4Q POWER AMPLIFIERS AC - DC
3x1kVA and 3x2kVA

PERFORMANCES

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

RS232

APPLICATIONS

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

DESCRIPTION

- PA-3x1000 and PA-3x2000 are « 4 quadrants » power amplifiers, AC+DC, three-phase, operating in voltage regulation:
  - For each phase, an analog input receives its « pilot » signal which amplitude is 0~±10 V peak
  - After insulation, the equipment amplifies this signal depending on selected range with a very short transition time,
  - On all our amplifiers, insulated analog outputs, two per phase, return images of voltage and current at the output of the equipment, with an amplitude of 0 ~ ±10 V peak.
- Built in linear technology, these amplifiers have high dynamics, a very low distortion over a wide frequency band and bandwidth. This technology also allows them to provide power up to 4 times their rated power peaks.
- Linear technology allows a quick and easy integration for "Real time" or "Hardware In the Loop" applications in combination with simulators.
- Entirely self-sufficient with local control on touch screen, they can be controlled remotely from a supervisor system via an Ethernet or RS232 link for an easy integration in a complex test system.

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THREE PHASES AMPLIFIERS

PA-3x1000	Nominal power 3x1000 VA		
	Model	260V-7.7A	
	Ranges	130V	130V
	Phase-to-neutral voltage (VRMS)	0~260	0~260
	Current per phase (ARMS)	0~7.7	0~3.8
	Peak current (1)	20 A peak	11 A peak
	Output voltage (VDC)	0~±180	0~±360
	Current per output (ADC)	0~±7	0~±3.5

PA-3x2000	Nominal power 3x2000 VA	
	Models	270V-8.4A
	Ranges	270 V
	Phase-to-neutral voltage (VRMS)	0~270
	Current per phase (ARMS)	0~8.4
	Peak current (1)	25 A peak
	Output voltage (VDC)	0~±270
	Current per output (ADC)	0~±8.4

Notes:

(1) Peak current is limited to 100 ms.

Connect the amplifiers **IN SERIES** is allowed **in DC only**

Connect the amplifiers **IN PARALLELE** is **not allowed**

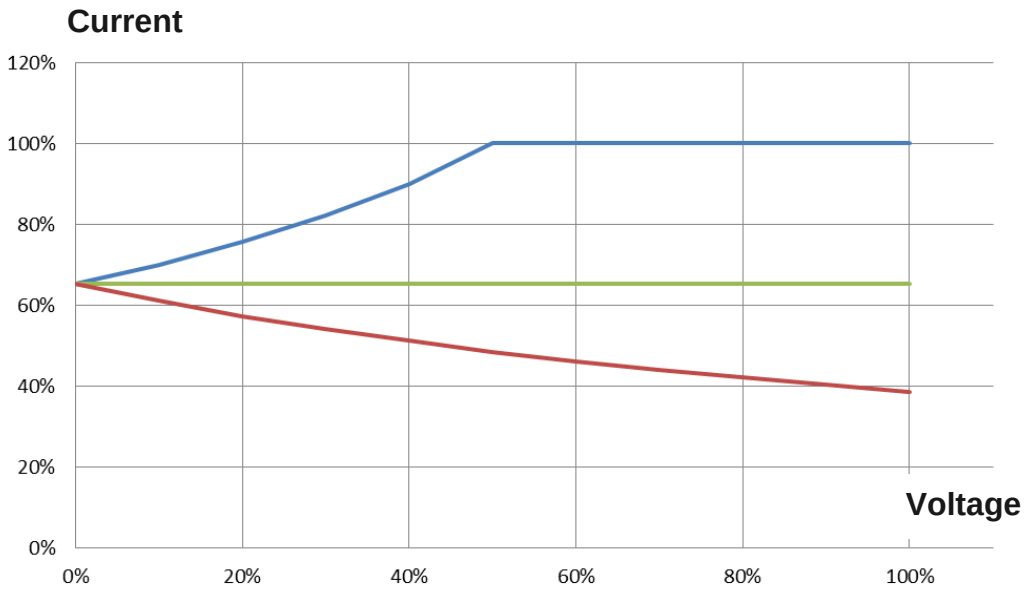
CONTINUOUS OPERATION

These diagrams indicate the relation between the current and the voltage when operating either in generation or in absorption mode, for various values of dephasing between voltage and current.

