LA7.16 AMPLIFIED CONTROLLER

- **16 x 16 architecture**
- **Compact (2U)**
- **Milan-AVB seamless redundancy**
- **L-SMART power management technology**
- **Optimized for multichannel applications**
- **High processing discretization**

LA7.16 is a 16 x 16 architecture amplified controller for rental which brings a unique solution to applications that can benefit from high discretization amplification and processing. Each of the 16 output channels can deliver up to 1300 W at 8 ohms or 1100 W at 4 ohms, making LA7.16 capable of driving most L-Acoustics loudspeakers in large quantities. This combination of high channel density and power capability makes LA7.16 the perfect partner for medium to large-sized touring applications.

The flexible feature set offered by LA7.16 benefits all types of productions, involving any system that uses diverse combinations of loudspeaker enclosures, such as corporate events and temporary exhibition spaces. Applications implementing line sources can benefit from single element discretization, leveraging the latest full frequency Autofilter algorithms to deliver even more uniform coverage across the audience space. Deployments requiring individual channel processing, such as L-ISA hyperreal and immersive hyperreal systems, or musical and theatrical tours, can exploit the 16 discrete inputs and outputs. Additionally, LA7.16 is the perfect complement to drive our Progressive Ultra-dense Line Source (PULS) systems, such as L2 and L2D.

Commonly an amplifier's power supply unit (PSU) and its output channels are linearly proportioned to drive the most demanding and power-hungry loudspeakers, typically subwoofers. However, most systems are composed of a varied mix of loudspeaker types, passive and active, small and large, sub and full-range, and often with temporal offsets in the signals. This leads to unique power delivery needs, at specific times, for each amplifier channel, reducing the overall demand on the PSU. LA7.16 benefits from the same patent pending L-SMART technology first introduced with the groundbreaking LA7.16i installation amplified controller. L-SMART is a suite of advanced power management technologies, developed by L-Acoustics, which uses predictive modeling algorithms to manage the PSU and the individual amplification channels. Hardware sensors' feedback data which is analyzed by the DSP to match the real-time needs of the loudspeaker system being driven. The PSU can provide extremely high short-term peak power and 7000 W for longer hold times, and this energy is delivered dynamically and intelligently to the advanced Class-D output stages, assuring optimum system performance.

Packaged in a compact 2U chassis for efficient use of rack space and lower transportation costs, LA7.16 reduces the associated carbon footprint of any L-Acoustics sound system, supporting our constant effort for greater sustainability.

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GREEN POWER

Efficiency is a core design principle of LA7.16. L-Acoustics System Modeling Adaptive Resource Technology, or L-SMART, is a patent pending innovation that intelligently matches the real-time needs of the loudspeaker enclosures being driven and the available power. Maximizing the output channel capacity for a given loudspeaker configuration and its power demands. In addition to the intelligent dimensioning of the power supply, computer modeling and a thorough airflow study of LA7.16 have resulted in a proficient thermal design, prolonging the long-term power delivery of the amplifier modules, by dramatically increasing their thermal performance.

Like all L-Acoustics amplified controllers, LA7.16 utilizes the latest SMPS technology and features power factor correction (PFC), which adds several benefits. Taking advantage of virtually 100% of the mains power cycle maximizes amplifier efficiency, increases tolerance to unstable mains, and enables significantly more economical use of the available electrical power. From a single 230 V / 16 A line, the LA7.16 delivers 16 channels of high-power amplification with 1300 W at 8 ohms and 1100 W at 4 ohms.

LA7.16 was also developed with sustainability in mind and brings direct economic benefits to touring productions and the long-term operational overheads of any rental system. The exceptional channel density leads to the minimization of network and cabling infrastructure needs, with up to four times fewer requirements than an equivalent system using four-channel amplified controllers. Additionally, there are significant reductions in weight and rack space, which delivers a positive impact on the transport and deployment costs of the system.

The design choices mentioned above lower the stress on the components, offering the benefit of added long-term durability.

