

# The D6 and D12 amplifiers

The D6 and D12 are dual channel amplifiers developed and manufactured by d&b utilizing Digital Signal Processing (DSP) to incorporate loudspeaker specific configuration information and functions. These are designed for use with d&b loudspeakers, have both digital and analog signal inputs as well as link outputs, remote control and monitoring capabilities and switch mode power supplies. The level control incorporates a digital rotary encoder enabling selection of all operating modes in conjunction with a Liquid Crystal Display (LCD).

Loudspeaker specific configurations for current d&b loudspeakers and a linear mode are contained within them, the exception being that the D6 does not include 2-Way Active, V-Series and B2-SUB configurations.

The digital elements of the D6 and D12 are specified and constructed to achieve the best possible audio performance while maintaining a very low latency of 0.3 msec. The Digital Signal Processing is used to provide the loudspeaker specific configurations, sophisticated protection circuits modelling thermal and mechanical driver behaviour, and switch functions.

User definable equalization and delay functions are incorporated in each channel of the amplifiers and can be used for applications such as front fills or under balcony delays without the need for external processors. The signal delay capability allows delay settings of up to 340 msec. (= 100 m/328 ft) to be applied independently to each channel as can the 4-band parametric equalizer, providing optional Boost/Cut or Notch filtering. A signal generator offering pink noise or sine wave program is also incorporated for test and alignment purposes. Every unit can be given a unique Device Name to simplify identification and a password protected LOCK function is also incorporated to prevent unauthorized changes.

The D6 and D12 amplifiers also detect incoming Pilot signals at its input (Input monitoring) and can use Load monitoring and System check functions to determine the status of the loudspeaker impedance. d&b System check is designed to verify that the system performs within a predefined condition and can be used to report the system condition after a show.

d&b Load monitoring, on the other hand, enables automatic and continuous impedance monitoring and along with Input monitoring is designed for incorporation within applications specified to the requirements stated in the International Standard IEC 60849 'Sound Systems for Emergency Purposes'. Both can determine the status of an LF or HF driver in systems with multiple elements, even if these are crossed over passively.

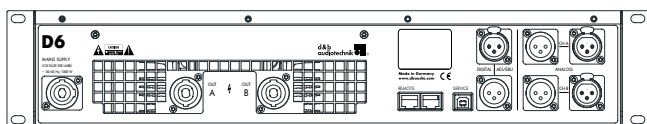
The D6 utilizes a switch mode power supply with PFC suitable for mains supply voltages 100 V/115 V/200 V/230 V, 50 - 60 Hz whilst the D12 utilizes an autosensing switch mode power supply for mains voltages 115/230 V, 50 - 60 Hz (optional 100/200 V). Both power supplies have overvoltage protection and each amplifier has a temperature and signal controlled fan to cool the internal assemblies.

The 2 RU lightweight D6 is specifically designed to deliver medium power into low impedance loads between 4 and 16 ohms. The 3 RU D12 is specifically designed to produce high power into low impedance loads, typically those between 4 and 16 ohms. Due to differences in impedance response against frequency, the maximum number of cabinets driven by each D12 channel varies depending on the loudspeaker type.

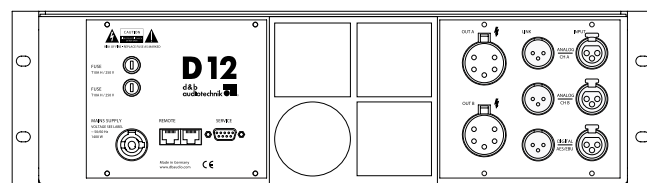
Apart from selectable output configurations for dual channel, Mix TOP/SUB and 2-Way Active mode, the D12 also provides d&b SenseDrive for use with the LF drivers in d&b active loudspeakers and subwoofers.

Both amplifiers house an I/O panel containing: analog signal inputs with link outputs for each channel, an AES/EBU digital input with a link output and NL4 loudspeaker outputs. The D12 I/O panel additionally offers the options of EP5 or NL8 loudspeaker outputs. The two RJ 45 REMOTE sockets at the rear of the D6 and the D12 amplifiers integrate them into the d&b Remote network via CAN-Bus, enabling remote control and/or monitoring.

