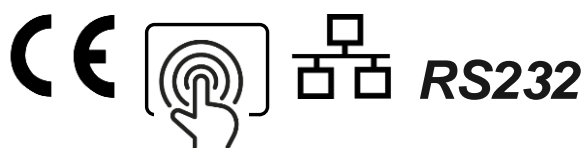




### PERFORMANCES

- High accuracy
- High stability
- Fast transients
- High inrush current facilities
- Wide bandwidth
- Very low distortion
- Quadrant change without transition
- Very low output impedance
- Low noise



### APPLICATIONS

- Three insulated outputs
- AC only
- Avionic networks 300-800-1200Hz
- Industrial networks 50-60 Hz
- Tests in accordance with standards ABD100.1.8 / MIL-STD-704
- Disturbed networks
- AC motor simulation
- Non-linear loads
- Harmonics generation

### DESCRIPTION

- PA-3x750 power amplifier is so-called "4 quadrants" AC three-phase operating in voltage regulation. For each phase:
  - Gain can be selected by moving a rotational switch on front panel,
  - An analog input receives the signal "pilot" of amplitude  $0 \sim \pm 10$  V peak,
  - A 10-turn potentiometer allows to adjust and lock the gain of each phase,
  - After insulation, the equipment amplifies this signal depending on the gain selected, with a very short propagation delay,
  - Two analog and isolated outputs return images of voltage and current at the output of the equipment with an amplitude of  $0 \sim \pm 10$  V peak.
- Built in linear technology, these amplifiers have high dynamics, very low distortion over a wide frequency band and a wide bandwidth. This technology also allows them to provide overpower up to 2 times their rated power.
- Linear amplifiers technology allows a quick and easy integration for "Real time" or "Hardware In the Loop" applications in combination with simulators such as Opal-RT, dSpace or National Instruments.
- Entirely self-sufficient with their internal regulation board, switches and potentiometers allow to select the gain (same gain for the three phases) and to adjust it manually (one potentiometer for each phase).

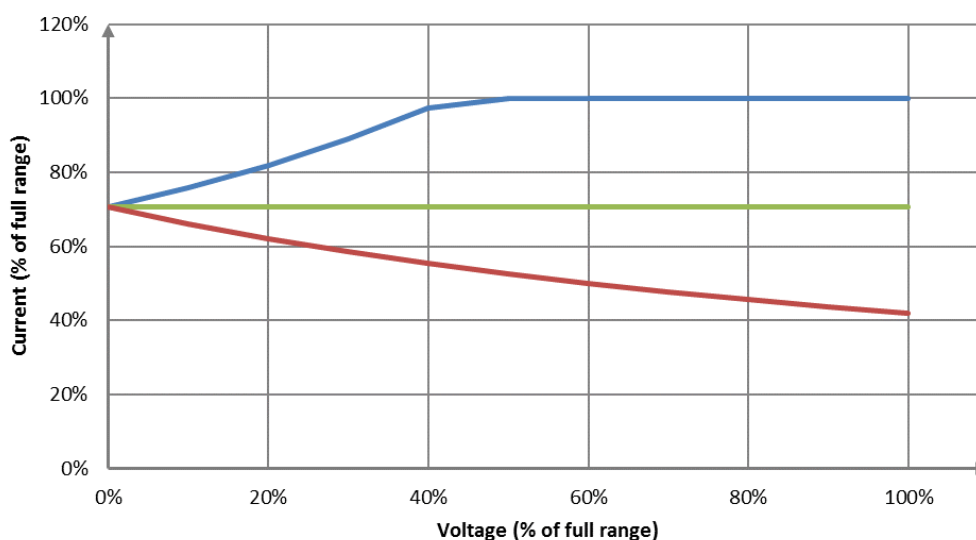
## PERMANENT OPERATION IN AC

These diagrams express the relationship between the current and the voltage for different values of power factor. X-coordinates express the voltage as a percentage of the range. Y-coordinates express the current percentage of the rated current of the range.

Continuous operation is allowed “below” curves. Limitations are due to the heating of the power transistors. Operation “above” diagrams will result in:

- An immediate switch-off by over-current protection if current is above the limits,
- A break after a delay by thermal protection in case of overheating of the power parts.

These features are for each phase.



**Blue trace:** dephasing between voltage and current is null. The power factor PF is equal to 1 (generation on resistive load).