I/O

LA7.16 is Milan-compliant and provides 16 inputs selected from up to 128 channels (16 Milan-AVB streams of 8 channels each) on etherCON™ connectors. With Milan-AVB seamless redundancy as standard, if there is a connection loss on the primary network audio will continue from the secondary network with no audible artifacts. If non-redundant network mode is selected the two Milan-AVB ports can be used to daisy-chain units, reducing the need for additional AVB switches.

An AES/EBU or analog input is available via a terminal block connector. Assignable automatic fallback functions from Milan-AVB to two channels of AES/EBU or a single channel of analog are available for increased audio path redundancy. This input can also be utilized as main or auxiliary sources if needed

The 16 loudspeaker outputs are presented on a single 37-pin connector, using 32 conductors, and connect to the loudspeakers using an SC32 cable, making the LA7.16 fast and reliable to connect and deploy. And accessories such as the BOB32 breakout box and SC32-4DO breakout adaptor cable enable flexible connectivity with the widest range of L-Acoustics loudspeakers. The same terminal block connector used for the audio input also accesses the configurable GPIOs and the backup 24V DC input.

Mains power is connected via a 32 A powerCON™ connector, and the switch-mode power supply (SMPS) can be used worldwide without the need to change the voltage range.

ACCESSORIES

SC32 cables: Transporting all 16 outputs from the LA7.16 in one cable, they are available in 5m, 10m, 25m, and 50m standard lengths. They enable single cable connections to L Series loudspeakers and can be used with other L-Acoustics loudspeaker models by utilizing additional accessories.

SC32-4DO: This adaptor converts from SC32 to four CA-COM connectors. Enabling up to four K2 loudspeakers to be connected to the LA7.16 quickly and conveniently using a single SC32 cable.

BOB32: A breakout box that converts a single SC32 connector to two CA-COM and eight Neutrik™ NL4 connectors. Making it an efficient way to connect high volumes of L-Acoustics loudspeakers when used together with existing SP and CA-COM cables. This flexible accessory can be used on the ground or flown using its two M8 rigging points, two eyebolts are included.

DSP

LA7.16 exploits our next-generation DSP processing, adding a summation matrix for the inputs, expanded Milan-AVB capabilities and new technologies. All L-Acoustics amplified controllers integrate powerful DSP resources gathering loudspeaker management, protection for transducers and electronics, and a comprehensive set of tools for system adjustments to create a natural, transparent, and realistic sound experience. The LA7.16 DSP engine is divided into four blocks.

System alignment:

The first block provides tools to create a coherent system by setting optimal summation of each element:

- Gain, polarity and up to 1 second of delay for each output channel
- The Autoalign tool, available as part of the M1 measurement suite, enables quick and easy alignment of an entire system

System tonal balance:

The second block provides advanced tools to maintain a consistent sonic signature between arrays in the system and from one venue to another:

- The Autofilter tool is used to linearize the full frequency response of the entire array across the audience space on a per amplifier channel basis
- The adjustable IIR & linear phase FIR filters are used to fine-tune the system to a specific venue or configuration
- The Array Morphing tool is a simple and yet efficient means to adjust the sonic signature of line sources to meet the program material needs
- The Autoclimate and Air Compensation tools are used to adjust the system response in relation to atmospheric conditions while preserving driver resources

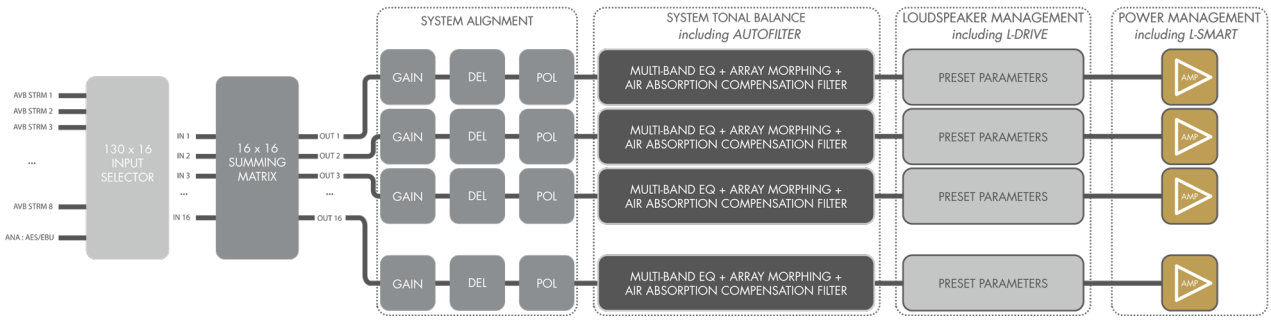
Loudspeaker management:

