LabJack

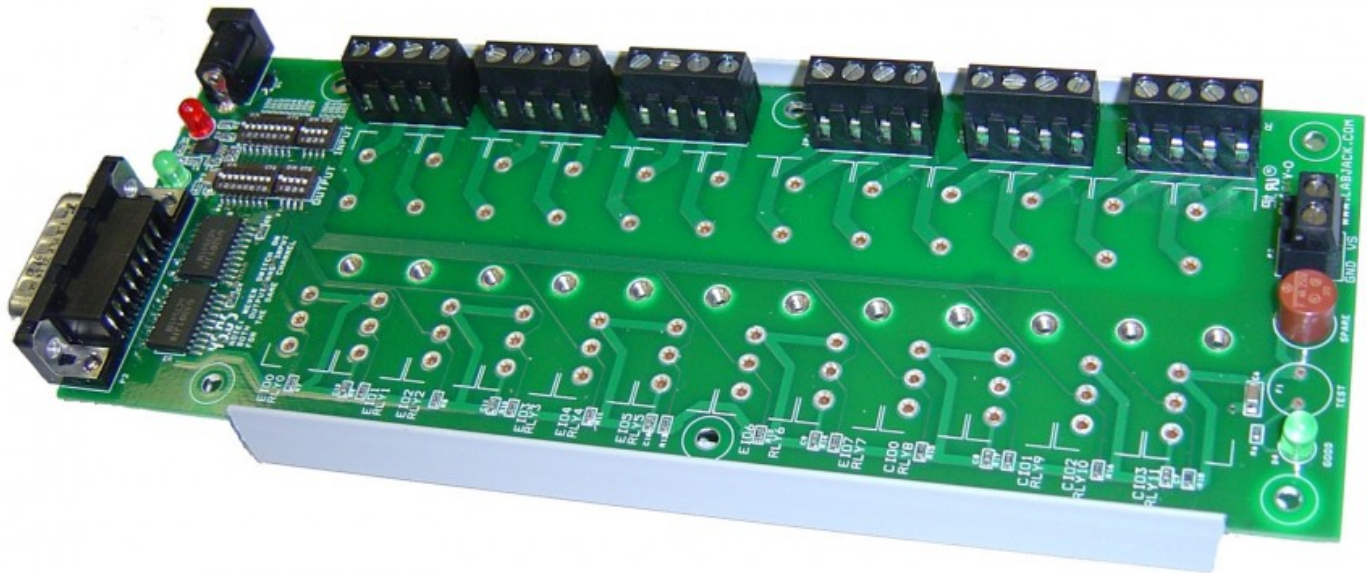Published on *LabJack* (https://labjack.com)

RB12 Datasheet

RB12 Relay Board
Stock: In Stock
Price: $139.00

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Note #1: The power jack (P1) is an alternate way to provide 5 volt power for the RB12, and is generally not used. Do not connect anything besides 5 volts to P1. The VS/GND screw-terminals (P3) are outputs. Do not connect any external supply to P3. The Rn+/Rn- terminals are on the load side of the I/O modules, and the only place load voltages should ever connect.

Note #2: On the U6/U6-Pro the digital lines CIO0-2 and MIO0-2 are shared. This means that changing the state of MIO0-2 will also change the state of CIO0-2. Therefore, anyone using two accessory boards with a U6 needs to be aware that they can use either CIO0-2 or MIO0-2, but cannot use both simultaneously. MIO0-2 are used to control extended analog channels, so if you are reading extended channels from the Mux80 you do not want to use slots 8-10 on the RB12 (only use slots 0-7 & 11).

The RB12 provides a convenient interface to industry standard I/O modules, allowing electricians, engineers, and other qualified individuals, to interface a LabJack with high voltages/currents. Logic buffers are used to provide the 10-15 mA needed for each typical I/O module, so that the current is provided by the 5 volt supply rather than the logic control lines.
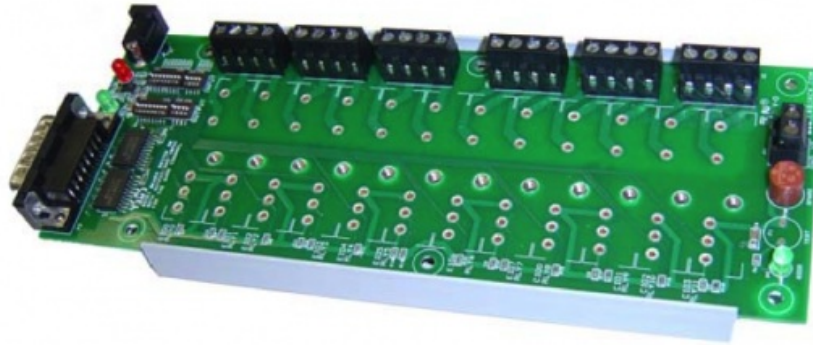
Figure 1: The RB12 without I/O modules (as shipped).