A USB-B (D6) or a SUB-D9 (D12) SERVICE interface is provided to enable future firmware updates containing new loudspeaker configurations or additional functions to be loaded to the units.



D6 rear view



D12 rear view

# The D6 and D12 amplifier data

## D6 Display

ISP, GR, OVL A/B.....LED indicators  
Liquid Crystal Display (LCD).....Graphic display/120 x 32 Pixel

## D6 Controls

POWER, MUTE/LEVEL.....Switch, rotary encoder  
Function switches.....Loudspeaker specific circuits  
4-band equalizer.....Optional PEQ/Notch  
Delay setting.....0.3 - 340 msec. with 0.1 msec. detents  
Configurations.....Current d&b loudspeakers and linear mode  
.....except 2-Way Active, V-Series and B2-SUB  
Frequency generator.....Pink noise or Sine wave

## D6 Connectors

INPUT/LINK ANALOG A/B.....3 pin XLR female/male<sup>1</sup>  
INPUT/LINK DIGITAL AES/EBU.....3 pin XLR female/male<sup>1</sup>  
Sampling rate.....48 kHz/96 kHz  
OUT CHANNEL A/B.....NL4  
REMOTE.....2 x RJ 45 parallel  
SERVICE.....USB Type B

## D6 Protection circuits

Mains inrush current limiter.....1.5 A RMS at 230 V  
Loudspeaker switch on delay.....Approx. 2 sec.  
Overvoltage protection.....Up to 400 VAC

## D6 Data (linear setting with subsonic filter)

Rated output power (THD+N < 0.1%).....  
.....2 x 350 W into 8 ohms, both channels are driven  
.....2 x 600 W into 4 ohms, both channels are driven  
S/N ratio (unweighted, RMS).....>110 dBr

## D6 Digital Signal Processing

Sampling rate.....96 kHz/27 Bit ADC/24 Bit DAC  
Basic delay/latency analog input.....0.3 msec.

## D6 Power supply

Switch mode power supply for.....  
.....100/115/200/230V, 50 - 60 Hz  
Mains connector.....PowerCon® 2

## D6 Remote network

Remote network.....CAN-Bus

## D6 Dimensions, weight

Height x width x depth.....2 RU x 19" x 353 mm/13.9"  
Weight.....8 kg/17.6 lb

## D12 Display

ISP, GR, OVL A/B.....LED indicators  
Liquid Crystal Display (LCD).....Graphic display/120 x 32 Pixel

## D12 Controls

POWER, MUTE/LEVEL.....Switch, rotary encoder  
Function switches.....Loudspeaker specific circuits  
4-band equalizer.....Optional PEQ/Notch  
Delay setting.....0.3 - 340 msec. with 0.1 msec. detents  
Configurations.....Current d&b loudspeakers and linear mode  
Frequency generator.....Pink noise or Sine wave

## D12 Connectors

INPUT/LINK ANALOG A/B.....3 pin XLR female/male<sup>1</sup>  
INPUT/LINK DIGITAL AES/EBU.....3 pin XLR female/male<sup>1</sup>  
Sampling rate.....48 kHz/96 kHz  
OUT CHANNEL A/B.....Optional EP5/NL4/NL8  
REMOTE.....2 x RJ 45 parallel  
SERVICE.....SUB-D9 female

## D12 Protection circuits

Mains inrush current limiter.....5 A RMS at 230 V  
Loudspeaker switch on delay.....Approx. 2 sec.  
Overvoltage protection.....Up to 400 VAC

## D12 Data (linear setting with subsonic filter)

Rated output power (THD+N < 0.1%).....  
.....2 x 750 W into 8 ohms, both channels are driven  
.....2 x 1200 W into 4 ohms, both channels are driven  
S/N ratio (unweighted, RMS).....>110 dBr

## D12 Digital Signal Processing

Sampling rate.....96 kHz/27 Bit ADC/24 Bit DAC  
Basic delay/latency analog input.....0.3 msec.

