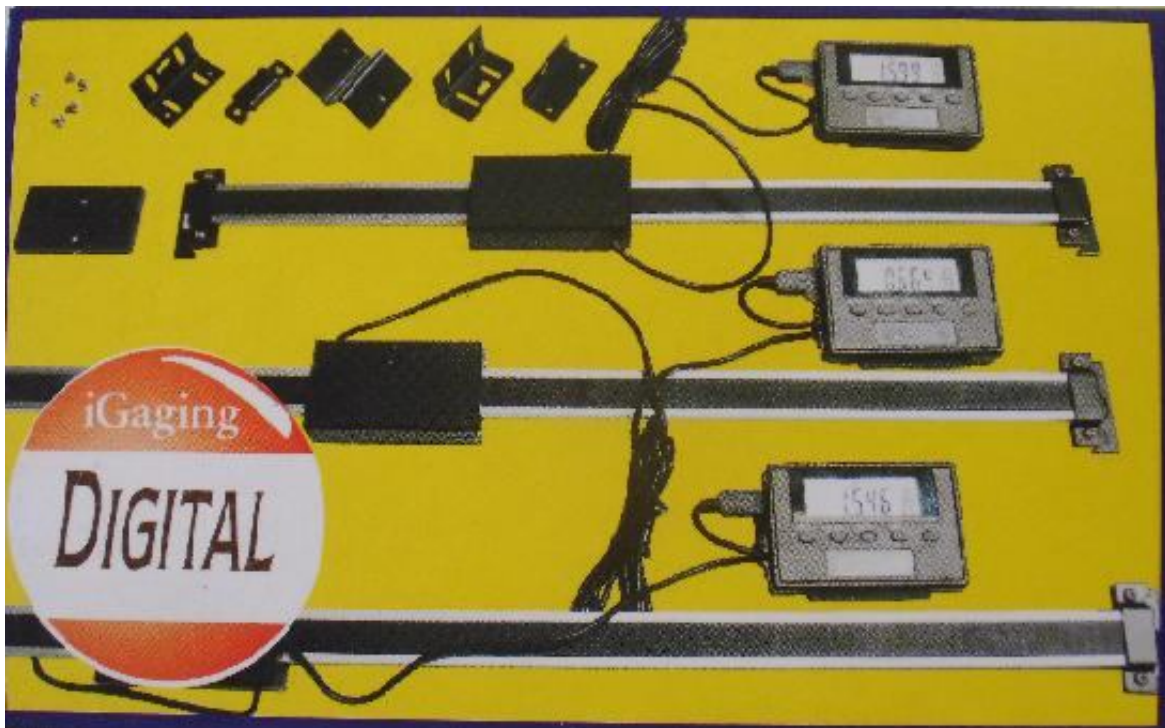


## What is an iGaging DigiMAG Scale?

The iGaging DigiMAG are digital linear scales that are easily connectable to the Caliper2PC interface.



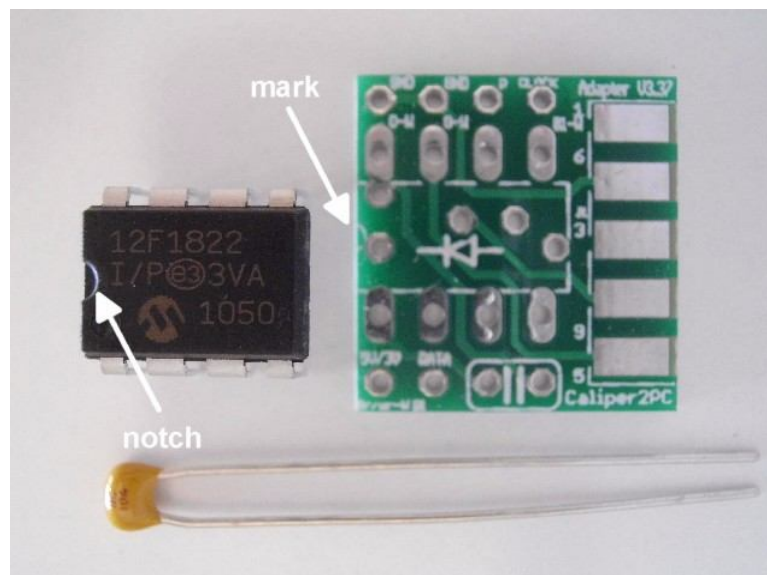
They consist of two parts, the encoder and the readout unit. The encoder unit acts as a slave, providing the data requested by the readout unit (the master). The data is transmitted in 21 bit serial packages. Connecting the scale to the Caliper2PC interface, the readout unit is not needed. To transfer the master tasks and to translate the 21-bit-protocol, the 21BIT Adapter Kit is available. This adapter has to be installed between the scale's encoder and the Caliper2PC interface. The following describes how to build and connect the 21BIT Adapter. The 21BIT Adapter will fit into the scale's encoder case, which will save a lot of wire mess.

## BOM & Tools Needed

- 21BIT Adapter Kit (available at [www.caliper2pc.de](http://www.caliper2pc.de))
- RJ45 patch cable (available at any computer store)
- 1 inch of shrink tube (1.6mm – 3.2mm diameter) or insulating tape
- glue (ideally hot glue) or epoxy adhesive
- soldering iron and solder, as well as copper wire
- optional: 1 (or 2) micro switches
- wire cutter
- small round rasp or a Dremel

## Building the 21BIT Adapter

The 21BIT Adapter Kit contains the adapter PCB, the converter IC and a 100nF ceramic capacitor.



