Date
2023-11-09

Low Noise Factory

Manual

LNF-PBA-HP

Low Noise Power Block

Low Noise Factory AB
Nellickevägen 24,
412 63 Göteborg, Sweden
info@lownoisefactory.com
lownoisefactory.com

1 Contents

1. Introduction

Important: This product is ESD sensitive and shall be handled as such.
Please, read this manual thoroughly before start using this product.

LNF-PBA-HP is a ±12 VDC low noise linear power supply designed to power up the LNF's line of HEMT power supplies. It can supply eight LNF-PS's of any kind. It operates with mains voltage of either 115 VAC or 230 VAC (selectable on the rear panel). Please consult factory for other voltage options.
The front panel has eight output connectors (Out 1, .. , 8 - all delivering the ±12 VDC. The outputs are not galvanically isolated from each other and that has to be taken in consideration while installing and using the instrument. Also, all outputs are floating (are galvanically isolated from the primary side of the AC/DC converters). The common practice is to have them in non-floating mode and for that purpose there two banana connectors on the front panel which provides the user with a possibility to do it by a simple plugging the jumper plug (provided by LNF) into them; thus connecting the Common to Earth – Earth is internally wired to protective earth prong on the power entry module 115/230VAC.
The outputs are electrically divided in two groups: Group Odd and Group Even. Group Odd is consisting of Out 1, 3, 5 and 7 while the Group Even is consisting of Out 2, 4, 6 and 8. Each group is capable of delivering totally maximum 5.1 A on +12 VDC rails together - so the instrument can deliver totally 10.2 A when all eight outputs are loaded to their maximum.
The -12 VDC rail is shared between all eight outputs and can deliver 1.7 A. Also, the Common is shared between all eight outputs.
There are two layers of protection for overload. The first layer is protection of each output individually on +12 VDC rails - they are equipped with fuses with trip current 3 A and hold current 1.5 A thus protected from e.g. short. The next layer of protection is foldback current limiter featured in AC/DC modules which, when the total current of the specific group is higher than 5.1 A, acts and suppresses both the voltage and total current of the associated group of the outputs.
As the -12 VDC rail shared between all outputs they are sharing even the protection – all are protected with one fuse and one foldback current limiter (in this case 1.7 A).
There is a LED display on the front panel for a coarse indication of the total current consumed by supplied LNF-PS's.

2. Specifications

Input					
Parameter	**Description**	**Minimum**	**Nominal**	**Maximum**	**Unit**
AC Input voltage range	Voltage selector at 115V Voltage selector at 230V	104 209	115 230	132 264	VAC
AC Input Power	Voltage selector at 115V Voltage selector at 230V			300 300	W
Input Frequency	AC input frequency	47		63	Hz

Table 1 input parameters

Output					
Parameter	**Description/Conditions**	**Minimum**	**Nominal**	**Maximum**	**Unit**
Efficiency			55		%
Noise	Ripple and noise		2	3	mV_{PK-PK}
Maximum Total Output Current	+12V -12V		10.2 1.7		A
Load Regulation	Output change for 50% load change	-0.05		0.05	%

Table 2 Output parameters

Environmental					
Parameter	**Description/Conditions**	**Minimum**	**Nominal**	**Maximum**	**Unit**
Storage Temperature		-40		85	°C
Operating Temperature		5		40	°C
Relative Humidity[1]	Non-Condensing	5		80	%RH

Table 3 Environmental parameters

[1] The LNF-PBA is for indoor use only, pollution degree 2.

Physical	
Weight	9.6 kg
Dimensions	329 (W) x 144 (H) x 271 (D) mm

Table 4 Physical properties

3. Before use

After unpacking, make a visual inspection that there is no damage to the unit. If any damage is found, please contact the factory prior to taking it into operation.

Before first use read the chapter 5. Using the Instrument.

4. Installing the Instrument

Important: The instrument is cooled by fan-forced air though the vent slots on left-, right-, top-, bottom- and rear-side and **no one of them may not** be covered. It shall be placed on a solid flat surface with 10 cm of free space to each side of it (except the bottom which is limited by size of the feet), and the place must be well ventilated.

The connection to the mains must be done with a power cord compatible with IEC 60320-C14 with a protective earth prong – in the rest of the text called just earth. The instrument must be connected to an outlet provided with earth.

The instrument can be used with either 115 VAC or 230 VAC mains (local power grid) voltage. The mains voltage is selected and indicated on the power entry module - see rear panel. It is already preconfigured to the power grid voltage in your region when you receive the instrument – example shown in Figure 1 shows how it looks like when the instrument is configured to operate with 230 VAC. In this example the instrument must be run with the voltage 230 VAC indicated in Figure 1 otherwise, if it was intended to be run with 115 VAC, it must be reconfigured according to the procedure described in chapter 5.1 prior to use.

