

DSP blue

MEQ-2000

24/96 MULTIMODE EQUALIZER



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MEQ-2000 24/96 MULTIMODE EQUALIZER, also called **DSP blue**, is the first member of the new digital audio 19" processor family, the **DSP-2000**. It is a extremely versatile digital equalizer. The **MEQ-2000** delivers warm analog sound and outstanding features thanks to the high-quality converters, the constant internal sampling rate of 96 kHz, and the power of absolutely precise low-noise digital processing functions. The 31-band graphic equalizer and 8-band parametric equalizer are supported by 6-band notch, low-cut, and high-cut filters. For sound finishing in mastering mode, a combined limiter/compressor is provided, for loudspeaker protection in reinforcement mode a reliable peak-limiter. A long separate delay in every channel allows adjusting the sound for different loudspeaker or spot microphone positions. The processor offers two fully independent channels that can be coupled for stereo use.

In connection with other members of the **DSP-2000** audio processor family, the **MEQ-2000** consistently remains in the 24-bit/96kHz digital domain through the whole audio processing path, maintaining the highest signal fidelity. The dithering and noise shaping options at the output of the processing chain take care of the audio quality if tailoring down to 16-bit CD.

The **MEQ-2000** incorporates high-quality 24bit/96kHz AD and DA converters as well as a sophisticated sample rate converter. This allows digital input to accept every sample frequency from 20 kHz to 100 kHz and digital output to deliver every typical sample frequency used in digital audio.

The remote control capability via MIDI or RS-232 permits cascading the devices with other members of the **DSP-2000** family or third party equipment and convenient controlling of the parameters over a PC compatible computer using proprietary software.

The **MEQ-2000** is an ideal universal tool for both the mastering and reinforcement engineer.

TYPICAL APPLICATIONS

Two-channel or stereo recording and mastering equalizer:

- analog and digital tracking, mixing and mastering
- sound shaping and compression
- critical material processing (notch, high-cut, low-cut)
- conversion between different analog and digital formats.
- sensitive treatment of solo tracks
- unique linear-phase mastering
(optionally with the DSP1 extension module)

Two-channel or stereo digital sound reinforcement equalizer:

- sound field control
- balancing of the room characteristics
- microphone alignment
- speaker compensation and protection
- manual feedback reduction
- automatic room measurement
(optionally with the DSP1 extension module)

FEATURES

- High-End 24-bit, 96 kHz A/D and D/A Converters
- Digital I/O on AES/EBU or S/PDIF with comprehensive Sample Rate Conversion
Input Rates: 20 - 100 kHz, Output Rates: 32, 44.1, 48, 64, 88.2, 96 kHz
- Superior THD+N performance (< 0.001%) for the crystal clear sound
- 40-bit Internal Signal Path to maintain increased head-room and low-level signals
- Up to 80-bit Processing Accuracy for the lowest digital distortion
- Internal Sampling Frequency always on 96 kHz to achieve analog-like processing
- Inherent System Delay less than 1 ms
- Extended Frequency Bandwidth up to 31.5 kHz
- Output Dither at 16, 20, or 24 bits
- 8-Band Fully Parametric Equalizer: Low Shelving, 6 x Bell, High Shelving
- Low-Cut and High-Cut Filters with switchable slopes
- 6-Band Notch Filters for feedback suppression
- 31-Band Graphic Equalizer
- Visually displayed filter curves
- True Peak Limiter for loudspeaker protection
- Mastering Limiter/Compressor with Soft-Knee and Auto-Release
- Absolutely clickless filter parameter update
- Intuitive Programming and Real-Time Navigation Interface
- Two Temporary Preset buttons for Real-Time Setup Comparison
- 32 Factory and User Presets
- Remote Control via MIDI or RS-232
- Software Update and special PlugIns via Internet and RS-232

TECHNICAL SPECIFICATIONS*

SIGNAL PROCESSING FUNCTIONS (per channel)