Permanent operating is allowed « below » the curves. The limitations are due to the heating of the power transistors. An operating “above” the curves will cause:

- Either an immediate disconnection: overcurrent protection in case of current higher than the limits
- Or a disconnection after a certain period: thermal protection in case of overheating of power components

These characteristics are valid for each phase.



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

Green trace: dephasing between voltage and current is 90°. PF power factor is equal to 0 (generation on inductive load).

Red trace: dephasing between voltage and current is 180°. PF power factor is equal to -1 (full absorption).

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COMMON FEATURES OF ALL THESE AMPLIFIERS

SORTIE DE PUISSANCE		
	Power	
	Nominal power	3x1000 VA or 3x2000 VA
	Ranges, voltages, currents	See tables page 2
	Voltage accuracy (regulation)	
	Typical	0,1% of the range + 0,1% of programmed value
	Resolution	12 bits
	Current accuracy (limitation)	
	Typical	0,1% of the range + 0,1% of programmed value
	Resolution	12 bits
	Voltage distortion at full output power	
	Typical	< 0,3%
	Max	< 0,7%
	Voltage regulation for a mains variation of +6% / -10%	
	Max	< 0,1% of nominal voltage
	Voltage regulation for a current variation from 0 to 100%	
	Max	< 0,1% of nominal voltage
	Residual noise	
	Max RMS	0,02% of nominal voltage
	Max peak to peak	0,3% of nominal voltage
	Bandwidth	
	Full scale	DC and 40 Hz – 3,5 kHz
	Small signals at -3 dB	25 kHz
	Variation with a square signal pilot	
	Rise time 10% / 90%	< 10 µs
	Fall time 10% / 90%	< 10 µs
	Transfer time	< 10 µs
	Transition from Q1 to Q4	< 10µs
	Variation according to temperature	
	Typical	50 ppm/°C
	Max	100 ppm/°C
	Stability after 15 minutes of operation	
	Max	< 0,05% of nominal voltage
	Insulation of the output versus case ground	
	Measure at 500 VDC	> 100 MΩ
	Images output (2)	
	Voltage	Max 6,7 VRMS
	Current	Max 6,5 VRMS
	Accuracy of the measurements displayed on the touch screen	
	Voltage measure	0,3% of the range + 0,3% of measure
	Current measure	0,3% of the range + 0,3% of measure
	Protections	
	Against overloads	Voltage limitation (3)
	Against output short-circuit	Power block is switched off (4)
	Against overheating	Power block is switched off (5)

Notes:

(2) The image outputs have the same reference and are isolated from power outputs.
(3) In case of temporary overload, the voltage decreases to limit the current.
(4) The output is switched off and will have to be reactivated by the touch screen or an external command.
(5) A temperature sensor is placed on every power part. It switches off the output of the amplifier in case of overheating.

"PILOT" INPUT	Input signal amplitude (external feature)	
	Insulation	> 10 MΩ (6)
	Voltage (full output scale)	7,07 VRMS / ± 10V peak
	Max voltage	± 15 V peak
	Input impedance	10 kΩ
	Input signal frequency	
	Fundamental	40 – 3,5kHz
	Harmonics (small signals)	Max 50 kHz

MAINS	Mains network	PA-3x1000	PA-3x2000
	Number of phases	single phase 1 Ph + N + E	three phases 3 Ph + E
	Voltage (VRMS) (7)	230 ±10%	400 ±10%
	Frequency	47 - 63 Hz	
	Input current**	PA-3x1000	PA-3x2000
	Max at full output scale (8)	26 ARMS	18 ARMS par Phase
	Protection	Magneto thermal breaker	
	Inrush current	Limited to 2 x Max current	
	Dielectric strength of the mains input versus the output connected to the case ground		
	Measure at 2500 VRMS/50Hz	Current < 10 mA	

Notes:

(6) The analog inputs have the same reference and are isolated from power outputs.

(7) Option "PA-RC-MAINS" adapts mains input of the amplifier to a 210 VRMS between phases network.

(8) The currents are indicated for a use on a 230VRMS between phase and Neutral network or 400 VRMS between phases.

