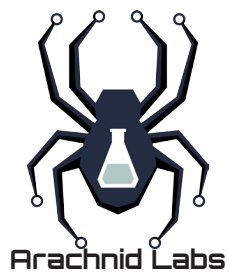


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# User Manual



## Re:load Pro

## EC Declaration of Conformity

In accordance with EN ISO 17050-1:2004

We Arachnid Labs Limited  
of 183 Richmond Road, E11 4DA, UNITED KINGDOM

*in accordance with the following directive(s):*

2004/108/EEC The Electromagnetic Compatibility Directive  
2001/95/EC The General Product Safety Directive

*hereby declare that:*

Equipment Re:load Pro DC Active Load

*is in conformity with the applicable requirements of the following documents*

Ref	Title
EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements.
EN 61010-1:2010	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements.

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all applicable Essential Requirements of the Directives.

Signed,



Name: Nicholas Johnson  
Position: Director  
Done at: London, UK  
On 2013-09-06

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## Safety Notices

Review the following safety precautions carefully before operating this device to avoid personal injury or damage to the device and any products connected to it. To avoid potential hazards use the device as specified by this user's guide only.

**This instrument should be serviced only as described in this manual.**

### To Avoid Fire or Personal Injury

**Observe All Terminal Ratings** To avoid fire or shock hazard, observe all ratings and marks on the instrument. Follow the user's guide for further ratings information before making connections to the instrument.

**Do Not Operate Without Covers** Do not operate the instrument with covers or panels removed.

**Avoid Circuit or Wire Exposure** Do not touch exposed connections and components when dangerous voltages are present.

**Do Not Operate With Suspected Failures** If suspected damage occurs with the instrument, have it inspected by qualified service personnel before further operations.

**Provide Proper Ventilation** Refer to the installation instructions for proper ventilation of the instrument.

**Do not operate in wet/damp conditions**

**Do not operate in an explosive atmosphere**

**Keep product surfaces clean and dry**

**Measurement Category** The Re:load Pro is intended to be used for measurements in Measurement Category I.

# 1. Overview

The Arachnid Labs Re:load Pro is a versatile and robust constant current active load intended for testing power supplies, batteries, and other current-supplying electronic equipment. It can also be used for other applications in which excellent current regulation is required, such as electroplating.

Features of the Re:load Pro:

- Active load with real-time analog current feedback loop.
- Dissipates 25 watts continuously, or more for short periods.
- Handle up to 6 amps, and 0-60 volts.
- Easy to use and intuitive user-interface.
- Current adjustable with milliamp precision over the whole range.
- Protection against overcurrent, overvoltage, overtemperature, ESD and reverse polarity.
- Power supplied over USB from either a computer or a USB charger.
- Fully isolated USB interface. Your computer is isolated from any direct interaction with dangerous voltages and currents.
- Fully controllable over USB, with monitoring functionality.
- Configurable display, showing voltage, current, power, resistance, and total energy dissipated.
- Open Source, with a USB bootloader, so firmware can be modified and upgraded without expensive development tools.

The Re:load Pro was made possible by the generous support of 361 backers on Kickstarter.

# 2. Calibration

Before initial use, calibrate the Re:load Pro. The calibration procedure requires test leads, a power supply capable of supplying at least 2 amps DC, and a current meter, either integrated into the PSU or discrete.

1. Detach all test leads.
2. Press in the knob to display the menu. Rotate the knob clockwise until 'Calibration' is selected. Press the knob again to select Calibration mode.
3. The display will show "Remove Leads". Press in the knob to perform

- offset correction.
4. Attach a power supply using test leads. The power supply may be configured for any voltage between 1V and 60V, but 9.99V is recommended for best calibration accuracy. If the power supply is equipped with current limiting, the limit must be set to at least 2 A. If the PSU lacks an integrated current meter, attach a current meter between the Re:load Pro and PSU.
  5. A voltage measurement will be displayed. Rotate the knob until the measured voltage matches the actual voltage supplied by the PSU. Press the knob.
  6. The Re:load Pro now attempts to draw approximately 2 amps from the power supply. Rotate the knob until the current measurement matches the actual draw as measured by the current meter. Press the knob.
  7. The Re:load Pro now performs internal calibration operations. Once this is complete, the main screen is again displayed, and calibration is complete.

### **3. General Usage**

1. Attach a USB cable between the Re:load Pro and a computer or USB power source. The Re:load Pro will boot up and display the splash screen. After 3 seconds, this will clear to display the readouts.
2. Rotate the knob on the right side until the main display shows the desired current draw.
3. Attach test leads between the red and black (positive and negative) terminals and the device under test (DUT), such that a circuit is formed with the Re:load Pro in series with the DUT and a power source.
4. Energise the power source; the Re:load Pro will automatically adjust its resistance so that the specified amount of current is consumed. The bottom left and right readouts show the actual current draw and measured voltage, respectively.

