The 40D amplifier

The 40D amplifier represents a new performance level of four channel Class D installation amplifiers using Digital Signal Processing (DSP) to incorporate loudspeaker specific configurations and user definable setups, equalization and delay functions.

The 40D amplifier has a dynamic range of 116 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 providing comprehensive information of the device configuration and enhanced status monitoring.

The 40D 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-definable16-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 40D 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 40D amplifier to preserve tonal balance when cable lengths of up to 70 m (230 ft) are used.

The 40D 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.

Up to eight opto-coupled GPI and up to four GPO pins are provided as additional digital control lines. This enables external control and detection functions. An additional FAULT contact is provided allowing a general device error to be remotely indicated.

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

The 40D amplifier includes two Ethernet ports (1 Gbit/100 Mbit) on RJ 45 connectors with the OCA/AES70 protocol incorporated for the upper (ETHERNET 1/PRI) connector socket and star wiring topology.
The bottom (ETHERNET 2/SEC) connector socket is currently disabled.

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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 %

Power supply

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

Mains connector ..... powerCON® TRUE 1 TOP
Mains fuse ..... internal
Rated mains voltage (High range) ..... 208 - 240 V, 50 - 60 Hz
Rated mains current (High range) ..... 13 A
Rated mains voltage (Low range) ..... 100 - 127 V, 50 - 60 Hz
Rated mains current (Low range) ..... 20 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 ..... 21 W
Idling ..... 130 W
Peak output ..... 2900 W

Audio power outputs*

SPEAKER OUTPUTS A/B/C/D ..... 2 x 4-pin Phoenix Euroblock female
Maximum output voltage/current ..... 180 V_{peak}/35 A_{peak}
Output power rating EIA-426B noise CF 12 dB ..... 4 x 2000 W/8 Ω
..... 4 x 2400 W/4 Ω
Sine wave 1 kHz, long term, +40 °C (+104 °F) ..... 4 x 250 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 180 V_{pk}) .....
Analog input ..... 350 μV_{RMS}/111 dB
Analog input, A-weighting ..... 250 μV_{RMS}/114 dB
Digital/Milan input ..... 200 μV_{RMS}/116 dB
Digital/Milan input, A-weighting ..... 150 μV_{RMS}/119 dB

THD+N / Crosstalk

THD+N (unweighted, 20 – 20 kHz) .....
4 x 250 W/8 ohms ..... < –86 dB/0.005 %
4 x 250 W/4 ohms ..... < –83 dB/0.007 %
Crosstalk (20 – 20 kHz) ..... < –70 dBr
..... 4 x 250 W into 8/4 Ω

Analog inputs and outputs

INPUT A1 - A4 ..... 3-pin Phoenix Euroblock male
Pin assignment ..... (⏚) GND, neg., pos.
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

Digital inputs and outputs

INPUT - D1/2, D3/4) ..... 3-pin Phoenix Euroblock male, AES3
Pin assignment ..... (⏚) GND, AES Signal, AES Signal
Input impedance ..... 110 Ω, transformer balanced
Sampling frequency ..... 44.1 | 48 | 96 | 192 kHz
Word length ..... 16 - 24 bit
LINK - D1/2, D3/4 ..... 3-pin Phoenix Euroblock male
Pin assignment ..... (⏚) GND, AES Signal, AES Signal
..... 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) ..... < 21 /< 4 sec.
Conversion ..... 96 kHz
Latency analog/digital (AES) input ..... 0.3/0.3 msec.
Latency Milan (AES input DS20 to amplifier loudspeaker output, 96 kHz, 2 ms PTO) ..... 9.7 ms
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
Switch ..... integrated 2-port, 1 Gbit/100 Mbit
IP address/Subnet mask 192.168.1.40/255.255.255.0
ETHERNET 1/PRI ..... Milan™, Remote control via R1 star topology
ETHERNET 2/SEC ..... Milan™ redundancy only, no remote control star topology

