

User's Manual

PMM PA6001

WIDEBAND RF POWER AMPLIFIER

100 kHz - 250 MHz / 40 Watts

SERIAL NUMBER OF THE INSTRUMENT

You can find the Series Number on the rear panel of the instrument.

Series Number is in the form: 0000X00000.

The first four digits and the letter are the Series Number prefix, the last five digits are the Series Number suffix. The prefix is the same for identical instruments, it changes only when a configuration change is made to the instrument.

The suffix is different for each instrument.

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NOTE:

Do not use the equipment in a function not specified by the manufacturer.

This instruction manual must be read before attempting to install or operate the amplifier.

Before using the equipment the user must insure that all instructions at switch on as indicated in chapter 2 have been properly made and checked.

The information contained in this document is subject to change without notice.

SAFETY SYMBOLS:



Warning, danger of electric shock



Read carefully the Operating Manual and its instructions, pay attention to the safety symbols.



EARTH PROTECTION

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SAFETY RECOMMENDATIONS AND INSTRUCTIONS

To maintain it in safe conditions and ensure correct use, these general instructions must be fully understood and applied before the product is used.

- CAT 1 Terminals are present on the equipment; do not use for categories of measurement II, III and IV.
- High leakage current equipment, connect the protective earth terminal before connection to mains.
- Hazardous live voltage are present at the outputs of the amplifier, connect load(s) to the amplifier outputs before using.
- Install the equipment in a shielding zone to meet the emission specifications of the directive 2004/108/CE. Inside the shielding area, other test equipments could be disturbed.
- For safety reasons, do not leave the equipment under mains voltage when the RF output is not connected.
- Before using the amplifier, the input level of the signal generator must be checked (0 dBm typical, + 10 dBm max.).
- Special care must be taken with regards to the level of radiation of all equipments connected to the amplifier.
- For the operator safety, do not connect or disconnect the load when the amplifier delivers the RF signal.
- When the amplifier is in the "RF ON" mode and during any change of input signal conditions, special care must be taken against transient and spurious signals generation.
- Connect terminal loads (50 Ω) with adequate power capability (see output power curves in calibration document) when the amplifier is operating.

Dichiarazione di Conformità EU Declaration of Conformity



In accordo alla Decisione 768/2008/EC, conforme alle direttive EMC 2014/30/UE, Bassa Tensione 2014/35/UE e RoHS 2011/65/UE, ed anche alle norme ISO/IEC 17050-1 e 17050-2.
In accordance with the Decision 768/2008/EC, compliant to the Directives EMC 2014/30/EU, Low Voltage 2014/35/EU and RoHS 2011/65/EU, also compliant to the ISO/IEC standard 17050-1 and 17050-2

Il costruttore
The manufacturer **narda Safety Test Solutions S.r.l. Socio Unico**

Indirizzo
Address **Via Benessea, 29 / B**

I-17035 Cisano sul Neva (SV) - Italy

sulla base delle seguenti norme europee armonizzate, applicate con esito positivo:
based on the following harmonized European Standards, successfully applied:

EMC - Emissioni:
EMC - Emission: **EN 61326-1 (2013)**

EMC - Immunità:
EMC - Immunity: **EN 61326-1 (2013)**

Sicurezza:
Safety: **EN 61010-1 (2010)**

dichiara, sotto la propria responsabilità, che il prodotto:
declares, under its sole responsibility, that the product:

Descrizione
Description **AMPLIFICATORE DI POTENZA
POWER AMPLIFIER**

Modello
Model **PA 6001**

è conforme ai requisiti essenziali delle seguenti Direttive:
conforms with the essential requirements of the following Directives:

Bassa Tensione
Low Voltage **2014/35/EU**

Compatibilità Elettromagnetica
EMC **2014/30/EU**

RoHS
RoHS **2011/65/EU**

Cisano sul Neva, 3 May 2017



Egon Stocca, General Manager

1 - General Information

1.1 General Information

The PA6001 amplifier is an up-to-date and high-performance equipment leading to all kinds of applications:

- EMC tests of radiated susceptibility (antennas, striplines, TEM and GTEM cells, etc),
- EMC tests of conducted susceptibility, according to each type of couplings
- Direct coupling,
- Capacitor coupling ,
- Inductor coupling,
- Transformer coupling,
- All types of modulation: AM, FM, pulse modulation,
- IEMN pulse tests (Damp Sine, Single-pole bi-exponential, etc).