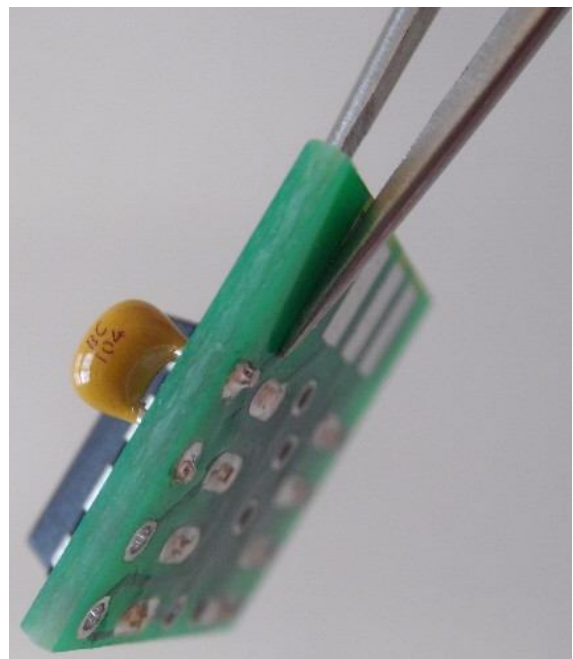
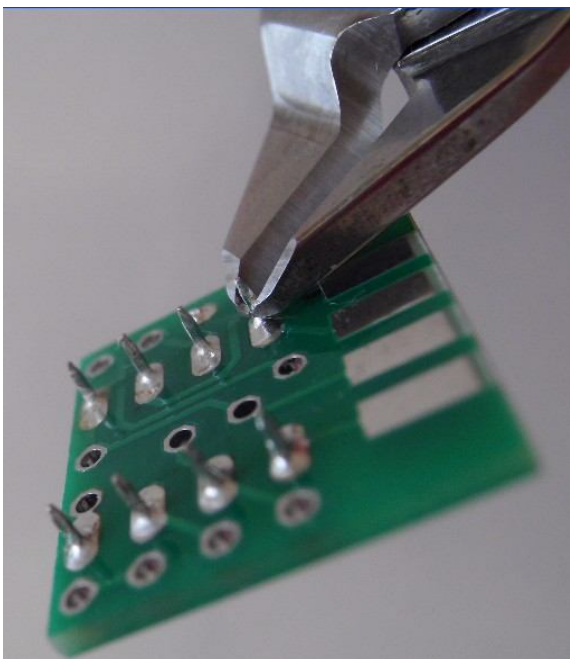
Double check that the IC is mounted in the right direction before the device is soldered (notice the notch and the mark on the PCB).

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Solder the capacitor as shown in the picture:



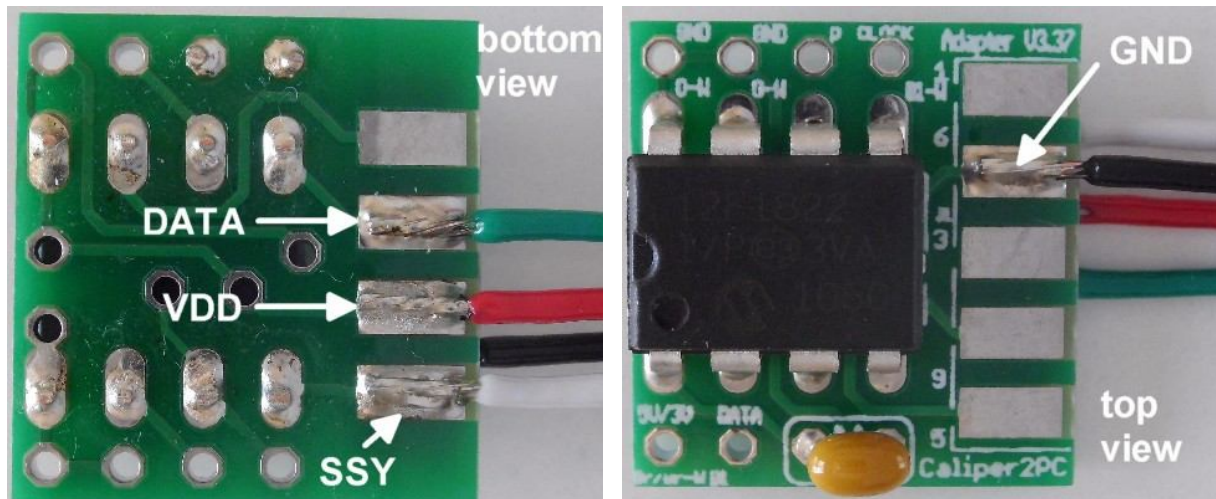
After the components are soldered, cut the components' leads with a wire cutter.



## Solder Cables to the 21BIT Adapter

The wires that will connect between the 21BIT adapter and the scale are soldered first. The cable colors on the following pictures correspond to the 5 pin mini-USB standard. The following color assignment is used:

- VDD = red
- SSY = white
- DATA = green
- GND = black



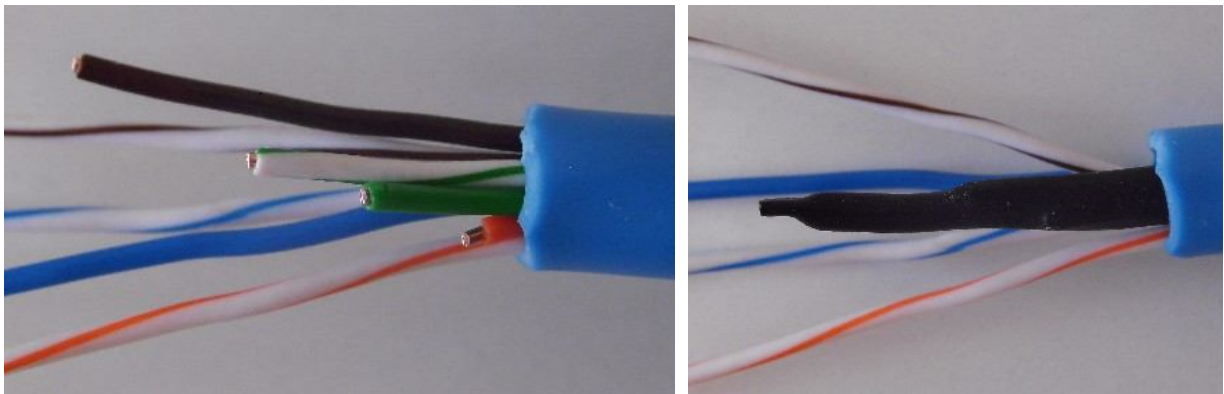
In the next step the RJ45 patch cable for connecting the 21BIT adapter to the Caliper2PC interface will be prepared. Cut one of the connectors from the Patch Cable with the desired cable length and then remove about 2 inches of the cable sheath from the cut end. The following 4 wires of the patch cable are needed:

- Brown / White = +3V
- Orange / White = GND
- Blue / White = CLOCK
- Blue = DATA

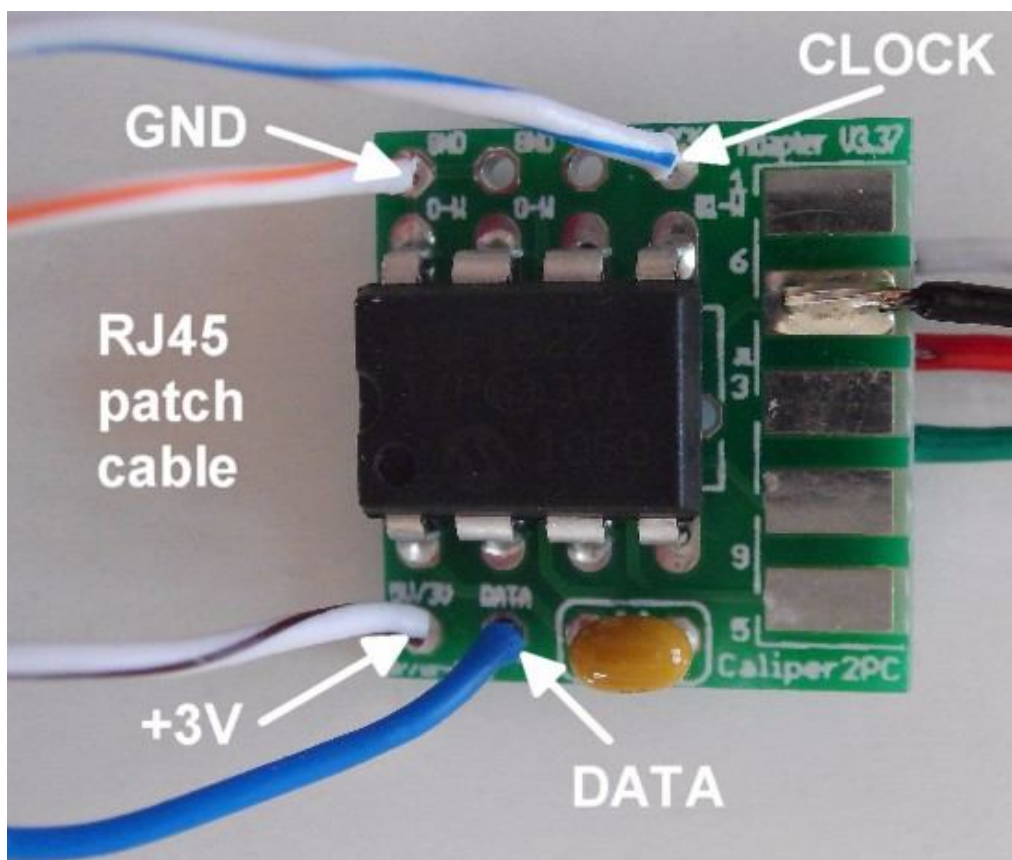
## Connecting iGaging DigiMAG Scales to the Caliper2PC Interface – A step by step Guide



The other wires (green / white, green, orange, brown) are not needed and must be cut (in different lengths see pictures below). The cut wires must be insulated with a shrink tube or insulating tape, to avoid short circuits.



Solder the 4 wires of the patch cable to the 21BIT adapter according to the pin assignment.