## D12 Power supply

Autosensing switch mode power supply for.....  
.....115/230 V, 50 - 60 Hz  
.....optional 100/200 V, 50 - 60 Hz  
Mains connector.....PowerCon® 2

## D12 Remote network

Remote network.....CAN-Bus

## D12 Dimensions, weight

Height x width x depth.....3 RU x 19" x 353 mm/13.9"  
Weight.....13 kg/29 lb

<sup>1</sup> XLR pin assignment analog, inputs and links: 1 = GND, 2 = pos. signal, 3 = neg. signal

XLR pin assignment digital, input and link: 1 = GND, 2 = signal, 3 = signal

<sup>2</sup> PowerCon® is a registered trademark of the Neutrik AG, Liechtenstein

# The operation with D6 and D12 amplifiers

## Operation with D6 and D12

|                            | T10 | Ti10L | Ti10P | T-SUB/<br>Ti-SUB | B4-SUB |
|----------------------------|-----|-------|-------|------------------|--------|
| <b>Max. LS per channel</b> | 4   | 4     | 4     | 2                | 2      |

Maximum loudspeakers per D6 or D12 channel

## D6 and D12 controller settings

|                  | T10 | Ti10L | Ti10P | T-SUB/<br>Ti-SUB | B4-SUB |
|------------------|-----|-------|-------|------------------|--------|
| <b>Arc, Line</b> | x   | x     |       |                  |        |
| <b>PS</b>        | x   |       | x     |                  |        |
| <b>CUT</b>       | x   | x     | x     |                  |        |
| <b>HFC</b>       | x   | x     |       |                  |        |
| <b>HFA</b>       | x   |       | x     |                  |        |
| <b>CPL</b>       | x   | x     | x     |                  |        |
| <b>100 Hz</b>    |     |       |       | x                | x      |

D6 and D12 controller settings for each loudspeaker

### Arc, Line and PS (point source) mode

The Line or Arc modes are selected when the T10/Ti10L loudspeaker is used as a line array. The chosen configuration will depend on the curvature of the array. The Line configuration is selected when groups of four or more cabinets are coupled in a straight long throw array section, where the splay angles to adjacent cabinets are 0° to 2°. The Arc configuration is selected when cabinets are used in curved array sections, where the splay angles to adjacent cabinets are 3° or more. Within a typical array both amplifier configurations are used. The PS configuration is selected when the Ti10P is used in either horizontal or vertical orientation or the T10 is used as a single spherical loudspeaker.

### CUT mode

Set to CUT, the cabinet low frequency level is reduced and is configured for use with d&b active subwoofers.

### HFC mode

Selecting the HFC (High Frequency Compensation, Line or Arc mode only) mode compensates for loss of high frequency energy due to absorption in air when loudspeakers are used to cover far field listening positions. The HFC mode has two different settings, which should only be used for those cabinets covering the following respective distances: HFC1 for distances between 25 m (80 ft) and 50 m (160 ft), and HFC2 for distances further than 50 m (160 ft). This enables the correct sound balance between close and remote audience areas, whilst all amplifiers driving the array can be fed with the same signal.

### HFA mode

Selecting HFA mode (High Frequency Attenuation, PS setup only), the HF response is rolled off. The HFA provides a natural, balanced frequency response when a unit is placed close to listeners in near field or delay use. HFA begins gradually at 1 kHz, dropping by approximately 3 dB at 10 kHz. This roll off mimics the decline in frequency response experienced when listening to a system from a distance in a typically reverberant room or auditorium.

### CPL function

The CPL (Coupling) function compensates for coupling effects between closely coupled cabinets by reducing the low and mid frequency level. CPL begins gradually at 1 kHz, with the maximum attenuation below 400 Hz, providing a balanced frequency response when cabinets are used in arrays of four or more. The CPL function can be set in dB attenuation values between -9 and 0, or a positive CPL value which creates an adjustable low frequency boost around 65 Hz (0 to +5 dB).

### 100 Hz mode

If the 100 Hz mode is selected, the upper operating frequency of the system is reduced to 100 Hz. This setting allows the subwoofer to supplement top cabinets in full range mode.

### SenseDrive

The D12 incorporates d&b SenseDrive for accurate control of LF drivers in d&b loudspeakers driven 2-Way Active or in d&b subwoofers driven actively, resulting in an extremely precise bass performance, even at high levels. SenseDrive is only available using the D12 fitted with EP5 connectors and appropriate 5-wire cabling. For further information please refer to the d&b TI 340 SenseDrive, which is available for download at [www.dbaudio.com](http://www.dbaudio.com).

