

The D90 amplifier



The D90 amplifier represents a new performance level of four channel Class D amplifiers using Digital Signal Processing (DSP) to incorporate loudspeaker specific configurations and user definable setups, equalization and delay functions.

The amplifier has a dynamic range of 119 dB (unweighted) and is designed to drive high voltage d&b loudspeakers while providing comprehensive management and protection capabilities.

The user interface of the amplifier consists of a 4.3" (480 x 272 pix.) color touchscreen in conjunction with a digital rotary encoder providing comprehensive information of the device configuration and enhanced status monitoring.

The amplifier includes enhanced energy saving features, power efficiency and automatic wake up for environmentally responsible and sustainable Green Building requirements.

Powerful signal processing extends the level of functionality of the onboard features. These include a range of loudspeaker-specific filter functions plus two user-definable 16-band EQs, which facilitate system tuning. The delay capability covers a range of up to 10 seconds.

The DSP unit of the amplifier has a fixed latency of 0.3 ms.

The amplifier can receive one redundant Milan™ Listener stream consisting of up to eight channels. It provides eight Milan inputs.

Additionally, four analog and four AES3 inputs with corresponding link outputs are provided.

Each of the inputs can be routed to any of the output channels.

The amplifier features a flexible Fallback structure, ensuring the transmission of a secondary signal when required.

For applicable d&b loudspeakers, d&b LoadMatch enables the amplifier to preserve tonal balance when cable lengths of up to 70 m (230 ft) are used.

The amplifier utilizes a switch mode power supply with automatic mains range selection and active Power Factor Correction (PFC) to produce a clean current draw and ensure stable and efficient performance under adverse mains conditions.

Remote control and full system integration are realized using the d&b ArrayCalc simulation software and R1 Remote control software.

The amplifier includes two Ethernet ports (1 Gbit/100 Mbit) on RJ 45 etherCON® connectors (ETH1/PRI - ETH2/SEC) with the OCA/AES70 protocol incorporated for the upper (ETH1/PRI) connector socket and star wiring topology.

The D90 amplifier

Operating conditions

| | |
|---|---|
| Operating temperature (*continuous/**short-term) | ..... |
| -10 °C ... +40*/+50** °C (+14 °F ... +104*/+122** °F) | |
| Storage temperature | -20 °C ... +70 °C (-4 °F ... +158 °F) |
| Humidity (rel.), non-condensating | < 70 % |
| Maximum height above sea level | 2000 m/6560 ft |

Power supply

Switched mode power supply with automatic mains range selection and active Power Factor Correction (PFC).

| | |
|----------------------------------|-------------------------------|
| Mains connector | powerCON-HC® |
| Mains fuse | internal |
| Rated mains voltage (High range) | 208 - 240 V, 50 - 60 Hz |
| Rated mains current (High range) | 16 A |
| Rated mains voltage (Low range) | 100 - 127 V, 50 - 60 Hz |
| Rated mains current (Low range) | 24 A |

Protection circuits

Mains and power supply: Overvoltage and undervoltage, inrush current limiter, internal fuse.

Output: Overcurrent, DC offset, HF voltage limiter, pop-noise suppression.

Cooling: Temperature-dependent RPM of fan, self-resetting overtemperature protection.

Power consumption (typical values)

| | |
|-------------|--------------|
| Standby | 24 W |
| Idling | 160 W |
| Peak output | 3650 W |

Audio power outputs*

| | |
|---|---|
| SPEAKER OUTPUTS A/B/C/D | 4 x NL4 |
| SPEAKER OUTPUTS A/B MIX\|2-WAY / C/D MIX\|2-WAY | 2 x NL4 |
| 4 CHANNEL OUTPUT | 1 x NL8 |
| Maximum output voltage/current | 210 V _{peak} /78 A _{peak} |
| Output power rating EIA-426B noise CF 12 dB | 4 x 2700 W/8 Ω |
| ..... | ..... 4 x 5400 W/4 Ω |
| Sine wave 1 kHz, long term, +40 °C (+104 °F) | 4 x 450 W/4 Ω |
| Frequency response (-1 dB, Linear mode) | 35 Hz - 25 kHz |
| Gain (Linear mode @ 0 dB) | 31 dB |

