

Mitutoyo Digimatic Devices

Mitutoyo is one of the world's leading manufacturers of precision measuring equipment, offering a huge range of professional products from micrometers, calipers to dial gauges. Many Mitutoyo devices possess a data interface using their own Mitutoyo Digimatic 52 bit protocol. These devices, as well as original data cables, are available all over the world.

Mitutoyo Digimatic devices with 52 bit protocol can now be connected to the Caliper2PC interface through a newly developed adapter.



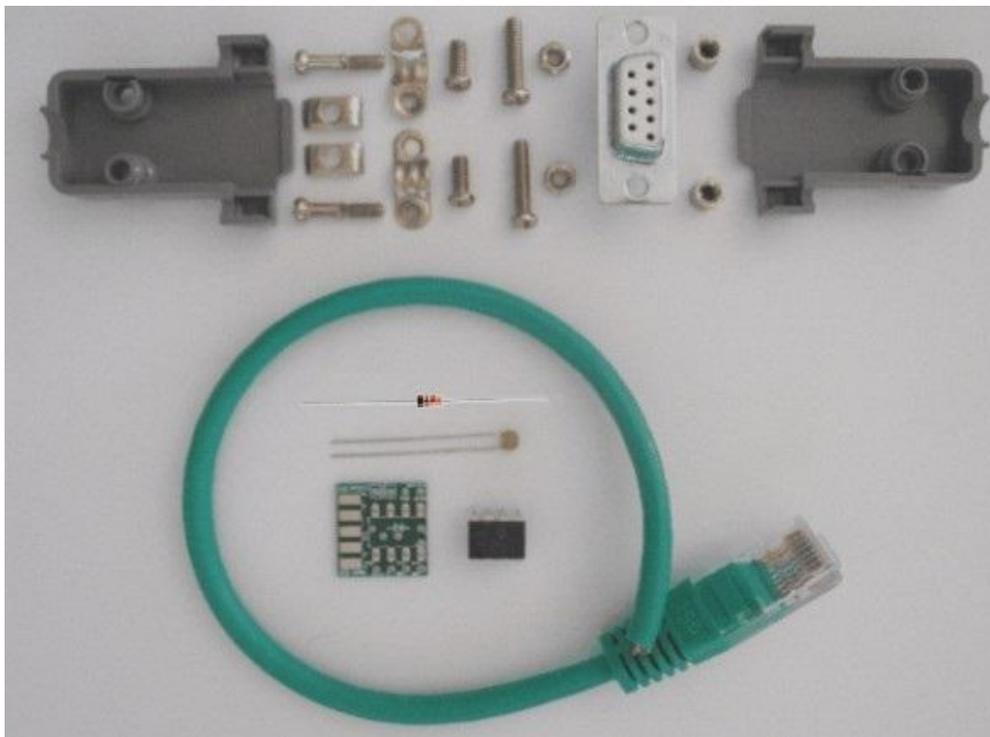
The MIT52 adapter kit for Mitutoyo Digimatic devices contains a 9D-SUB connector, the RJ45 patch cable for the Caliper2PC interface as well as the electronics for the 52 bit protocol converter. The adapter's PCB is designed to fit into the 9D-SUB connector. The MIT52 adapter has to be installed between the Mitutoyo measuring device and the Caliper2PC interface. In the following will be described how to build and connect the MIT52 adapter.

BOM & Tools Needed

- MIT52 Adapter Kit (available at www.caliper2pc.de)
- connector 10 pin header straight (available at www.digikey.com)
- prototype board perforated material 0.1" (2.54mm) grid for the panel
- 1 inch of shrink tube (1.6mm – 3.2mm diameter) or insulating tape
- wire
- soldering iron and solder
- wire cutter

Building the Adapter

The MIT52 adapter kit contains the adapter PCB, the converter IC, a diode and a 100nF ceramic capacitor as well as the 9D-SUB connector and the RJ45 patch cable.



First solder the components to the adapter PCB as shown in the picture. Please 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).



After the components were soldered, cut the capacitor's leads with a wire cutter.

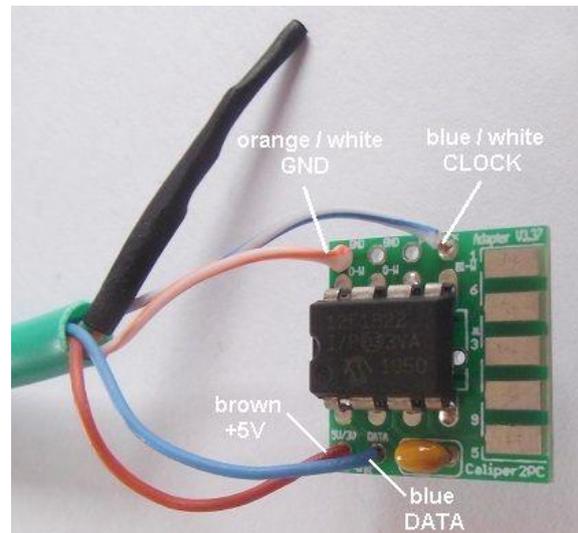
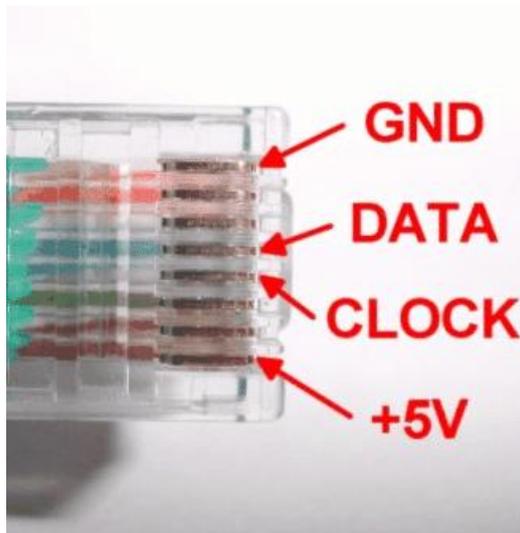
Connect the Patch Cable to the MIT52 Adapter

In the next step, the RJ45 patch will be prepared. Dismantle the outer sheath (about 1 inch). Please keep the dismantled outer sheath. It will be needed later on.