1. Full Parametric Equalizer



- Eight Low-Noise Digital Filters:
 - Low Shelving, 6 x Constant-Q Bell, High Shelving
- Shelving Characteristics: Baxandall or 6 dB/octave
- Extended Frequency Range: 20 Hz to 25 kHz
- Bandwidth: 1/12 to 2 Octaves
- Boost/Cut Range: ± 16 dB or ± 8 dB

2. Graphic Equalizer



- 31 Constant-Q Filters on 1/3-Octave ISO or musically divided center frequencies
- Bandwidth: 1/3, 2/3, or 1/6 octave
- Boost/Cut Range: ± 16 dB or ± 8 dB

3. Cut Filter Block

- Low-Cut and High-Cut Filters
 - Low-Cut Frequency Range: 2 Hz to 2 kHz suitable for DC-Removal and De-Rumble
 - High-Cut Frequency Range: 200 Hz to 25 kHz
 - Slope: 6, 12, 18 dB/octave
 - Characteristics: Bessel, Butterworth
- Notch Filters
 - Six Low-Noise Digital Filters
 - Frequency Range: 20 Hz to 20 kHz
 - Q: 15, 30, 45, 60
 - Cut: 0 to -24dB

4. Limiter/Compressor (mastering mode version)

- Unique Combination of a Limiter and Compressor smoothly adjustable between limiting and compressing
- Knee: Hard and Soft (different grades)
- Threshold: 0 to -50 dBFs
- Ratio: 1:1 to inf:1
- Attack Time: 0.1 to 200 ms
- Hold Time: 0.1 to 500 ms
- Release Time: 20 to 5000 ms
- Look-Ahead Delay: 0, 2, 5, 10, 25 ms
- Program-Dependent Auto-Release Function
- Make-Up Gain
- True Stereo Coupling
- Sophisticated Metering: Input, Output, Gain Reduction

5. Peak Limiter (reinforcement mode version)

- Brick-Wall Function
- Threshold: 0 to -50 dBFs
- Knee: Hard and Soft (different grades)
- Auto-Attack for Reliable Peak-Stop Function
- Hold Time: 0 to 200 ms
- Release Time: 20 to 2000 ms
- Program-Dependent Auto-Release Function
- Make-Up Gain
- True Stereo Coupling
- Sophisticated Metering: Input, Output, Gain Reduction

6. Master Delay

- Length: 2×1240 ms
- Programmable in milliseconds, meters or feet (the actual environment temperature can be considered)

7. Sophisticated Signal Measurement and Adjustment:

- Peak/RMS for Input and Output
- Correlation Meter
- Normalizing

8. Digital Output Level Attenuation and Requantization with Dither

- Attenuation: 0 to -24 dBFs
- Phase Invert
- Dithering Levels: 16, 20, 24 bits
- Dither Type: TPDF, HTPDF

9. 1/3 Octave Real-Time Spectrum Analyzer

- 31-Band conform to GEQ
- Peak-Hold Function with Reset
- Adjustable Averaging and Decay Time
- Adjustable Display Range: Maximal Level and Zoom
- Inverse Spectral Function as a reference for GEQ

10. Reference Signal Generator

- Waveforms: Sine, Sine Sweep
- Noise: White, Pink

11. Manual Feedback Detection and Suppression

12. Room Measurement and Correction

13. Comprehensive Sample Rate Conversion:

- Input Sample Rates: 20 - 100 kHz
- Output Sample Rates: 32, 44.1, 48, 64, 88.2, 96 kHz

14. Detailed Digital I/O Status Monitoring

- AES-3 (AES/EBU) conform
- IEC958 (S/PDIF) conform

15. Configuration Modes

- Two-Channel / Mono
- Mastering / Reinforcement
- Acoustic Measurements
- Channel Swap

