

PowerH SERIES

Hi-End Remote Controllable Power Amplifiers



PowerH SERIES

the new age of power



A new chapter in the history of professional high-performance power amplifiers has begun.

The PowerH power amplifier series represents another milestone in the 60-year pro audio tradition of Dynacord. DYNACORD has long been established world-wide as a manufacturer of professional power amplifiers of the highest quality and has consolidated its position at the top end of the market through many innovations and a reputation for absolute reliability. Electro-Voice has played a substantial role in this as a sister company to Dynacord, and as one of its largest OEM-customers. For years, power amplifiers from Dynacord / EV have been used in large and very large audio systems – whether installed or touring – all over the world. Today there are literally thousands of amplifiers made by Dynacord powering major productions in all four-corners of the globe and demonstrating time and again their superlative quality and legendary reliability.



PowerH







The requirements imposed upon modern power amplifiers are enormous: they are expected to combine very high power, minimal weight, outstanding audio performance, absolute reliability, remote monitoring and control, and networking.

In order to realize power levels of 2500 W / 4 Ω, power amplifiers must be able to supply peak output voltages between 180 V and 200 V. This requirement limits the number of plausible topologies to two:

Class D and Dynacord's Linear Grounded Bridge Class-H.

After extensive research, the Dynacord engineering department decided against the use of Class D designs: the besetting evils of Class D technology – primarily, distortion and a clear load-dependence in the frequency response – cannot be overcome, even by modern designs, and the result is an un-wanted discoloration of the output signal. Linear push-pull designs with Class-H topology are acceptable solutions for output levels up to 1500 W / 4 Ω and are used in many Dynacord power amplifiers. The limitation of the Class-H push-pull approach is the 250 V specification of typical audio power transistors and their second breakdown restrictions. Even exceeding the specified peak voltage or the second breakdown limit for a short period leads directly to failure of the power transistors and the power amplifier. The use of exotic 350V-specified transistors presents no reliable solution in view of their second breakdown behaviour, their performance and also their availability.

Higher power classes require different solutions! Dynacord's Linear Grounded Bridge designs (e.g. L 2400/P3000) have proven extremely reliable over many years as well as outstanding in terms of audio performance. One of the key advantages of Grounded Bridge solutions is the considerable reduction in 'voltage stress' for the power transistors. This permits the design of high-power power amplifiers with peak output voltages in excess even of 200 V. A logical step in the direction of lowering power dissipation while increasing the output power at the same time was the development of a linear Grounded Bridge topology using Class-H technology with a three-stage switching, floating power supply. The use of an extremely stable switching power supply makes a decisive contribution to the very low weight of these power amplifiers: 7 kW packed into 2 rack-spaces and weighing less than 15 kg!

PowerH power amplifiers are ready for integration into IRIS-Net™-based audio systems and networks. Retrofittable remote control modules, e.g. the RCM-26, make possible complete system supervision and remote control combined with digital controller functions including ultra-precise FIR filters and optimised loudspeaker protection algorithms

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the new age of power



Features

- **stable, very high power output**
- **very high efficiency**
- **very light weight**
- **3-stage Grounded Bridge Class-H topology**
- **floating switching power supply**
- **large LC-display**
- **integrated micro-controller for internal control**
- **retrofitable remote control module for integration into the IRIS-Net™ with remote supervision, remote control, digital controller functions and digital audio inputs**

The power amplifiers of the PowerH series represent a milestone in the design and production of high-performance power amplifiers. Their innovative three-stage Grounded Bridge Class-H topology with its floating switching power supply offers very high and stable output power, very high efficiency, an extremely high level in terms of audio performance and extreme lightness. They are therefore the ideal drivers for professional touring and high-end concert sound, as well as pro sound applications. Through the use of IRIS-Net™-compatible remote control modules, they also offer extensive remote supervision and control functions as well as a universal two-channel digital controller including ultra-precise FIR filtering and digital loudspeaker protection algorithms.