# The D6 and D12 amplifiers installation

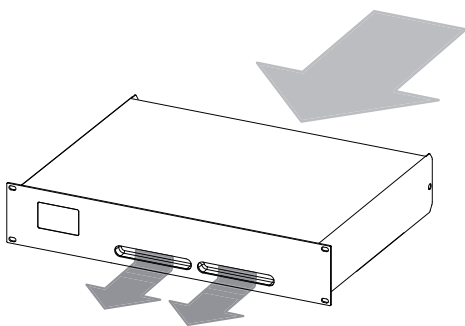
The diagram opposite shows the thermal operating range within which the technical data will be maintained. The operation beyond this range is possible for a short time but for thermal reasons this may trigger the amplifier protection circuit for thermal overload.

The D6 and D12 amplifier enclosures are designed to fit a standard 19" equipment rack or cabinet.

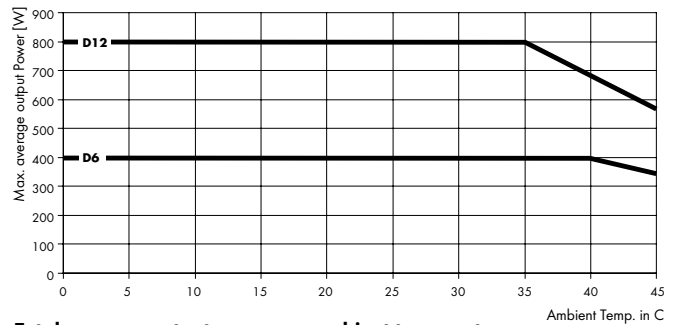
When specifying a rack, be sure to allow extra depth (10 cm / 4" is usually sufficient) to accommodate the cables and connectors at the rear of the amplifier(s). When mounting amplifiers into a 19" rack cabinet, provide additional support using shelves fixed to the inner sides of the cabinet or the mounting holes provided on the amplifier rear mounted rack ears; do not just rely on fixing and supporting amplifiers by their front panels.

Since the amplifiers can generate a lot of heat, please ensure, whatever the mounting or racking arrangement, that adequate cool airflow is provided to avoid a build-up of hot air inside the rack leading to overheating. When setting up the amplifier, do not block or cover the rear panel air intake or the vents on the front panel of the amplifier.

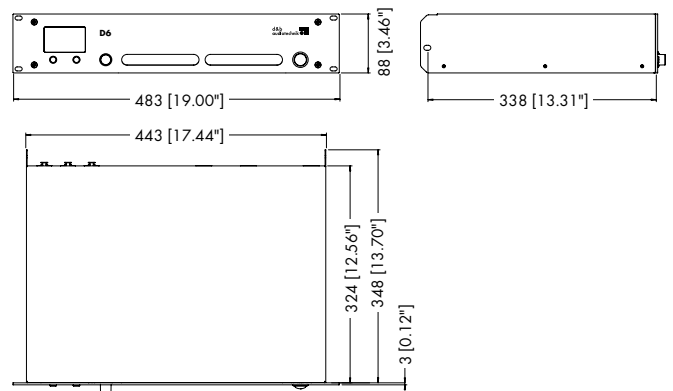
If amplifiers are installed in cabinets so that direct access to the rear panel filters is not possible, we recommend using additional fan modules with front mounted filters that can be easily replaced without opening the sealed cabinets.



