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VoltPAQ-X2/X4

User Manual

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1. Introduction

The VoltPAQ is a linear power amplifier designed to run Quanser experiments. VoltPAQs come in three different flavours: X1, X2 and X4. These suffixes stand for the number of channels. Therefore, the VoltPAQ-X1 can power one load, the VoltPAQ-X2 can power two, and the VoltPAQ-X4 can power four. This manual is specifically for the X2 and X4 models.

⚠️ **If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.**

2. Specifications

The VoltPAQs replaces the UPM line of power amplifiers. Every VoltPAQ-X2/X4 consists of the following components and features:

1. Amplifier capable of supplying around 24V and 4A continuous per channel
2. Current sensing capability for each channel
3. User ability to enable/disable individual amplifiers
4. Automatic thermal shut-down to prevent damage to amplifier
5. Over-heating/over-current fault indication output
6. E-stop

AC Input Specifications	Value
Input Voltage Range	100V-120V/ 220V-240V
Max Input Current per channel	1.0A RMS @ 220V 1.9A RMS @ 110V
Input Frequency Min	47Hz
Input Frequency Max	63Hz

Table 1: Amplifier specifications

Amplifier Specifications	Value
Output Voltage	No load: -23.3V to +21.8V 2A load: -22.3V to +20.8V
Continuous Current Output per channel	± 4 A
Voltage Gain	3V/V
Current Sense	1 A/V
Amplifier Command Voltage Range	± 10V

Table 2: Amplifier specifications

3. Connections

Below are a few pictures of the front panel of the VoltPAQ-X2 and VoltPAQ-X4. Following the pictures is a summary and description of all the front panel connections.

Figure 1: Front panel connections for the VoltPAQ-X2

Figure 2: Front panel connections for the VoltPAQ-X4

Connection	Description	Electrical Range
Amplifier Command	An analog voltage is applied on this channel. This directly controls the output of the amp through the "To Load" channel.	-10V to +10V
Amplifier LED	Enabled/Disabled status of channel	LED on = enabled
Current Sense	Indicates the current being drawn by the load	1A/V
To Load	The load to be driven is connected here. Amp Out = 3 * Amplifier Command	
System Power	Indicates the VoltPAQ is receiving power	
Enable	User applies this signal. In the VoltPAQ-X2, enable 0 and 1 are used. Enable 2 and 3 are floating. VoltPAQ-X4 uses all 4 enable pins.	0V = Disable 5V = Enable
/Fault	User reads this signal. In the VoltPAQ-X2, /Fault0 and /Fault1 are used. /Fault2 and /Fault3 are floating. The VoltPAQ-X4 uses all /Fault pins.	/Fault0 = 0 means Amplifier0 is disabled
E-Stop	E-stop is the master enable/disable	

Table 3: Connection summary of VoltPAQ-X2 and X4

4. E-Stop

	E-Stop Connected	E-Stop Not-Connected
E-Stop Button Released	VoltPAQ amps enabled if amplifier enable lines set HIGH	All VoltPAQ amps disabled
E-Stop Button Pressed	All VoltPAQ amps disabled	All VoltPAQ amps disabled

Table 4: Truth table of E-Stop interaction with the amplifier.

5. Cables

4-Pin DIN to 6-Pin DIN

This cable connects the VoltPAQ output to the desired load.

Figure 3: 4-pin DIN to 6-pin DIN

RCA-to-RCA

RCA-to-RCA cables connect the "Amplifier Command" and the "Current Sense" to a data acquisition board.

Figure 4: RCA-to-RCA cable

E-Stop

The E-Stop must be plugged into the X2 or X4 unit for proper operation.

Figure 5: E-Stop Button

16-Pin Ribbon Cable

This cable is used to connect a Quanser DAQ to the enable lines of the VoltPAQ-X2 and the VoltPAQ-X4. Additionally, this cable also carries amplifier fault lines, which allows the user to read the status of the individual amplifiers.

