Constant Current Source CS02 - User manual

Bio-Signal Group Corp. 2007

Warning !

The Constant Current Source is designated to be used only for stimulation of the animals during behavioural experiments. Any other use is strictly prohibited without prior consultation with the supplier.

It is strictly prohibited to touch the *OUTPUT* connector or the conductors connected to the connector, when the device is on (the *POWER*" switch is in *ON* position). Before any manipulation with the conductors make sure the device is OFF. The blue LED under the *POWER* switch has to be off.

- **Risk of electric shock, may interfere with electrical devices such as pacemakers**
- **This high voltage instrument is not intended for clinical measurements using human subjects.**
- **Do not touch the Output connector either directly or indirectly e.g. through a wire connected to the connector while the device is on. Before any manipulation with the wires connected to the Output connector make sure that the device is turned off – the device switch must be in the OFF position and the blue light under the switch must be off.**
- **Do not open the device, replace the internal battery, or connect different accessories than the ones specified in the device documentation or use any other charger than the one provided by Bio-Signal Group Corp. In case of problems operating the device, contact Bio-Signal Group Corp for repairs. Do not attempt to repair the device yourself.**
- **As with all electrical devices, use caution when operating the device. Make sure the device is turned off before you plug or unplug the device. Keep the device away from liquids.**
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1. Description

Constant current source is used for subject stimulation during behavioral experiments. The device is able to deploy a current 0-700uA when the maximum ouptut voltage is limited to 1000V.

Figure 1: Contant Current Source

The current level at the output can be controlled by two mechanisms:

- using analog optically isolated input (Analog Control) with analog voltage 0-7V corresponding to 0-0.7mA at the output and supplying TTL „high“ signal at GAT input
- using digital optically isolated input (Digital Control) with BCD 3-bit parallel TLL signals corresponding to 0-0.7mA at the output.

Charging of the device can be done only when the main power switch is in **Charge** position. In this state, the attached power adapter is electromechanicaly disconnected from the current generation circuit so the current can't appear on the ouput. Charging is signalled by the blue LED under the switch. When the LED is blinking, accumulator is charged. After the LED starts to be lit constantly, the accumulator is fully charged and ready for use.

When the device is turned **ON**, the power adapter is electromechanicaly disconnected from the accumulator and the current generation unit. In the ON state, the control blue LED is lit constantly.

Before use of the device, capacity of the internal accumulator can be checked by pushing the **Battery Test** button (power switch has to be in ON position). When the capacity of the accumulator is hgher than 20% the green LED would light. If it doesn't, the accumulator is discharged and has to be charged.

The shape of the output current might be either **DC** or **Pulse**. Selection between the two is done by the **Output Signal** switch.

The device is also equipped with the current monitor at the output and the LED signalling the shorting of the output (**Short**). When the output is shorted, the resistance at the output is very small and thus the voltage at the output drops under a certain level which might be set inside the device.

2. Specifications

- **Digital control signal levels**: TTL 0-5V DC
- **Analog control signal levels**: 0-7V DC, GATE TTL 0-5V DC
- **Power**: ⎓ 18-24VDC / 400mA from external power adapter
- **Maximum current from the external power adapter**: 300mA
- **Maximum current from the internal accumulator**: 500mA
- **Maximum current at the device output**: 0.7mA
- **Maximum voltage at the device output**: 1000 V
- **Typical output load**: < 1MΩ
- **Frequency of the output signal in Pulse mode**: 50Hz, repeat 1:1, positive polarity
- **Error of the output current**: <20%
- **Charging time**: about 7 hrs
- **Accumulator type**: Pb sealed 12V/1,2Ah
- **Relative operational humidity**: 5 - 80%
- **Operational temperature**: 10 - 30°C
- **Protection level**: IP20
- **Dimensions**: (255/260/85mm – width/depth/height)