Output noise/Dynamic range

| | |
|--|-------------------------------------|
| Output noise (BW 20 kHz)/dynamic range (BW 20 kHz, reference 210 V _{pk}) | ..... |
| Analog input | 235 μV _{RMS} /116 dB |
| Analog input, A-weighting | 185 μV _{RMS} /118 dB |
| Digital/Milan input | 170 μV _{RMS} /119 dB |
| Digital/Milan input, A-weighting | 135 μV _{RMS} /121 dB |

THD+N/Crosstalk

| | |
|---------------------------------|----------------------------|
| THD+N (unweighted, 20 - 20 kHz) | ..... |
| 4 x 450 W/8 ohms | < -80 dB/0.01 % |
| 4 x 450 W/4 ohms | < -74 dB/0.02 % |
| Crosstalk (20 - 20 kHz) | < -70 dB |
| ..... | ..... 4 x 450 W into 8/4 Ω |

Analog inputs and outputs

| | |
|---|--------------------------------------|
| INPUT A1 - A4 | 3 pin XLR female |
| Pin assignment | 1 = GND \| 2 = pos. \| 3 = neg. |
| Input impedance | 32 kΩ, electronically balanced |
| CMRR @ 100 Hz/1 kHz / 10 kHz | >80/>80/>70 dB |
| Maximum input level (balanced/unbalanced) | +25/+18 dBu |
| ..... | ..... +27.3 dBu @ 0 dBFS |
| LINK A1 - A4, parallel to input | 3 pin XLR male |
| Pin assignment | 1 = GND \| 2 = pos. \| 3 = neg. |

Digital inputs and outputs

| | |
|--------------------|---|
| IN - D1/2, D3/4 | 3 pin XLR female, AES3 |
| Pin assignment | 1 = GND, 2 = AES Signal, 3 = AES Signal |
| Input impedance | 110 Ω, transformer balanced |
| Sampling frequency | 44.1 \| 48 \| 96 \| 192 kHz |
| Word length | 16 - 24 bit |
| OUT - D1/2, D3/4 | 3 pin XLR male |
| ..... | ..... electronically balanced |
| Output modes | Mains on: analog signal buffering (refresh) |
| ..... | ..... Mains off/power fail: bypass relay |

Milan™ inputs

| | |
|------------------------|--|
| Device type | Endstation |
| Input channel streams | 1 stream with up to 8 channels @ 48/96 kHz |
| Redundancy | Yes (always) |
| Routable Milan™ inputs | M1-8 |

Digital Signal Processing

| | |
|-------------------------------------|--|
| System start-up time | < 45 sec. |
| Time to tone (Standby/ReadyStandby) | < 4/< 1 sec. |
| Time to tone (Off/Wake on Audio) | < 45 /< 4 sec. |
| Conversion | 96 kHz |
| Latency analog/digital (AES) input | 0.3/0.3 msec. |
| A/D conversion | 27 Bit (dual-stacked A/D converters) |
| Internal processing | Combination of high-resolution fixed point |
| ..... | ..... and floating point processing |
| Equalizer | two user definable 16-band equalizers |
| ..... | ..... Filter types: PEQ/Notch/HiShlv/LoShlv/Asym |
| Delay | 0.3 msec. - 10 sec. |
| Frequency generator | Pink noise or Sine wave 10 Hz - 20 kHz |

Network connections

| | |
|------------------------|---|
| Connector type | 2 x RJ 45 (etherCON®) |
| Switch | integrated 2-port, 1 Gbit/100 Mbit |
| IP address/Subnet mask | 192.168.1.90/255.255.255.0 |
| ETH1/PRI | Milan™, Remote control via R1 star topology |
| ETH2/SEC | Milan™ redundancy only, no remote control star topology |