16. Hard Bypass (switchable to Hard Mute with jumpers)

EXTENDED FUNCTIONALITY

with add-on DSP1 Module and optional software Plugins

17. Real-Time Spectrum Analyzer

simultaneously to the complete processing capability

18. 8-Band Liner-Phase Mastering Equalizer

19. Expander / Noise Gate

20. Extended Acoustic Measurements Functions

TECHNICAL SPECIFICATIONS*

AUDIO INPUTS AND OUTPUTS

- Analog Inputs: XLR (pin 2 hot) electronic balanced, RF suppressed
Impedance: > 10 kOhms (balanced)
Maximal Signal Level: +24 dBu (Input Gain @ +12 dB)
Input Gain Range (potentiometer adjusted): -12 dB to +12 dB
- Digital Inputs: XLR: AES-3 or AES/EBU (up to 24 bits) transformer balanced
Coaxial and Optical: S/PDIF (up to 20 bits), IEC 958, EIAJ CP-340, coax with transformer
Sample Rate: 20 to 100 kHz (any)
- Analog Outputs: XLR (pin 2 hot) electronic balanced, RF suppressed
Impedance: 100 Ohms
Maximal Signal Level: +24 dBu @ 600 ohm
Output Level Gain: 0 to -24 dBfs (digitally adjusted)
- Digital Outputs: XLR: AES-3 or AES/EBU (up to 24 bits) transformer balanced
Coaxial and Optical: S/PDIF (up to 20 bits), IEC 958, EIAJ CP-340, coax with transformer
Sample Rate: 32 kHz, 44.1 kHz, 48 kHz, 64 kHz, 88.2 kHz and 96 kHz

AUDIO PERFORMANCE

- Digital Processing: A/D conversion: Sigma-Delta, 24-bit, 96 kHz
D/A conversion: Sigma-Delta, 24-bit, 96 kHz
Digital In/Out: 24-bit, 32 to 96 kHz
Internal Sampling Frequency: 96 kHz (always)
Calculation Resolution: up to 80 bits
Internal Signal Path: 40 bits
Inherent System Delay: < 1 ms (between any input and output)
- Analog Input: Frequency Range: 10 Hz - 31.5 kHz, 0/-0.5 dB
Dynamic Range: > 113 dB(A), THD+N: 0.001% (10Hz - 31.5 kHz)
Crosstalk: < -105 dB @ 1 kHz, CMRR: > 55 dB @ 1 kHz
- Analog Output: Frequency Range: 10 Hz - 31.5 kHz, 0/-0.3 dB
Dynamic Range: > 115 dB(A), THD+N: 0.0015% (10Hz - 31.5 kHz)
Crosstalk: < -105 dB @ 1 kHz, CMRR: > 50 dB @ 1 kHz
- Digital In/Out: Frequency Range: 10 Hz - 44 kHz, 0/-0.2 dB,
Dynamic Range: > 124 dB(A), THD+N: 0.0005% (10 Hz - 44 kHz)