The PA6001 amplifier is manufactured to operate in a CW mode (CW) with a single instantaneous range from 100 kHz to 250 MHz.

The typical output power is about 40 watts minimum on a 50 ohms load.

The equipment operates under any VSWR conditions. It can deliver a high RF current under short circuit conditions and a high voltage under open circuit conditions. This key feature makes the amplifier PA6001 a high performance tool with a high degree of safety.

The bandwidth is instantaneous. This allows to use a sweep frequency generator or to amplify large frequency spectrum signals. Consequently, no adjustment of the amplifier is necessary.



Fig. 1-1 PA6001

1.2 Main specifications

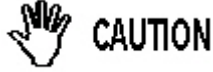
TABLE 1-1 Technical specifications	
Frequency bandwidth	100 kHz – 250 MHz
Typical output power	40 W
Power at 3 dB compression	40 W min. up to 100 MHz / 35 W min. from 100 MHz to 250 MHz
Power at 1 dB compression	35 W min. up to 100 MHz / 30 W min. from 100 MHz to 250 MHz
Harmonics distortion	H2, H3 < -20 dBc for the output power at 1 dB compression limit
Class type	Class A
Gain	43 dB
Linear power gain flatness	± 3 dB max
Mismatch tolerance	Infinite without damage
Input impedance	50 Ω / VSWR: 2:1max
Output impedance	50 Ω / VSWR: 2:1max
Input power	+ 10 dBm max.
RF input connector	Type N fem. (front or rear panel) – other connector type on request
RF output connector	Type N fem. (front or rear panel) – other connector type on request
Ambient operating temperature	0 °C / + 35 °C
Room temperature storage	-20 °C / + 70 °C
Cooling	Forced air: 20 l/sec max. (self contained fans)
Power voltage	90 – 250 Vac, 47 – 63 Hz, single phase
Rated current	2 A @ 230 Vac
Dimensions	438 x 410 x 125 mm (3U) / 17.2 x 16.1 x 4.9 in (3U)
Weight	12 kg / 26.4 lb

2 - Installation

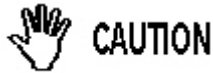
2.1 Mains supply cable

The mains cable is connected to a single phase network (16A min + neutral + ground). The typical current measured when the amplifier is in **RF ON** mode (amplification is active) is :

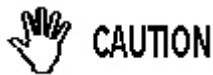
$$110 \text{ Vac} := 3.7 \text{ Amps AC} \quad // \quad 230 \text{ Vac} := 1.8 \text{ Amps AC}$$



CAUTION



CAUTION



CAUTION

Use a plug with minimum rating of 16 A min.

Installation requirements on which the equipment is connected: low voltage installation to IEC 60364 (NFC15-100).

High current leakage equipment.

Connect the auxiliary earth conductor to the protective ground before switching on the equipment.

