

How to solder wire to FSR sensors

Introduction

Interlink manufactures a range of standard force sensing resistors which have solder tabs attached to allow for connection to the appropriate measurement circuit. FSR sensors are polymeric force sensors and are constructed with thin flexible polymer substrates and PTF materials. The typical temperatures that are generated during soldering operations will damage the sensor if care is not taken in how this done. The following instructions should the necessary guidance to achieve high quality electrical connection using soldering while ensuring the integrity of the sensors is maintained.

Soldering Station Type: It is a good practice to use state of the art soldering Station.

There a various types of Temperature controlled Soldering work stations; for example Weller, Edsyn, Hakko, Oki and other vendors.

We use Metcal OKI PS-900 soldering station, which provides Smart Heat Technology (SHT). The SHT enables the PS-900 to solder at lower temperatures, even for such demanding applications as lead-free soldering processes. This means operators are more productive and materials are safe from damaging temperatures.



Solder type:

We recommend Kester Lead-free solder #58/275 No clean core part # 24-7068-7608, wire size.015.

Lead-free solder melts at 340°C to 370°C (depending on the formula), and takes about 4 seconds to wet. Good bonds are not shiny, and it is harder to visually detect a bad joint, at least at first.

If you use a temperature controlled soldering iron it needs to be set at least to 340°C-370°C (650F-700F)



Lead-Free solder

Flux

optional: lead solder sn63pb37

Notes: Soldering 24ga wire to 402 sensor:

Warning! It does not require much heat transfer to damage the plastic substrate. Extra precaution is required when soldering wires to FSR 400 series sensors or any other type sensor due to plastic meltdown.



1. Soldering irons with Smart Heat technology the temperature is control on contact i.e.. Metcal Oki-PS-900

However with thermostat control temperature is much higher May need to re-adjust temp between 340-370c for fast melting point, therefore precaution is needed to prevent pin meltdown on plastic. We recommend adjusting temperature to where melts solder immediately to prevent too much contact time by transferring to much heat to pin.

We experience melting Lead Free solder at lower temp than 340C/ 640F and noted melting point is not sufficient. Temperature needs to be 340C/640F and above contact not to exceed 1-2 sec at a time to prevent meltdown.

2. Prior to Soldering wires to 402 sensors certain procedure needs to be taken.

Note: Different wire gauges solder easier than others, for example 30ga requires less on time heat than 24gauge wire.

Optional: to customers

Some customers may still prefer to use Tin/Lead solder in U.S. for experimental projects verses Lead free solder. We noted that melting point is a lot less for Lead solder than Lead Free solders, much easier to solder than Lead free solder

For proof of concept samples using Tin/Lead solder sn63pb36 may be preferable to some customer due to lead solder melting point being lot less than Lead Free i.e. Tin/Lead solder melts at 183C -217C vs. Lead-free solder melting point is at 340c.

With most tin/lead solder combinations, melting does not take place all at once. Fifty-fifty solder begins to melt at 183 C -361 F, but it's not fully melted until the temperature reaches 216 C - 420 F. Between these two temperatures, the solder exists in a plastic or semi-liquid state. **The 63/37 ratio, known as eutectic solder has practically no plastic range, and melts almost instantly at 183 C -361 F.**

Preparing To Solder

Tinning the Soldering Tip

Before use, a new soldering tip, or one that is very dirty, must be tinned. "Tinning" is the process of coating a soldering tip with a thin coat of solder. This aids in heat transfer between the tip and the component you are soldering, and also gives the solder a base from which to flow from.

Step 1: Warm Up the Iron

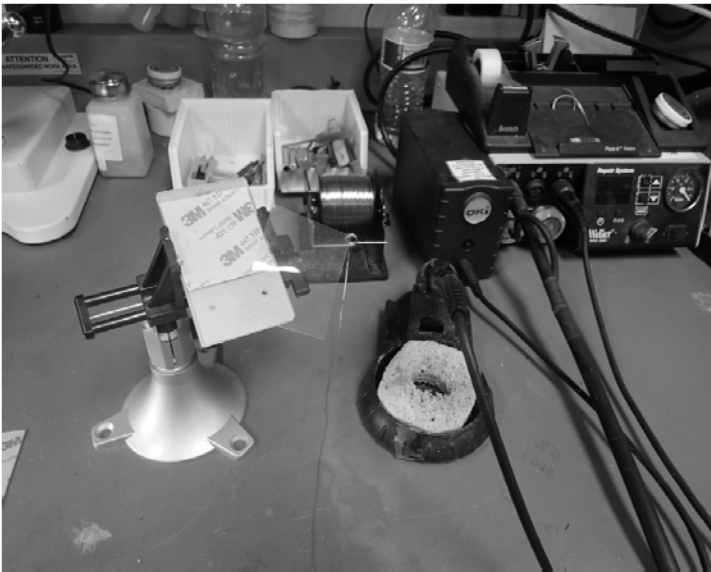
Warm up the soldering iron or gun thoroughly. Make sure that it has fully come to temperature because you are about to melt a lot of solder on it. This is especially important if the iron is new because it may have been packed with some kind of coating to prevent corrosion.