3. Device controls

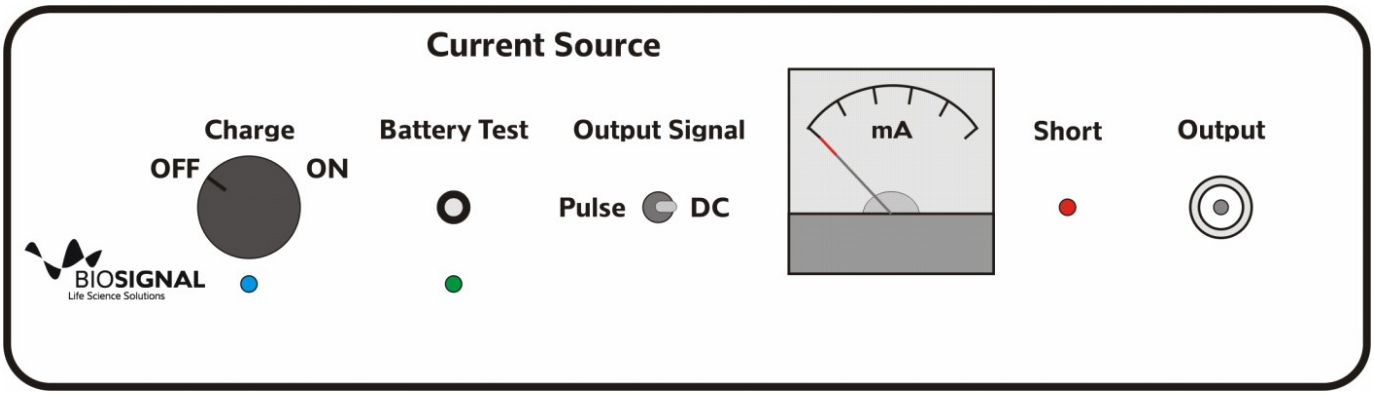

Figure 2: Front panel

· **Rotary Power switch OFF-Charge-ON**

In **OFF** mode the device is OFF. The blue control LED is off.

In **Charge** mode the internal accumulator is charged. There is no voltage at the device output. The blue control LED is blinking. After the internal accumultor is charged, the LED is lit constantly.

In **ON** mode the device is disconnected from the external power adapter and ready to use.

· **Button Battery Test**

When the device is ON the **Battery Test** button can be pushed to measure the capacity of the internal acumulator. When the accumulator capacity is higher than about 20%, the green control LED will light up. If it doesn't it is necessary to charge the accumulator..

· **Switch Output Signal**

In the **Pulse** mode the device produces a monopolar square signal with frequency of 50Hz and repeat of 1:1. The amplitude of the square signal corresponds to the value set on the input.

In the DC mode the device produces positive DC signal with amplitude corresponding to the value set on the input.

- **Panel meter**

The panel meter is used to monitor the output current. In both DC and Pulse mode it shows the maximum current value at the output.

· **Short monitor**

Red LED **Short** is activated only in the Pulse mode when the level of the output voltage drops under the alarm voltage 0-40V which can be set inside the device.

· **Output connector**

Output connector (BNC) is used as the current output from the device.

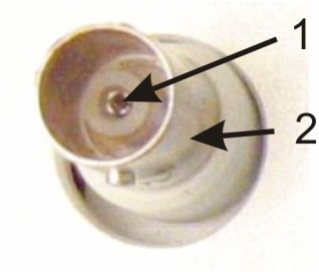

Figure 3: Output connector pinout

Pinout:

Pin 1 – positive output
Pin 2 - GND

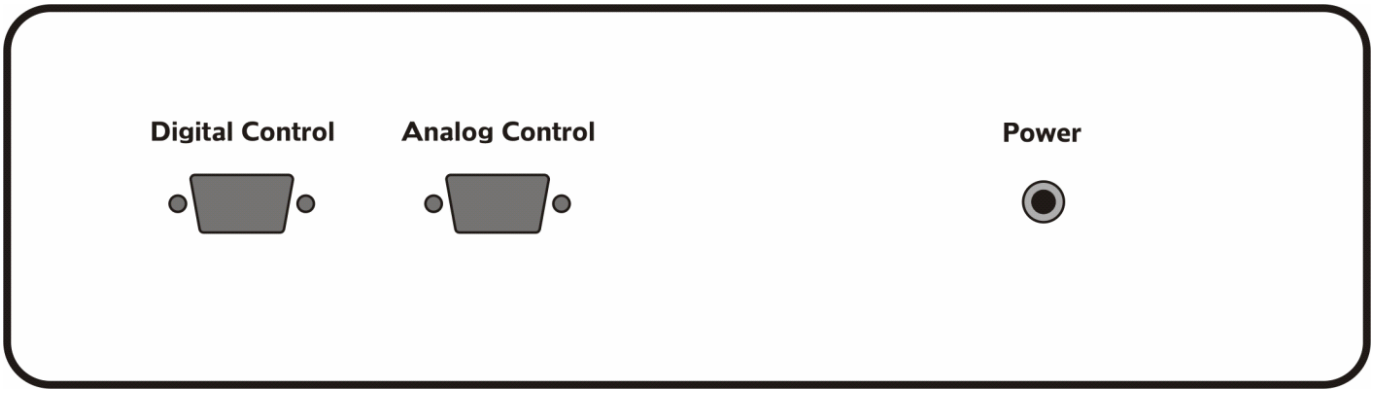

Figure 4: Back panel

· **Digital control connector**

The connector is used for the digital control of the device. The device can be controlled either using the digital or analog connector, never by both. Selection between the digital and analog control is set inside the device using the jumper.