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GPI/GPO/FAULT
External power supply ..... 24 V DC ±25% (18 – 30 V DC)/150 W

GPI ..... 8 x Opto-coupled (galvanic isolation)
High-level ..... 18 ... 30 V DC
Low-level ..... 0 ... 9 V DC
Serial resistance ..... 5.4 kOhms
Forward voltage drop ($U_{f\,(max.)}$) ..... 3.7 V
Input current draw per pin @ 9/18/24/30 V DC .....
..... 1.5/2.6/3.7/4.8 mA
Connector type ..... 1 x 9-pin Phoenix Euroblock male
Pin assignment ..... (⏚) GND, GPIs 1 – 8

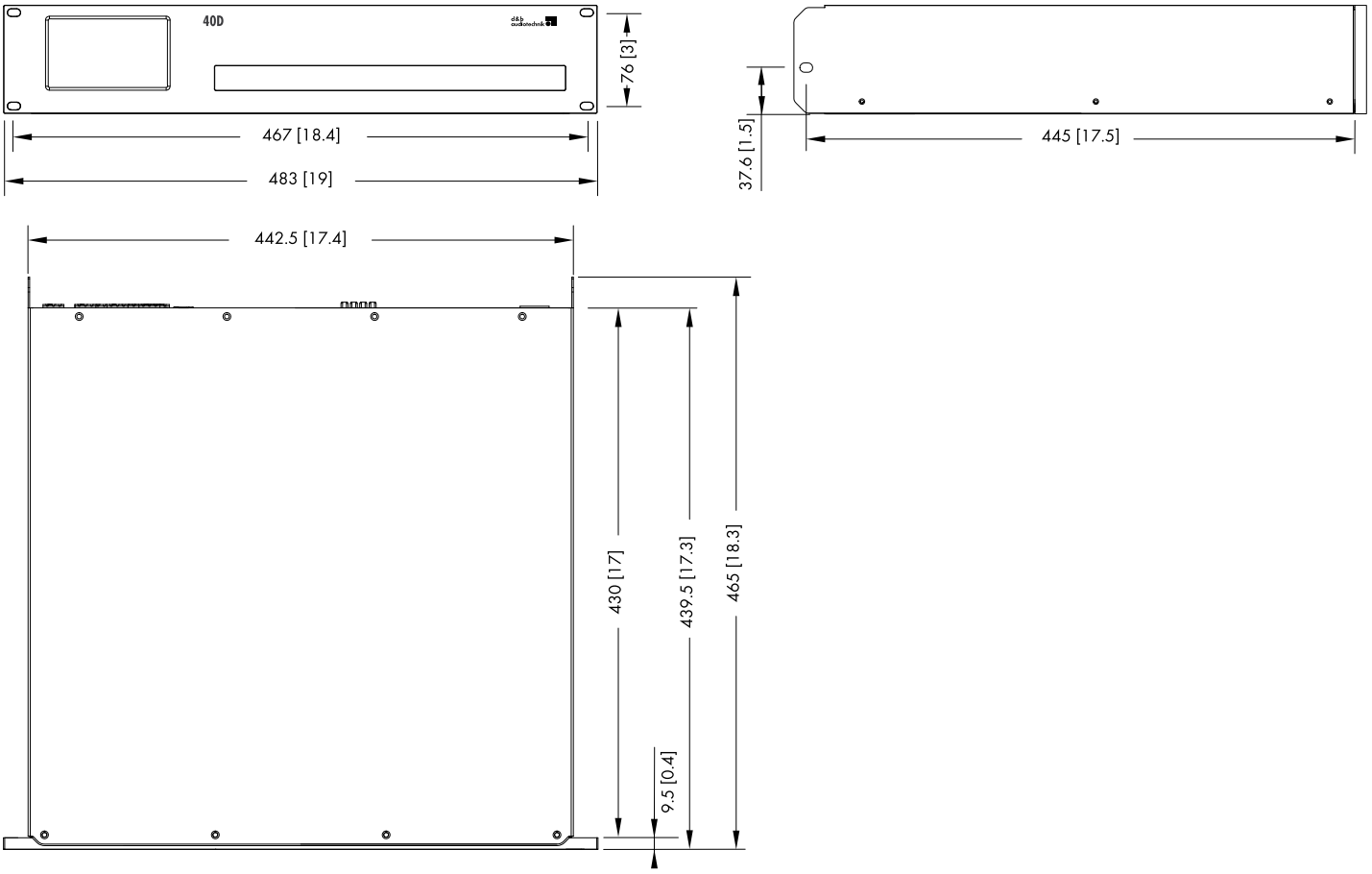
GPO ..... 4 x Low-Side-Switch-Relay
High-state ..... Closed (connected to common GPO GND)
Low-state ..... Open (high resistive)
Max. current draw ..... 1 A/Total: 4 A
Connector type ..... 1 x 5-pin Phoenix Euroblock male
Pin assignment ..... (⏚) GND, GPOs 1 – 4