Figure 1 Power Entry Module configured for 230 VAC.

5. Using the Instrument

When using the instrument, it is absolutely **a must** to provide with good ventilation – do not cover any of ventilation slots (they are made on all sides of it except the front panel).
If necessary, reconfigure the power entry module in the rear panel, by following the procedure described in 5.1.

5.1. Mains and Fusing Configuration

The instrument can be run with either 115 or 230 VAC mains voltage. The mains voltage is selected by configuring the power entry on the rear panel. It is already preconfigured to the voltage of end user's region when the instrument is shipped from the factory.
As a good practice, it is recommended to check if the instrument is configured as it shall and if it is according to your mains voltage you can skip the procedure described below.
If you, by some reason, get in situation that you need to swap from 115 VAC to 230 VAC or vice versa you can do it by following seven steps:

1. Disconnect the power cable from the power entry of the instrument.
2. Pry out the hatch for the fuse cartridge with a slot screwdriver (e.g. 0.4 x 3 mm). See photo below for details -
3. Figure *2*.
4. Use a slot screwdriver to carefully pull out the red fuse assembly – see
5. Figure *2*.
6. Replace both fuses according to the markings on the instrument. For 230 V use 2.5 A slow blow fuse and for 115 V use 5 A slow blow. The fuse size is ¼" x 1-¼" - see Figure 3.
7. Re-insert the fuse cartridge it into the power entry module – with the actual voltage (230 V or 115 V) indicating label up.
8. Close the hatch – see Figure 4.
9. Double check that the mains voltage indicator shows the right voltage - Figure 4.

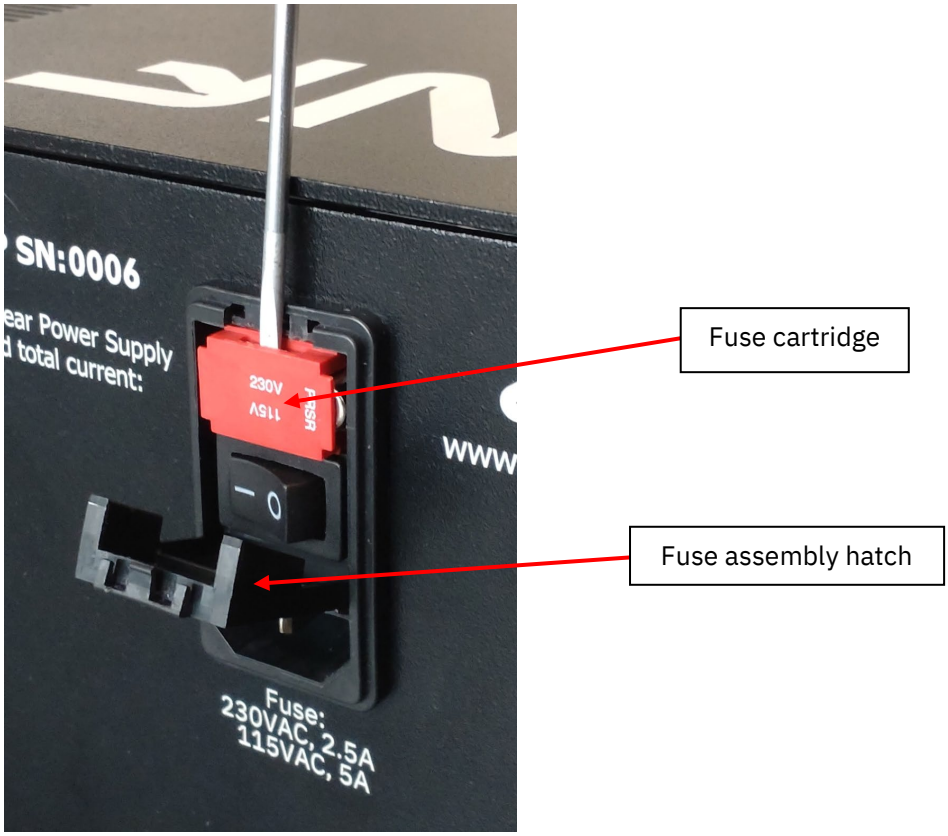

Figure 2 Prying out the assembly hatch and pulling out the fuse cartridge.