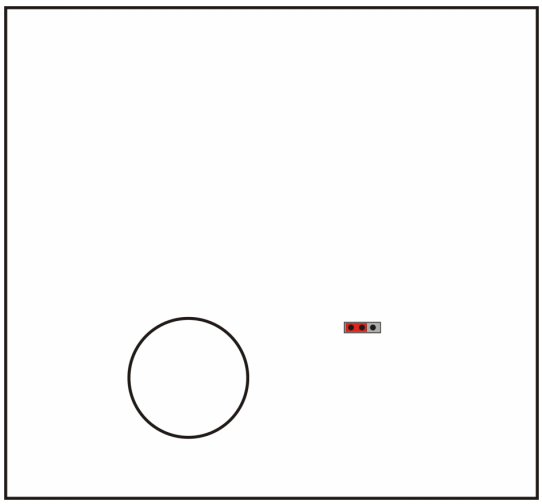

Figure 5: Location of the jumper on the PCB

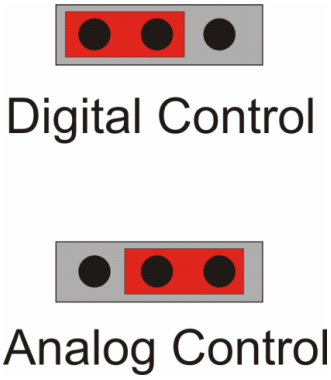

Figure 6: Jumper settings for analog and digital control

On the following image the device is set for the digital control.

