

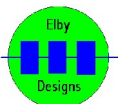
# EuroRack – FracRack Comparisons



A summation of the major differences between the EuroRack and FracRack systems.

This documents attempts to cover the major differences between these 2 popular `mini` modular systems and the pros and cons of building a unit that incorporates modules from both systems.

Revision 1.01 April 3<sup>rd</sup> 2009



**Elby Designs – Laurie Biddulph**

Kariong, NSW 2250, Australia

[elby\\_designs@ozemail.com.au](mailto:elby_designs@ozemail.com.au) <http://www.elby-designs.com>

# EuroRack – FracRack Comparisons

## Mechanical Differences

Although both systems are designed with 3U as the height criteria there are some minor differences between them.

Frac-rack panels are 4mm taller than Eurorack panels. This is because the Eurorack modules make allowance for the 2mm lips on the edges of each mounting rail (top and bottom).

The spacing for the panel fixing screws are also different.

In this picture of a Fracrack you can see the 2 mounting rails at the top and bottom of the case. The Fracrack panel extends fully over these thus achieving the full 3U panel height. Even though the panel is a full 3U, it is obvious from the picture that the mounting rails occupy a reasonable chunk of the top and bottom edges resulting in the actual free panel space for components like pots being restricted to the spacing between the top and bottom rails. You will also note that there are only a handful of fixing points provided for the panels.



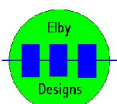
In this picture of a Eurorack you can see that the panel is bordered top and bottom by a small lip. This lip is actually part of the mounting rails and provides a 'frame' in which the panel is mounted. Again, like with the Fracrack, the mounting rails occupy a portion of the actual panel and, again, restricts the available panel space to the distance between the rails. This distance is, generally, the same for both systems. You will also note that there are substantially more fixing holes provided for the panels.

A Eurorack module will fit in to a Fracrack chassis but there will be a height difference in the panels and you will need to add additional fixing holes. This fit can be achieved without modification to the module and only requires the addition of extra fixing holes.

A Fracrack module will only fit in to a Eurorack chassis after the panel has been trimmed top and bottom by 4mm (2mm at the top and 2mm at the bottom). You will also need to add additional fixing holes to the panel to align with the mounting rail.



It is generally recommended that a mixed modular system employ multiple racks with each rack being assigned to one family. This results in a much neater solution and requires no mechanical modifications to any modules that are installed.



**Elby Designs – Laurie Biddulph**

Kariong, NSW 2250, Australia

[elby\\_designs@ozemail.com.au](mailto:elby_designs@ozemail.com.au) <http://www.elby-designs.com>

# EuroRack – FracRack Comparisons

## Electrical Differences

In general, Eurorack systems use +/-12VDC power rails while Fracrack uses +/-15VDC. In many cases you can mix modules on the different power rails. The mains points to be aware of are:-

### 12V modules on 15V power rails

1. Any onboard regulators in the module may run slightly warmer. This should not normally be a problem as most module designs will ensure adequate cooling is provided for the regulators over a reasonably wide range of input voltages.
2. Some modules derive internal reference voltages/currents from the power rails. Increasing the power rails will also result in the reference signals being increased and this could affect the overall operation of the module. It may be necessary to re-calibrate the module or even modify the relevant components
3. If a module uses components that are rated to a maximum of 12V then their operation at higher voltages could cause a failure of that component.

### 15V modules on 12V power rails

1. Any onboard regulators will need to be checked to ensure that they are receiving adequate input voltage for the regulator to maintain correct and proper regulation. This should only really affect regulators providing outputs in excess of 9VDC.
2. Some modules derive internal reference voltages/currents from the power rails. Decreasing the power rails will also result in the reference signals being decreased and this could affect the overall operation of the module. It may be necessary to re-calibrate the module or even modify the relevant components.

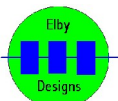
As mentioned in the Mechanical Differences section, it is generally recommended to use separate racks for the different systems and this would also apply to the power supplies. Although this does increase the cost of the overall system, it does ensure that all modules remain completely unmodified and simplifies the management of modules when moving them around as you do not need to consider if the module is suitable and/or has been modified.

The range of control/signal voltages required both as inputs to and outputs from a module tend to vary slightly within the different systems. Some systems may require, say, a 0V to +5V control voltage to achieve full range control of a function whereas other systems may require 0V to +10V. In the case where 15V modules are run on 12V power rails, the maximum achievable output range may be attenuated slightly by the reduced power rails. It will depend upon the modules being used, what they are connected to and what adjustments are provided that will determine if this will be a problem. As many large systems utilise modules from 2 or more systems, they have, usually, already addressed the need to match signal levels and so this problem is usually controllable.

You should also check with the relevant module suppliers to determine if modifying them affects any warranty you may have on the module.