ENVIRONMENT	Metallic parts treatment	
	Front panel	Aluminum painted RAL7021
	Rear panel	Black anodized aluminum
	Temperature and humidity	
	Storage temperature	-10°C to +85°C
	Operating temperature	+0°C to +40°C
	Humidity	10% - 90% non-condensing
	Sound level (fans at full speed)	
	Measured at 1 m	< 70 dBA
	Marking	
	Marking	CE
	Protection index	IP20

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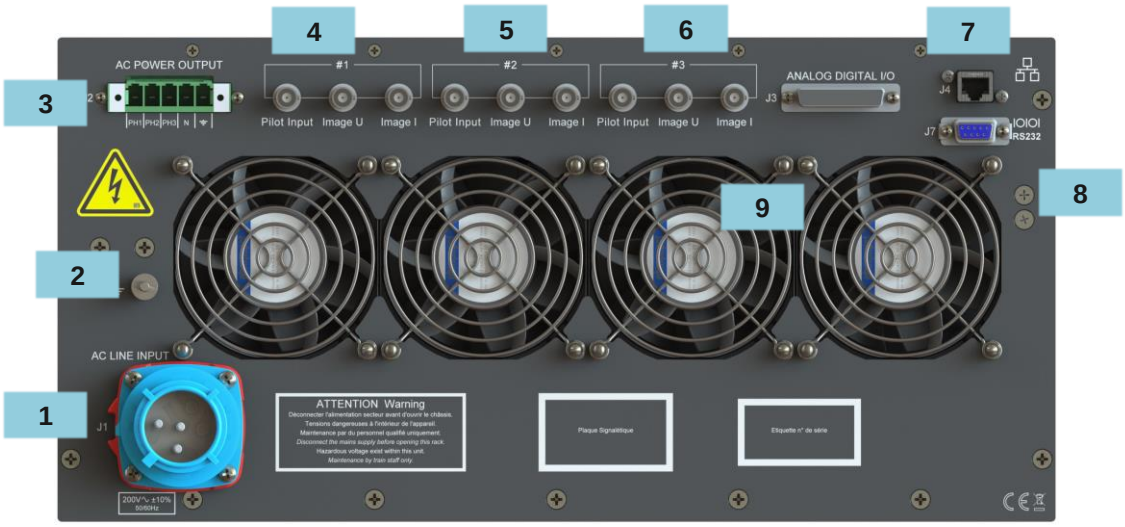
MECHANICAL CHARACTERISTICS OF PA-3x1000 and PA-3x2000

PA-3x1000 and PA-3x2000 amplifiers are racks. They can be installed in a 19 inches cabinet without other accessories (slides not provided).

	Dimensions and weight	PA-3x1000	PA-3x2000
MECA-NICHAL	Width	483 mm (19 inches)	
	Depth (connectors excluded)	600 mm	
	Height	222 mm (5U)	355 mm (8U)
	Weight	59 kg	110 kg

Rear panel (PA-3x1000)



Non-contractual picture

1 Mains socket (connector is provided)

2 Earth pin

3 3 Phases + Neutral + Earth power output (connector is provided)

6 **5** **4** Isolated BNC connectors, « Pilot » signal input, output of voltage (U) and current (I) readbacks for each phase

7 RJ45 connector for Ethernet link

8 female 9 pins SUBD connector for RS232 serial link

9 Fans with variable speed (speed is adjusted in accordance with heat to dissipate)

Rear panel PA-3x2000

On this panel are the same things as on an amplifier PA-3x1000.

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LOCAL OR REMOTE

Managed by a Control Board, the amplifiers have two operating modes:

- **Local control:** The control device equipped with a graphical touch screen disposed in front panel gives access to all the control functions and the display of the measures.
- **Remote control:** The control device has one TCP/IP Ethernet interface and two serial interfaces, RS232 and RS485, for a control through a remote PC. Control can be done either using Puissance+ OPS3 software (not supplied), either directly via instructions TCP/IP or RS232 / RS485 using customer software.

EXAMPLES OF LOCAL CONTROL: THREE-PHASE AMPLIFIER

Commands and the display of the measures and the status of the three amplifiers are grouped on the same screen.

Other screens are to set up communications links or for the management of variable speed fans.

ORDER INFORMATION

PA-3x1000-AC-DC-260V-7.7A
3x1000 VA amplifier, one range, 270V-3.8A

PA-3x2000-AC-DC-270V-8.4A
3x2000 VA amplifier, one range, 270V-8.4A

AVAILABLE OPTIONS (to order separately)

PA-RC-BW: small signals bandwidth increased from 25 kHz to 50 kHz

PA-RC-L65: increase absorption possibility up to 65% instead of 35% of rated power

Specification may change without notice