The following 4 wires of the patch cable are needed:

- Orange / White = GND
- Blue = DATA
- Blue / White = CLOCK
- Brown = +5V

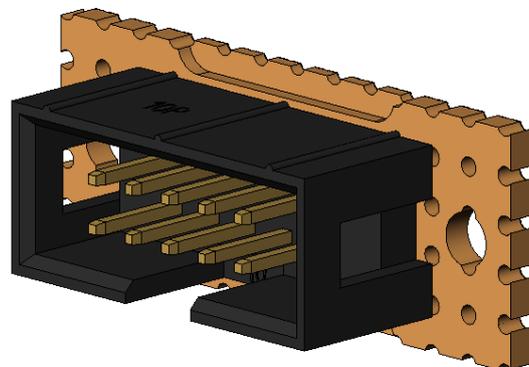
The remaining wires (green / white, green, orange, brown / white) are not needed and must be cut in different lengths. The cut wires must be insulated with a shrink tube or insulating tape (see picture below), to avoid short circuits.



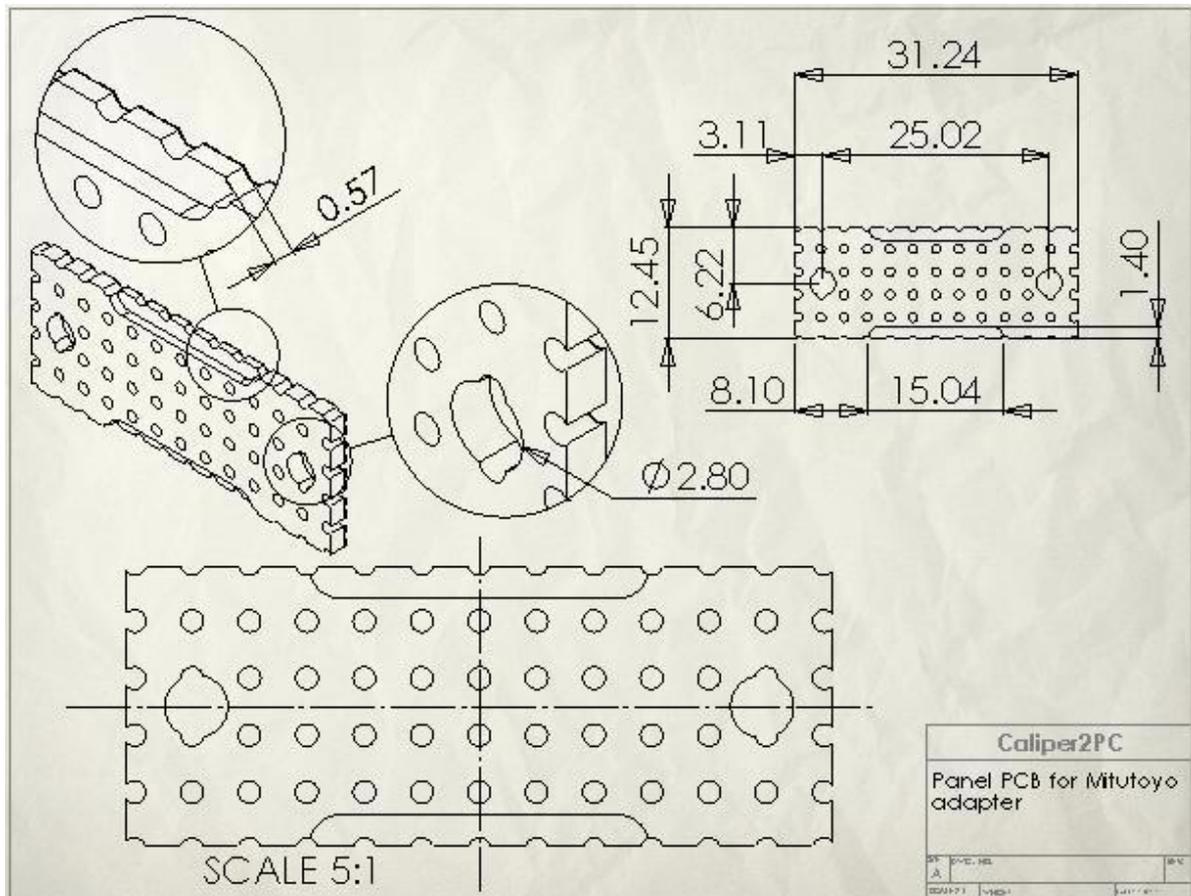
Solder the 4 wires GND, DATA, CLOCK and +5V of the patch cable to the MIT52 adapter PCB according to the pin assignment shown above.