MEMORY

32 Factory and 32 User Presets
2 Temporary Presets for fast setup comparison

REMOTE INTERFACE

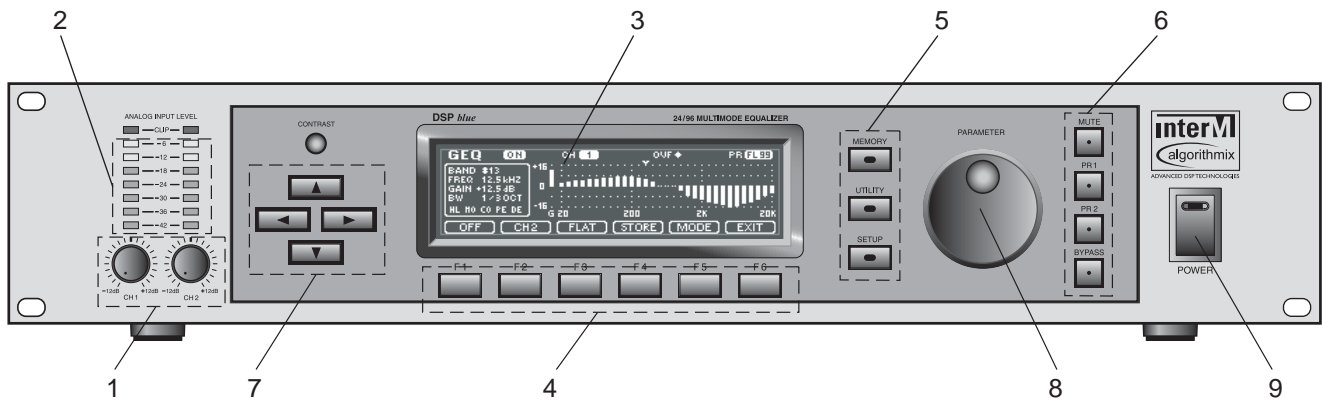
MIDI: In, Thru, Out
RS-232: In, Thru

GENERAL

Password Protection with Alphanumeric Key
Power Source: 100 - 120/200 - 240 VAC, 50/60Hz, 25 VA
Weight: 6.5 kg
Dimensions: 19" 2U Rack, 482(W) x 88(H) x 300(D) mm

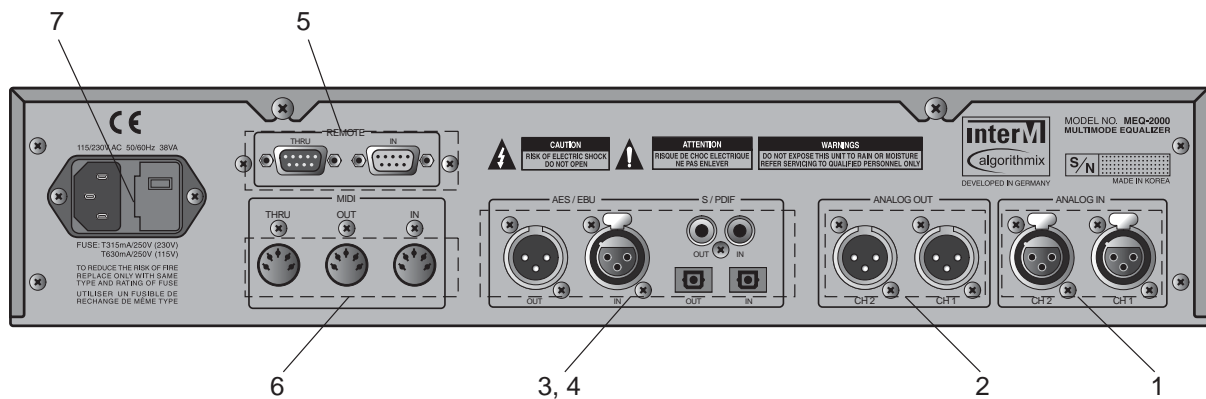
* Due to continuous improvements of our products, we secure us the right to change these specifications without prior notice.

FRONT PANEL



1. Two Analog Input Level Potentiometers with ± 12 dB range
2. Two 8-segment LED Quasi-Peak Analog Level Displays with Clip
3. LCD Display: blue, 240 x 64 dots with EL back light
4. Six Menu Soft Keys (F1 - F2)
5. Three Display Mode Keys with LEDs: Setup, Utility, Memory
6. Four Function Keys with LEDs: Mute, Bypass, Preset1, Preset2
7. Cursor Keys: Up, Down, Left, Right
8. Parameter Wheel
9. Power Switch

REAR PANEL



1. Analog Audio Inputs: 2 x XLR-3
2. Analog Audio Outputs: 2 x XLR-3
3. Digital Audio Inputs: AES-3 (XLR), S/PDIF coax (RCA), S/PDIF optical (TOS-Link)
4. Digital Audio Outputs: AES-3 (XLR), S/PDIF coax (RCA), S/PDIF optical (TOS-Link)
5. Remote: RS-232 IN and THRU (2 x 9-pin SUB-D)
6. MIDI: IN, OUT, THRU (3 x 5-pin DIN)
7. AC Power Supply: IEC Receptacle, Fuse, and Voltage Switch