One final point here is that the different systems also tend to use different power connectors and cables. Again, this is easily addressed with system specific racks in a system. If you intend, however, to opt for mixed systems within a rack then you will also need to consider providing custom power-patch cables that will allow the different modules to be connected to common power supplies.

It is also worth mentioning that the PAiA series of modules are designed for +/-18V power rails as they have onboard regulators that generate the required +/-12V. This does mean that (a) they will work quite happily in Fracrack systems utilising +/-15V rails as the regulators only need a round 2.5V headroom for guaranteed regulation. Also, by bypassing the onboard regulators, the modules can be run directly from system running on +/-12V rails. (Thanks to John McMillan for this tippet).



**Elby Designs – Laurie Biddulph**

Kariong, NSW 2250, Australia

[elby\\_designs@ozemail.com.au](mailto:elby_designs@ozemail.com.au) <http://www.elby-designs.com>

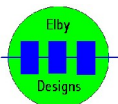
# EuroRack – FracRack Comparisons

## Interfacing Differences

In addition to the mechanical and electrical differences already discussed, there is the question of the connections between the various systems. The smaller modules tend to use either 3.5mm (1/8") jacks or 4mm banana plugs. Patch cables can be made that allow signals from one system to be patched in to a different system but this does result in a reasonable increase in the number of cables that need to be carried.

This problem increases in further when larger module formats are added which tend to use 6.35mm (1/4") jacks.

Depending upon the type of patch cable used and the configuration of the module, 3.5mm jacks may sometimes utilise the screen wire that is available with the 3.5mm jacks. As banana plugs only support a single wire, it is conceivable that some connections may need to be handled in a different way.



**Elby Designs – Laurie Biddulph**

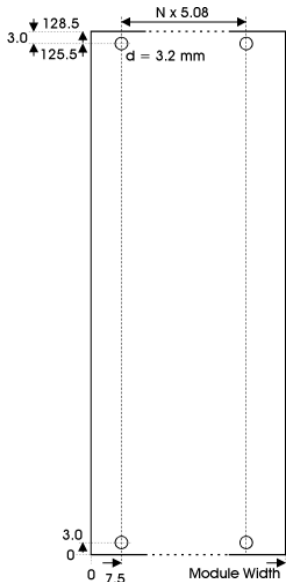
Kariong, NSW 2250, Australia

[elby\\_designs@ozemail.com.au](mailto:elby_designs@ozemail.com.au) <http://www.elby-designs.com>

# EuroRack – FracRack Comparisons

## Mechanical Details

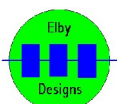
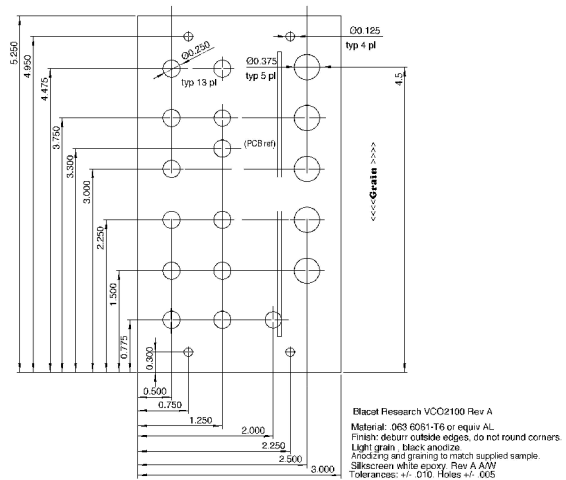
Both EuroRack and FracRack utilize industry standard 19" racks as the basic frames for their systems. The structure of the mounting rails differs slightly between these systems with the FracRack system utilizing a flat-fronted mounting rail that allows the front panel to extend to the upper and lower limits of the rack. The drawing to the right is from Blacet and details the basic dimensions for a typical FracRack module. The drawing below is from Doepfer and details the basic dimensions for a EuroRack module



FracRack module front panels are all 3U high (1U = 1.75 inch = 44.45mm, 3U = 133.4 mm) while EuroRack module front panels are 128.5 mm.

The width of the front panels is measured in HP (HP = horizontal pitch, 1 HP = 5.08 mm or 1/5 inch or 1/5"). The actual width of a front panel is usually a few tenth of a mm less than the calculated value to allow some tolerance to assemble the panels side-by-side.

The rack system has a usable width of 84 HP (= 426.4 mm). EuroRack modules come in a wide variety of module widths whereas FracRack modules tend to use just a few standard widths.



**Elby Designs – Laurie Biddulph**

Kariong, NSW 2250, Australia

[elby\\_designs@ozemail.com.au](mailto:elby_designs@ozemail.com.au) <http://www.elby-designs.com>