H5000

2 x 2.500 W / 4Ω

2 x 3.500 W / 2Ω

2 HE / 14.5 kg



H2500

2 x 1.450 W / 4Ω

2 x 1.900 W / 2Ω

2 HE / 14.2 kg

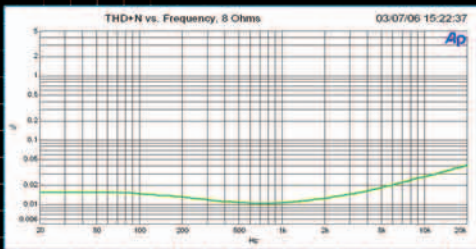


Dynacord power amplifiers are known for their absolute reliability under the most arduous of conditions on the road. In addition to the legendary manufacturing quality that comes with the 'Made in Germany' label, the comprehensive set of protective circuits plays an important role here: an integrated micro-controller co-ordinates proven protections against short-circuit, HF or DC at the output, back EMF, overheating and open-circuit operation, the power-up current limitation and dynamic audio limiters, as well as making additional new and highly intelligent protective functions possible: for example, the temperature in the power amplifiers is monitored at no fewer than six different points and the front-to-rear ventilators controlled accordingly. Under abnormal thermal 'worst case' conditions, the CPU activates a voltage limiter or gain reduction depending upon the requirements of the situation, so as to prevent a thermal shutdown of the power amplifiers. All corrective measures are indicated on the front panel and spelt out clearly on the liquid crystal display. In addition, a report is created making it possible to enquire later as to all such 'interventions', each of which is time-stamped.

The mains voltage is monitored and displayed continuously, with the devices adapting automatically to 230 V, for example, or 120 V. At the same time, the mains current consumption is also monitored and displayed. The user can adjust, via the front panel display, the threshold value of the automatic circuit breakers. In the event of possibly overloading the mains, the amount of amplification is reduced to prevent the circuit breakers tripping. Any short-circuits at the output of the power amplifier are detected early on, even at low levels. The protective circuit is activated and the error report in question appears simultaneously on the front display. In the event of excessive high-frequency overload, there is an automatic level reduction to protect the power amplifier itself and also the loudspeaker components connected.



The large, backlit liquid crystal display delivers comprehensive status information, error reports and measurements as well as allowing you to control the basic settings and (with the IRIS-Net™ module integrated) select presets as well.