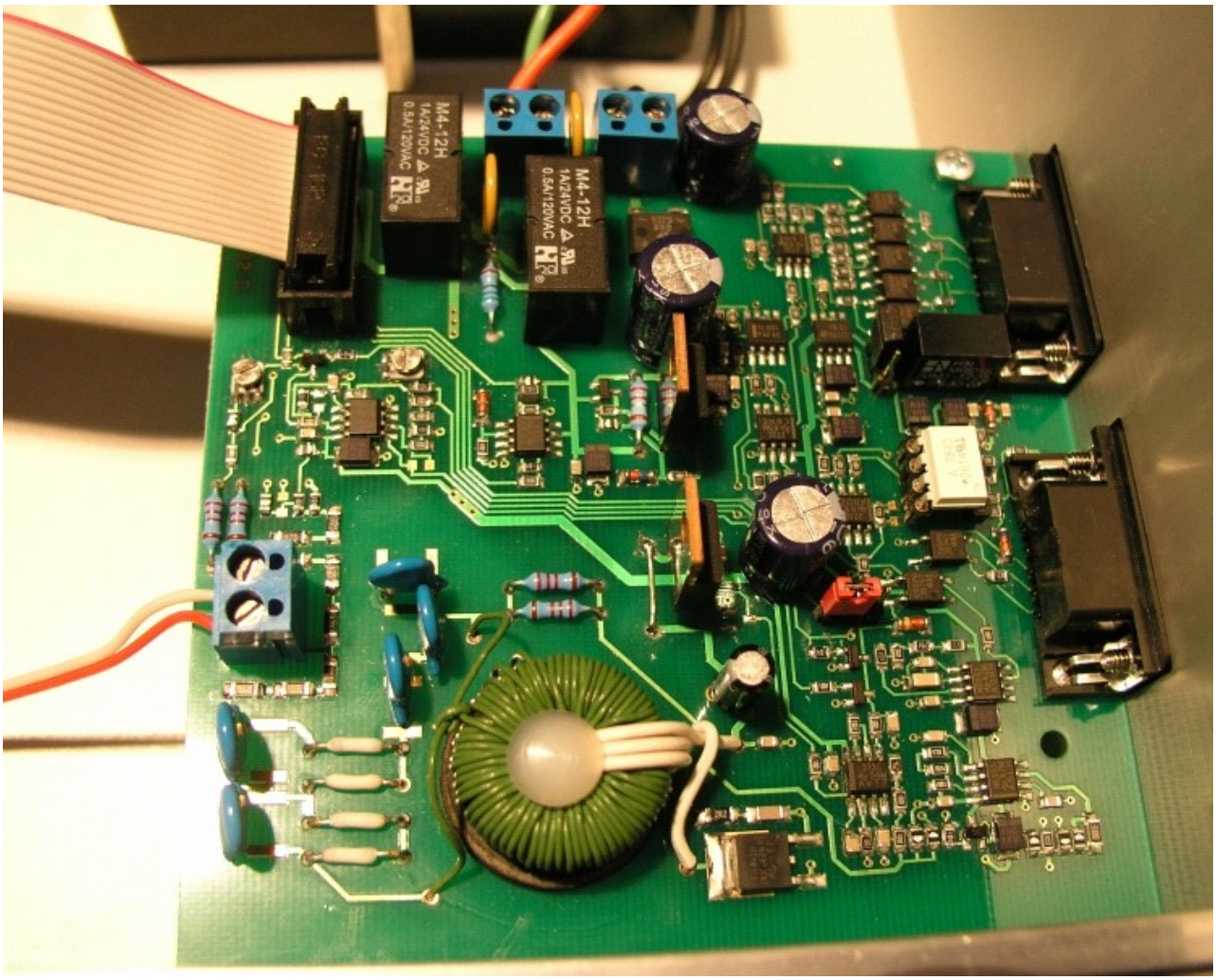

Figure 7: Digital control mode

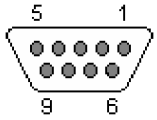

Figure 8: Digital control connector

Pinout:

Pin1-bit0
Pin2-bit1
Pin3-bit2
Pin9-GND

Kombinations of the TTL signals at pins 1-3 creates the following levels of the output current:

- 0..ON (the device is ready, but there is 0mA flowing into the output load)
- 1.. N (the device is ready, but there is 0mA flowing into the output load)
- 2.. 0.2mA flowing into the output load
- 3.. 0.3mA flowing into the output load
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- **Analog Control connector**

  This connector is used for the analog control of the device. The control is made using two signals – analog signal at pins 1,3, which set the level of the output current using the formula 1V~0.1mA for the control voltages between 0-7V. The second signal is the gate signal, enabling the current at the output at pins 8,9. TTL high turns on the device.

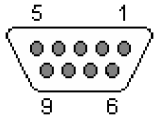

Figure 9: Analog control connector pinout

Pinout:

Pin1- analog control voltage 0-7V
Pin3- GND (control voltage)
Pin8- TTL GATE
Pin9- GND (TTL GATE)

- **Power connector**

  Power connector is used for supplying the voltage to charge the internal accumultor. The adapter should be DC 18-24V/400mA.

Figure 10: Power connector pinout

4. Installation of the device

1. Make sure the Power switch is in ON position.
2. Connect the external power adapter into Power jack at the back panel of the device.
3. Connect the digital control cable.
4. Connect the testing load of 200kΩ to the output.
5. Set the Output signal switch to Pulse mode.
6. Set the Power switch into On state.
7. Push the Battery test button. If the green control LED doesn't shine, you have to charge the accumulator by switching the main switch into the Charge state.
8. Set maximum output current in the on the Digital Control (i.e. by the Port Test application supplied with the ITS system. The maximum current of 0.7mA should appear at the panel meter.

5. Contact information

Bio-Signal Group Corp.
760 Parkside Avenue, Brooklyn, NY, 11226-1508, USA
www: http://www.biosignalgroup.com
emai: support@biosignalgroup.com