The third block is the system parameters that unify loudspeaker response and system protection through specific loudspeaker presets developed in-house. It integrates the proprietary L-DRIVE system, providing over-excursion, over-voltage and thermal protection, to maximize output power and minimize nonlinearities. L-DRIVE's optimum protection ensures durable performance and preserves sonic transparency in the linear and nonlinear domains.

Power management:

In addition to the standard system tools, LA7.16 utilizes a suite of power management technologies. L-SMART intelligently manages PSU and amplifier efficiency by analyzing present needs and anticipating future demand thanks to a combination of DSP-controlled sensors, feedback loops, and predictive modeling techniques, which adapt to real-time conditions. Automatically applying momentary gain reduction to all outputs if excessive power demands are experienced, protecting the electronics and reducing the risk of long-term damage to the system.

Within L-SMART the Power Budget enables loudspeaker systems to be deployed in several ways depending on users' needs, utilizing the multichannel architecture and capabilities of LA7.16. The concepts of Nominal and Maximized Use allow the user to exploit the real-time temporal and level differences across the outputs and maximize loudspeaker system efficiency. There is no need for the user to fix or allocate channel resources, it is managed intelligently and automatically by L-SMART.

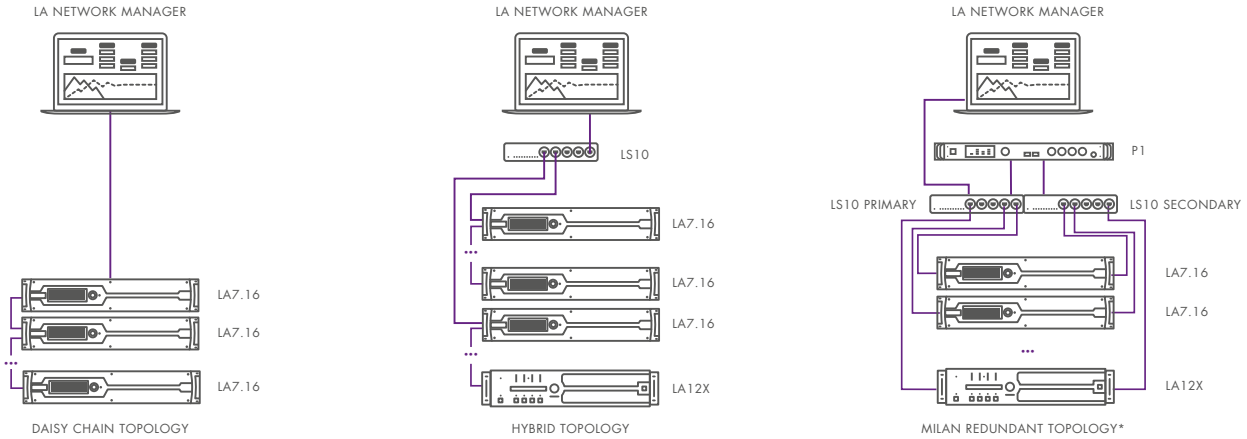


SOFTWARE AND NETWORK

LA Network Manager is designed to efficiently take users through the workflow process of Setup, Tuning, and Live. The tools required for each task are available on the dedicated page for each step of the control and supervision process. An advanced network engine allows automatic discovery of connected units, multiple-group assignment, real- time monitoring with event logging, and includes numerous productivity tools.

Supported AV control solutions:

Our proprietary Ethernet based L-Net protocol is used to configure and monitor all L-Acoustics amplified controllers. Thanks to its high-speed data transfer capability of 1 Gbit/s, up to 253 units can be controlled and monitored in real-time by LA Network Manager, a proprietary software available for both Windows and Mac operating systems. All amplified controllers are fitted with two Ethernet ports allowing daisy-chain topologies, star topologies or a hybrid of the two, using standard CAT5e U/FTP cables.