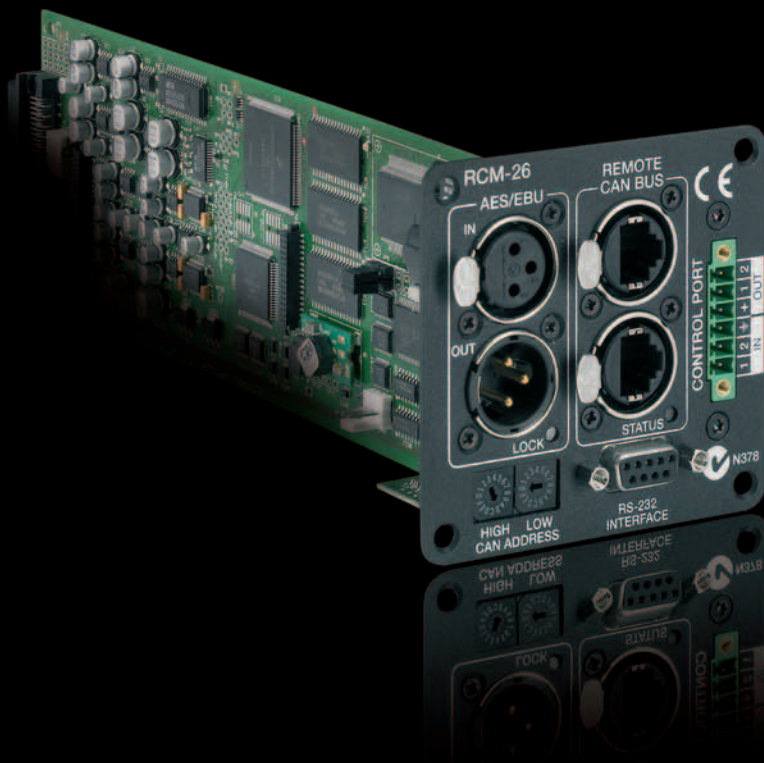


In addition to extreme reliability and forward-looking operating security, the PowerH power amplifiers are impressive for their outstanding audio performance. The THD, intermodulation distortion (IMD-SMPTE) and dynamic intermodulation (DIM) are all well below 0.05% and therefore far below the limit of audibility. All the components of the switching power supply are so safely dimensioned that they are capable of delivering the maximum peak output current of 70 A continuously, thereby allowing the power amplifier to operate as a stable voltage source even at extremely low loads. PowerH power amplifiers therefore have a significant amount of headroom at their disposal, which results in superior dynamics even at low loads.

PowerH power amplifiers leave nothing to be desired in the way of connectors. For the inputs, XLR IN/parallel OUT sockets are provided along with additional Phoenix connectors. The input sensitivity is selectable between 0 dBu, +6 dBu and 32 dB Constant Gain. In addition, there are switches for bridged operation and parallel / dual as well and, naturally, a Ground Lift switch.

A latching PowerCon connector is provided for the mains power line, which prevents the plug being yanked out accidentally. The power outputs are implemented as Speakon sockets with parallel binding posts. In terms of connectivity, therefore, PowerH power amplifiers satisfy all the demands of both mobile applications and pro audio fixed installations.





RCM-26

The RCM-26 is a dual-channel digital controller module for live sound, PA and fixed installation. It offers all conventional signal-processing functions such as parametric equalizers, crossovers, delays, compressors and limiters. It also makes available linear phase FIR filters, zero-latency FIR filters and digital loudspeaker protection algorithms to permit the dynamic range of the amplifier to be exploited to the full potential. In addition to the electronically balanced analogue inputs, digital inputs in AES3(AES/EBU) format are on board.

Using the CAN bus, networks of up to 250 power amplifiers can be realized. Additional interfaces include the RS-232 interface for media control and the Control Port with freely programmable control inputs and outputs (GPIO). Despite its compact dimensions, the RCM-26 is unmatched in terms of its capabilities and audio performance. The IRIS-Net™ Remote Control Module RCM-26 extends the functionality of PowerH power amplifiers by providing:

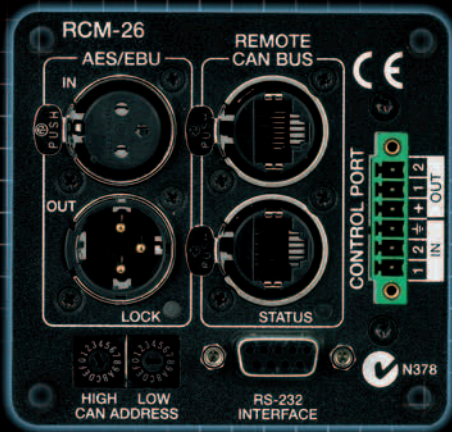
- remote supervision and remote control
- AES3 (AES/EBU) digital inputs
- digital signal processing
- advanced loudspeaker protection algorithms
- system integration and networking



IRISNet™ is the integrated software platform for all remote-controllable devices and systems from Telex Communications, Inc. It allows complete audio systems with a multitude of identical or different devices to be configured, supervised and controlled centrally from a single user interface. IRIS-Net™ supports Ethernet, CobraNet™, CAN-bus and USB and is open for further implementations in the future. IRIS-Net™ makes possible the comprehensive supervision of power amplifiers and loudspeakers including their cables and interfaces. System statuses are being polled permanently, with errors detected and reported instantaneously and all problems and other

events logged along with the date and time of their occurrence. The totality of parameters and settings of all system components can be stored and reloaded at the push of a button ("Total Recall"). Depending upon the application, users can design their own control panels, program automatic sequences, and form device and function groups.