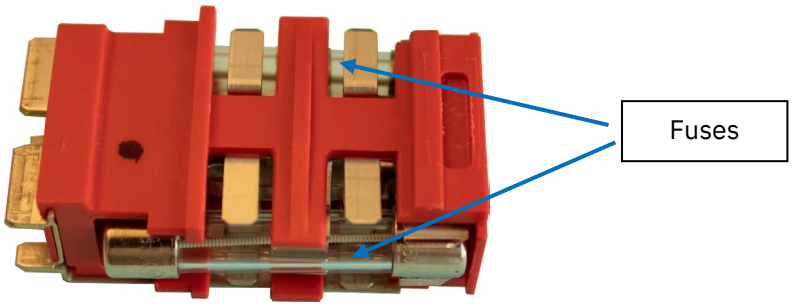

Figure 3 Places to insert proposed fuses.

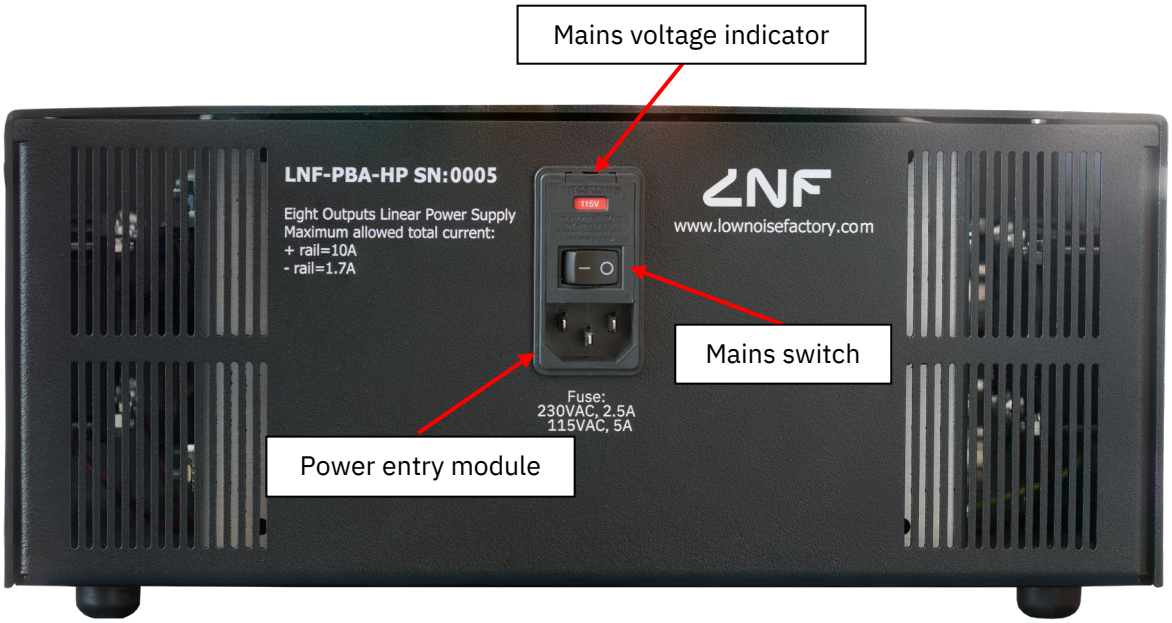

Figure 4 Example: the rear panel when the instrument is configured for 115 VAC.

5.2. Front panel

Figure 5 bellow shows the front panel of the instrument.