*Milan redundant topology is not available for LA4X.

AVB is the only protocol that guarantees deterministic and synchronous network behavior, ensuring on-time delivery of time-sensitive data. Milan is the applications layer on top of AVB, independent from any private entity, that ensures seamless interoperability between any Milan-certified device. The Milan initiative developed agreed-upon standards for media stream format, media clocking, seamless redundancy, and more so that no IT expertise is required to set up a reliable and deterministic AVB network with Milan-certified devices.

Milan-AVB is an evolving, long-term, viable and durable network developed by the industry for the industry.

SYSTEM MONITORING

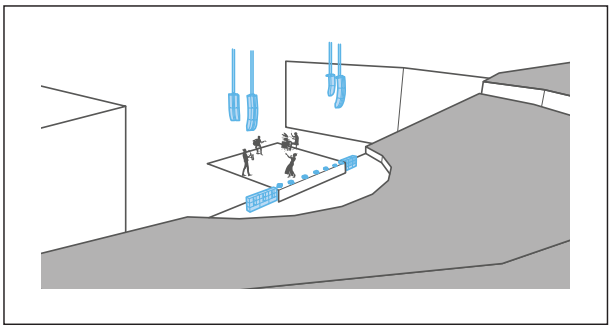
L-Acoustics amplified controllers integrate system supervision functions that monitor amplifier and loudspeaker status, behavior, and continuity. The amplified controllers can monitor input and output signal integrity, levels, temperature, voltage values, and a power amplifier fault status. Any malfunction is reported in real-time within LA Network Manager control software or third-party control systems.

The Load Checker feature verifies the output cabling, validates that the preset loaded matches the expected load and number of enclosures in parallel.

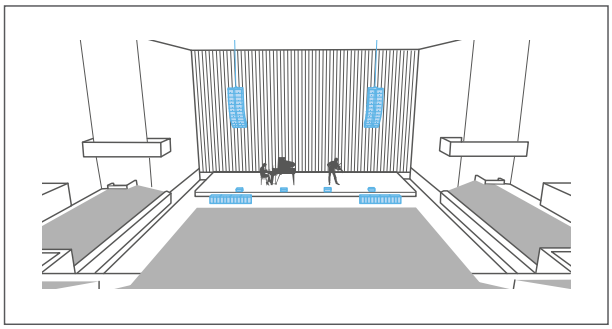
LA7.16 monitors the output circuits using a combination of real-time load presence and periodic silent tests. And provides comprehensive status monitoring via the control network and GPIO interfaces, including amplifier channel, and PSU status reporting. In addition to Milan-AVB seamless redundancy, options for automatic fallback and backup of input signals are available. These can be configured and enabled on a per-channel basis or globally as an input override if required.

APPLICATIONS

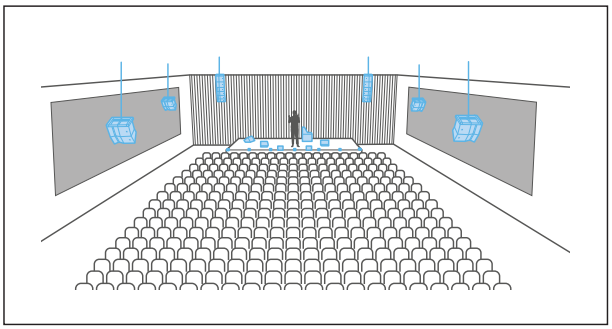
LA7.16 supports a wide variety of diverse rental applications, powering most elements of a sound system from main PA, fills, delays, and monitors. Corporate events and temporary exhibition spaces using varied combinations of loudspeakers will benefit from the flexibility LA7.16 offers. The channel density and discretization available make it ideal for rental and touring applications using large line sources for the finest element granularity for enhanced performance. L Series loudspeaker deployments will utilize all the benefits of LA7.16 and its single cable connectivity at the outputs. It is also ideal for applications that require large numbers of discreet signals such as L-ISA or surround systems.