Cutting out the Front Panel

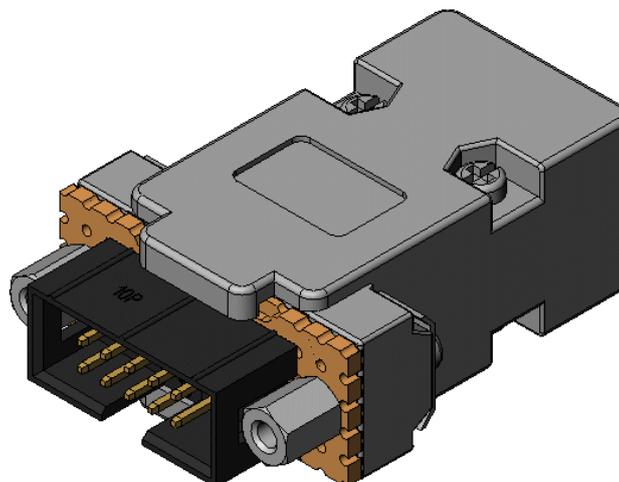
At this stage the front panel will be prepared. The front panel will be used to hold the 10 pin connector. Mitutoyo data cables (for example 5 pole Mitutoyo 905409 or 10 pole Mitutoyo 936937) fit to these 10 pin connectors.



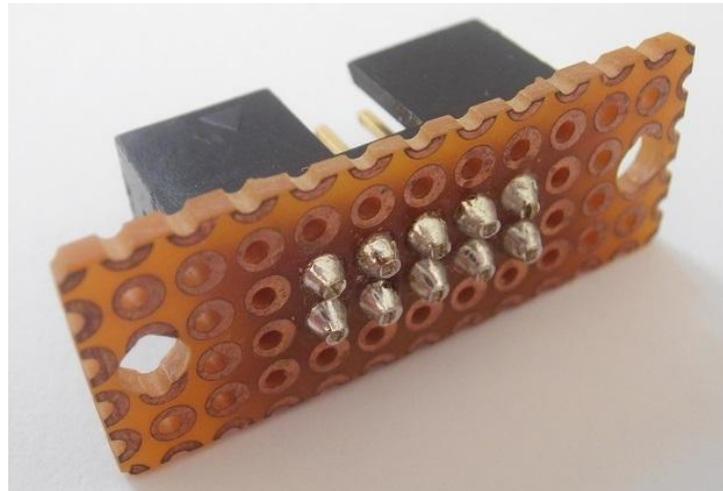
Please cut out the front panel from perforated prototype board material with 0.1" (2.54mm) grid according to the drawing.



The panel is designed to hold the 10 pin connector and fits to the D-Sub housing.

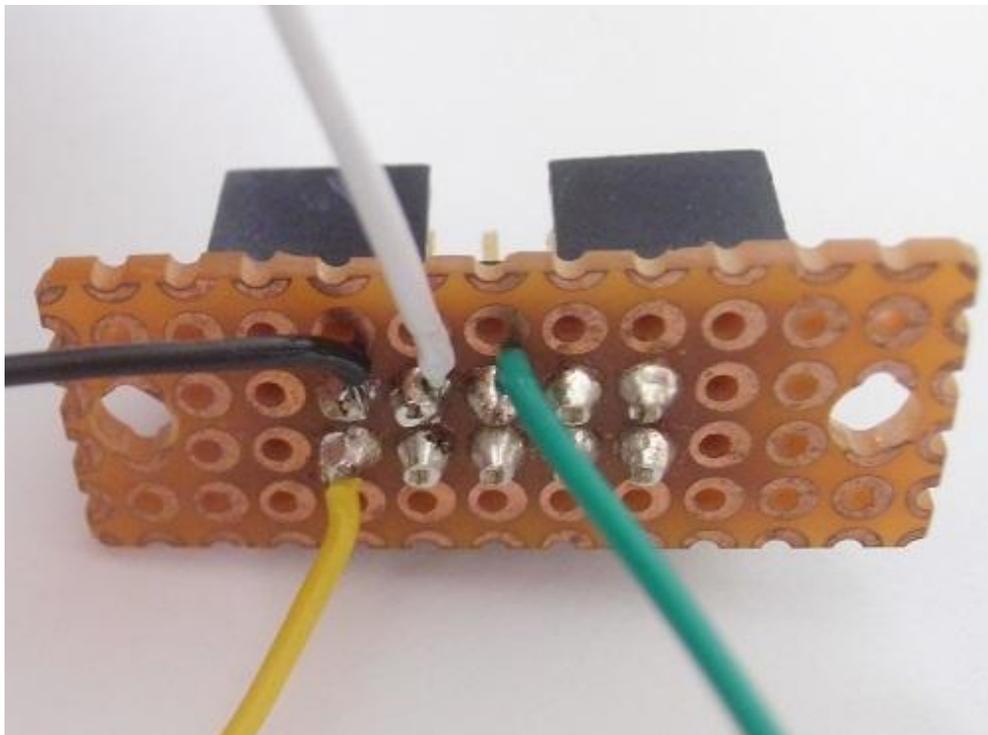


After the panel has been cut, the 10 pin connector can be soldered to it.



Connecting the Panel to the Adapter PCB

For the connection of the panel to the adapter PCB, different colored wires are used. Please solder the wires to the panel as shown below.



