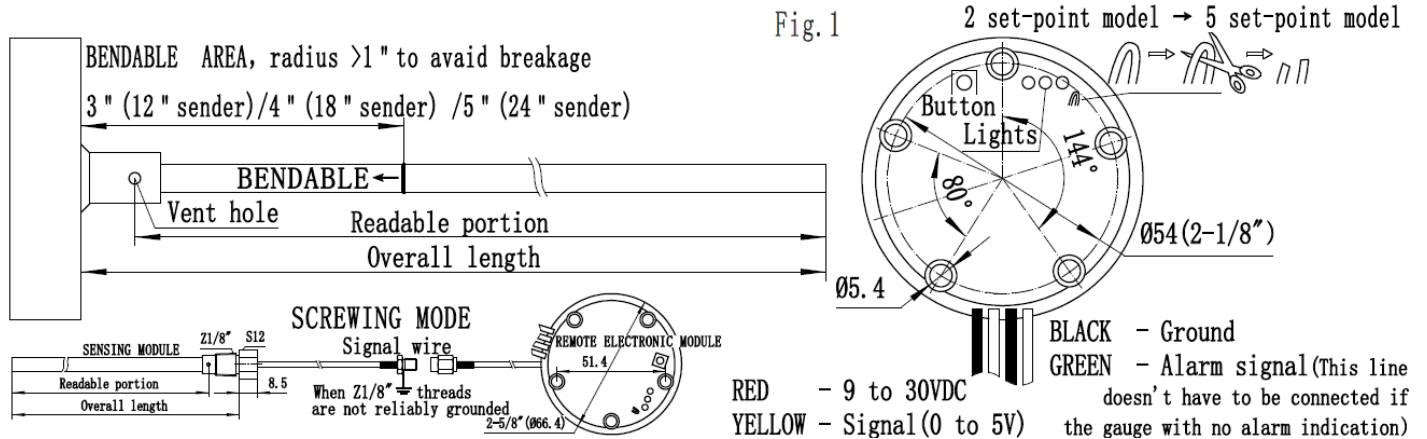


# FUEL LEVEL SENDERS

Please read it before installation or using this sender.

**Note:** Please check and confirm the quality of the fuel level sender before cutting and bending. Senders have been cut or drill or bent or it's leads be cut cannot be exchanged or returned for credit unless they are found to have a manufacturer defect.

Drilled metal shavings and improper bending and water can easily cause shorting of the sensing outer and inner tube. The sender's LED light will have a fault indication when shorted and its output switch between 0V and 1.25V.



## Instructions

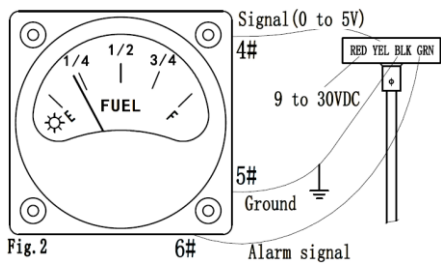
It is a capacitive sender, with high precision and good linearity. It is a best product of various types of fuel level senders. This sender was upgraded in 2018. Since then, the sender has a stronger anti-electromagnetic interference capability, it is not affected by high-frequency radio (distance between the radio antenna and the sender metal rod is more than 0.5 meters away), simple push buttons make calibration easy and accurate.

The sender has 5-hole flange mounting mode (Model SF-F-\*\*) and 2 1/8" NPT pipe thread screwing mode (Model SF-Z-\*\*) (\*\* represents length). There are 12", 18" and 24" three items at flange mounting mode. There are 12", 24" and 48" three items at screwing mode. They are all with alarm output, all can be cut. Flange mounting ones all can be bent. It is suitable for measuring fuel tank depth from 6" to 12" / 18" / 24". It is 2 set point (Empty, Full) at ex-factory setting and can be changed to 5 set-point model in seconds, cut line to get (see fig. 1). 12" item is allowed bend in 3" area (The aluminum outer tube was marked), 18" item is allowed bend in 4" area, 24" item is allowed bend in 5" area. Bend area still has measure function. Note that the bending radius must be greater than 1 inch to avoid breakage.

This senders is suitable for measuring the level of gasoline, aviation gasoline and diesel oil. It is not suitable for measuring the level of conductive liquid such as water.

*We can accept orders of fuel level sender for other length and for other bend area and for other bend site.*

This senders outputs 0 ~ 5V (5V PWM) fuel level signal, are matched with many fuel level gauges such as CFI, SWIFT, UMA, WESTACH etc. It is recommended to priority selection CFI, SWIFT fuel level gauges. There are four items of CFI, SWIFT fuel level gauges, single pointer (tank), dual pointers, single pointer with alarm and dual pointers



with alarm. The sender is set to output a signal when the fuel level reaches a certain level. At this moment, the red LED on the fuel level gauge with alarm indication will light, send a warning signal. Ignore the sender's alarm signal output when the fuel level gauge with no alarm indication is used.