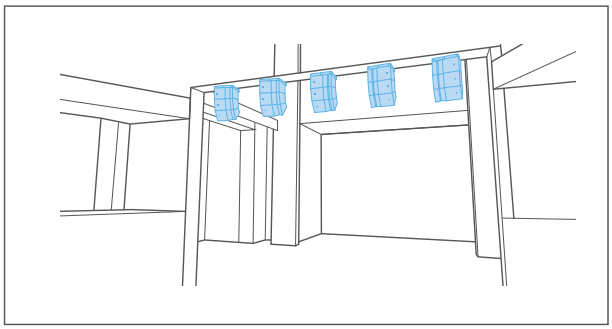
L Series: single cable connectivity



Variable Curvature Line Source: arenas, stadia and performing arts centers



Multichannel Systems: corporate events, exhibitions, stage monitors



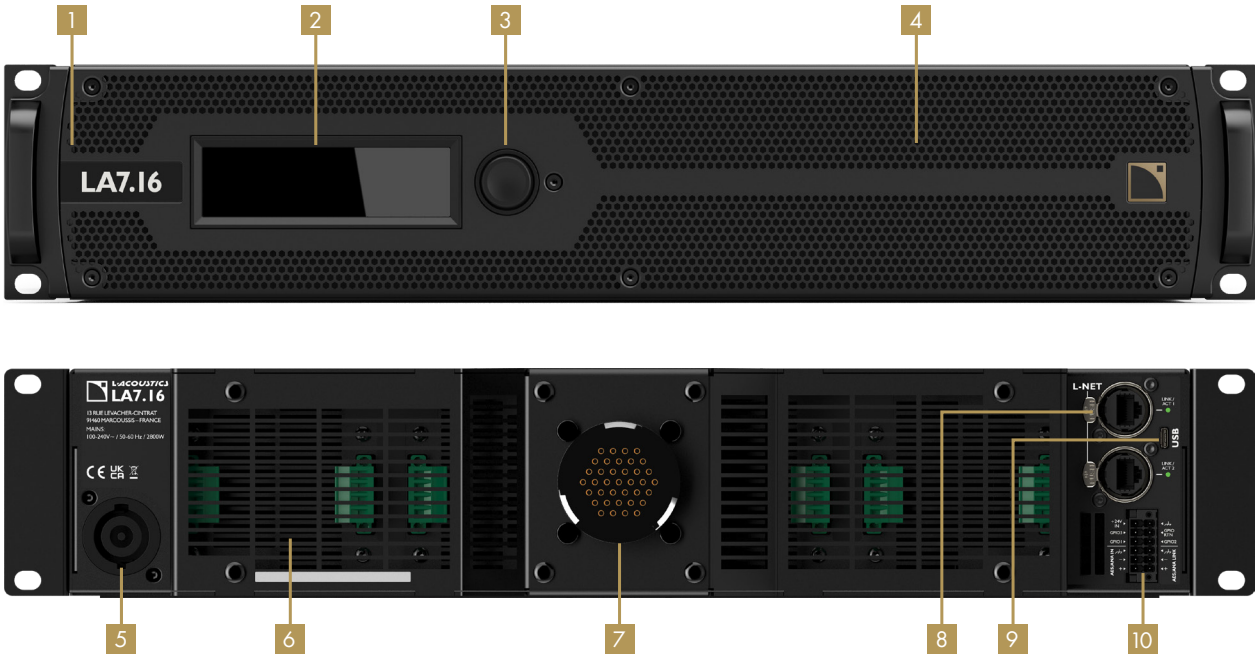
Immersive Hyperreal Systems: theaters and large scale installations