**Green trace:** dephasing between voltage and current is  $90^\circ$  ( $\pi / 2$ ). The power factor PF is equal to 0 (generation on inductive load).

**Red trace:** dephasing between voltage and current is  $180^\circ$  ( $\pi$ ). The power factor PF is equal to -1 (full absorption).



Connection **IN-SERIES** of amplifiers outputs is not allowed.

Connection **IN PARALLEL** of amplifiers outputs is not allowed.

## USING AMPLIFIER

### Range selection:

User has to use rotational switch on front panel to select the expected range

### Gain adjustment:

User can adjust the gain of each phase on each range using trimmers on front panel

### Information:

Power-On, overcurrent and overtemperature are displayed on front panel using LEDs.

### FEATURES

<b>POWER OUTPUTS</b>	<b>Power</b>			
	Outputs	3 phases (independent)		
	Rated power	750 VA per phase		
	Peak power	2 times rated current during 50 ms		
	Regulation	Voltage regulation		
	Number of ranges	2 (same range for the three phases)		
	<b>Output ranges</b>	150 V		300 V
	Selectable gain	10.5	21	42
	Voltage (VRMS) / current (ARMS)	75 V / 5A	150 V / 5 A	300 V / 2.5 A
	<b>Gain adjustment by trimmers on front panel for each phase</b>			
	Gain adjustment	10.5 ± 1	21 ± 1	42 ± 2
	<b>Voltage linearity</b>			
	Typical	0,1%		
	<b>Voltage distortion at full output power</b>			
	Typical	< 0,2% at 100 Hz		
	Max	< 0,5% at 2 kHz		
	<b>Voltage regulation for a mains variation of +6% / -10%</b>			
	Max	< 0,1% of rated voltage		
	<b>Voltage regulation for a current variation from 0 to 100%</b>			
	Max	< 0,1% of rated voltage		
	<b>Noise</b>			
	Max RMS	0,02% of rated voltage		
	Max peak to peak	0,3% of rated voltage		
	<b>Bandwidth</b>			
	Full scale	40 to 3500 Hz		
	Small signals at -3 dB	25 kHz		
	<b>Variation with a square signal pilot</b>			
	Rise time 10% / 90%	< 10 µs		
	Fall time 10% / 90%	< 10 µs		
	Transfer time	< 15 µs		
	Transition from Q1 to Q4	< 10µs		
	<b>Variation according temperature</b>			
Typical	50 ppm/°C			
Max	100 ppm/°C			
<b>Stability after 15 minutes of operation</b>				
Max	< 0,05% of rated voltage			
<b>Insulation of the outputs versus case ground</b>				
Measurement at 500 VDC	> 100 MΩ			
<b>Images analog outputs (1)</b>				
Voltage image	Max 7,07 VRMS			
Current image	Max 7,07 VRMS			
<b>Protections</b>				
Against overload	Breaker on front panel			
Against output short-circuit	Switch off the power output (2)			
Against overheating	Switch off the power output (3)			

**Notes:**

- (1) The analog outputs are isolated from power outputs.
- (2) The output is switched off and will have to be reactivated.
- (3) A temperature sensor is placed on every power part. It switches off the output of the amplifier in case of overheating.

### FEATURES

<b>MAINS</b>	<b>Mains network</b>	
	Number of phases	Single-phase Phase + Neutral + Earth
	Voltage	230 VRMS $\pm 10\%$
	Frequency	45 to 65 Hz
	<b>Mains current</b>	
	Max at full output power	14 ARMS
	Protection	Magneto thermal breaker
	Inrush current	Limited to 2 x Max current
	<b>Dielectric strength of the mains input versus the output connected to the case ground</b>	
	Measurement at 2500VRMS / 50Hz	Current < 10 mA

<b>“PILOT” SIGNAL INPUT</b>	<b>Input signal amplitude (external feature)</b>	
	Insulation measured at 500 VDC	> 10 M $\Omega$ (4)
	Voltage for full output scale	7,07 VRMS / $\pm 10V$ peak
	Max. voltage	$\pm 15 V$ peak
	Input impedance	10 k $\Omega$
	<b>Input signal frequency</b>	
	Fundamental	40 – 3500 Hz
	Harmonics (small signals)	Max 50 kHz