2.2 Auxiliary earth conductor connection

See below how to connect the auxiliary earth conductors

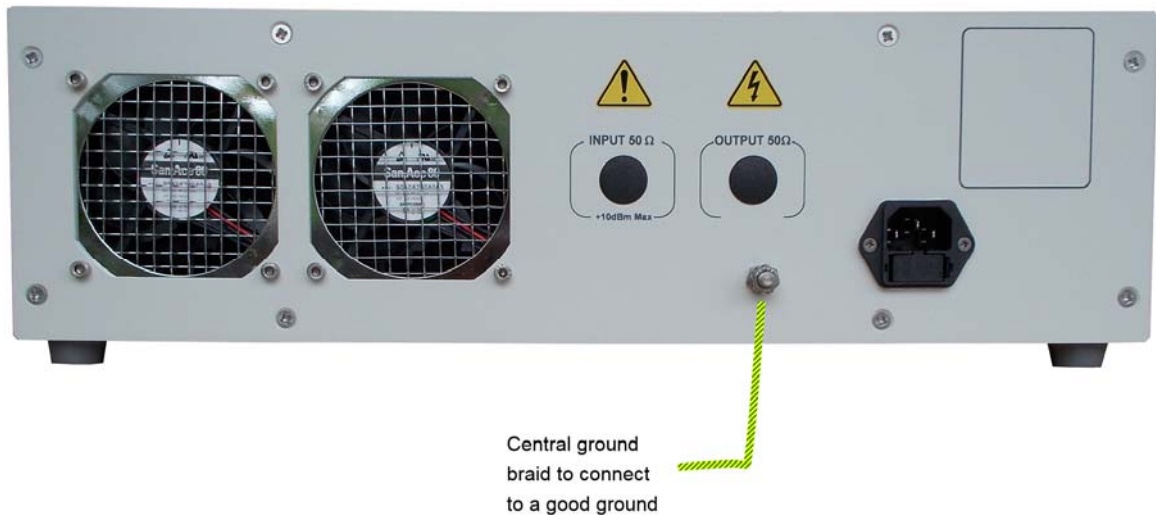
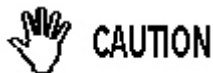


Fig. 2-1 PA6001 Auxiliary earth conductor connection

2.3 Air intake and escape (in house installation)

The air intake is allowed via the front panel and the sides of the equipment.

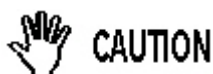
The air exhaust is provided on the rear panel (horizontal air flow). It is imperative to avoid any air flow obstruction and to allow air exhaust toward the front panel and the sides of the equipment.



CAUTION

The rear panel of the amplifier must be located at 1 meter minimum from any wall, except in case of air forced extract

2.4 Weight of the equipment



CAUTION

Heavy equipment

This equipment weighs 10 kg, the tables or cabinet where it will be installed must be capable of supporting this weight.

2.5 Moving of the equipment

In the event of displacement, first of all switch off the amplifier, disconnect the equipment of the electrical supply network, then all the external cables (including the connections of ground) must be removed

2.6 RF interconnections

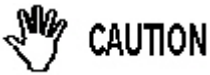
The cables used must be of a sufficient quality to allow operation up to 1000 MHz and to withstand the power delivered by the amplifier. The connectors recommended are N male for output power connections and N male for input power. The characteristic impedance of the cable must be 50 Ω in order to allow maximum power operation. As this equipment will be used in an EMC test environment, we recommend using cable as short as possible and with a length less than 3 meters

2.7 Switch on (for 1st check step)

For this simple check step, connect a 50 Ω load to the RF input and output connectors.

Execute the following operations to switch on the amplifier :

- Install the mains supply cable,
- Push the button "**POWER**",
- Verify the fans switch on on the rear panel.



For safety reason, do not switch on the equipment if its input and output are not connected to an adequate 50 Ω load.

2.8 Switch off (for 1st check step)

Press the "**POWER**" button to completely stop the amplifier.

Please refer to Chapter 3 for the user operation instructions.

3 – Operating Instruction

3.1 Front panel in standard configuration

The mains cable is connected to a single phase network (16A min + neutral + ground). The typical current measured when the amplifier is in **RF ON** mode (amplification is active) is :

110V AC : = 3.7 Amps AC // 230V AC : = 1.8 Amps AC

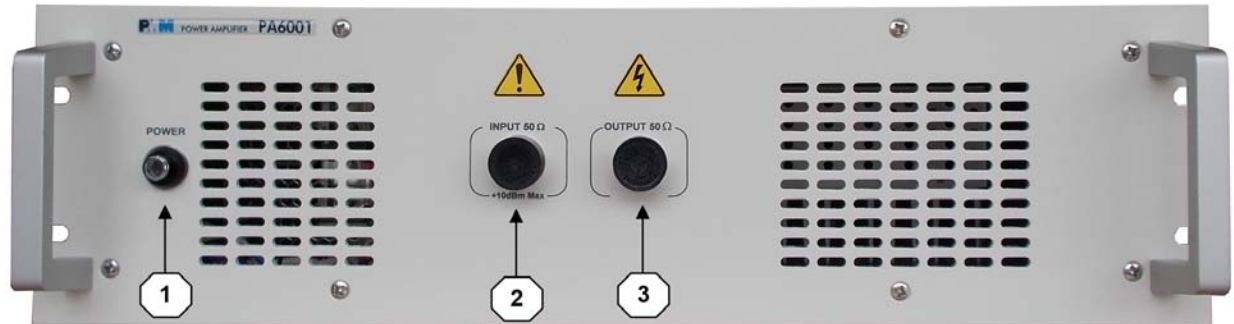


Fig. 4-1 PA6001 front panel

Legend:

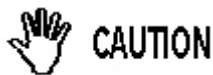
1 - Button "POWER": A push button with green window allows the switch on and switch off of the amplifier.

2 - Connector "INPUT 50Ω": N type female, to be connected to the generator.

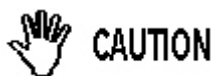
3 - Connector "OUTPUT 50Ω": N type female, to be connected to the load.

3.2 Operation Instructions

3.2.1 Switch on

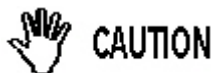


Before using the equipment the user must insure that all instructions at switch on as indicated in chapter 2 have been properly made and checked.

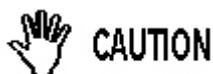


Hazardous live voltage are present, connect load before using.

Connect the generator to the connector "INPUT 50 Ω" and the load to the connector "OUTPUT 50 Ω"

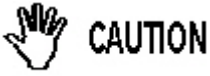


Before using the amplifier, the input level of the signal generator must be checked (0 dBm typical, + 10 dBm max.)

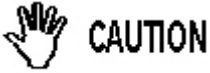


Special care must be taken with regards to the level of radiation of all equipments connected to the amplifier

Push the **"POWER"** mains switch after following the instructions presented in § 2.7. Switch on



For the operator safety, do not connect or disconnect the load when the amplifier delivers the RF signal.



When the amplifier is on the "RF ON" mode and during any change of input signal conditions, special care must be taken against transient and spurious signals generation.

3.3 Operation

3.3.1 Power measurement

If the amplifier does not have the optional integrated measurements capability, the direct and reflected powers levels can be however measured by using a directional coupler placed on the output of the amplifier without affecting the signal applied to the load.

An attenuator or a matched 50 Ω load can be used as load to allow the measurement of the power received.

If no power can be measured then refers to chapter 4.

3.3.2 Excess direct power

The direct power can generate large harmonics distortions when it is higher than the nominal power.

3.3.3 Mismatch

The load is mismatched when its value varies from its nominal setting of 50 Ω (ex : 40 or 60 Ω).

The amplifier allows permanent operation on all impedance conditions. However, with a mismatched load, an important power can be reflected toward the amplifier so the power delivered to the load decreases.

In case of short circuit, the delivered current is approximately twice the nominal current on a 50 Ω load.

In case of open circuit, the delivered voltage is approximately twice the nominal voltage on a 50 Ω load.

3.3.4 Temperature

In case of thermal effect excess, power stages are stopped.

The defect may have four reasons:

- Bad installation with an internal overheating consequence (see chapter 2),
- Excessive Ambient air temperature (see chapter 4),
- Failure of a RF power stage,
- Air cooling system failure.

The class A operation of the amplifier implies a higher thermal dissipation when no RF signal is delivered to the output load.

In case of no disappearance of the defect, call the Narda customer care service.

3.3.5 Switch off

Press the **"POWER"** button to completely stop the amplifier.

4 – Maintenance

4.1 1st Level Maintenance

When no output power can be measured on the output of the amplifier :

- Check the level of RF input signal of the generator.

If this point indicates there is no defect, call Narda customer care service.

4.2 Preventive maintenance

A simple check of the output power over the frequency bandwidth allows to detect any eventual active components defects.

The tables in the calibration document show performance after factory acceptance

To reproduce these tests, it is necessary to use a signal generator, a wattmeter and a power load.

Install between the output of the amplifier and the wattmeter probe:

- A power attenuator,
or
- A directional coupler connected to a power load.

Taking cares to correct the ringing of the attenuator or of the coupler with regard to the frequency.

Any variation, higher than 1 dB from the nominal values must be reported to the Narda customer care service.

USED4TEST

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