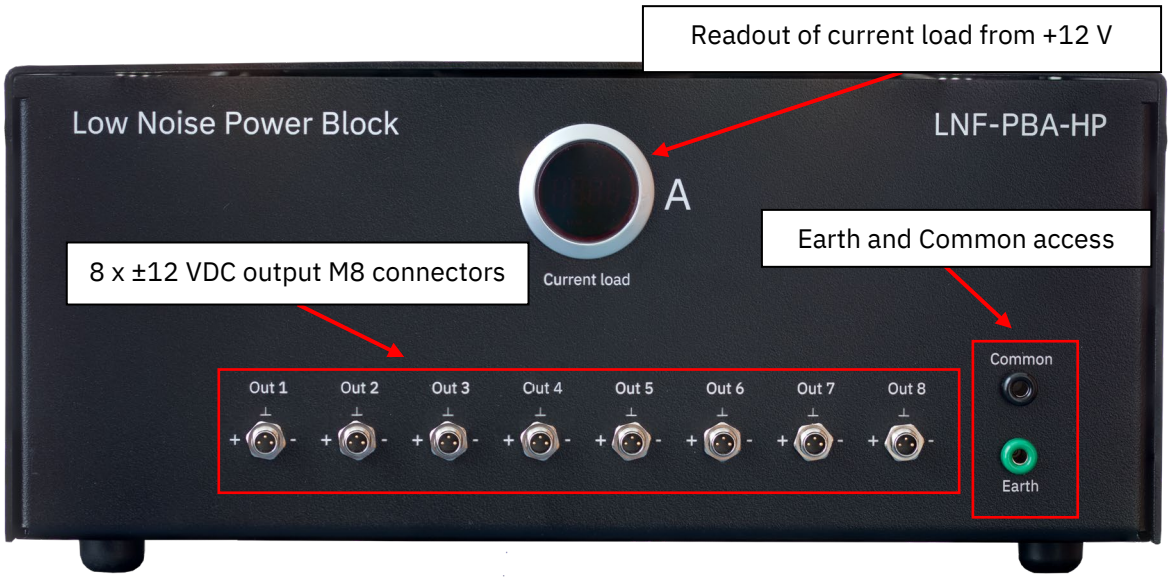

Figure 5 Front panel.

There are eight ±12 VDC outputs – Out 1, .., 8 - M8 3-pole connectors. Each of the connectors is compatible with power cable LNF-CAB_PS3b which is used for powering of the LNF-PS family of products.

There are two banana connectors – the black one labelled as Common and the green one labelled as Earth. There is a LED display which is intended for providing with a coarse information of the total current on +12 VDC side.

5.3. Configuring Floating and Non-Floating Instrument Mode

There is access to circuit Common and Earth on the instrument's front panel. There is also a jumper plug delivered with the instrument which can be used to electrically connect Common to Earth. With this feature, the instrument can be configured to be floating or non-floating. It is highly recommended to always use it non-floating, i.e. with the jumper plug installed, when connecting or disconnecting LNAs to your system. Once the system is in operation, the jumper plug can be removed if a floating system is desired. This could be the case in complex electrical systems with many ground return paths to prevent ground loops. If there is no specific reason to use it floating, it is recommended to always leave the jumper plug installed. In floating operation, the instrument common can float several Volts over earth (depending on your lab's electrical system) which could cause LNA failures when connecting or disconnecting an LNA if the Vd or Vg pin engages before the ground pin. It is therefore important to always use the jumper plug when connecting or disconnecting LNAs.
If it is desired to have Common on defined – non-floating, i.e. Earth potential it is just to plug the jumper plug (provided by LNF - KURZ 19-4 IG Ni / SW) between Common and Earth banana connectors as shown in Figure 6:

Figure 6 Connecting Common to Earth

5.4. Running the Instrument

All eight outputs are sharing the Common (GND). The ±12 VDC rails are organized as shown in Table 5

Rail	Shared between Output – fit together	Max total Current
+12 VDC Internal Rail 1	1, 3, 5 and 7 (Group Odd)	5.1 A
+12 VDC Internal Rail 2	2, 4, 6 and 8 (Group Even)	5.1 A
-12 VDC	1, .. , 8 (Group Odd + Group Even)	1.7 A

Table 5 Internal connection between the rails

The configuration is that +12 VDC of Out 1, 3, 5 and 7 are fit together and the Out 2, 4, 6 and 8 are fit together. Such configuration of outputs does that the outputs are not galvanically isolated from each other's which has to be taken in consideration while wiring the system.
Each output has pinout seen from outside (front panel) as shown in Figure 7 – it is also labelled on the front panel.

Common

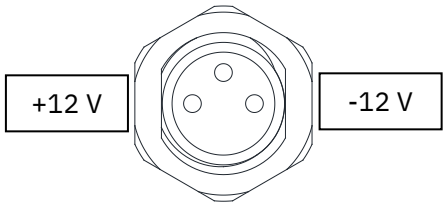

Figure 7 Output pinout

To connect any of LNF-PS's use the cable LNF-CAB_PS3b.
Since all LNF's current and future HEMT power supplies mainly draw current from the positive rails, this current will always be the limiting factor to how many power supplies (LNF-PS's) the LNF-PBA can drive. The maximum total current the instrument can deliver is 5.1 A per group (Odd or Even). The instrument has automatic current limit/foldback for each group. When the total current exceeds 5.1 A, the voltage will drop below 12V. When this happens all HEMT power supplies connected to that specific group will stop working properly.
A good practice is, if you want to start simultaneously several LNF-PS3, 4 or 8's attached (i.e. LNF-PBA-HP is off and LNF-PS3, 4 or 8's are attached to the front panel and turned on) to start with LNF-PS3, 4 or 8's displays in off state (there is switch Display on their front panels for that purpose) and then turn on the Displays one by one. The reason for this percussion is that the inrush current of the Displays theoretically can overrun the foldback current limiter limit and get it to trip.

6. Maintenance and Service

There are no serviceable parts in the instrument. If the ventilation holes are clogged with dust, disconnect the instrument from the mains supply and use a dry fabric to gently clear the ventilation holes.