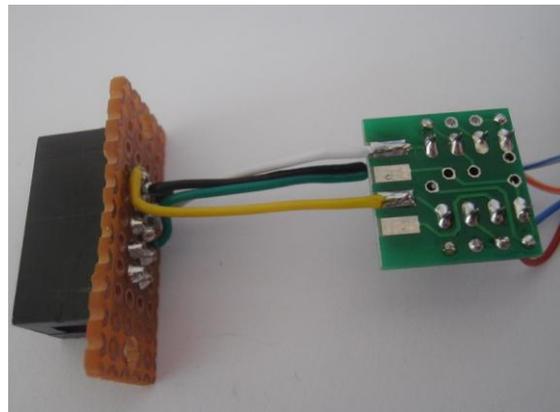
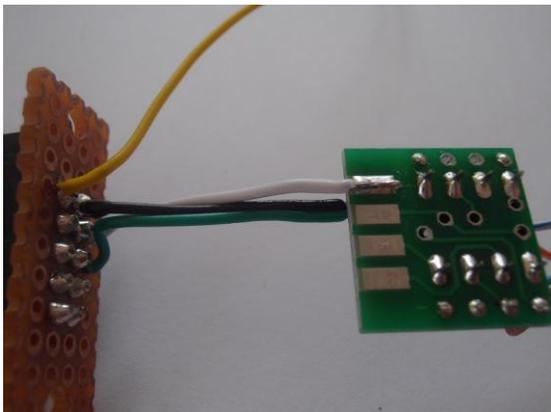
Connecting Mitutoyo Digimatic Devices to the Caliper2PC Interface – A step by step Guide V2.0



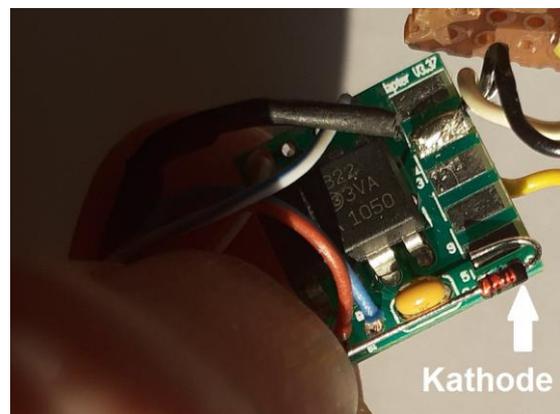
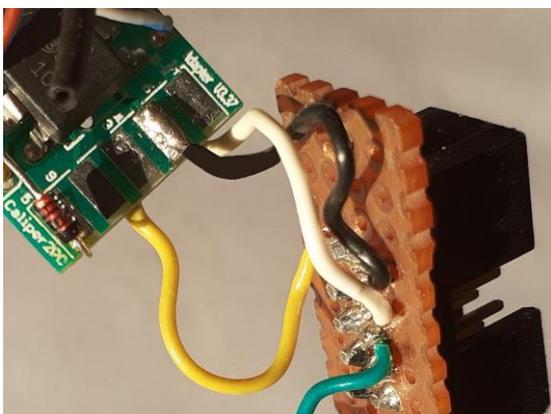
The color assignment for the 10 pin connector and the panel is as follows:

- Black = GND (Pin 1)
- White = CLOCK (Pin 3)
- Green = $\overline{\text{REQ}}$ (Pin 5)
- Yellow = DATA (Pin 2)

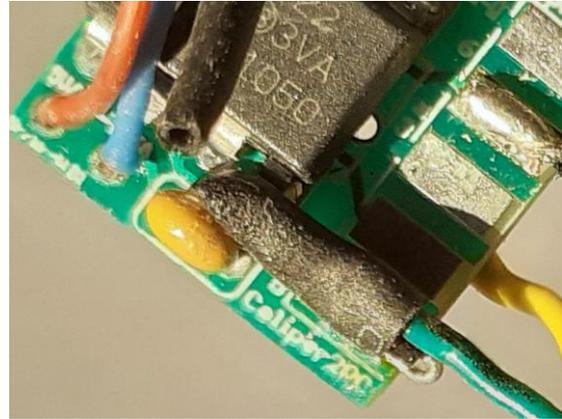
The white wire (Mitutoyo CLOCK) and the yellow wire (Mitutoyo DATA) must be soldered to the M_CLOCK and the M_DATA terminals on the bottom side of the adapter PCB as shown below.



Solder the black wire to the M_GND terminal on the top side of the adapter PCB. Solder the diode's cathode to the PCB's Z2 terminal as shown below.



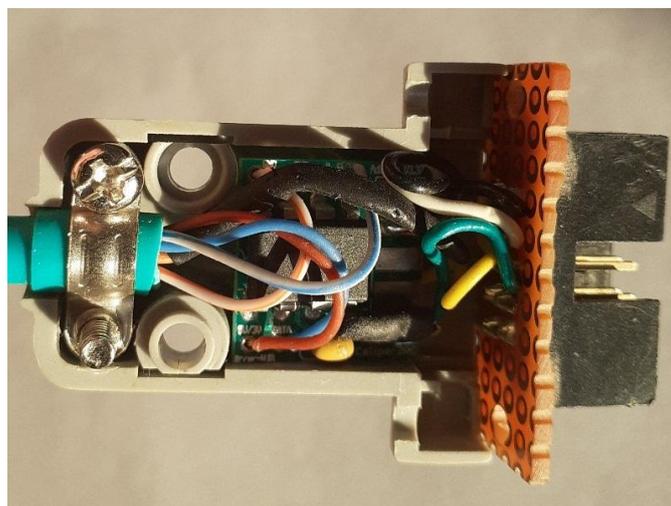
Please connect the green wire to the diode's anode ($\overline{\text{REQ}}$ to diode's anode).