Figure 6: 16-pin ribbon cable used to enable the amplifiers

Split 16 Pin Ribbon Cable (Used only with Q8-USB version 2.0 and earlier)

This cable is used to connect a Quanser Q8-USB DAQ (version 2 and earlier) to the enable lines of the VoltPAQ-X2 and VoltPAQ-X4. Aditionally, this cable also carries amplifier fault lines, which allows the user to read the status of the individual amplifiers.
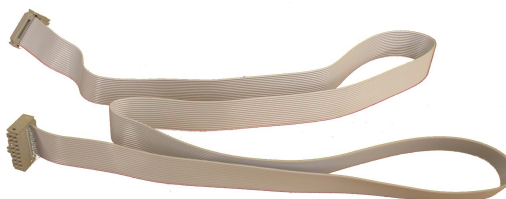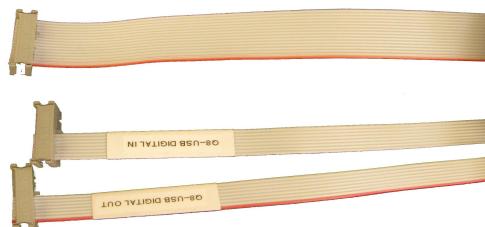
Figure 7: Split 16-pin ribbon cable

6. Enabling The Amplifier Through QUARC

Connect one end of the 16-Pin ribbon cable to DI/O 0-7 header of the DAQ. Next connect the other end to your VoltPAQ-X2/X4. Through QUARC, set digital channels 0-3 as outputs. Write a logic 1 to the channels 0-3 to enable and write a logic 0 to disable the respective channel. The LED of the associated amplifier will turn on when correctly enabled.

Through QUARC, set digital channels 4-7 as inputs. You can read these lines to recognize the status of a specific amplifier channel. For example, if you read digital input channel 4 as logic 1, it means that amplifier channel 0 is enabled. If you read digital input channel 5 as logic 0, it means that amplifier channel 1 is faulted/disabled.

If you are using a Q8-USB (version 2 or earlier), ensure that you are using the Split 16-pin ribbon cable to connect to your amplifier. Connect the end marked Q8-USB DIGITAL IN to the digital input channel of the Q8-USB. Connect the end marked Q8-USB DIGITAL OUT to the digital output channel of the Q8-USB. Finally, connect the free end to the VoltPAQ-X2/X4.

To enable the VoltPAQ-X2/X4 using a Q8-USB (version 2 or earlier), write a logic 1 to the respective digital output channels 0-3. For example, writing a logic 1 to digital output 0 will enable amplifier channel 0. Writing a logic 0 to digital output 2 will disable amplifier channel 2.

To read the status of the VoltPAQ-X2/X4 amplifier channels when using a Q8-USB (version 2 or earlier), you must read digital input channels 0-3. For example, reading a logic 1 on digital input 0 means amplifier channel 0 is enabled. Reading a logic 0 on channel 2 means amplifier channel 2 is faulted/disabled.

7. Fuses

If you find your unit does not output on either the positive or negative output, or otherwise stops functioning, check the fuses located at the back of the unit.

Figure 8: Backside of VoltPAQ-X2 has 2 fuses.

Figure 9: Backside of VoltPAQ-X4 has 4 fuses.

There is one fuse per channel. So, for example, in the VoltPAQ-X2, there are 2 fuses. If your voltage input is 100-132 VAC use the following fuses: Slow Blow 1.5A – Digikey part number F2551-ND.

If your voltage input is 200VAC-240VAC use the following fuses: Slow Blow 1A – Digikey part number F2543-ND

Remove the existing fuse by pushing inward and turning the fuse approximately 90 degrees, then pull the cap out. Replace the fuse, push back in and twist to lock.

8. Obtaining Support

Note that a support contract may be required to obtain technical support. To obtain support from Quanser, go to http://www.quanser.com and click on the *Tech Support* link. Fill in the form with all requested software and hardware information and a description of the problem encountered. Be sure to include your email address and a telephone number where you can be reached. A qualified technical support person will contact you.