Step 2: Prepare A Little Space

While the soldering iron is warming up, prepare a little space to work. Moisten a little sponge and place it in the base of your soldering iron stand or in a dish close by. Lay down a piece of cardboard in case you drip solder (you probably will) and make sure you have room to work comfortably.

In addition to workstation obtain the following:

- Small vise
- Fixture made of Acrylic or Delran (3 x 85 x 50mm) with 5 mill double sided tape, one side to be taped to plastic and other side to adhere sensor to fixture.
- Additional 10mil plastic is used to cover sensor to prevent solder splash on to tail.



Step 3: Thoroughly Coat the Tip in Solder

Thoroughly coat the soldering tip in solder. It is very important to cover the entire tip. You will use a considerable amount of solder during this process and it will drip, so be ready. If you leave any part of the tip uncovered it will tend to collect flux residue and will not conduct heat very well, so run the solder up and down the tip and completely around it to totally cover it in molten solder.



Step 4: Clean the Soldering Tip

After you are certain that the tip is totally coated in solder, wipe the tip off on the wet sponge to remove all flux residue. Do this immediately so there is no time for the flux to dry out and solidify.



Step 5: You're Done!

You have just tinned your soldering tip. This must be done anytime you replace the tip or clean it so that the iron maintains good heat transfer.

Soldering wires to FSR 400 series sensors or any other sensor:

Step 1:

Cut wire to length. Then strip both ends to .125 / 3mm.



Step 2:

Apply flux to both ends



Step 3:

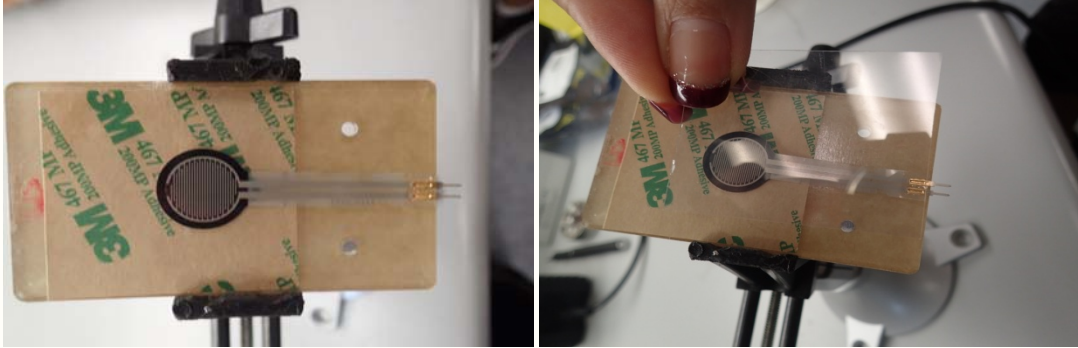
Then pre-tin both pins, afterward make sure tin wire is .120 / 3mm in length same as pin, cut any excess wire.



Step 4:

Place Sensor on fixture with double sided tape, so it sticks to fixture.

- a. For additional pin protection place 5-10mil plastic cover over the pins to keep sensor in place and other solder splash. (Optional)



Step 5: Pre-Tin pins with solder.

Note:

When soldering pins, contact time is very important in preventing meltdown of pin to plastic, apply least amount of minimum contact time 1-2sec at time.

Warning!

With **no-lead solder** full wetting occurs within 4 sec where **lead solder** melts at much lower temperature and lesser time ie 1.4 sec Therefore contact precaution needs to be taken with **no-lead** solder on contact time, too long it will melt pin to plastic. We recommend 1-2 sec, this is the reason we pre-tin prior to making final bond.



Step 6:

Solder wire to Pin.

- a. Start inside of the pin by moving iron to outside of the pin.

Import step is to make solder flow with least amount contact time 1-2 sec at a time to prevent meltdown. For novice Additional flux may be helpful to Accelerate no-lead solder to flow more readily.



Step 7:

Apply 1/8 Heat shrink tubing .250 / 6mm to cover the pins to prevent shorts.



Step 8:

Pre-shrink tubing with Heath Gun, point heat gun away from tail to prevent meltdown.