## Pre Installation Preparation

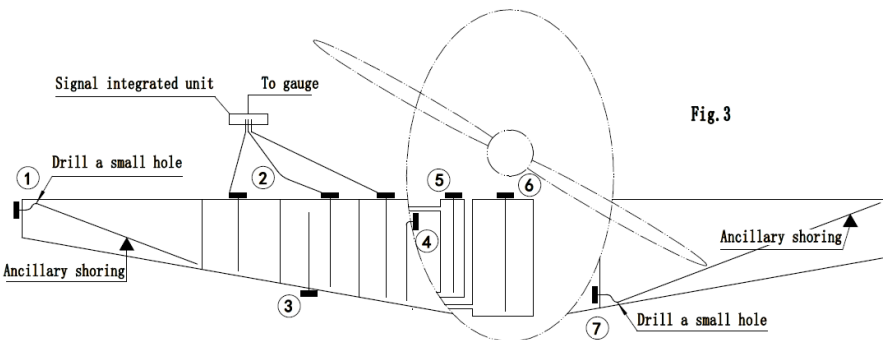
Prepared a 9~30V dc stabilized power supply or battery and a fuel level gauge, attention to power +, -. Put the sender outside the tank. As shown in fig. 2, the red wire of the sender to connect "+" of the power supply, the black wire of the sender to connect "-" (ground), the yellow wire connected to 4# pin of the gauge, the green wire connected to 6# pin of the gauge (This line doesn't have to be connected if the gauge with no alarm indication), 5# pin of the gauge connected to power supply "-". (The fuel level sender can be separately test when without the fuel level gauge.

The sender will perform a self-test sequence when power is applied. The output of the sender will go to full for 1 second and then empty for 1 second. After the self-test a heartbeat will flashes every 2 seconds on the middle light. This allows a visual test of both the gauge and the sender for proper operation.

## Installing location

The sender usually can be installed in several locations as shown in fig.4

② position shows that three senders are installed in the three tanks. Or, numerous (2 to 5) senders are installed into numerous tanks or into different locations of same tank. The



information collected by each sensor is indicated on a single gauge after them is synthesized and averaged by the signal integrated unit.

It is must to drill a diameter of 1/16" (1.6mm) vent hole on the aluminum tube when adopt ①, ⑦ installation position, pay attention to metal chips do not enter into the aluminum tube.

## Measuring

Place the sender in the 1/2 inch hole without the rubber grommet. Allow the aluminum sensing tube to rest on the bottom of the tank. Measure from the bottom of the sender head to the top of the tank. Add 1/2 inch to the measurement or an appropriate value (must be greater than zero). This is the amount to shorten the sender (see fig. 4).

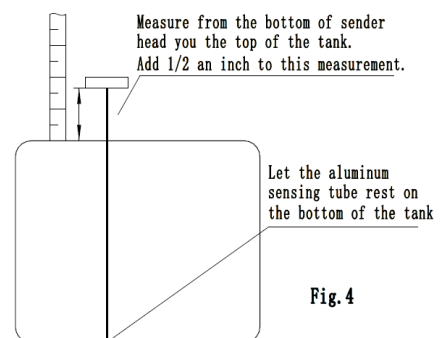


Fig. 4

**Cutting**

Measure from the top of the sender the amount determined, and mark with a felt top marker. Double-check your measurements. Cut senders cannot be exchanged or returned for credit. Senders can be shortened to 6 inches of length measured from the vent hole to the end of the sender. Use a pipe cutter to cut the outer aluminum tube. Do not hold the sender head while cutting. Hold the aluminum tube. This will keep you from cutting too aggressively. The sender head is not designed to take a twisting force. Slide the separated part from the center brass rod. Do not cut the brass rod at this time. You may need to deburr both ends of the cut aluminum tube with a sharp x-acto knife. Do not forcefully remove the separated part. It should slide off easily when de-burred(see fig. 5). There will be one or more exposed plastic spacers. Slide the closest one into the remaining aluminum tube about 1/8 of an inch. Use side cutters to cut the brass tube even with the end of the aluminum tube. There is no need to trim the cut end of the brass tube. The slightly deformed the cut end will keep the spacer from falling out. The brass tube must not be in contact with the aluminum tube.

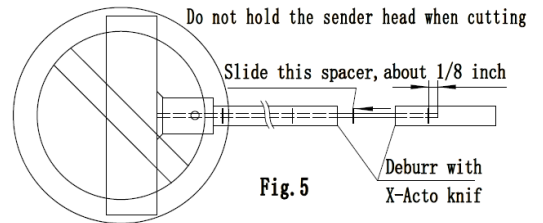


Fig. 5

**Bending (Does not apply to the screwing mode(Model SF-Z - \*\*))**

If the sensing tube need be bended, the model SF-F-\*\* can be bent within the marked area of the aluminum outer tube. Note that the bending radius must be greater than 1 inch to avoid breakage and slowly exert force. It is recommended that you use our special bending tool (see fig. 6). After bending the sensing tube, 5 set-point model should be used.