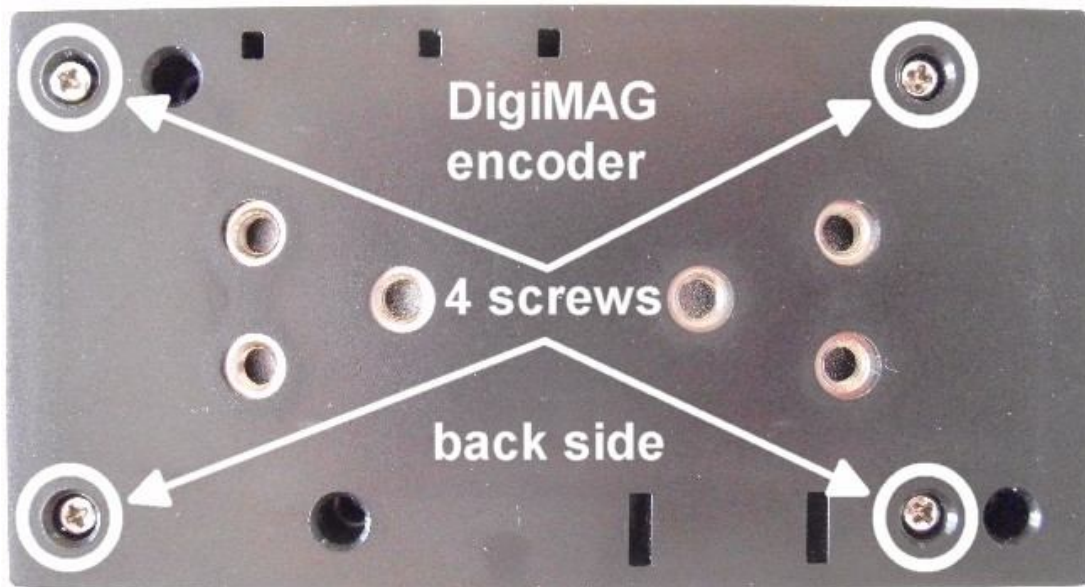


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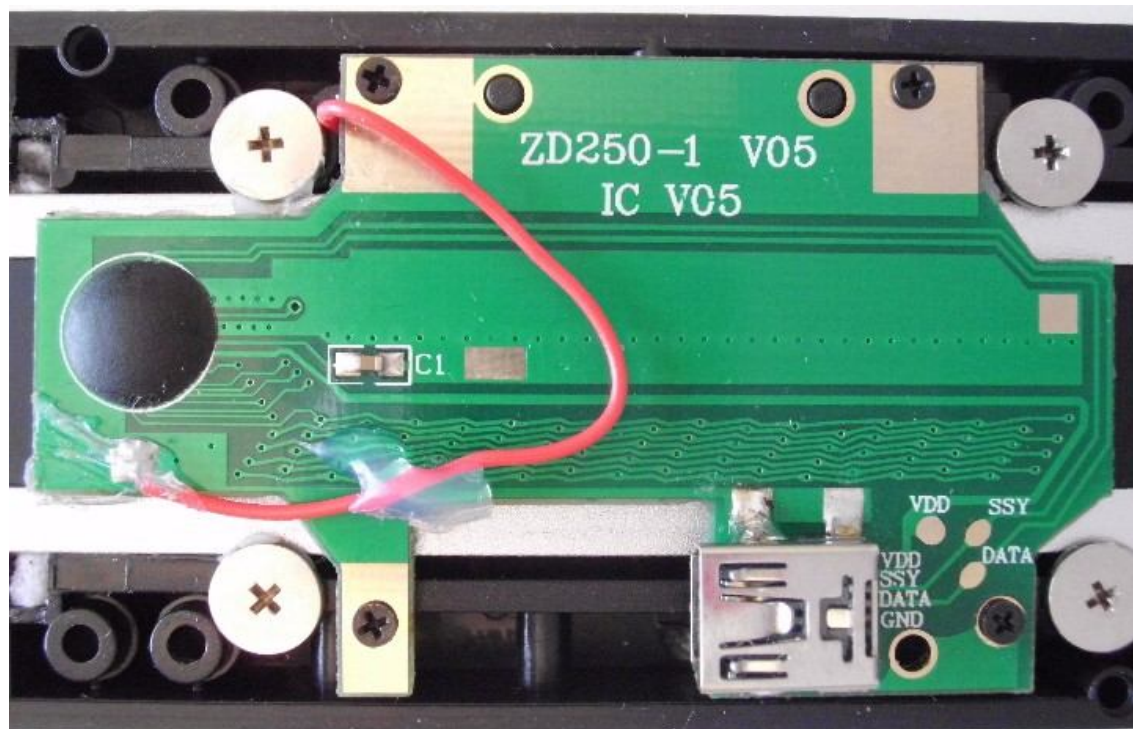
[www.caliper2pc.de](http://www.caliper2pc.de)

## Opening the DigiMAG Encoder

Remove the 4 screws on the back side of the encoder enclosure and then remove the cover.

