

# PRA-AD604 Amplifier, 600W 4-channel

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Invented for life



- ▶ Flexible power partitioning across all channels
- ▶ Extremely low power consumption and heat loss
- ▶ Full supervision with integrated fail-safe redundancy
- ▶ Digital signal processing per channel
- ▶ IP-networked on OMNEO for audio and control

The PRA-AD604 is a flexible and compact 4-channel power amplifier for 100 V or 70 V loudspeaker systems in Public Address and Voice Alarm applications. It fits in centralized system topologies, but also supports decentralized system topologies because of its OMNEO IP network connection, combined with DC power from a multifunction power supply.

The output power of each amplifier channel adapts to the connected loudspeaker load, only limited by the total power budget of the whole amplifier. This flexibility, and the integration of a spare amplifier channel, makes it possible to utilize the available power effectively and use less amplifiers for the same loudspeaker load, compared to using traditional amplifiers.

Digital sound processing and control, adjusted to the acoustics and requirements of each zone, allow for better sound quality and speech intelligibility.

## Functions

### Efficient 4-channel power amplifier

- Transformerless, galvanically isolated, 70/100 V outputs, with a total loudspeaker output power of 600 W.
- Flexible partitioning of the available output power across all amplifier channels to use it effectively, significantly reducing the amount of required amplifier power in a system.

- Cost and space saving, integrated, independent spare channel for fail-safe redundancy.
- High-efficiency in all operating conditions; dissipation and heat loss is minimized to save on energy and battery capacity for backup power.

### Flexibility in loudspeaker topologies

- A/B outputs on every amplifier channel to support redundant loudspeaker wiring topologies. Both outputs are individually supervised and disabled in case of a fault.
- Class A loop wiring possible between the A and B loudspeaker outputs. Dedicated connection facility for an end-of-line device to supervise the complete loop, including the B-output connection.
- Load independent frequency response; the amplifier channels can be used with any loudspeaker load up to the maximum, without any change in audio quality.

### Sound quality

- Audio-over-IP, using OMNEO, the Bosch high-quality digital audio interface, compatible with Dante and AES67; audio sample rate is 48 kHz with 24-bit sample size.
- Large signal to noise ratio, wide audio bandwidth and very low distortion and crosstalk.
- Digital signal processing on all amplifier channels, including equalization, limiting and delay, to optimize and tailor the sound in each loudspeaker zone.

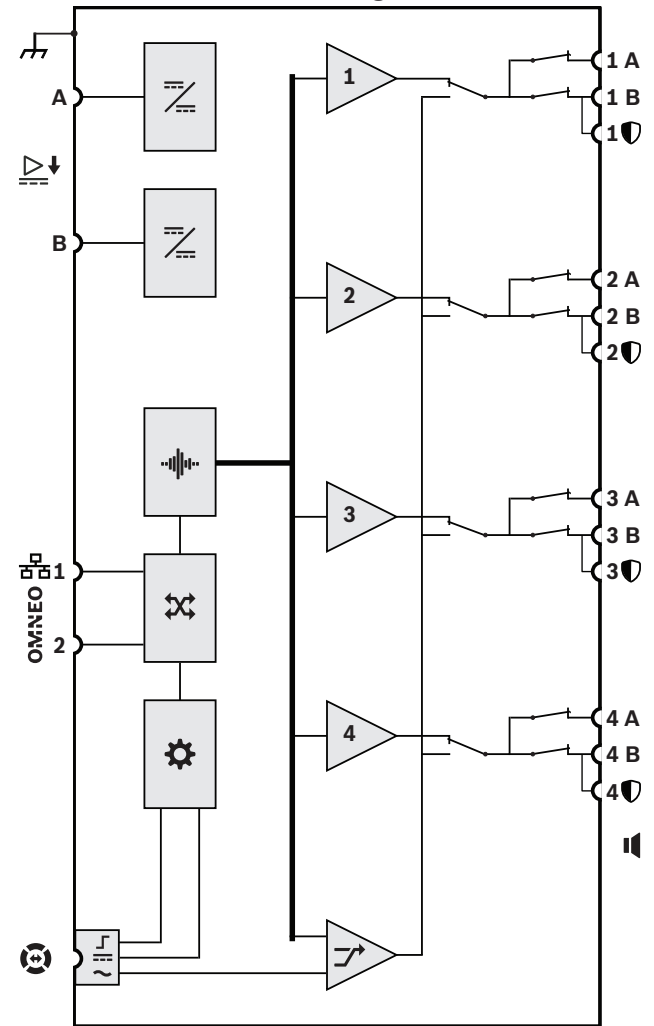
### Supervision

- Supervision of amplifier operation and all of its connections; faults are reported to the system controller and logged.
- Loudspeaker line integrity supervision without interruption of audio, using end-of-line devices (separately available) for best reliability.
- Network link supervision.