The RB12 relay board connects to the DB15 connector on the LabJack U3/U6/UE9, using the EIO/CIO digital I/O lines to control or read industry standard digital I/O modules. The RB12 is designed to connect directly to the LabJack, but can also connect via a 15-line 1:1 male-female cable (such as the C7MFG-1506G, or Phoenix Contact 1656262 from Digi-Key not included or required).

The RB12 PCB is mounted to a piece of Snaptrack. The Snaptrack is DIN rail mountable using TE Connectivity part #KAD (not included).

The green LED on the RB12 is directly powered by the 5-volt supply (Vs) from the LabJack, so it should be lit whenever the RB12 is connected to a powered LabJack. The red LED is powered directly by the external power supply (not included or required).

Power Supply

The RB12 can be powered from the LabJack through the DB15, or from an external 5-volt supply on power jack P1. If both the LabJack and external supply are connected at the same time (both green and red LEDs on), the external supply will provide power. In most cases the RB12 can simply be powered by the LabJack, but there are various reasons why powering from an external supply, rather than the LabJack, might be desirable. For example, most I/O modules use 10-15 mA, and thus 12 of them would use 120- 180 mA total. In most cases a LabJack can provide this power without problem, but if 12 of the 70G-IDC5S module (Isupply = 41 mA) were used, the total power required by the RB12 could be over 500 mA which is a problem for most LabJacks.

If an external supply is used, it should be regulated with a nominal voltage of 5.0 volts. This is generally provided by a wall-wart or wall-transformer type of supply. A supply capable of 500 mA or more is recommended. The power jack connector is 2.1 x 5.5 mm, center positive. The RB12 is designed to use the same power supply as the UE9, so see Section 2.3 of the UE9 Datasheet for specific recommendations.

Towards the bottom of the RB12 is a 2-position screw terminal (P3) with GND and VS. This is designed as an output connection to provide the user access to the 5 volt supply.

If the RB12 is powered by an external supply, always maintain valid control signals (EIO/CIO) for all output I/O modules. For instance, if the RB12 is powered by a wall-wart, but there is nothing connected to the DB15, the state of output modules is undefined and might vary, but is likely to be enabled.

Output/Input Configuration

The RB12 can be used with output or input types of digital I/O modules. There are 4 banks of DIP switches used to configure whether each of the 12 channels is for output or input. When the switches in the S1 and S2 banks are put in the ON position, those lines are configured for output I/O modules. When the switches in the S3 and S4 banks are put in the ON position, those lines are configured for input I/O modules. To avoid uncertain behavior, do not turn on output and input switches for the

same line at the same time.

The RB12 behaves with inverted or negative logic. For output modules that means the applicable LabJack DIO must be set to output-low to enable the I/O module. Output modules will be disabled with the DIO set to input or output-high. For input modules the applicable DI will read high when the module is inactive and read low when the module is active. Here are tests with a few different modules:

70G-ODC5A Testing: Module is inactive (LED off) with LabJack DIO set to input or output-high. Module is active (LED on) with LabJack DIO set to output-low. Connected LabJack VS to R+, and connected R- to a 320 ohm resistor to GND. When the module is inactive the voltage across the resistor is about 0V (no current is flowing), and when the module is active the voltage across the resistor is about VS (~5 volts, current is flowing).

G4IDC5 Testing: Module is inactive (LED off) with nothing connected to R+/R-, and LabJack digital input reads high. Connected LabJack GND to R-, and connected output from an LJTick-DAC to R+. With LJTDAC=0V, module is inactive (LED off) and LabJack digital input reads high. With LJTDAC=10V, module is active (LED on) and LabJack digital input reads low.