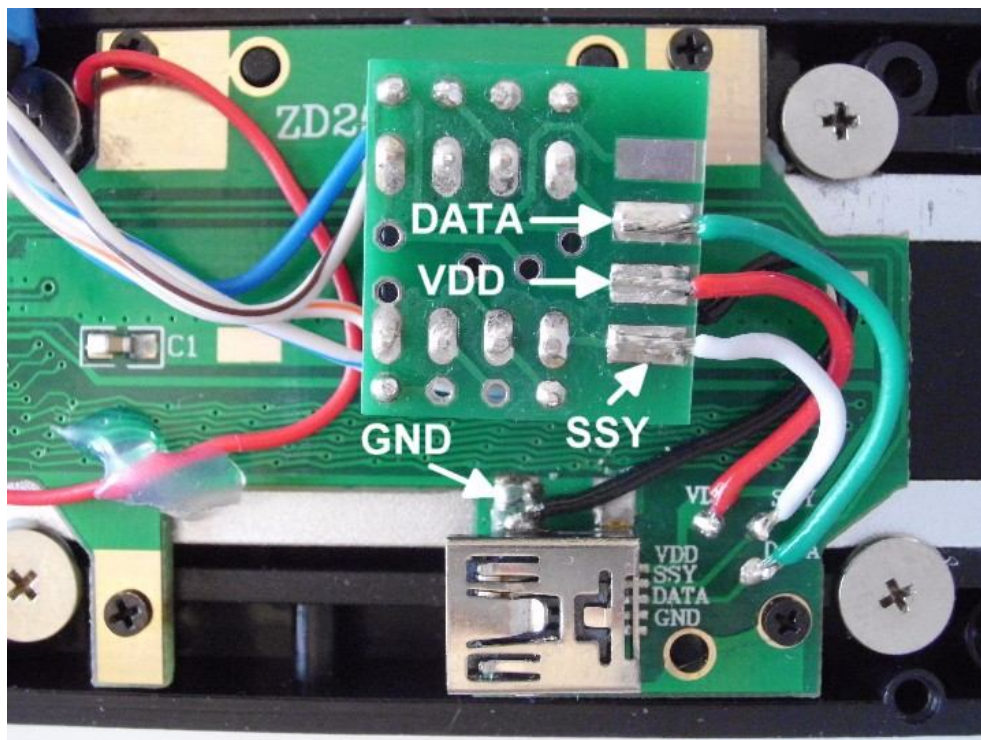


Unplug the USB cable from the Mini USB socket (it is not needed anymore).

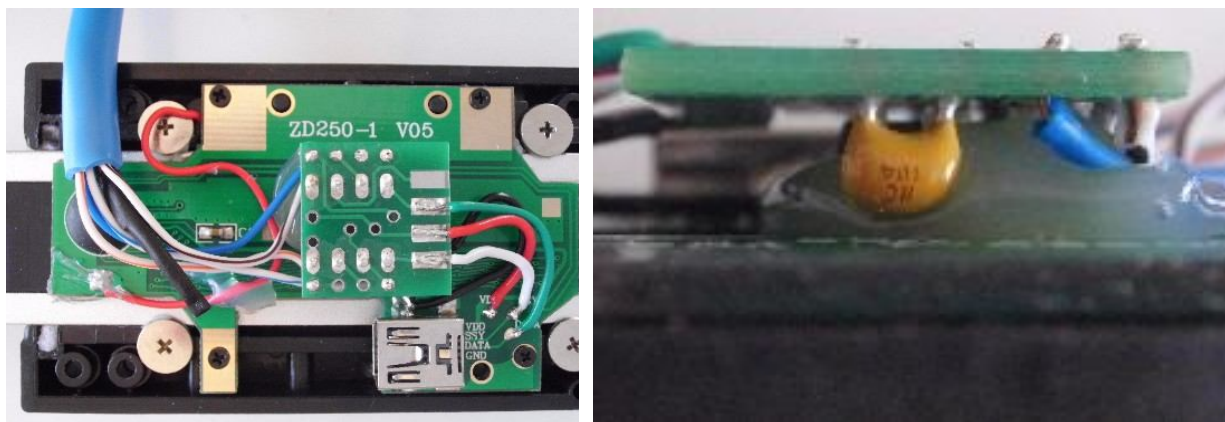


## Attaching the 21BIT Adapter to the Encoder

Solder the adapter's wires (red, white, green and black) to the encoder PCB according to the pin assignment seen on the picture below. The black GND cable must be soldered to the Mini USB socket's solder tail. The socket's body and the scale's metal beam are connected to GND.

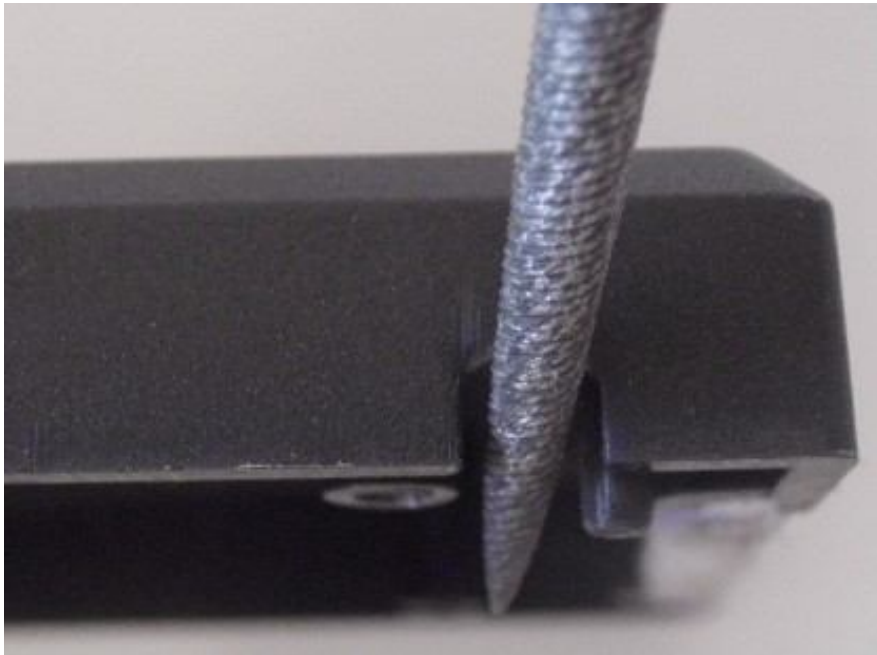


Secure the adapter on the encoder PCB with hot glue or with epoxy adhesive.