At any time during operation, you may adjust the current consumption by turning the knob to select the appropriate value.

When under load, the Re:load Pro can generate a lot of heat. Ensure the heatsink at the back remains unobstructed and well ventilated for safe and effective operation.

The Re:load Pro is equipped with an overtemperature cutout that will pre-

vent damage to the device in case of overtemperature. If this engages, the Re:load Pro will set its current limit to 0, and display a message indicating an overtemperature condition. Pressing enter dismisses the message and allows you to resume using the device as normal.

## 4. Display Configuration

The main display is configurable to show a variety of different measurements as needed for the task at hand. The readouts can be reconfigured at any time from the menu, and are stored persistently.

To change a readout:

1. Press the knob to enter the menu.
2. Select “Readouts” and press the knob.
3. Select which readout to change - the main (large) readout, the lower left, or the lower right. Press the knob to select.
4. Select the desired measurement and press the knob. The selected readout is replaced with the selected measurement.

## 5. USB Control & Monitoring

The Re:load Pro comes equipped with a USB serial interface, providing the ability to control and monitor it from a connected computer. Serial settings of 115200/8/N/1 should be used. Complete documentation of the serial protocol is out of scope for this manual; consult <http://www.arachnid-labs.com/reload-pro/usb-interface.html> for more details.

## 6. Firmware Updates

The Re:load Pro ships with a bootloader that allows updating of firmware over USB. Updating the firmware first requires entering bootloader mode, which can be accomplished in two ways.

If the standard firmware is running, enter the menu and select “firmware update” to enter firmware update mode.

If the standard firmware is not functional, enter recovery mode by unplugging the device, and plugging it into a computer while holding in the knob.

The display will turn on but remain blank; you may then release the knob.

After entering bootloader mode, use the bootloader host software on your computer to send updated firmware to the device.

## **7. Factory Reset**

Should user data become corrupted or invalid, it may be necessary to perform a factory reset.

To perform a factory reset, plug the Re:load Pro into a USB power source or computer, and wait for the splashscreen to display. As soon as it does, press the knob in, and hold it until the main display is shown.

This will cause all data to be reset to factory settings, including calibration data. Follow the steps in section 2 to re-calibrate the device.

## **8. Disassembly & Servicing**

Should you need to disassemble the Re:load Pro, care is required in order to avoid damaging sensitive connectors inside the device.

1. Use a small flat-head screwdriver to loosen the grub screw on the knob. Remove the knob and set it aside.
2. Using a phillips head screwdriver, unscrew the four front panel screws. Gently pull the front panel away from the enclosure. It is connected by three spade terminals and one ribbon connector.
3. To disconnect the ribbon connector, identify the socket on the PCB. It has a small black tab on either side of the ribbon cable. Use fingers or a tool to gently pull this tab towards you in order to unlock the ribbon cable. Pull gently on the ribbon cable to remove it from the socket.
4. Disconnect the spade connectors from the banana jacks by grabbing the connector by its plastic housing and pulling while securely holding the front panel in your other hand. Do not pull on the wire to remove the spade connector. Set aside the front panel.
5. Unscrew the four screws connecting the heatsink to the enclosure. Gently slide the heatsink and enclosure apart; the PCB will remain attached to the heatsink. Take care not to put any stress on the component attached to both the heatsink and the PCB.

# Specifications

<b>DC</b>		
Input Voltage Range	0 ~ 60 VDC	
Maximum Current	6 A	
Maximum Power	Continuous	25W
	Peak	50W for 10 min 75W for 1 min
Measurement Accuracy	2mA/10mV (after calibration)	
Output Accuracy	2mA (after calibration)	

<b>AC</b>	
Input transient response time	20 $\mu$ s @ 12V - 5V burden voltage transient
Frequency Response	50 KHz (computed)

<b>Power</b>	
Supply Voltage (USB)	4.5 - 5.5 VDC
Power Consumption	Less than 5W

<b>Environmental</b>	
Ambient Temperature	Operating 10°C ~ 40°C
	Non-operating -20°C ~ +60°C
Cooling	Natural Convection
Humidity	$\leq$ 90% Relative Humidity
Altitude	Operating 3,000m or below
	Non-operating 15,000m or below

<b>Mechanical</b>		
Size	Width	112mm
	Height	59mm
	Depth	120mm
Weight	510g	