G4IDC5-SW Testing: Module is inactive (LED off) with nothing connected to R+/R-, and LabJack digital input reads high. Module is active (LED on) with a jumper wire shorting R+ to R-, and LabJack digital input reads low.
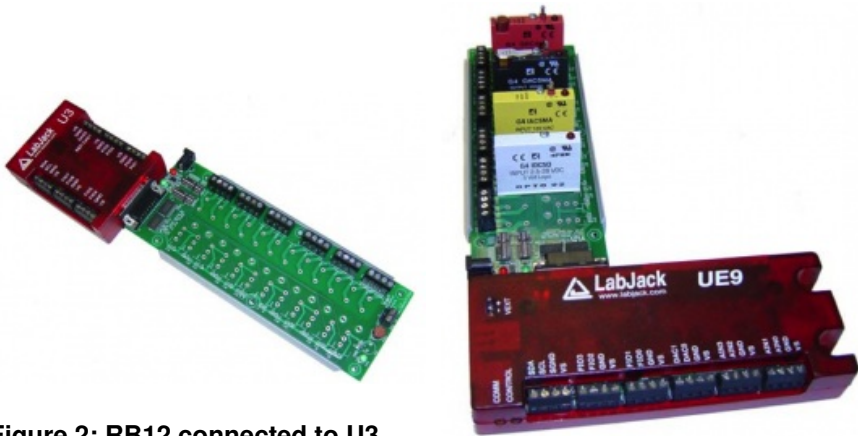

Figure 2: RB12 connected to U3

Figure 3: RB12 w/ modules connected to UE9

I/O Modules

For more information specifically about the various I/O modules, see the documentation from the manufacturer. One such manufacturer is Opto22, and as of this writing, the Opto22 "Generation 4 Digital I/O Family Data Book" is dated January 2017 and is available at the following URL:

http://documents.opto22.com/0727_G4_Digital_IO_Data_Book.pdf

Pages 35-52 of this data book cover the available modules, including typical wiring diagrams. The following table maps the I/O modules pin numbers 1-5 (as shown in the Opto22 data book) to their respective RB12 connections:

I/O Module	RB12
1	Rn+ screw terminal
2	Rn- screw terminal
3	Vs (~5 volts)
	4.7 kΩ pull-up to Vs and EIOn/CIOn (buffered for output, direct connection for

4	input)
5	GND

When configured for output, the control line (EIO/CIO) from the LabJack connects to a logic buffer which then connects to pin 4 of the I/O module. When the control line is high, the buffer output is in a high-impedance state. When the control line is low, the buffer output is connected to ground with the ability to sink up to 24 mA.

When configured for input, the control line (EIO/CIO) from the LabJack connects directly to pin 4 of the I/O module.

The RB12 includes a spare fuse. There is also a fuse tester socket where if a fuse is installed the "GOOD" green LED will light. The spare fuse holder and tester on the RB12 are designed for the TR5 fuse used by Opto22 (Digikey part number WK3062BK).

The RB12 is designed to accept G4 series digital I/O modules from Opto22, and compatible modules from other manufacturers such as the G5 series from Grayhill. Opto22 modules are available from opto22.com, alliedelec.com, and newark.com. Grayhill modules are available from digikey.com.

AC Output

G4OAC5A (Opto22, 24-240 VAC Output @ 3 A, 12 mA control current)

G4OAC5AMA (Opto22, 24-240 VAC Output @ 3 A, Manual Override)

70G-OAC5A [PDF] (Grayhill, 24-280 VAC Output @ 3.5 A)

70G-OAC5AMA [PDF] (Grayhill, 24-280 VAC Output @ 3.5 A, Manual Override)

DC Output

G4ODC5 (Opto22, 5-60 VDC Output @ 3 A, 12 mA control current)

G4ODC5MA (Opto22, 5-60 VDC Output @ 3 A, Manual Override)

G4ODC5A (Opto22, 5-200 VDC Output @ 1 A)

70G-ODC5 [PDF] (Grayhill, 3-60 VDC Output @ 3.5 A)

70G-ODC5MA [PDF] (Grayhill, 3-60 VDC Output @ 3.5 A, Manual Override)

70G-ODC5A [PDF] (Grayhill, 4-200 VDC Output @ ? A)

Dry Contact Output

G4ODC5R (Opto22, Mechanical Relay Output)

70G-ODC5R [PDF] (Grayhill, Mechanical Relay Output)

AC Input

G4IAC5 (Opto22, 90-140 VAC Input)

G4IAC5MA (Opto22, 90-140 VAC Input, Manual Override)

G4IAC5A (Opto22, 180-280 VAC Input)

70G-IAC5 [PDF] (Grayhill, 90-140 VAC Input)

70G-IAC5A [PDF] (Grayhill, 180-280 VAC Input)

DC Input

G4IDC5D (Opto22, 2.5-28 VDC Input)

G4IDC5 (Opto22, 10-32 VDC Input)

G4IDC5MA (Opto22, 10-32 VDC Input, Manual Override)

G4IDC5G (Opto22, 35-60 VDC Input)