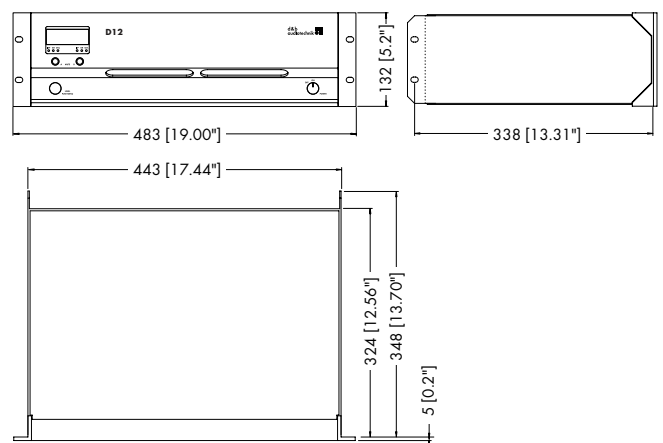
**Airflow**



**Total average output power vs. ambient temperature**



**D6 enclosure dimensions in mm [inch]**



**D12 enclosure dimensions in mm [inch]**

# The D6 and D12 amplifiers power consumption and power loss

## D6 and D12 power consumption and power loss

The power required from the mains supply and the waste heat produced by the amplifier power loss vary depending on the load impedance and the signal levels and characteristics (e.g. speech, music). In practice, the theoretical peak power consumption of a system will only be sustained for a short period of time. Basing mains current and air conditioning plant requirements on the peak power consumption of the sound system would result in a generously overspecified installation. The key factor in power consumption calculations is the crest factor of the music or speech signal - the ratio of peak to sustainable RMS voltage of the signal.

The table below gives power figures for various types of signal waveforms.

| Signal waveform                      | CF  | Duty | P <sub>out</sub> [W] | P <sub>in</sub> [W] | P <sub>loss</sub> [W] | I <sub>in</sub> [A] | U <sub>in</sub> [V] |
|--------------------------------------|-----|------|----------------------|---------------------|-----------------------|---------------------|---------------------|
| Sine wave                            | 1.4 | 1/1  | 1200                 | 1560                | 360                   | 6.8                 | 230                 |
|                                      |     |      |                      | 1645                | 445                   | 14.3                | 115                 |
|                                      |     |      |                      | 1715                | 515                   | 17.2                | 100                 |
| Highly compressed music <sup>1</sup> | 2.4 | 1/3  | 400                  | 520                 | 120                   | 2.3                 | 230                 |
|                                      |     |      |                      | 550                 | 150                   | 4.8                 | 115                 |
|                                      |     |      |                      | 570                 | 170                   | 5.7                 | 100                 |
| Music with low dynamic range         | 4.0 | 1/8  | 150                  | 215                 | 65                    | 1.0                 | 230                 |
|                                      |     |      |                      | 220                 | 70                    | 2.0                 | 115                 |
|                                      |     |      |                      | 220                 | 70                    | 2.2                 | 100                 |

### D6 Power balance

| Signal waveform                      | CF  | Duty | P <sub>out</sub> [W] | P <sub>in</sub> [W] | P <sub>loss</sub> [W] | I <sub>in</sub> [A] | U <sub>in</sub> [V] |
|--------------------------------------|-----|------|----------------------|---------------------|-----------------------|---------------------|---------------------|
| Sine wave                            | 1.4 | 1/1  | 2400                 | 3480                | 1080                  | 20.6 <sup>2</sup>   | 230                 |
|                                      |     |      |                      |                     |                       | 41.2 <sup>2</sup>   | 115                 |
|                                      |     |      |                      |                     |                       | 47.4 <sup>2</sup>   | 100                 |
| Highly compressed music <sup>1</sup> | 2.4 | 1/3  | 800                  | 1230                | 430                   | 9.2                 | 230                 |
|                                      |     |      |                      |                     |                       | 18.4 <sup>2</sup>   | 115                 |
|                                      |     |      |                      |                     |                       | 20.2 <sup>2</sup>   | 100                 |
| Music with low dynamic range         | 4.0 | 1/8  | 400                  | 640                 | 240                   | 5.3                 | 230                 |
|                                      |     |      |                      |                     |                       | 10.6                | 115                 |
|                                      |     |      |                      |                     |                       | 11.2                | 100                 |

### D12 Power balance

#### Key:

**CF:** Crest factor, **Duty:** Duty cycle, **P<sub>out</sub> [W]:** Max. average output power (sum of both channels), **P<sub>in</sub> [W]:** Input power (effective power)  
**P<sub>loss</sub>:** Power loss (thermal power), **I<sub>in</sub> [A]:** Resulting current, **U<sub>in</sub> [V]:** Mains voltage

## Mains supply

Maximum number of devices per phase conductor when full output power is required:

| Mains supply   | Maximum number |     |
|----------------|----------------|-----|
|                | D6             | D12 |
| 230 V/16 A     | 4              | 2   |
| 115/100 V/15 A | 2              | 1   |

In the USA and Japan we recommend the operation over two phase conductors (phase to phase - 240/200 V) or the use of mains leads with a much higher cross section.

<sup>1</sup> Maximum practicable operation

<sup>2</sup> Only in conjunction with appropriate mains power supply installation