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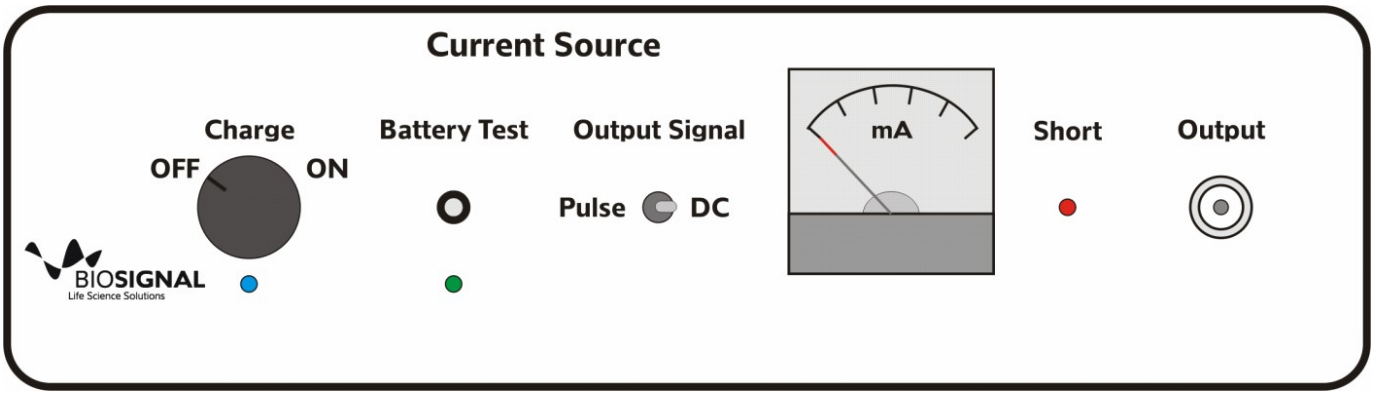

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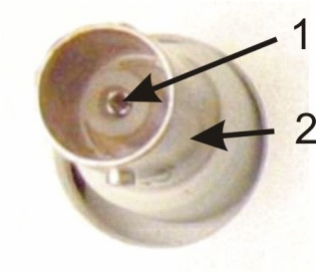
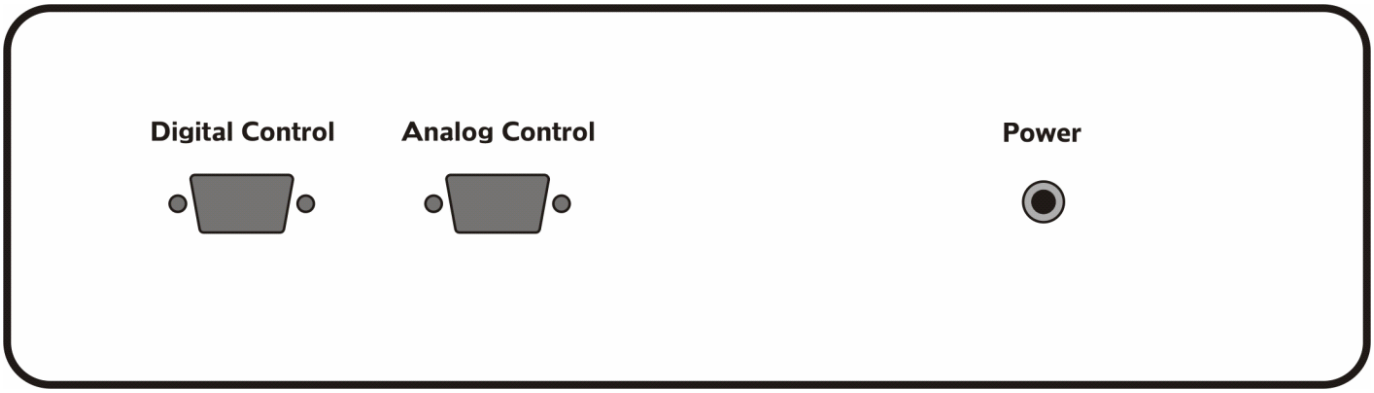


Figure 3: Output connector pinout

Pinout:

Pin 1 – positive output
Pin 2 - GND



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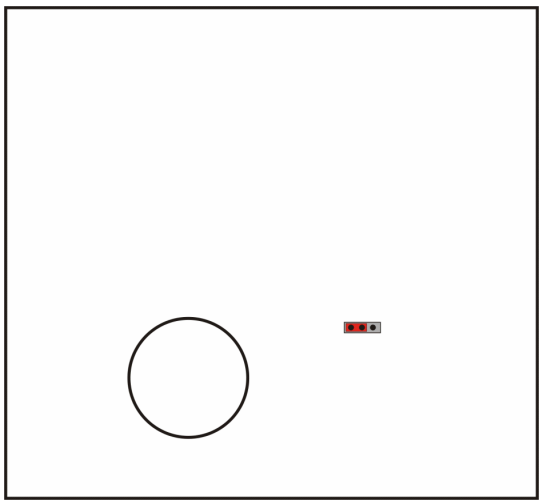