ENCLOSURE DRIVE CAPACITY

Categories - Series	Reference	Power Budget per enclosure*	Nominal Use	
			nb of enclosure per ouptut	nb of enclosure per LA7.16**
Short throw X Series	X4i	1.6%	4	64
	5XT	1.2%	3	48
	X6i	3.3%	1	16
	X8i	3.9%	1	16
	X8	3.6%	1	16
	X12	7.1%	1	14
	X15 HiQ	6.0%	1	8
Medium throw S Series	Soka	5.0%	1	16
	Syva	9.5%	1	10
	Syva Low	12.5%	1	8
	Syva Sub	6.0%	1	16
Medium throw A Series	A10(i) Wide/Focus	5.5%	1	16
	A15(i) Wide/Focus	9.7%	1	10
Long throw K Series* **	KIVA II	3.1%	2	32
	KARA II(i)	5.5%	1	8
	K3(i)	12.5%	1	8
	K2	11.5%	1	4
L Series	L2 / L2D	47.0%	1	1
Subwoofers* **	SB6i	1.1%	1	16
	SB10i	3.1%	2	32
	SB15m	11.0%	1	9
	SB18 (IIi)	16.7%	1	6
	KS21(i)	12.2%	1	8

* Approximate values per enclosure at full power, for accurate values refer to the latest version of LA Network Manager or Soundvision
** The maximum number of enclosures per LA7.16 is given, for Nominal Use, assuming that all channels are driven at full power
*** K1, K1-SB, KS28 and SB28 are not supported by LA7.16

USER INTERFACE



1 2U chassis
2 TFT color touch screen (480 x 128 px)
3 Encoder wheel with push button
4 Front ventilation grill
5 powerCON™ power supply inlet
6 Fan exit grill
7 Loudspeaker outputs on SC32 connector
8 etherCON™ 1 Gb/s Ethernet connectors
9 USB port
10 24 V DC External DSP backup voltage input
General Purpose I/O (GPIO)
AES/EBU / analog input connection
AES/EBU / analog link connection

AMPLIFIED CONTROLLERS – THE RANGE

The latest generation of amplified controllers share similar architecture with extremely powerful DSP. The main differentiators between amplified controllers are gathered in the following table:

Specifications	LA7.16(i)	LA2Xi	LA4X	LA12X
Touring / Install	Touring / (i) Install	Install	Touring / Install	Touring / Install
Multi / Four channel	Multi-channel	Four-channel	Four-channel	Four-channel
In x Out	16 x 16	4 x 4/ 4 x 3 / 4 x 2 / 4 x 1	4 x 4	4 x 4
Output power **12 dB Crest Factor, sine burst, 1 kHz, 2 ms**	16 x 700 W (at 16 ohms) 16 x 1300 W (at 8 ohms) 16 x 1100 W (at 4 ohms)	4 x 190 W (at 16 ohms) 4 x 370 W (at 8 ohms) 4 x 710 W (at 4 ohms)	4 x 560 W (at 16 ohms) 4 x 1100 W (at 8 ohms) 4 x 1400 W (at 4 ohms)	4 x 1400 W (at 8 ohms) 4 x 2600W (at 4 ohms) 4 x 3300W (at 2.7 ohms)
All channels loaded **CEA-2006/490A, Sine burst , 1 kHz, 20 ms, THD < 1%, all channels loaded**	16 x 580 W (at 16 ohms) 16 x 920 W (at 8 ohms) 16 x 1000 W (at 4 ohms)	4 x 190 W (at 16 ohms) 4 x 360 W (at 8 ohms) 4 x 640 W (at 4 ohms)	4 x 1000 W (at 8 ohms) 4 x 1000 W (at 4 ohms)	4 x 1400 W (at 8 ohms) 4 x 2600 W (at 4 ohms) 4 x 3300 W (at 2.7 ohms)
Nominal current requirements for 200 - 240 V / 100 - 120 V	16 A / 30 A	10 A / 20 A	10 A / 20 A	16 A / 30 A
Input channels	16 x AVB** 1 x Analog / 2 x AES/EBU	4 x AVB* 4 x Analog / 4 x AES/EBU	4 x AVB* 4 x Analog / 4 x AES/EBU	4 x AVB* 4 x Analog / 4 x AES/EBU
Noise level (20 Hz - 20 kHz, 8 Ω, A-weighted, digital input)	< - 79 dBV	< - 77 dBV	< - 70 dBV	< - 75 dBV
Front panel	TFT Colour Touch Screen (i: LED's only)	LED's only	LCD display with rotary encoder, power and mute keys	LCD display with rotary encoder, power and mute keys
Height	2U	1U	2U	2U
Weight	15.8 kg / 34.8 lb (i: 14.5 kg / 32 lb)	4.40 kg / 9.70 lb	11.3 kg / 24.9 lb	14.5 kg / 32 lb

* 4 channels from one AVB stream of up to 8 channels ** 16 channels from up to 16 AVB streams of up to 8 channels

LA7.16 AMPLIFIED CONTROLLER

LA7.16 is a 16-channel amplified controller designed for rental applications. It integrates patent-pending L-SMART power management technology to dynamically match the real-time needs of the loudspeaker system being driven. LA7.16 is efficiently dimensioned for multichannel applications, distributed systems, or line sources for the finest discretization.