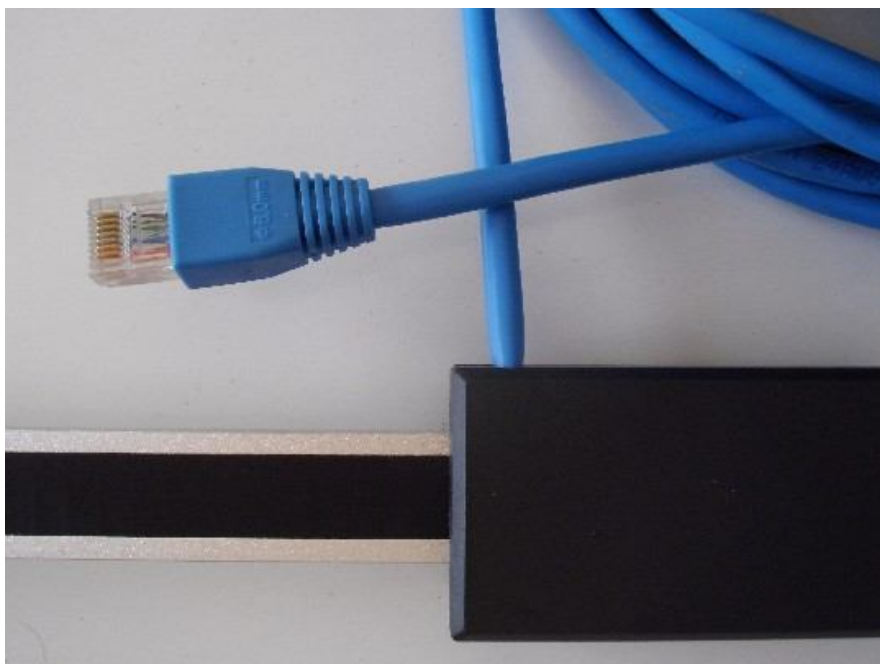


## Closing the DigiMAG Encoder

Enlarge the top cover's hole for the RJ45 patch cable with a small round rasp or a Dremel.



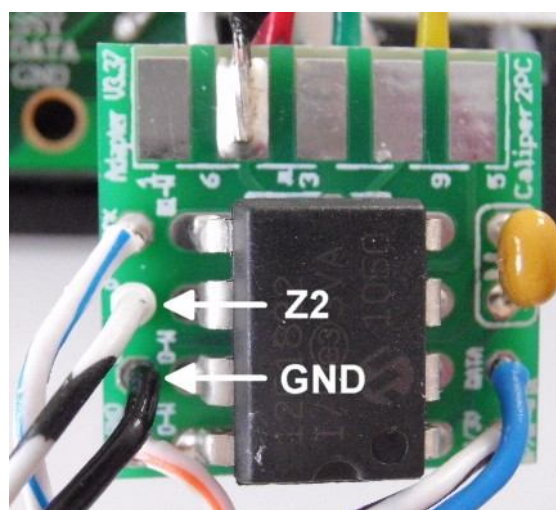
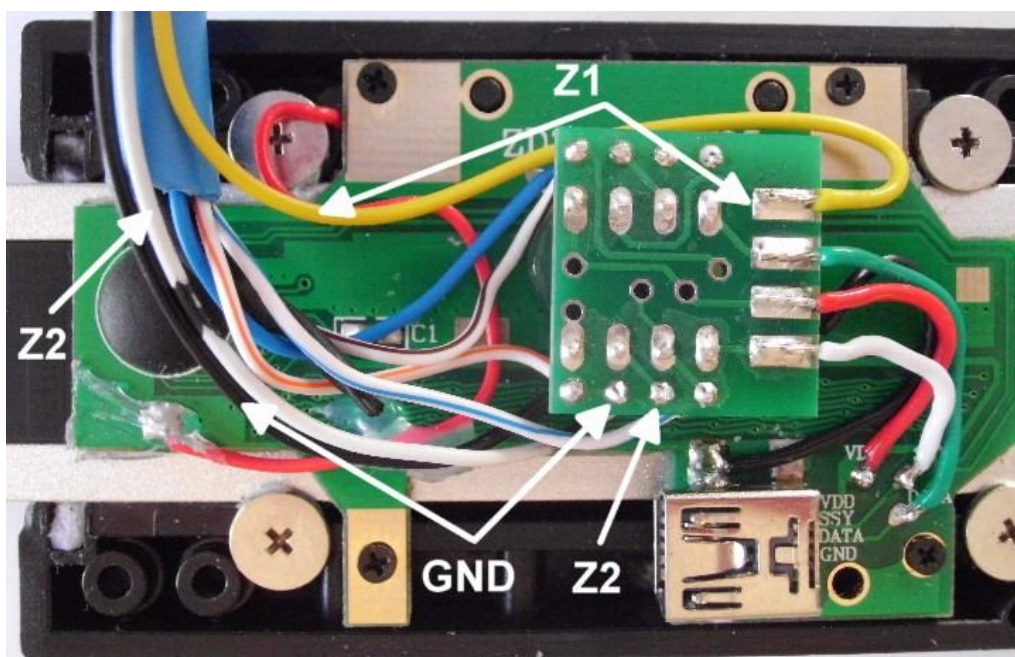
Reinstall the encoder enclosure's cover.