FAULT ..... NO - Normally Open | NC - Normally Closed
..... 1 x 3-pin Phoenix Euroblock male

Controls and indicators
RESET ..... Recessed push-button (rear panel)
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 ..... 30/50 dB(A)
..... Ambient temperature 23 °C/73.4 °F

Dimensions and weight
Height x width x depth ..... 2 RU x 19" x 465 mm (18.3")
Weight ..... 13.3 kg/29.3 lb



40D dimension in mm [inch]

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Features and benefits

- High voltage output suitable for driving applicable d&b loudspeakers, including the KSLi System
- Information-rich monitoring display, including device status, speaker setups, Input and Load monitoring, GPIO status, fault indication and more
- Dynamic range (SNR) digital input 116 dB unweighted
- Enhanced energy saving features (Eco mode)
- Eight GPI and four GPO plus a separate general FAULT connector
- Flexible Fallback structure, ensuring the transmission of a secondary signal when required
- Supports d&b ArrayProcessing which improves tonal balance and coverage across the audience area
- OCA/AES70 protocol for easy integration into third party environments using the R90 Touchscreen remote control
- Broad variety of third party integration including Beckhoff, Q-SYS, Crestron, AMX, MediaMatrix

Applications

- Performing arts
- House of worship
- Club / Dance club
- Sports arena & Sports stadium
- Multi-purpose hall
- Cruise ships
- Conference facilities

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 a 4.3" (480 x 272 pix.) color touchscreen while remote control shall be via dedicated remote control software.

Four analog input connectors shall be provided also acting as link output.

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).

Connector type for all audio inputs and link outputs shall be 3-pin Phoenix Euroblock male.

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 connectors shall be 2 x Phoenix 4-pin Euroblock female.

Output configurations shall be selectable for Dual Channel, Mix TOP/SUB and 2-Way Active modes.

Eight GPI and four GPO lines shall be provided on an Phoenix Euroblock male connector as additional digital lines and shall allow either level (Hi/Lo active) or edge (rising/falling) triggering.

In addition a FAULT contact shall be provided on an 3-pin Phoenix Euroblock male to allow a general device error to be remotely indicated.

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.

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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.
A 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 2000/2400 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 180 V_{peak} and the maximum output current shall be 35 A_{peak}.
THD+N (20 Hz – 20 kHz) shall be < –86 dB/0.005% and the Crosstalk (20 Hz – 20 kHz) shall be < –70 dBr while the dynamic range (SNR - digital input unweighted) shall be at least 116 dBr.
The dimensions (H x W x D) shall not exceed 2RU x 19" x 465 mm (18.3") and shall weigh no more than 13.3 kg (29.3 lb).

The amplifier shall be the 40D by:
d&b audiotechnik GmbH & Co. KG.

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