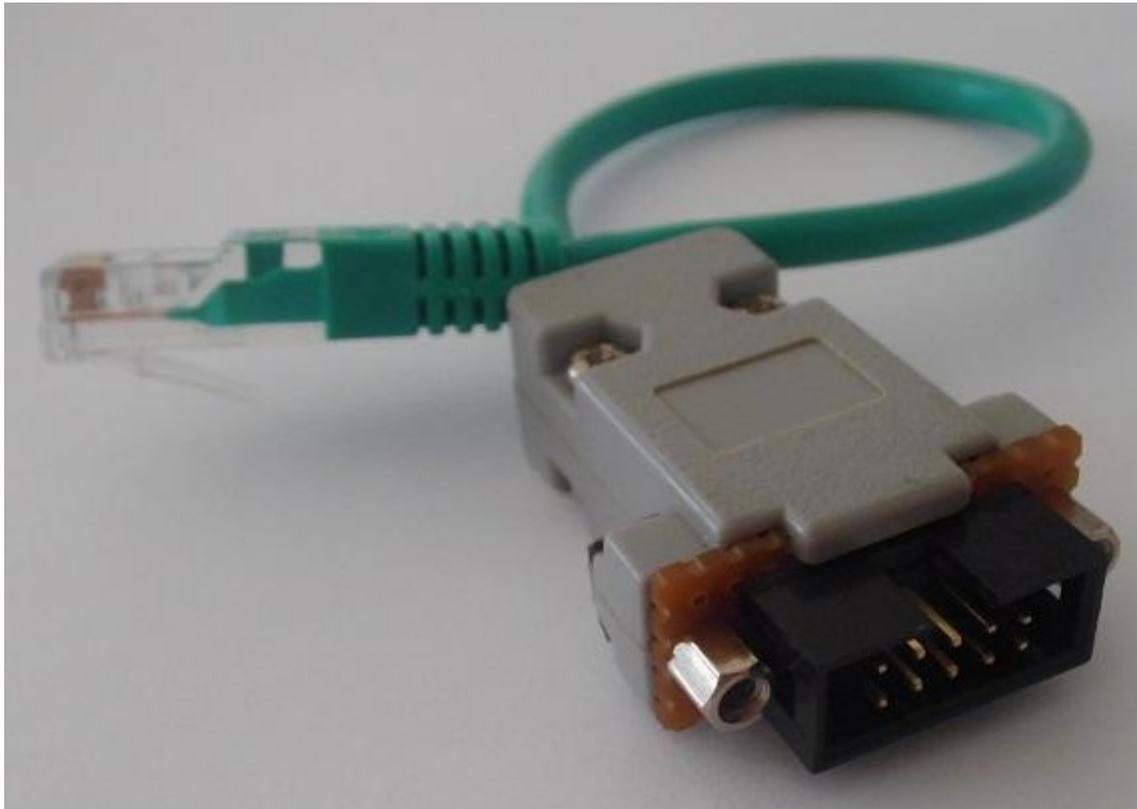
Insulate the diode and the green cable soldered to it with a shrinking tube.

Mounting the Housing

Before the adapter can be mounted into the adapter housing please fasten the patch cable clamp. For the protection of the patch cable and for a better hold of the cable clamp, a piece of the dismantled cable outer sheath can be cut and wrapped around the patch cable in the position of the cable clamp. Now the adapter PCB and the cable clamp can be fitted into the adapter housing. Please carefully bend the panel's cables so that the panel can be fitted to the housing.