## Additional Features of the 21BIT Adapter

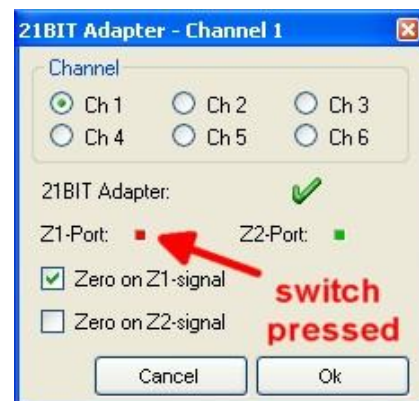
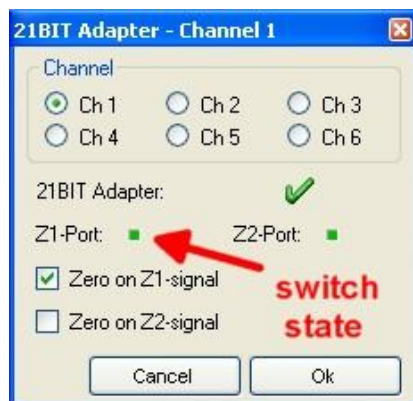
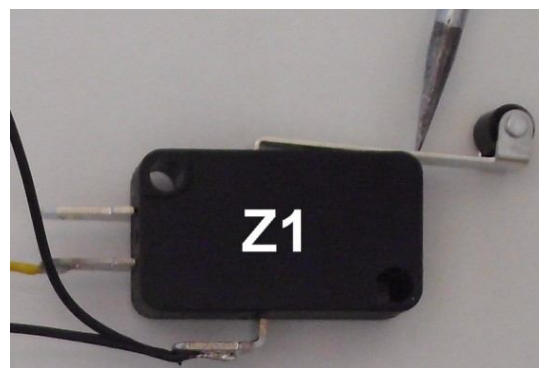
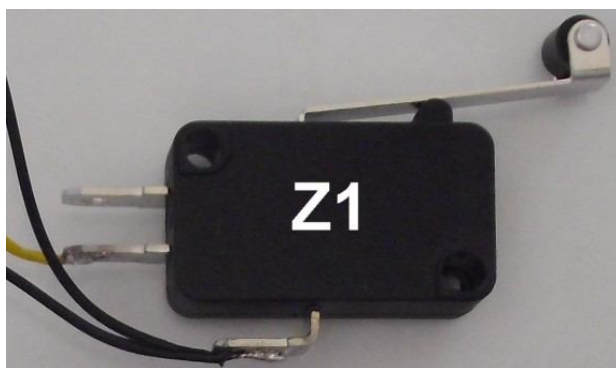
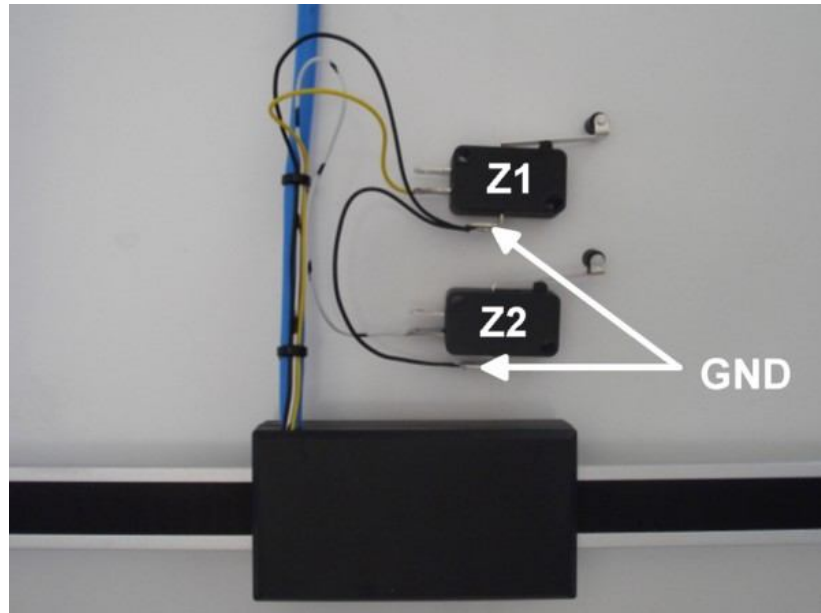
In addition to its functionality as a signal converter the 21BIT adapter possesses 2 input ports (Z1 and Z2). They can be used for connecting home switches, limit switches, edge finder, or a tool length sensor. The input ports are active low and can be triggered by switches when connecting to GND. The switch states are recognized and processed in the Caliper2PC software. To connect switches to the 21BIT adapter 3 wires must be soldered according to the pictured pin assignments.



# Connecting iGaging DigiMAG Scales to the Caliper2PC Interface – A step by step Guide



The black GND cable is connected to both switches.

