

# LIBB

## Low Impedance Bus Board

# System Power Wiring Guide

version 1.0

## System Wiring Overview

This guide gives practical advice for wiring Eurorack system power. It is not only important to have a low noise bus board, you must also wire it correctly to prevent increases in system noise.

For smaller systems such as a two row skiff it is okay to wire two bus boards in series using the barrier strip terminals. Just keep the wires short with a maximum of 20 inches (500 mm) total series length. However if you really want the minimum amount of noise coupling, add a barrier strip between your power supply and bus boards, as detailed below for the small system.

For medium and large systems, parallel "star configuration" connections are required to reduce noise coupling across bus boards. The following table shows how many Low Impedance Bus Boards (LIBB) can be supported for each configuration.

System Size	Number of LIBB supported, single wire per LIBB connection	Number of module power connections	Number of LIBB supported, dual wire per Power Supply and LIBB connection
Small	1-3	48	Not Applicable - direct connect instead
Medium	1-7	112	2-3
Large	1-14 (use 2 wires for PSU connection)	224	2-7

## Guidelines for all Systems

- 1) Run a single 12 AWG wire for each LIBB barrier strip connection, 3 power wires and 2 ground wires. Single wire connection is suitable for most installations. Extra long connections (over 39 inches or 1.0 meter) may need to use dual wire connections. At that length, the resistance of the ground path (two wires paralleled) is 4.7 milliohms.
- 2) The metric equivalent to 12 AWG wire is 2.05 mm diameter wire, or metric cross section of  $3.3 \text{ mm}^2$ . The UK equivalent is #14 SWG.
- 3) Color coding of wires is optional but definitely helps prevent wiring errors.
- 4) Barrier strips have been around for over 65 years and are used here to provide the star power distribution to multiple bus boards.
- 5) If building a system from scratch, try to keep the bus board count to 8 or less per each power supply. Remember that the noise is additive across the common part of the wiring between the power supply and the distribution barrier strip.
- 6) The two way barrier strips have metal plates that connect the back to back screws. Without any terminal jumpers, this allows four wire entries, one on each side of the screws. When more wire entries are needed, just add jumpers across terminals.
- 7) The pair of side holes on each side of the barrier strip is used to attach it to the cabinet. Wood screws can be used for a wood cabinet or machine screws with washers and nuts can be used for metal cabinets.
- 8) Mount the barrier strip as close as possible to the power supply, 6 inches or less. The goal is to keep shared power wires as short as possible.
- 9) The important point to remember is that noise coupling is created by the shared resistance across modules. Therefore all power distribution wiring to the bus boards increase the noise floor. That is why wiring from the power supply to barrier strip and bus boards is just as important as installing low noise bus boards.
- 10) It is preferred to strip the wire and insert it directly under the barrier strip screw heads. Each connection adds resistance to the connection, including crimping to a spade lug type connector. For LIBB there are top plates on each screw helping to keep the wire strands contained.
- 11) Wires are mounted above the bottom plates or jumpers of the barrier strips and below the screw heads.
- 12) Insure that wires are really tight by tugging on them after tightening down the screw.

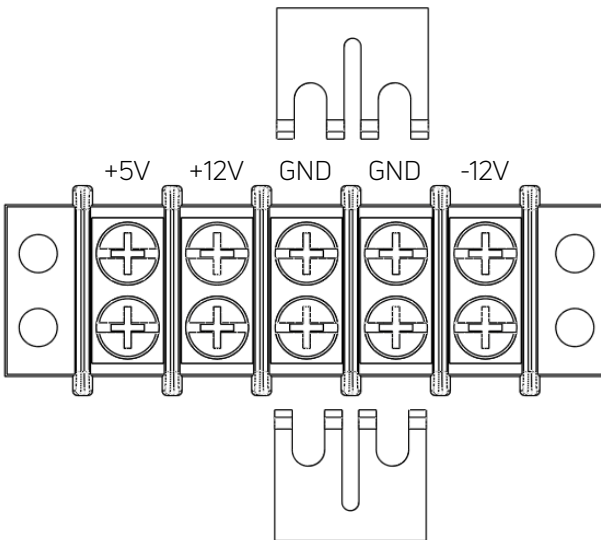
- 13) For linear power supplies with solder turrets you can wrap 1 or more wires around the turret, to fit large gauges such as 12 AWG.
- 14) Each system build includes suggested parts for building star ground and power systems. Other parts may be used but these are commonly available across most locations. The Molex parts support #12-24 AWG wires.
- 15) Always check for shorts when wiring is complete and before anything is powered on.

## Small System Wiring

The following parts are needed for the small system wiring, supporting up to 3 Genus Modu Low Impedance Bus Boards.