### Fault tolerance

- Dual OMNEO network connections, supporting Rapid Spanning Tree Protocol (RSTP), for loop-through connections to adjacent devices.
- Dual 48 Vdc inputs with polarity reversal protection, each with a full power DC/DC converter, operating in tandem for redundancy.
- Fully independent amplifier channels; the integrated spare channel automatically replaces a failing channel, with due regard of the actual sound processing settings.
- All amplifier channels support two independent loudspeaker groups, A and B, enabling redundant loudspeaker wiring topologies.
- Backup analog audio lifeline input driving the spare amplifier channel to serve all connected loudspeaker zones in case both network connections, or the amplifier network interface, would fail.

### Connection and functional diagram



	DC to DC converter		Audio processing (DSP)
	OMNEO network switch		Controller
	Power-save control interface		Power-save DC input
	Lifeline audio input	1-4	Amplifier channel
	Spare channel		

## Front view



	Spare channel substitute 1-4	White
	Signal present 1-4 Fault present 1-4	Green Yellow
	Ground fault present	Yellow
	Device fault present	Yellow
	Audio life-line substitute	White
	Network link to system controller present Network link lost	Green Yellow
	Power on	Green

## Rear view



## Rear panel indicators

	100 Mbps network 1 Gbps network	Yellow Green
	Power on Device in identification mode	Green Green blinking
	Device fault present	Yellow

## Rear panel controls

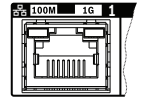
	Device reset (to factory default)	Button
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## Rear panel connections

	48 Vdc input A-B	
	Audio life-line interface	
	Loudspeaker output A-B (1-4)	
	End-of-line device	

OMNEO

Network port 1-2



Chassis ground



## Architects &amp; Engineers specification - PRA-AD604

The IP-networked 4-channel amplifier shall be designed exclusively for use with Bosch PRAESENSA systems. The amplifier shall adapt the maximum output power of each amplifier channel to its connected loudspeaker load, with free assignable output power per channel for a total maximum of 600 watt per amplifier, supporting 70 V or 100 V operation with direct drive capability and outputs that are galvanically insulated from ground. The amplifier shall have a built-in independent spare amplifier channel for automatic failover. The amplifier shall provide an interface for control data and multi-channel digital audio over OMNEO using dual Ethernet ports for redundant network connection, supporting RSTP and loop-through cabling, with automatic failover to an analog lifeline input. The amplifier shall have dual power supply inputs and power supplies. All amplifier channels shall have independent A/B zone outputs with support for class-A loudspeaker loops. All amplifier channels shall supervise the integrity of connected loudspeaker lines without interruption of audio distribution. The amplifier shall provide front-panel LED status indications for the network link, ground fault, power supplies and audio channels, and provide additional software monitoring and fault reporting features. The amplifier shall be rack mountable (1U) and feature software-configurable signal processing including level control, parametric equalization, limiting and delay for each channel. The amplifier shall be certified for EN 54-16 and ISO 7240-16, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The amplifier shall be a Bosch PRA-AD604.

## Certifications and approvals

## Emergency standard certifications

Europe	EN 54-16
International	ISO 7240-16

## Environmental directive compliancy

Safety	EN/IEC/CSA/UL 62368-1
Immunity	EN 55103-2 (E1, E2, E3) EN 50130-4

**Environmental directive compliancy**

Emissions	EN 55032 EN 61000-6-3 ICES-003 ANSI C63.4 FCC-47 part 15B class A
Maritime	IEC 60945 (excluding salt mist test) DNV Type approval
Railway	EN 50121-4

**Conformity declarations**

Europe	CE/CPR
USA/Canada	FCC/c-UL/CSA
China	CCC
Korea	KE
Australia	RCM
Taiwan	BSMI
Russian Federation	EAC
Environment	RoHS

**Parts included**

Quantity	Component
1	Amplifier, 600W 4-channel
1	Set of 19" rack mounting brackets (pre-mounted)
1	Set of screw connectors and cables
1	Quick Installation Guide

**Technical specifications****Electrical****Loudspeaker load**

Maximum loudspeaker load 100 V mode, all channels* 70 V mode, all channels*	600 W 600 W
Minimum loudspeaker load impedance 100 V mode, all channels* 70 V mode, all channels*	16.7 ohm 8.3 ohm
Maximum cable load capacitance 100 V mode, all channels* 70 V mode, all channels*	2 uF 2 uF

\*All channels combined, with free output power allocation to channels.