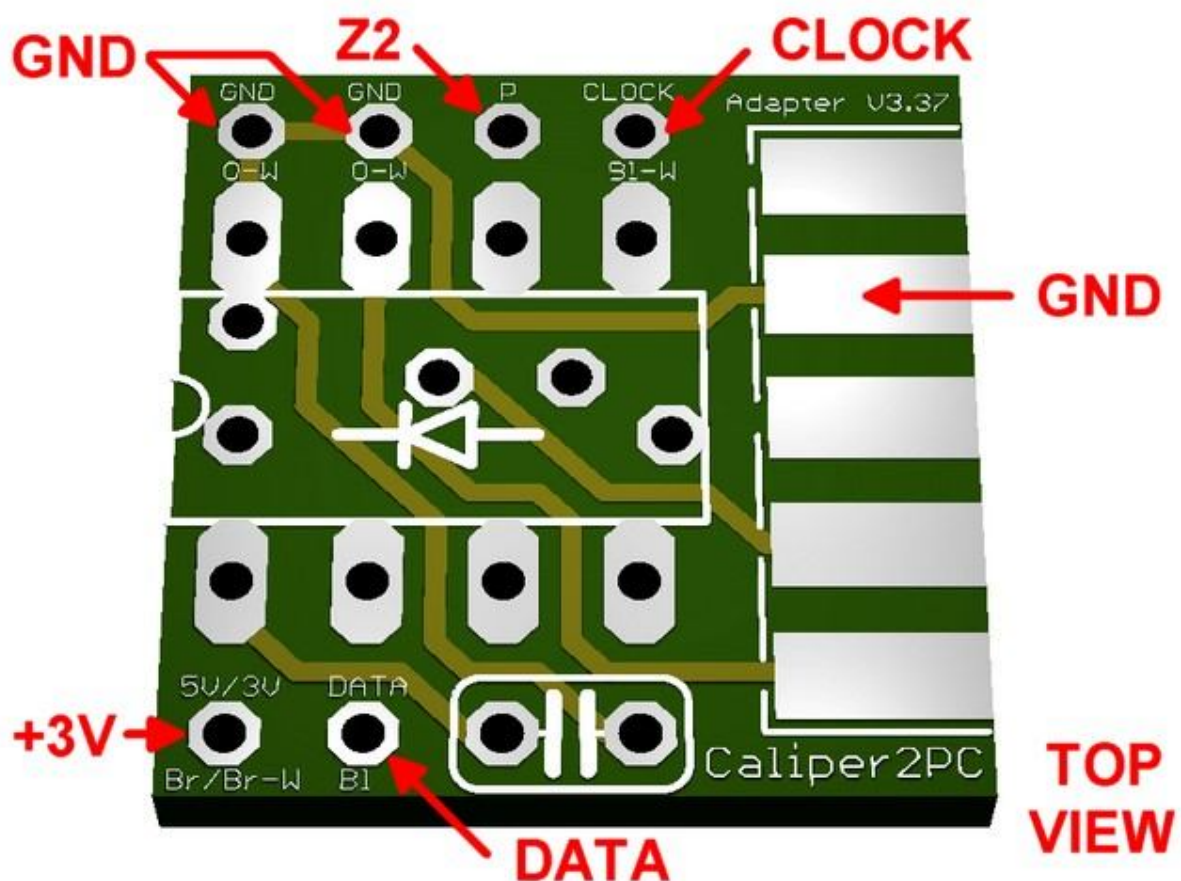


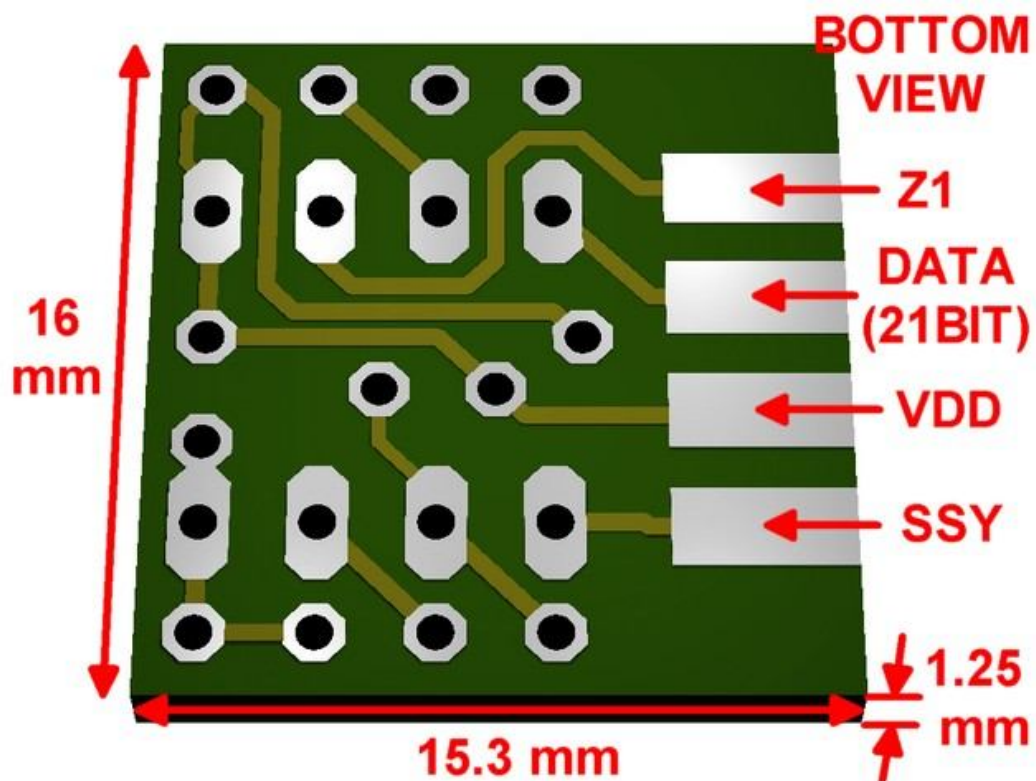
The yellow cable is connected to the 21BIT adapter's Z1 port. The pictures above show the "open state" and the "closed state" of the Z1 switch. The switch state is detected by the Caliper2PC software and can be used to automatically reset the DRO. The path to the 21BIT adapter window in the Caliper2PC software is:

"Input" -> "Settings" -> "21BIT Encoder"

In the 21BIT adapter window the channel the 21BIT adapter is connected to must be chosen.

## Data Sheet 21BIT Adapter PCB





## Signals to Caliper2PC (RJ45 Patch Cable)

- +3V (Brown / White) Pin 7
- GND (Orange / White) Pin 1
- CLOCK (Blue / White) Pin 5
- DATA (Blue) Pin 4

## Signals to DigiMAG Encoder

- VDD
- SSY
- DATA (21BIT)
- GND
- Z1 (optional)
- Z2 (optional)

PCB Measuring (Inch)	Length	Width	Height
	0.630	0.602	0.049