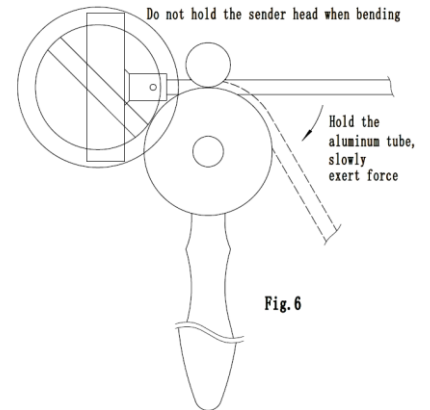


Fig. 6

**Calibration**

The fuel level sender has been pre-calibration on the basis of 2 set point before ex-factory. And the output of the sender is no more than 100mV at Empty, and the output is 5V at Full, we've made the "Full" mark on the tube with a black ring, alarm default at 10% fuel level.

If you satisfy ours pre-calibration, and without cutting, you can installation and use the sender at once. You can also calibrate it according below suggestion.

If you cut sensing tube you must be calibrate sender according below suggestion.

**Note:** You should turn off power when you connect sender with gauge.

Confirm there are not collision and short circuit of inner and outer sensing tube. Water affects the sender giving a reading of full. Gently tapping the sender remove water. Drilled metal shavings and improper bending and water can easily cause shorting of the sensing outer and inner tube. The sender's LED light will have a fault indication when shorted and its output switch between 0V and 1.25V.

The sender reads fuel level linearly from 0 to 100%. Meaning if the fuel level is covering 25% of the sender the output will be 25% of the 5 volt output. If the tank is square then the level in the tank will match the output of the sender and a 2 set-point sender will read linearly. When the tank is not square. 25% on the sender may not match the actual fuel level. This is where a 5 set-point model will linearity the reading. The output is still continuous from empty to full. This sender can be changed to 5 set-point model in seconds, cut line to get (see fig. 1).

Turn on the power, **first electrify the sender for 10 minutes**, and then hold down the button for 10 seconds until the left light flashes(To enter calibration mode), indicating Empty set point. Calibrate Empty first. Place the amount of fuel you want to read Empty in the tank(The front end of the sensing tube can just touch the oil surface or go a little deeper under the oil surface). Hold down the button for 6 seconds until the right light flashes(2 set-point model) or the left light & middle light flashes(5 set-point model). Indicating next set point. 2 set-point model will continue with Full.

5 set-point model will continue with 1/4, 1/2, 3/4 and Full.

Place the amount of fuel that you want to read for the next set point. Refer to table 1. Press the button. Continue until done. After the Full set point has been entered the left & right two lights will on. Short press the button can come into the alarm set mode. If you don't press the button and after waiting for 10 seconds, the alarm level remains the same as before, until the middle light will flashes about every two seconds. This indicates the sender is functioning and outputting fuel level information. If the setting is abnormal (if the fuel level at the late setting is lower than the previous), the three lights flashes alternately, and the setting will be automatically returned to the Empty set point after 6 seconds.

**Alarm Adjustment**

If you select the CFI, SWIFT fuel level gauge with alarm indication, Follow the wiring in fig. 2. Alarm default at 10% Full level before ex-factory. After cutting and bending of the sender, the alarm presetting value does not change much. If you need to calibrate or re-adjust the alarm value, after the Full set point has been entered and in the period of the left & right two lights on for 10 seconds, press the button, then the left & right two lights flashes. Wait for the fuel to adjust into the level you want to read Alarm. Hold down the button for 6 seconds, that three lights on. Then wait that three lights off, enter normal run mode, the middle light will flashes about every two seconds. Up and down the sender slightly adjust the fuel level, watch whether the alarm light on the gauge is on and off freely.

If necessary, adjust the fuel level to re-check each calibration and the alarm levels.

The sender can be recalibrated an unlimited number of times. Calibration can be entered or restarted at any time.

*If the power supply is cut off during calibration settings, the new calibration value is not stored and the sender still working on the old settings after power on. You may need to restart the calibration.*

**Disclaimer**

This fuel level sender is for reference only. The operator is responsible to visually inspect fuel quantities prior to use. Relying solely on a fuel gauge could result in unexpected engine stoppage. Because we does not install the fuel monitoring system. We rely solely on the installer to insure proper installation.

○ Flashing	● Off		
○●●	●●●	EMPTY	Set Point
○●○	●●●	1/4	Set Point
●○●	●●●	1/2	Set Point
●○●	○●○	3/4	Set Point
●●○	○●○	FULL	Set Point
○●○	○●○	ALARM	Set Point

Table 1 Set point modes

○ ON	● OFF	
ALTERNATING		
○●○/●●○	●●○	Short circuit
○●○/●○●	●○●	Set Error
○●○/●○●	○●○	Self-Test failed

Table 2 Error codes

CERTIFICATE OF QUALITY	
DATE:	
NAME OF INSTRUMENT	Fuel Level Sender
MODEL NO.	SF-
SERIAL NO.	
THIS INSTRUMENT HAS BEEN TESTED TO FACTORY QUALITY STANDARDS, AND APPROVED FOR INSTALLATION.	
INSPECTED BY:	
CHANGFENG INSTRUMENTS	