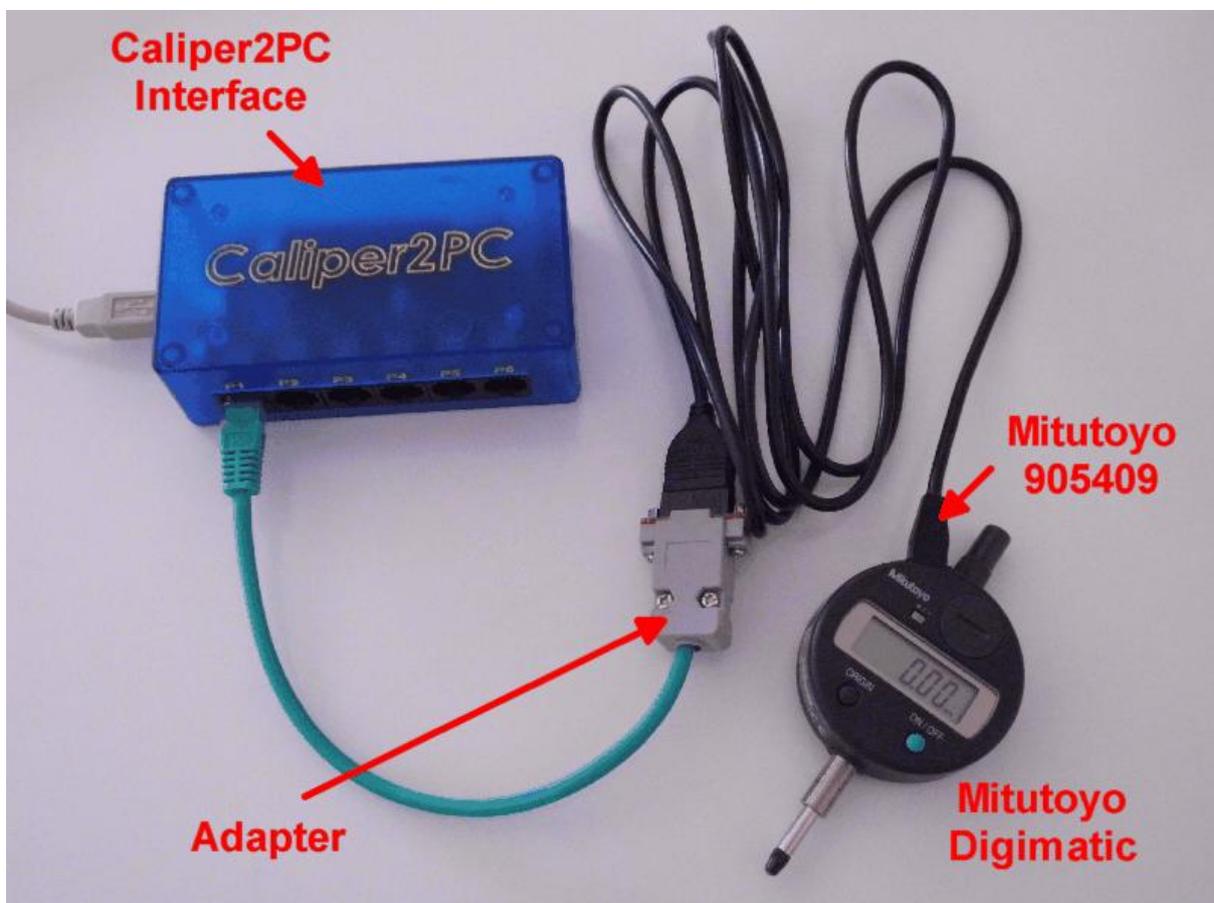


Put the panel screws with the washers in the right position before closing the housing. Finally close the housing with all screws and fasten the nuts. The Mitutoyo adapter is ready to be connected to the Caliper2PC interface.



Connecting Mitutoyo Digimatic Device

Connect the Mitutoyo device to the MIT52 adapter through its data cable (for example 5 pole Mitutoyo 905409 or 10 pole Mitutoyo 936937 depending on your Mitutoyo Digimatic device). Connect the MIT52 adapter's RJ45 connector to one of Caliper2PC interface's ports P1 – P6. The Mitutoyo device is now connected to the Caliper2PC interface. The data can be read out by the Caliper2PC software.



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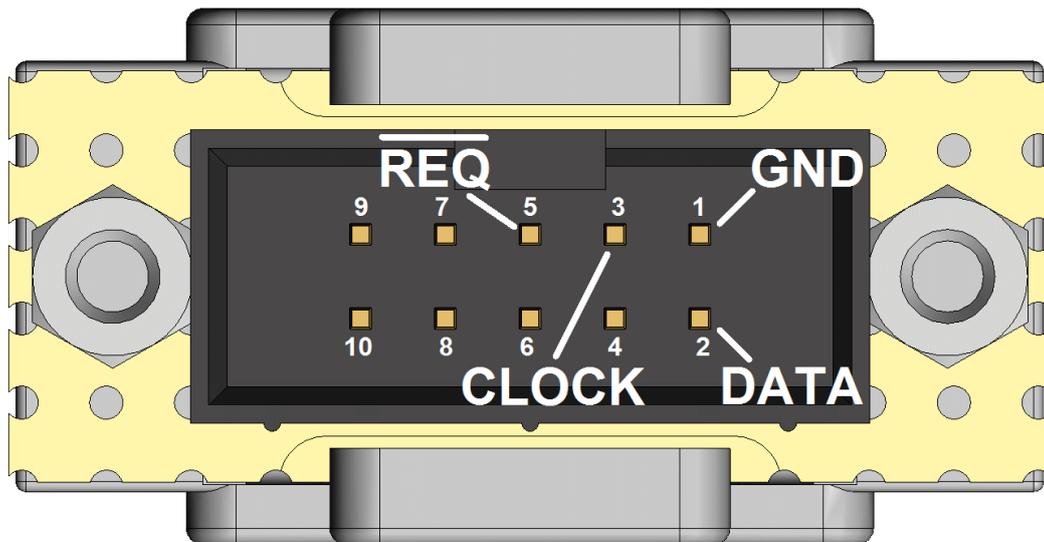


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www.caliper2pc.de

Connectors' Pin Assignments

The MIT52 adapter uses four pins of the 10 pin connector. The Mitutoyo Digimatic pin assignment for the 10 pin connector is shown below.



Mitutoyo Digimatic – Pin Assignment									
1	2	3	4*	5	6*	7*	8*	9*	10*
GND	DATA	CLOCK	/	REQ	ORIG	/	/	5V	SHIELD

* Not Connected

The pin assignment for the Mitutoyo 905409 (5 pole) gage connector:



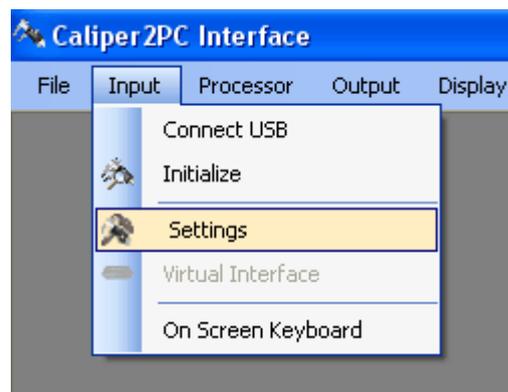
The pin assignment for the Mitutoyo 936937 (10 pole) gage connector:



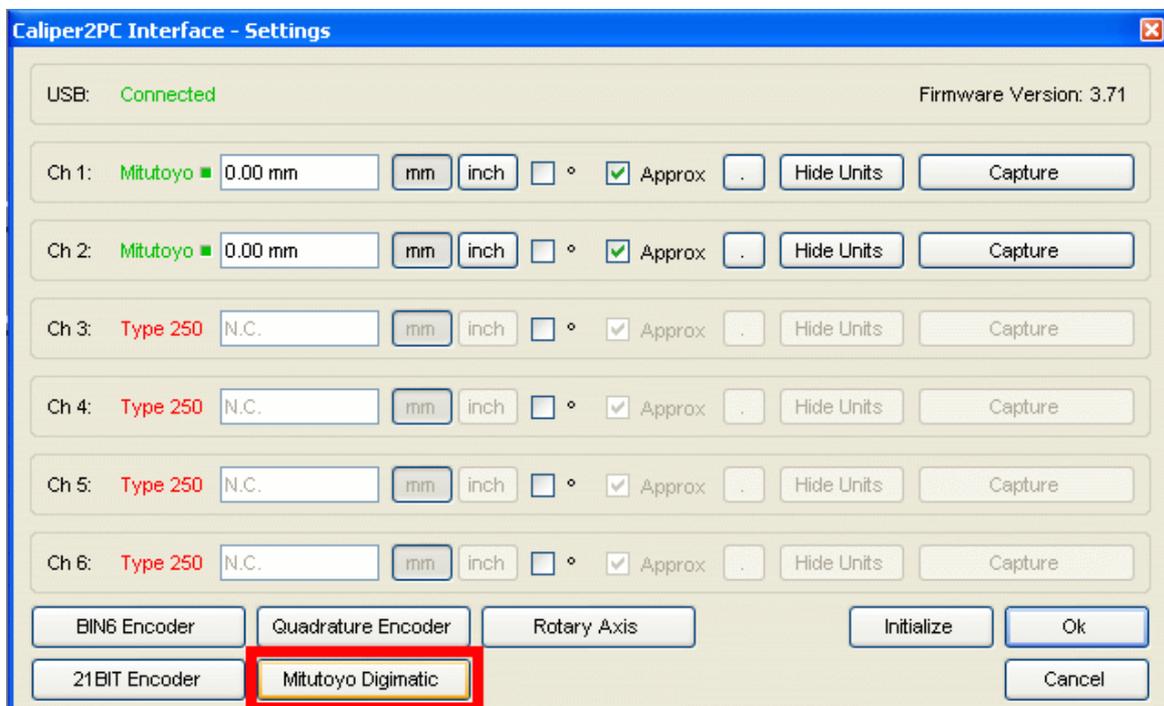
The Mitutoyo Adapter Window in the Caliper2PC Software

All information and statuses of the MIT52 adapters connected to the Caliper2PC interface can be viewed in the “Mitutoyo Adapter Window”. This window can be opened by the following steps:

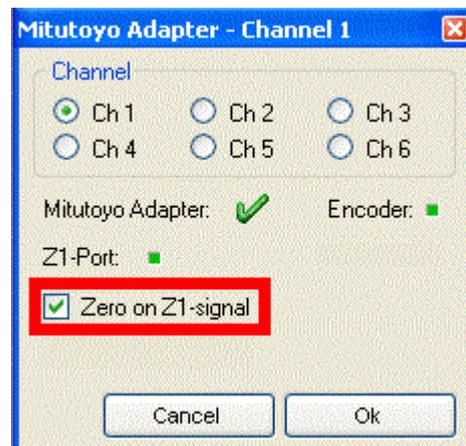
Open the “Caliper2PC Interface - Settings” window:



In the “Caliper2PC Interface - Settings” window click the “Mitutoyo Digimatic” button:



After the 'Mitutoyo Adapter Window' is shown, please choose the channel the adapter is connected to (for example Ch1).



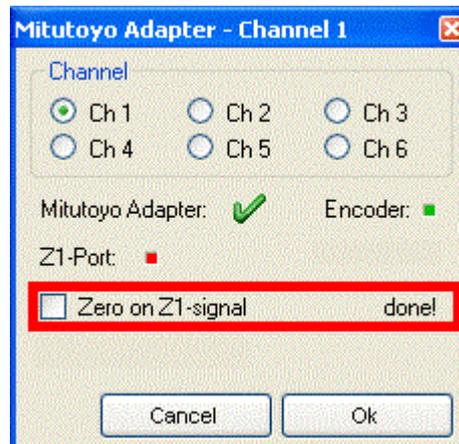
A green “V” is shown if the MIT52 adapter is connected to the interface. As soon as a Mitutoyo Digimatic device is connected to the MIT52 adapter and is turned on, the little square beside the “Encoder:” - label turns green. If this square is red, the device is either not connected or it is turned off.

The status for Z1 (see “Additional Features” below) is green as long as the port is not connected to GND. As soon as port Z1 is connected to GND the green colored square will change its color to red.