**Amplifier outputs**

Maximum voltage swing 100 V mode, 1 kHz, THD <1%, no load 70 V mode, 1 kHz, THD <1%, no load	100 Vrms 70 Vrms
Dynamic / rated power** 100 V mode, load 16.7 ohm // 50 nF 70 V mode, load 8.3 ohm // 50 nF	600 W / 150 W 600 W / 150 W
Full to no load regulation 20 Hz to 20 kHz	< 0.2 dB
Bandwidth Rated power, +0.5 / -3 dB	20 Hz to 20 kHz
Total Harmonic Distortion (THD) Rated power, 20 Hz to 20 kHz 6 dB below rated power, 20 Hz to 20 kHz	< 0.5% < 0.1%
Intermodulation Distortion (ID) 6 dB below rated power, 19+20 kHz, 1:1	< 0.1%
Signal to Noise Ratio (SNR) 100 V mode, 20 Hz to 20 kHz 70 V mode, 20 Hz to 20 kHz	> 110 dBA > 107 dBA
Crosstalk between channels 100 Hz to 20 kHz	< -84 dBA
DC offset voltage	< 50 mV
Signal processing per channel Audio equalization Level control Level control resolution Audio delay Audio delay resolution RMS level limiter	7-section parametric 0 to -60 dB, mute 1 dB 0 to 60 s 1 ms Clip level -6 dB
Life line sensitivity Sensitivity (100 V out) Mute attenuation	0 dBV > 80 dB

\*\*Full voltage swing into maximum loudspeaker load for speech and music program material (crest factor > 9 dB)

**Power transfer**

Power supply input A/B Input voltage Input voltage tolerance	48 Vdc 44 to 50 Vdc
Power consumption (48 V) Sleep mode, no supervision Snooze mode, supervision active Active mode, idle Active mode, rated power	6 W 7 W 28 W 230 W
Heat loss Sleep mode, no supervision Snooze mode, supervision active Active mode, idle Active mode, rated power	22 kJ/h (21 Btu/h) 25 kJ/h (24 Btu/h) 100 kJ/h (95 Btu/h) 288 kJ/h (273 Btu/h)

**Supervision**

Supervision pilot tone	
End-of-Line detection mode	25.5 kHz, 3 Vrms
Modulation duty cycle	< 10%
Modulation cycle time	90 s
Ground short detection	< 50 kohm
Amplifier channel redundancy switching	Internal
Loudspeaker line redundancy switching	A/B group, Class-A loop
Temperature	Overheat
Fan rotation speed fault	> 30% deviation
Network interface	Link presence

**Network interface**

Ethernet	100BASE-TX, 1000BASE-T
Protocol	TCP/IP
Redundancy	RSTP
Audio/control protocol	OMNEO
Network audio latency	1 ms
Audio data encryption	AES128
Control data security	TLS
Ports	2

**Environmental****Climatic conditions**

Temperature	
Operating	-5 to +50°C (23 to 122°F)
Storage and transport	-30 to +70°C (-22 to 158°F)
Humidity (non condensing)	5% to 95%
Air pressure (operating)	560 to 1070 hPa
Altitude (operating)	-500 to +5000 m (-1640 to 16404 ft)

**Climatic conditions**

Vibration (operating)	
Amplitude	< 0.7 mm
Acceleration	< 2 G
Bump (transport)	< 10 G

**Airflow**

Fan airflow	Front to sides/rear
Fan noise	
Idle condition, 1 m distance	< 30 dBSPLA
Rated power, 1 m distance	< 50 dBSPLA

**Reliability**

MTBF	> 1,000,000 h
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**Mechanical****Enclosure**

Dimensions (WxHxD)	
With mounting brackets	483 x 44 x 400 mm (19 x 1.75 x 15.7 in)
Rack unit	19 in, 1U
Ingress protection	IP30
Case	
Material	Steel
Color	RAL9017
Frame	
Material	Zamak
Color	RAL9022HR
Weight	8.1 kg (17.9 lb)

**Ordering information****PRA-AD604 Amplifier, 600W 4-channel**

Network connected, DC powered, 4-channel, 600 W power amplifier with integrated spare channel and DSP functions.

Order number **PRA-AD604**

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