IRIS-Net™ has been used for several years now in hundreds of audio installations and systems and has demonstrated its merits in a very wide variety of applications. Since the year 2002, IRIS-Net™ has been the platform for the EV Precision series power amplifiers and since 2005 also for the NetMax N8000 networked matrix system.

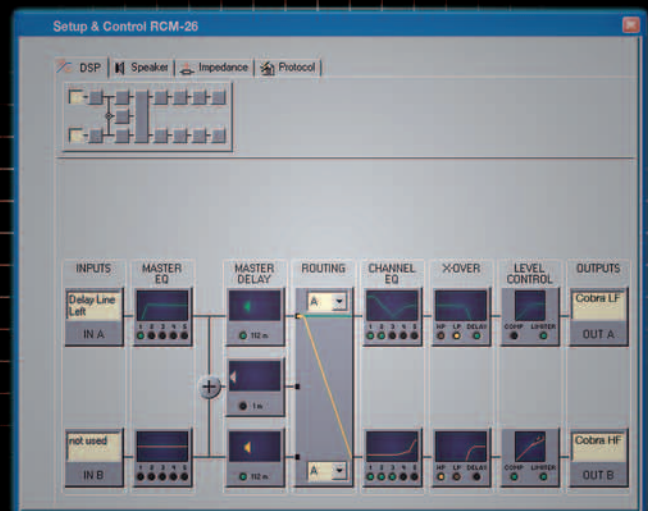


- linear 24 Bit AD/DA converters, Sigma-Delta, 128 x oversampling
- dynamic range > 116 dB
- 96 kHz sample rate, 48 kHz optional
- THD+N < 0,005%
- 2 DSPs 150 MHz / 300 MIPS computing power
- 48 Bit double-precision algorithms

Supervision and Diagnosis

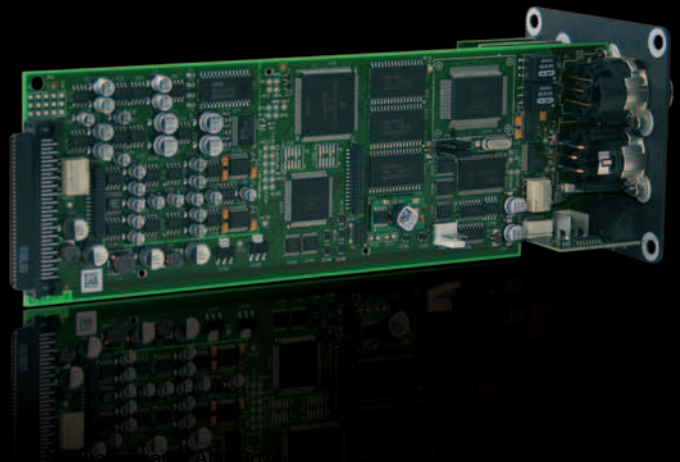
The RCM-26 transmits all relevant amplifier data to the IRIS-Net™ user interface, supervising the operating status of the power amplifiers, the temperature in the power blocks and in the power supply, voltages and currents at the outputs, all protections, the mains voltage and current consumption, pilot tone and network status.

The impedance measurement with a 20 Hz to 20 kHz sine wave sweep and the comparison with the stored reference data makes it possible to diagnose with precision the condition of the connected loudspeakers and even of their individual components and cable connections. Problems are therefore detected early and the system is able to respond in good time. It is even easy to examine the state of loudspeakers that are difficult to access, such as those in stadiums or large entertainment venues. The System Check function allows you to measure comprehensively and conduct a full examination of a very large audio system at the push of a button. Even in live performance, the connected load is monitored continuously. Any undershooting (short-circuit) or overshooting (interruption) of the set tolerance limits is automatically detected and reported immediately.