The D90 amplifier

Controls and indicators

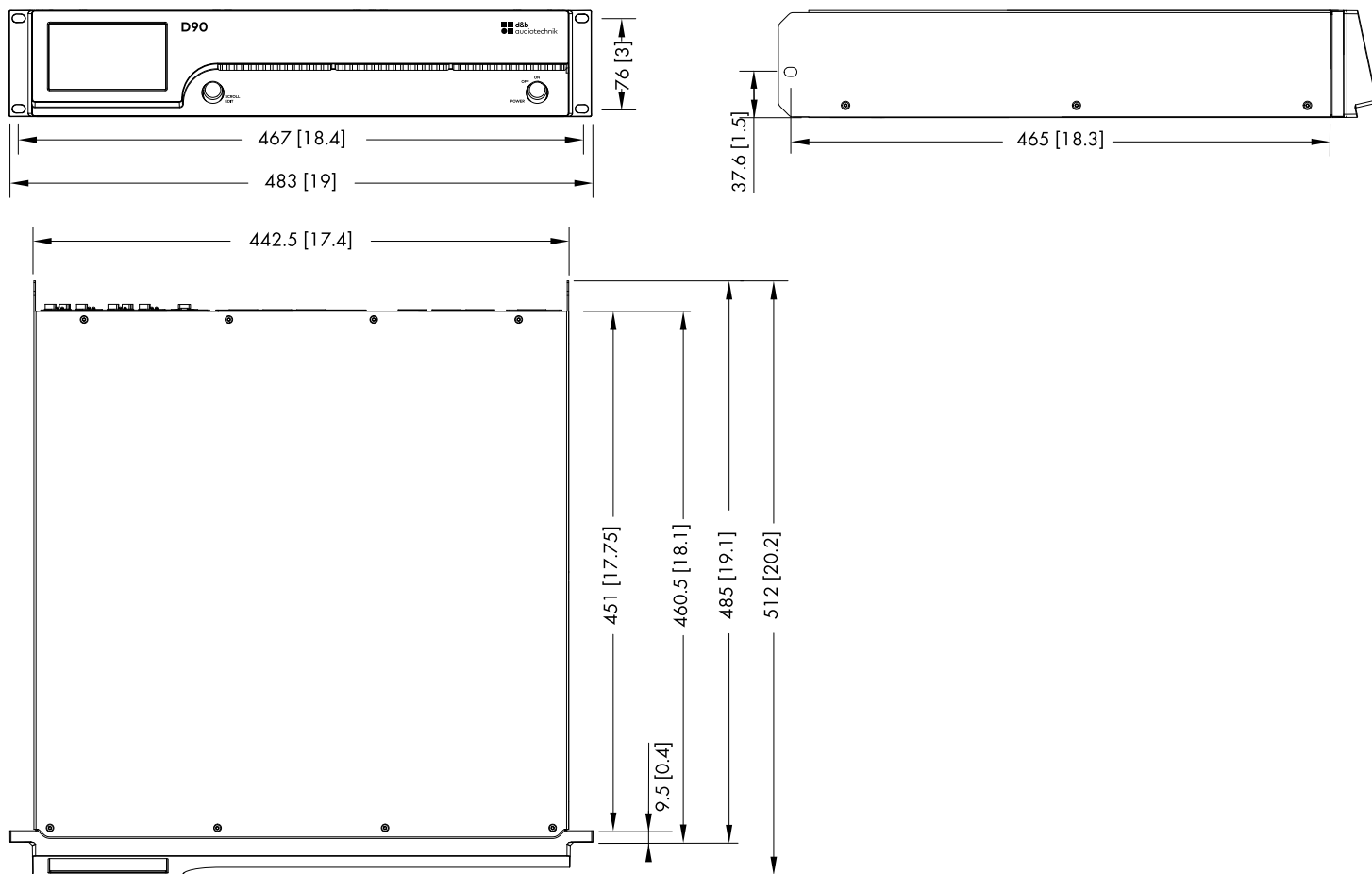
POWER Mains power switch
 SCROLL/EDIT Digital rotary encoder
 TFT color touchscreen 4.3"/480 x 272 pixels

Fan noise emission

Rack mounted, measured on axis, 1 m (3.3 ft) to front panel, A-weighting.
 Min./Max. RPM 27/50 dB(A)
 Ambient temperature 23 °C/73.4 °F

Dimensions and weight

Height x width x depth 2 RU x 19" x 512 mm (20.2")
 Weight 18.8 kg/41.5 lb



D90 dimension in mm [inch]

Features and benefits

- High voltage output suitable for driving all d&b systems
- Increases overall system efficiency
- Energy-efficient for minimal ecological impact
- Enhanced DSP capabilities accommodates future system architecture

Applications

- International Touring and Rental
- Musical theatre rental
- Corporate and industrial rental

The D90 amplifier

Architectural specifications

The amplifier shall be four channel incorporating digital signal processors (DSP) to provide loudspeaker specific configurations and functions and dedicated protection circuits. It shall be equipped with digital and analog signal inputs as well as link outputs, remote control and monitoring capabilities via Ethernet (OCA/AES70). User interface shall be via a 4.3" (480 x 272 pix.) color touchscreen in conjunction with a digital rotary encoder while remote control shall be via dedicated remote control software.