Its streamlined and elegant 2U chassis hides a powerful DSP engine with features for loudspeaker management, system protection, and monitoring as well as a comprehensive set of tools for system adjustment and calibration. The Milan-compliant LA7.16 supports AVB inputs with seamless network redundancy, in addition to AES/EBU and analog connections. The 16 amplifier outputs are available via a single SC32 loudspeaker connector.

SPECIFICATIONS

Amplification and power supply			
Output power, all channels loaded	16 channels at 4 Ω	16 channels at 8 Ω	16 channels at 16 Ω
Peak output power 12 dB Crest Factor, sine burst, 1 kHz, 2 ms	1100 W	1300 W	700 W
Output power, CEA-2006 / 490A, sine burst, 1 kHz, 20 ms, < 1 % THD	1000 W	920 W	580 W
Amplification class	High efficiency class D		
Power supply model	Universal Switched Mode Power Supply (SMPS) with Power Factor Correction (PFC)		
External DSP backup voltage input	24 V DC (±15%) / 0.8 A		
Mains rating	100 V - 240 V ~ ±10%, 50-60 Hz		
Audio specifications			
Frequency response (20 Hz - 20 kHz, 8 Ω load, 60 W output power)	± 0.05 dB		
Distortion THD+N (20 Hz - 20 kHz, 8 Ω load, 60 W output power)	< 0.1%		
Output dynamic range (20 Hz - 20 kHz, 8 Ω, A-weigthed, Digital input)	> 119 dB		
Noise level (20 Hz - 20 kHz, 8 Ω, A-weigthed, Digital input)	< - 79 dBV		
DSP			
Digital Signal Processor (DSP)	Gen.5 Dual SHARC 32-bit, floating point, 96 kHz sampling rate		
I/O routing	16 x 16 routing and summation matrix		
Per output channel	Built-in EQ station with 8 IIR, 4 FIR EQ filters, Autofilter full-range Array morphing (LF contour, zoom factor), Air absorption compensation filters		
	Internal IIR and FIR EQ algorithms for speaker phase linearization and improved impulse responses		
	Output delay from 0 to 1000 ms		
Technologies			
Loudspeaker management	L-DRIVE advanced system protection (excursion, temperature and over-voltage)		
Power management	L-SMART adaptive power management		
Circuits protection			
Mains and power supply	Over and under voltage / over temperature / overcurrent / inrush current protection		
Power outputs	Over current limiting / DC / short circuit / over temperature		
Inputs / Outputs			
AVB input with support of Milan seamless dual networking	16 channels 48kHz / 96 kHz from 16 streams of up to 8 channels		
AES/EBU input (shared connectors with Analog)	2 channels (1 x AES/EBU, 44.1 - 192 kHz sampling rate) With active link and bypass relay		
Analog input (shared connectors with AES/EBU)	1 channel, link output		
Loudspeaker output	1 SC32 connector (37 pins utilizing 32 conductors)		
Control and monitoring			
Network connection	Dual-port Ethernet Gigabit interface etherCON™ I/O		
General Purpose Inputs / Outputs (GPIO)	3 GPIO, isolated optocoupler inputs, isolated relays contacts		
Third-party control solutions	Q-SYS® / Crestron®/ HTTP API		
Operating conditions			
Temperature	Room temperature from -5° C / 23° F to +50° C / 122° F		
Physical data			
Dimensions W x H x D	483 x 88 (2U) x 510 mm / 19 x 3.5 (2U) x 20.1 in		
Weight	15.8 kg / 34.8 lb