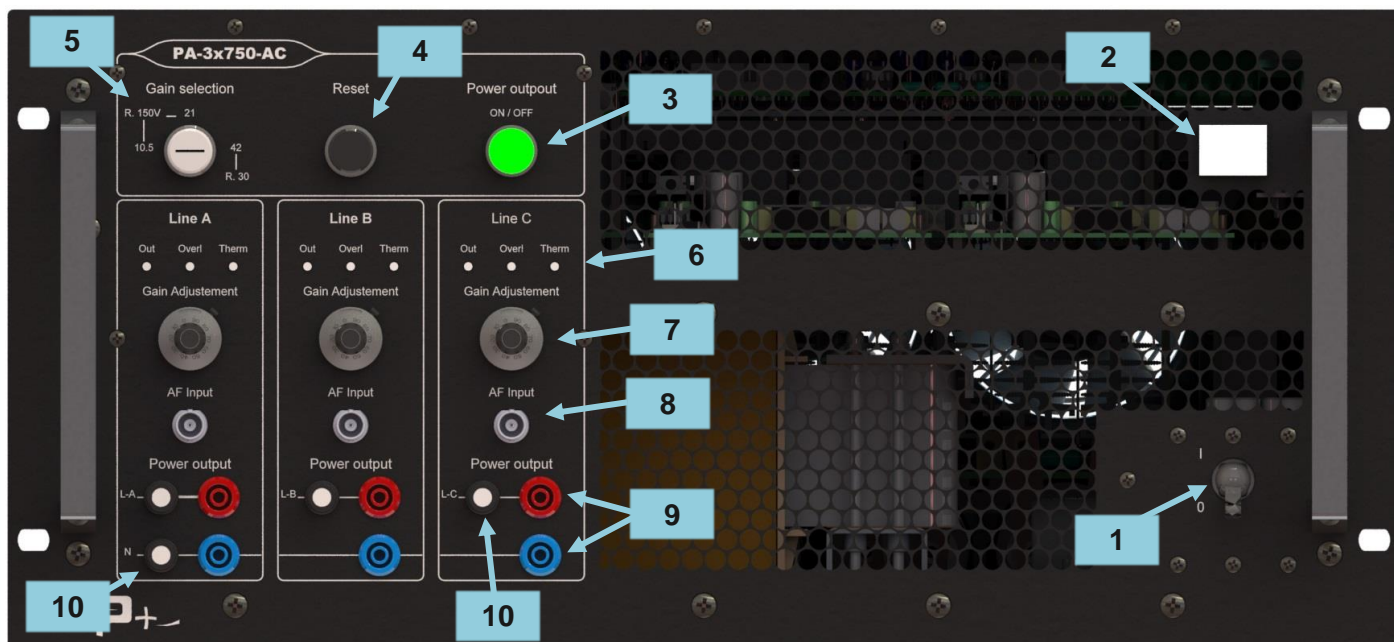
**Notes:**

- (4) The analog inputs are isolated from power outputs.

### MECHANICAL AND ENVIRONMENTAL FEATURES

<b>MECHANICAL AND ENVIRONMENTAL</b>	<b>Metallic parts treatment</b>	
	Front panel	Aluminum painted RAL7021
	Rear panel	Black anodized aluminum
	<b>Temperature and humidity</b>	
	Storage temperature	-10°C à +85°C
	Operating temperature	+0°C à +40°C
	Relative humidity	10% - 90% non-condensing
	<b>Sound level (fans at full speed)</b>	
	Measured at 1 m of front panel	< 70 dBA
	<b>Marking</b>	
	Marking	CE
	Index of protection	IP20
	<b>Dimensions and weight</b>	
	Width	483 mm (19 inches)
	Depth (connectors excluded)	600 mm
	Height	222 mm (5U)
	Weight	60 kg