Four analog XLR input and link output connectors shall be provided.

Two digital input connectors shall be provided, each accepting a 2 channel digital (AES3) audio signal.

Analog inputs shall be electronically balanced with an input impedance of 32 kOhms.

The digital inputs shall be transformer balanced with an input impedance of 110 ohms while the digital link output shall be electronically balanced providing analog signal buffering (refresh) and power fail relay (Bypass).

The device shall act as a Milan™ Endstation with one redundant Milan Listener stream @48/96 kHz consisting of up to eight channels. Eight routable Milan inputs (M1-8) shall be provided.

Signal processing shall utilize 96 kHz sampling rate while the latency shall not exceed 0.3 msec.

The output connector options shall be 4 x NL4 for Dual Channel mode and 2 x NL4 for Mix TOP/SUB and/or 2-Way Active modes. A four channel out connector (NL8) shall be provided for loudspeaker multicore purposes. Output configurations shall be selectable for Dual Channel, Mix TOP/SUB and 2-Way Active modes.

It shall incorporate two user definable 16-band equalizers for independent application to each channel allowing parametric filters, notch, hi- and lo-shelf filters as well as asymmetric filters.

A signal delay capability of up to 10 sec. shall be incorporated for independent application to each channel.

It shall contain a signal generator offering pink noise or sine wave program.

Compensation for cable length shall be incorporated to improve impulse response.

Load monitoring and System check functions shall be included to ascertain the status of the loudspeaker impedance. Load monitoring shall allow impedance monitoring to determine the status of an LF or HF driver in systems with multiple elements, even if these are crossed over passively.

Input monitoring shall be included to allow detection of incoming pilot signals.

A Fallback function shall be available to enable the definition of primary (Regular) and secondary (Fallback) signal paths for analog and digital input signals with two different modes (Manual or Auto). It shall ensure that any secondary or emergency signal fed to the Fallback inputs is transmitted when required.

An Override function shall be available to allow any of the signal inputs, either analog or digital, to be set as a major signal path with highest priority for general messages or emergency services.

An AutoStandby function shall automatically switch the amplifier to Standby mode after a predefined time when the incoming signal level at the individually specified inputs drops below a defined threshold. The function shall be independent of the mute status of the respective channels.

An AutoWakeup function shall automatically repower the amplifier, when an input signal is present and exceeds a defined threshold.

A switched mode power supply shall be incorporated and shall allow automatic mains range selection of 100 to 127 V AC and 208 to 240 V AC, 50 - 60 Hz mains power supply voltages.

Active power factor correction (PFC) shall be incorporated to provide a clean and efficient sinusoidal current draw.

Mains voltage monitoring, mains inrush current limiter, self-resetting overtemperature, under- and overvoltage protection shall be incorporated. It shall have temperature and signal controlled fans for cooling the internal assemblies.

The power amplifier channels shall have ground fault protection, output pop-noise suppression, DC offset protection, output HF voltage limitation, output current limitation/protection and self-resetting overtemperature protection.

The output power shall be 4 x 2700/5400 W into 8/4 ohms (EIA-426-B signal with a crest factor (CF) of 12 dB, all channels driven) while the maximum output voltage shall be at least 210 V_{peak} and the maximum output current shall be 78 A_{peak}.

THD+N (20 Hz - 20 kHz) shall be < -80 dB/0.01 % and the Crosstalk (20 Hz - 20 kHz) shall be < -70 dB while the dynamic range (SNR - digital input unweighted) shall be at least 119 dB.

The dimensions (H x W x D) shall not exceed 2RU x 19" x 512 mm (20.2") and shall weigh no more than 18.8 kg (41.5 lb).

The amplifier shall be the D90 by:
d&b audiotechnik GmbH & Co. KG.