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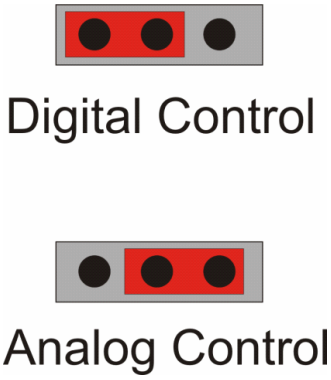

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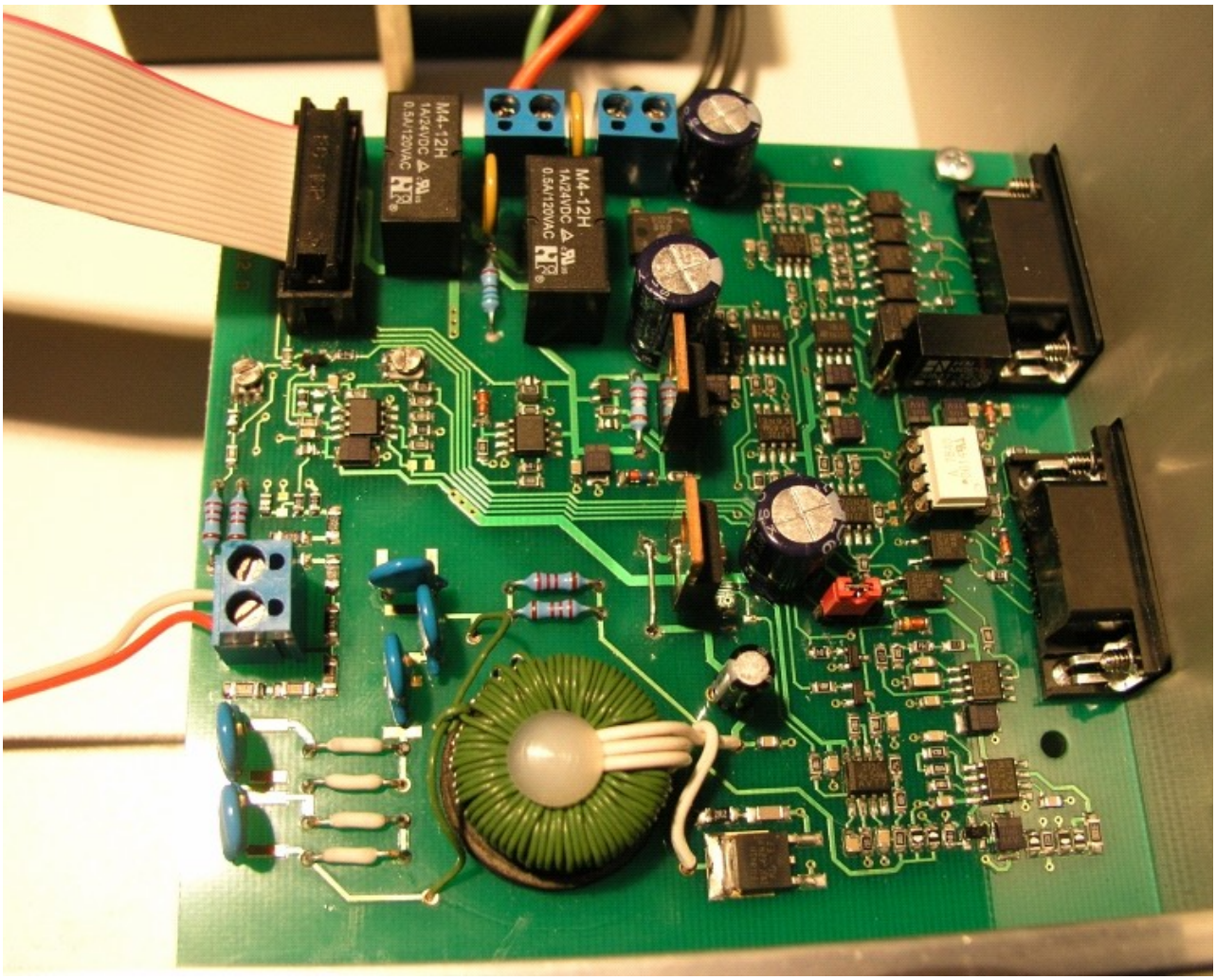

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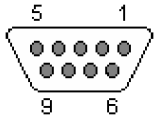

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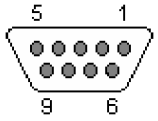

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