Remote Functions

Remote control via the IRIS-Net™ provides Power On / Standby switching and the programming of power-up sequences for the power amplifiers as well as level settings and the muting of individual channels or channel groups. In the RCM-26, all parameters can be controlled in real time as well as stored in user memories, from which they can be retrieved and reloaded subsequently.



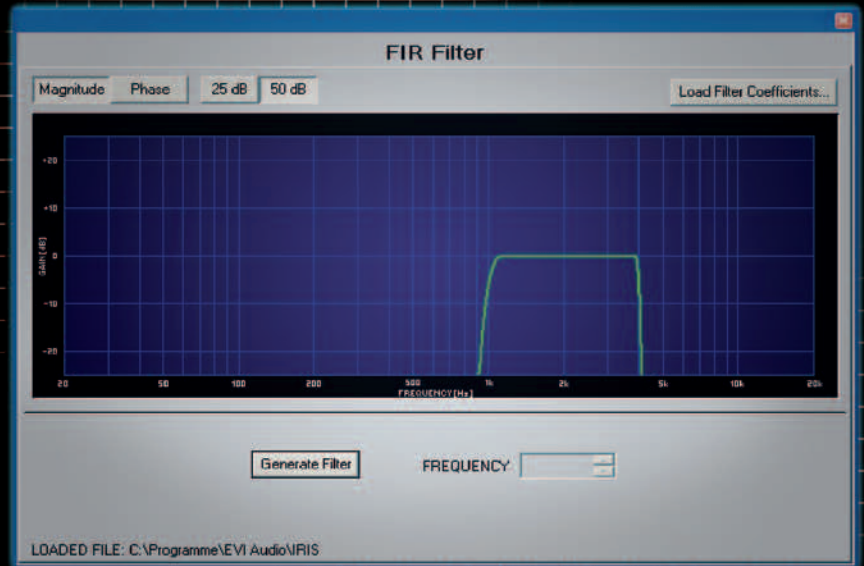
DSP Functions

X-Over:	Linkwitz-Riley, Butterworth, Bessel
FIR Filters:	zero-latency processing, linear phase x-over
Master EQ:	6 filters per channel; PEQ, lo-shelf, hi-shelf, hi-pass, lo-pass selectable
Channel EQ:	6 filters per channel; PEQ, lo-shelf, hi-shelf, hi-pass, lo-pass, all-pass selectable
Master-Delay:	2 ms - 2000 ms per channel
Channel-Delay:	speaker alignment
Dynamics:	compressor, limiter per channel
Protection:	advanced digital voice-coil protection algorithms
Misc.:	input routing, level, mute, polarity, sine and noise generators, VU meter

FIR Filters

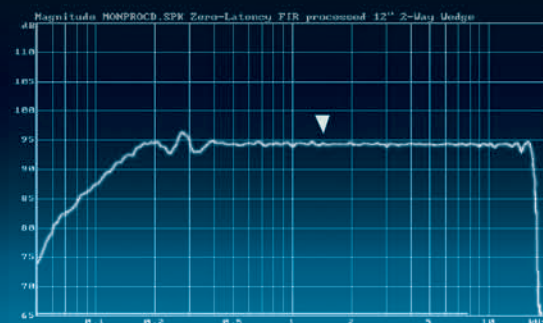
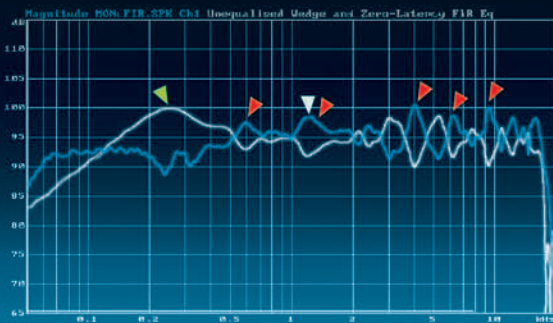
Although FIR filters require a massive amount of processing and are highly complex, they are realized in the RCM-26 in addition to the classical filtering and signal processing functions. Available are linear-phase FIR filters and 'zero latency' FIR filters, which add no further latency to the time signals require to pass through the device.