Description	Qty	Manuf.	Manuf. Part No.	Digikey Part No.	Newark/Farnell Part No.
5 Circuit Dual Row 0.375 inch (9.53mm) Barrier Strip Connector	1	Molex	38770-0105	WM5762-ND	14F2617
Terminal Jumper 2 position 0.375 inch	2	Molex	038723-6502	WM4244-ND	72K2052

The small system uses one 5 Circuit Barrier Strip with two 2 position terminal jumpers for the ground connection. This doubles the common wire entries for ground to 8 using 4 screws. Medium System Wiring

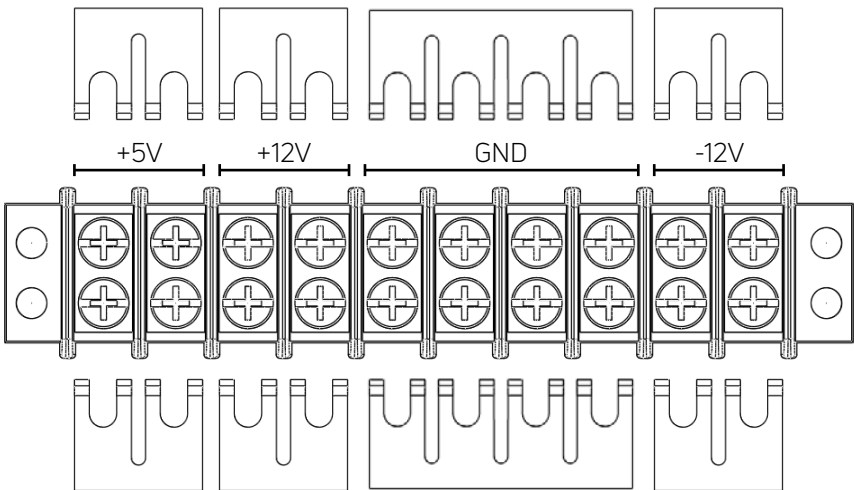


# Medium System Wiring

The following parts are needed for the medium system wiring, supporting up to 7 Genus Modu Low Impedance Bus Boards.

Description	Qty	Manuf.	Manuf. Part No.	Digikey Part No.	Newark/Farnell Part No.
10 Circuit Dual Row 0.375 inch (9.53mm) Barrier Strip Connector	1	Molex	38770-0110	WM5766-ND	72K2070
Terminal Jumper 2 position 0.375 inch	6	Molex	038723-6502	WM4244-ND	72K2052
Terminal Jumper 4 position 0.375 inch	2	Molex	038002-1286	WM9718-ND	01J6087

For the medium size system a 10 circuit barrier strip is used. Each power rail, +5V, +12V and -12V gets a pair of 2 position terminal jumpers, for 8 wire entries. Ground gets a pair of 4 position terminal jumpers, for 16 wire entries.



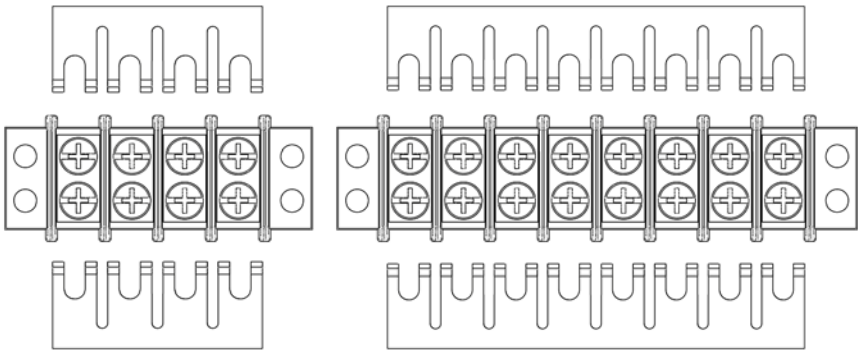
# Large System Wiring

The following parts are needed for the large system wiring, supporting up to 14 Genus Modu Low Impedance Bus Boards.

Description	Qty	Manuf.	Manuf. Part No.	Digikey Part No.	Newark/Farnell Part No.
4 Circuit Dual Row 0.375 inch (9.53mm) Barrier Strip Connector	3	Molex	038770-0104	WM5761-ND	72K2066
8 Circuit Dual Row 0.375 inch (9.53mm) Barrier Strip Connector	1	Molex	038770-0108	WM5765-ND	72K2069
Terminal Jumper 4 position 0.375 inch	6	Molex	038002-1286	WM9718-ND	01J6087
Terminal Jumper 8 position 0.375 inch	2	Molex	038002-1290	WM5017-ND	72K1979

For the large system wiring a 4-circuit barrier strip is used for each power rail, each with a pair of 4 position terminal jumpers. For ground an 8-circuit barrier strip is used with a pair of 8 position terminal jumpers.

There are three 4-circuit barrier strips with 4 position jumpers, for +5V, +12V and -12V. There is one 8-circuit barrier strip with 8 position jumpers for ground.



The diagram on the next page illustrates the wiring for a 3 bus board system. Use the example connections to scale to larger systems.

# Power Supply Barrier Strip or Turret DC Power Connections