70G-IDC5 [PDF] (Grayhill, 3-32 VDC Input)

Dry Contact Input (Switch Input)

G4IDC5-SW (Opto22, Switch Input, Isupply = 25 mA)

70G-IDC5S [PDF] (Grayhill, Switch Input, Isupply = 41 mA)

Declaration of Conformity

Manufacturers Name: LabJack Corporation

Manufacturers Address: 3232 S Vance St STE 200, Lakewood, CO 80227, USA

Declares that the product

Product Name: RB12 Relay Board

Model Number: RB12

conforms to the following Product Specifications:

EMC Directive: 89/336/EEC

EN 55011 Class A

EN 61326-1: General Requirements

Mechanical Drawings

See the following dimension drawing and the attached CAD files.
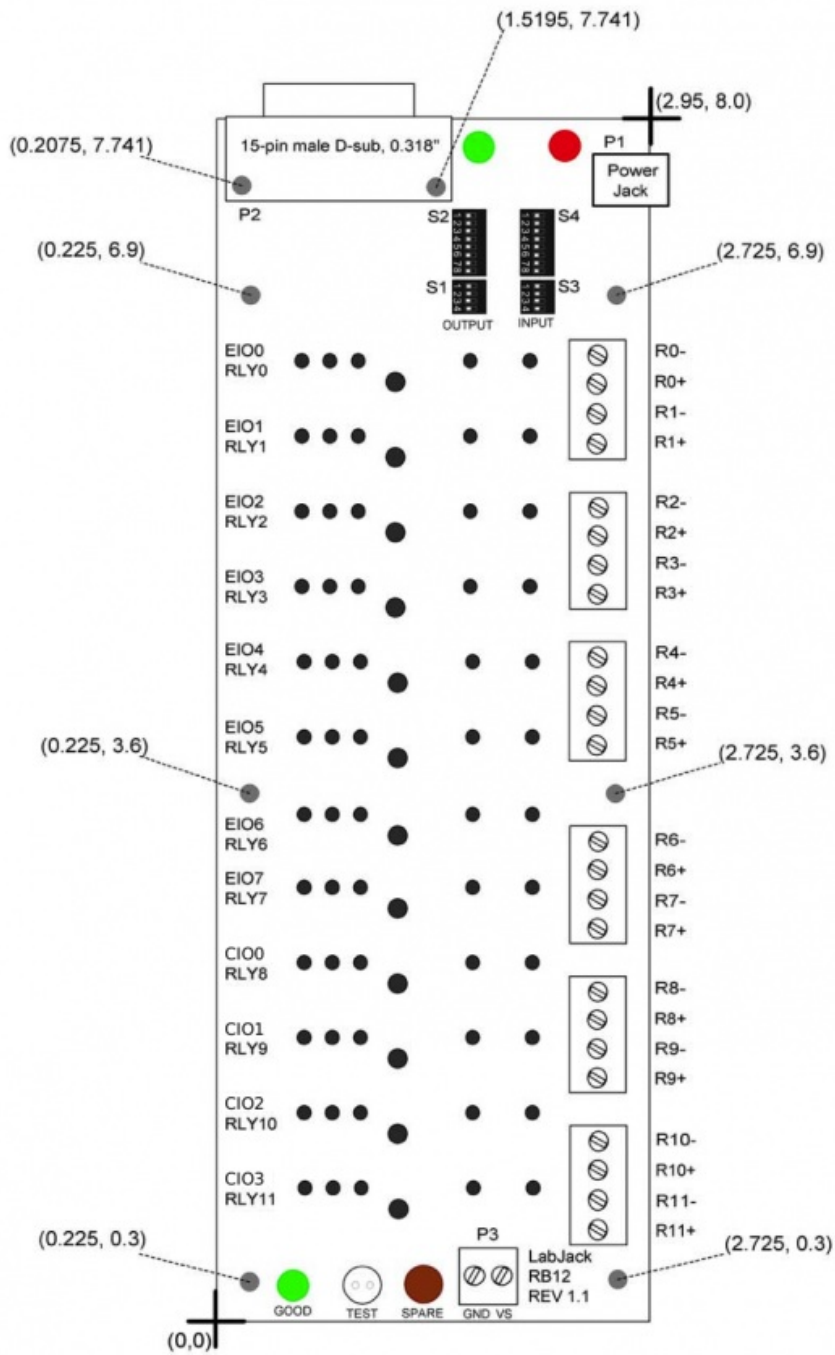
File Attachment:
- RB12.IGS
- RB12.STEP
- SnapTrack_6in.IGS
- SnapTrack_6in.STEP