DSP-2000 the new millennium digital audio excellence

A new system-oriented audio processor family for recording, mixing, mastering, and reinforcement applications

The DSP-2000 is a comprehensive family of universal digital audio processors for recording, mixing, mastering and reinforcement applications. They can be used as separate devices or can be easily combined to large sound processing systems with remote control if necessary. Thanks to high-quality converters, a constant internal sampling rate of 96 kHz, and very precise low-noise digital processing functions, the DSP-2000 delivers warm analog sound and outstanding digital features. When connecting more devices, DSP-2000 remain consistently in the 24/96 digital domain through the whole audio processing chain, thus maintaining the highest signal fidelity.

The DSP-2000 devices incorporate high-quality 24bit / 96kHz AD and DA converters as well as a sophisticated sample rate converter. This allows digital input to accept every sample frequency from 20 kHz to 100 kHz and digital output to deliver every typical sample frequency used in digital audio.

All modules of the DSP-2000 family have the same intuitive man-machine interface to decrease the learning time of the operator. Their front panels have been designed in different colors, providing a quick identification of the DSP-2000 family members.

The following six devices of the DSP-2000 family replace tens of classical separate units:

1. DSP blue

MEQ-2000 MULTIMODE EQUALIZER

31-band graphic equalizer and 8-band parametric equalizer supported by 6-band notch, low-cut, and high-cut filters. For sound finishing in mastering mode, a combined limiter/compressor is included. A reliable peak-limiter is provided for loudspeaker protection in reinforcement mode. A long delay in every channel allows precise alignment of the sound for different loudspeaker or microphone positions. This unit includes a real-time spectrum analyzer as well as room measurement and equalizing functions for advanced sound system installations.

2. DSP red

MDP-2000 MULTIMODE DYNAMICS PROCESSOR

A fully featured multiband or broadband dynamics processor with limiter, compressor, expander, and noise gate with adjustable threshold, ratio, attack time, hold time, and release time. Contains program dependent auto-release function for the best results in audio finishing process and variable soft knees and true stereo coupling for compressor. This unit has a normalizer and soft-clip with tape saturation emulator as well as a de-esser with side equalizer, a brick-wall limiter for absolute reliable level controlling in reinforcement mode plus sophisticated metering: input, output, gain reduction and correlation.

3. DSP green

MXO-2000 MULTIMODE CROSS-OVER

Loudspeaker management system with two-channel analog or digital input and six-channel analog output. Also has flexible routing and virtually any cross-over type with adjustable frequencies and filter characteristics. In every input channel a 6-band parametric EQ and master delay, in every output channel a 6-band PEQ, reliable peak limiter, and delay for loudspeaker alignment is provided.

4. DSP brown

MNS-2000 MULTIMODE NOISE SUPPRESSOR

Cleans up noisy sound in reinforcement installations. Restores badly recorded tracks and remasters historic recordings. Remove unwanted noise from film or video sound. Useful for forensic applications. Pre-prepared or measured noise profiles. Optionally linear-phase equalizer, as well as declipping, decrackling, and spectrum enhancement for restoration of old shellac and vinyl records.

5. DSP yellow

MFC-2000 MULTIMODE FEEDBACK CANCELLER

Dynamic range and sound clarity enhancement in reinforcement installations. Twelve assignable notch filters per channel with manual or automatic parameter adjustment. Different feedback control algorithms. 8-band parametric EQ. Optionally a real-time spectrum analyzer as well as automatic room measurement and equalizing functions.

6. DSP gold

MAS-2000 MULTIMODE ACOUSTIC ENVIRONMENT SIMULATOR

Room simulation, reverberation, and 3D functions for placing and shaping the sound in space. Modulation effects like vibrato, flanger, and chorus. Various delay algorithms. Stereo image correction and enhancement. Mono-to-stereo function. Tape saturation emulator. Sophisticated phase vocoder as option.

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