Users can create their own linear phase 'brick-wall X-overs' and edit them in real time.



Example: Linearization of a floor monitor

- ▶ Original frequency response of monitors on stage
- ▶ Zero-latency FIR equalization
- ▶ Potential FEEDBACK frequencies
- ▶ Linear frequency response of the 'pre-linearized' monitors on stage



For Dynacord loudspeaker cabinets, measurements of the frequency and phase response are already provided in the IRIS-Net™. This data can be displayed and merged in IRIS-Net™ together with the filter, crossover and delay settings. The superposition then shows the acoustical frequency response of

the loudspeaker cabinet.

The IRIS-Net™ module RCM-28 (under development) offers, instead of the AES3 digital input, a CobraNet™ interface, making it possible to integrate PowerH power amplifiers into CobraNet™ networks.

TECHNICAL SPECIFICATIONS

	H2500			H5000		
Load Impedance	2 Ω	4 Ω	8 Ω	2Ω	4Ω	8Ω
Maximum Midband Output Power, 1 kHz, THD=1%	1900 W	1450 W	850 W	3500 W	2500 W	1500 W
Rated Output Power, 20 Hz ... 20 kHz, THD <0.1%	—	1200 W	600 W	—	2100 W	1050 W
Max. Single Channel Output Power Dynamic-Headroom, IHF-A	2050 W	1700 W	940 W	4500 W	3200 W	1800 W
Max. Single Channel Output Power Continuous, 1 kHz	1950 W	1600 W	900 W	4100 W	2700 W	1600 W
Maximum Bridged Output Power 1 kHz, THD=1%	—	3800 W	2900 W	—	7000 W	5000 W
Maximum RMS Voltage Swing 1 kHz, THD=1%	95 V			125 V		
Power Bandwidth THD=1%, ref. 1 kHz, half power @ 4Ω				10 Hz ... 50 kHz		
Voltage Gain ref. 1 kHz	39 dB / 33 dB / 32 dB (switchable)			41 dB / 35 dB / 32 dB (switchable)		
Input Sensitivity at rated output power @ 8Ω, 1 kHz	0 dBu / 6 dBu / 7 dBu (switchable)			0 dBu / 6 dBu / 9 dBu (switchable)		
THD at rated output power MBW=80kHz, 1 kHz				< 0.05 %		
IMD-SMPTE , 60 Hz, 7 kHz				< 0.05 %		
DIM 30 , 3.15 kHz, 15 kHz				< 0.02 %		
Max. Input Level				+22 dBu (9,75 Vrms)		
Crosstalk , ref. 1 kHz at rated output power				< -80 dB		
Frequency Response , ref. 1 kHz				< 10 Hz ... 30 kHz (± 1 dB)		
Input Impedance , active balanced				20 kΩ		
Damping Factor , 1 kHz				> 400		
Slew Rate	30 V/μs			35 V/μs		
Signal to Noise Ratio Amplifier A-weighted, 32 dB constant gain	109 dB			111 dB		
Output Noise , A-weighted				< -70 dBu		
Output Stage Topology				Class-H Grounded Bridge		
Power Requirements				100 V - 240 V, 50 Hz - 60 Hz; 100 V, 50 Hz - 60 Hz		
Power Consumption at 1/8 maximum output power @ 4 Ω	1000 W			1450 W		
Protections				Audio limiters, High temperature, DC, HF, Short Circuit, Back-EMF, Peak current limiters, Inrush current limiters, Turn-on delay, Mains Circuit Breaker Protection, Mains Overvoltage Protection		
Cooling				Front-to-Rear, 5-stage-fans		
Ambient Temperature Limits				+5°C ... +40°C (40°F ... 105°F)		
Safety Class				I		
Dimensions (WxHxD), mm				483 x 88.1 x 498		
Weight	14.2 kg			14.5 kg		

Amplifier at rated conditions, both channels driven with 8 Ω loads, unless otherwise specified.

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