## FRONT PANEL



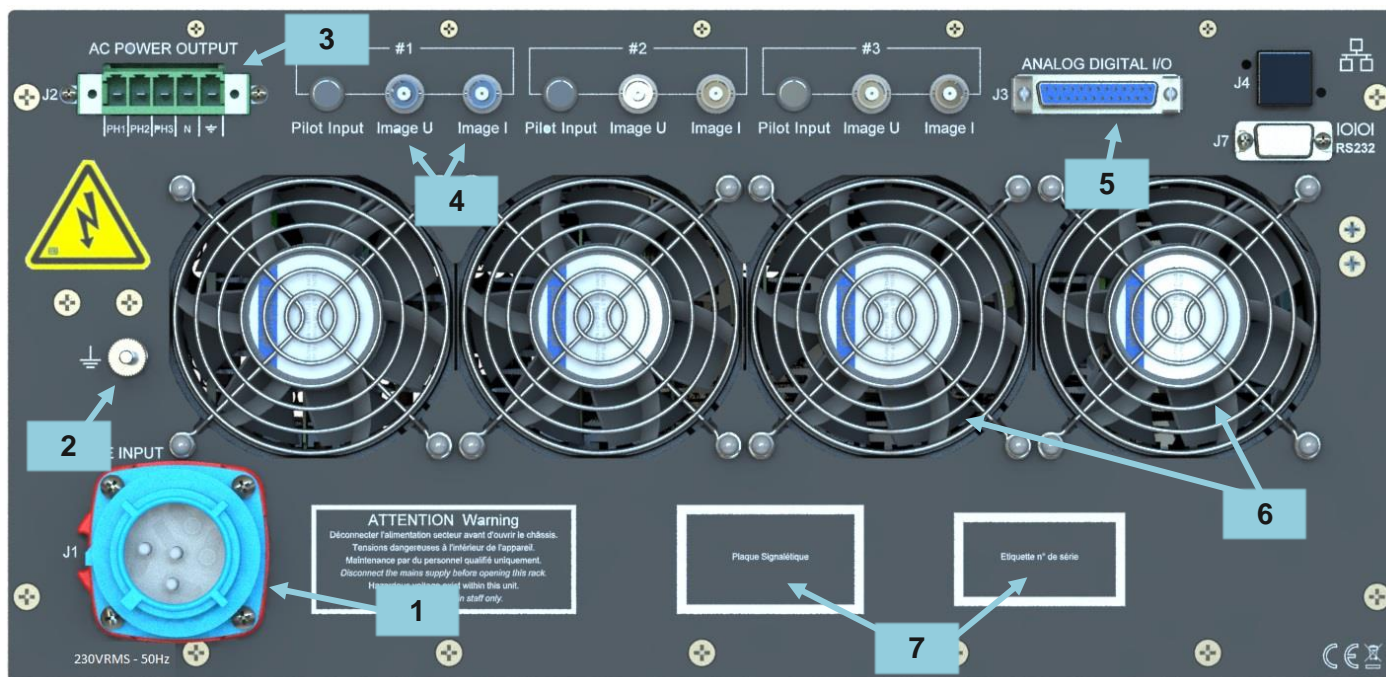
### Common tools:

- 1 This breaker switches power ON or OFF for this amplifier.
- 2 This white light is ON when mains is ON.
- 3 This green light is ON when output power is ON.
- 4 In case of overcurrent or thermal fault, output is switched OFF. This button allows to reset fault and restart outputs.
- 5 This rotative knob allows range and gain selection: 150V-10.5, 150V-21 or 300V-42.

### For each phase: A, B or C

- 6 Three LED:
  - Out: green means output is ON, off means output is OFF
  - Overl (Overcurrent): off means no overcurrent, red means overcurrent detected
  - Therm (Thermal fault): green means OK, red means thermal fault occurred
- 7 10-turn gain adjustment potentiometer with a mechanical lock
- 8 AF input using an insulated BNC socket
- 9 Monitor outputs, to connect, for example, a multimeter or an oscilloscope. Power outputs are on the rear panel of the amplifier
- 10 Output breakers: one for each phase and one for Neutral

### REAR PANEL



- 1 Mains socket MARECHAL Phase + Neutral + Earth.
- 2 Case ground connection.
- 3 Power output: Phase1 + Phase2 + Phase3 + Neutral + Earth (Neutral of each output are connected together inside the rack..)
- 4 Images of Voltage and Current outputs ( $\pm 10V$  peak) for closed loop systems.
- 5 Auxiliary connector: a link between pins 1 and 2 must be established to allow power output (inhibition input).
- 6 Four fans with variable speed in accordance with heath to evacuate.
- 7 Identification labels: reference, serial number, dimensions, weight...

### ORDER INFORMATION

#### PA-3x750-AC-300V-5A-2G

Amplifier 3x750 VA, max voltage (L-N) 300VRMS, max. current 5A, 2 ranges

Specification may change without notice