Additional Features

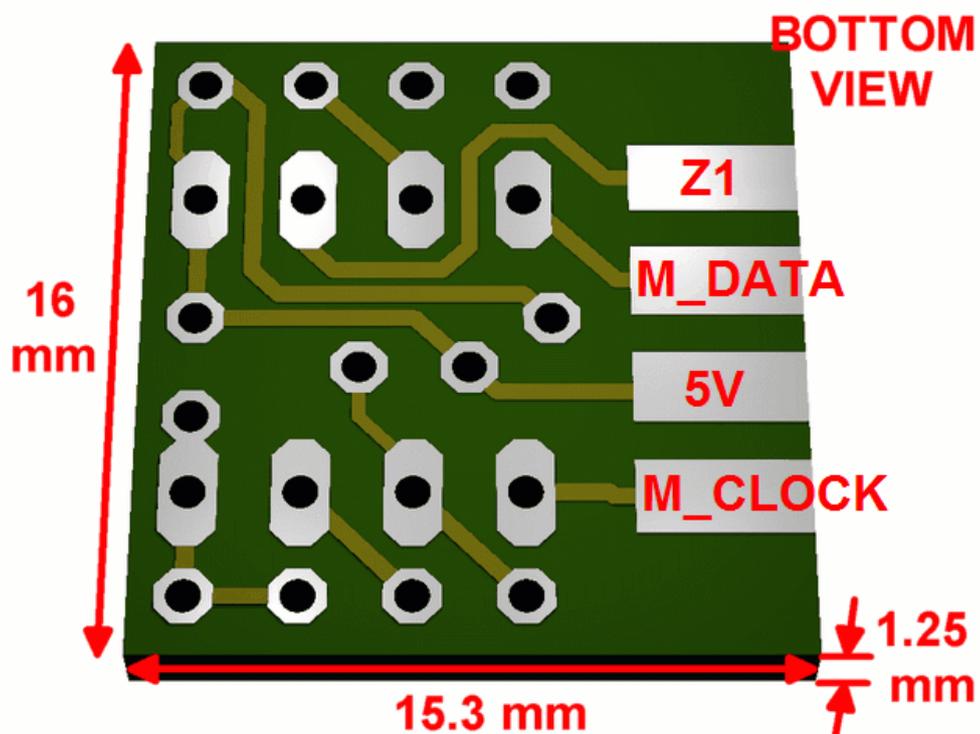
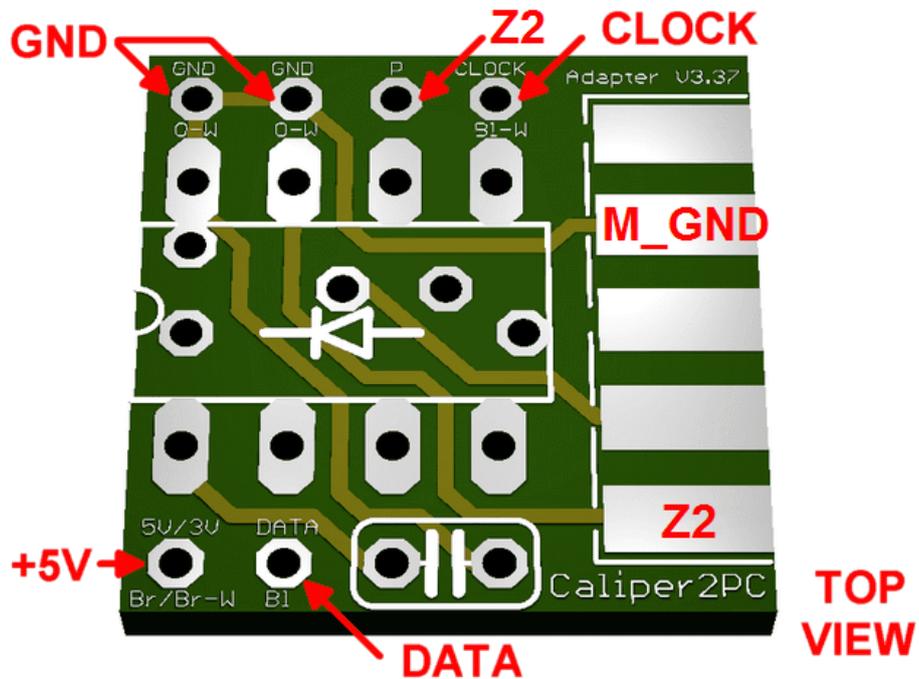
In addition to its functionality as a signal converter the MIT52 adapter possesses an input port Z1. It can be used for connecting home a switch, limit switch, edge finder, or a tool length sensor. The input port is active low and can be triggered by a switch when connecting to GND. The switch states are recognized and processed in the Caliper2PC software. In the Mitutoyo Adapter window, a simple event controlled zero function can be enabled for Z1. If this feature is enabled, the

DRO will be set to “0” as soon as a switch event is detected (Z-port is connected to GND). The “Zero on Z-Signal” feature can be enabled by checking the check box.



You have to know the approximate position of the switch you want to use to auto zero the axis. The Caliper2PC software will capture the precise position of the switch while you move the axis with low speed through the switch. The green square will turn red as soon as the switch is reached. At this position the axis will be zeroed, the check box will be unchecked automatically to avoid multiple zeroing of the axis.

Data Sheet - MIT52 Adapter PCB



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Signals to Caliper2PC (RJ45 Patch Cable)

- +5V (Brown) Pin 8
- GND (Orange /White) Pin 1
- CLOCK (Blue / White) Pin 5
- DATA (Blue) Pin 4

Signals to Mitutoyo Digimatic

- M_GND
- M_CLOCK
- M_DATA
- Diode's anode

PCB Measuring (Inch)	Length	Width	Height
	0.630	0.602	0.049