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VTX M Series User Manual







Introduction

Thank you for your purchase of the JBL Professional VTX M Series!

M Series is comprised of the dual-10" VTX M20 and the dual-12" VTX M22 professional stage monitors, both featuring high-performance differential drive woofers and the large-format D2 dual-diaphragm dual voice-coil compression driver. The option of Dual-Channel (Bi-Amp) or Single-Channel (Passive) operation comes standard, allowing the user to choose the right option for the application with no compromise in output power or performance. Drawing on JBL's unique history of sharing technological innovations across product lines, the VTX M Series HF waveguide features Image Control Waveguide Technology, which gives both the VTX M20 and VTX M22 a broad and stable 60H x 60V coverage pattern that delivers maximum gain-before-feedback. All of these premium, tour-ready features are enclosed in modern, low profile enclosures that are lightweight, ergonomic, and show-ready for even the most high profile concert or broadcast events. VTX M Series comes fully supported in JBL HiQNet Performance Manager[™] with V5 linear phase FIR processing.







Declaration of Conformity

Brands: JBL Professional Family Name: VTX M Series Model Names: VTX M20, VTX M22

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We, Harman International, declare under our sole responsibility that the product, to which this declaration relates, is in conformity with the following directives.

Copies of all Technical Data, Safety Data and EMC reports can be obtained by contacting Frank Lacelle at frank.lacelle@harman.com

I certify that the product identified above conforms to the requirements of the Low Voltage Directive 2006/95/EC and the Waste from Electrical and Electronic Equipment Directive 2002/96/EC RoHS. <u>Document Link</u>

ELECTROMAGNETIC COMPATIBILITY DIRECTIVE 2004-108-EC.pdf JBL Professional, part of the Harman International group of companies, declares that the products produced under the aforementioned brand names are designed and produced as professional audio speakers and therefore outside of the intended scope of the European Commission Regulation (EC) 1275/2008 of 17 December 2008 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment. <u>Document Link</u>

Harman International expects our suppliers and business partners to be aware of their obligations under REACH and expects any substances or products within the scope of REACH to be pre-registered before December 1, 2008. The product identified above meets REACH requirements for chemicals designated by the European Chemicals Agency (ECHA) as Substances of Very High Concern (SVHC). Our current products are exempt from REACH pre-registration and later registration activities. We provide separate E.U. Reduction of Hazardous Substances documentation for our RoHS compliant products. None of the products listed above have SVHC's over the 0.1% threshold for any chemical on the Candidate list. Document Link

The WEEE directive (2002/96/EC) places an obligation on all EU-based manufacturers and importers to take back electronic products at the end of their useful life. JBL, through it's agent, accepts its responsibility to finance the cost of treatment and recovery of redundant WEEE in accordance with the specific WEEE recycling requirements. All of our products are marked with the WEEE symbol; this indicates that this product must NOT be disposed of with other waste. Instead it is the user's responsibility to dispose of their waste electrical and electronic equipment by handing it over to an approved re-processor, or by returning it to JBL's agent for reprocessing. For more information about where you can send your waste equipment for recycling, please contact your local distributor. <u>Document Linkt</u>





System Components



VTX M20 Dual 10" Stage Monitor



VTX M22 Dual 12" Stage Monitor



VTX S25 Dual 15" Subwoofer



VTX F18S Single 18" Subwoofer







Crown Audio I-Tech HD 2 Channel System Amplifier

VTX M20 Specifications

ystem		Transducers	
Frequency Range (-10 dB):	55 Hz - 19.5 kHz	Low Frequency:	2 x 2261H, 254 mm (10 in) diameter, dua 76 mm (3 in) diameter voice coil, NDD [®] ,
Coverage Pattern (-6dB)			Direct Cooled ™
Horizontal:	60	High Frequency:	1 x D2430H, D2 dual diaphragm, dual
Vertical:	60		76mm (3 in) diameter voice coil
		Enclosure	
System Input Power Rating ¹		Manitar Angles	30 degrees
Passive:	1250 W Continuous (IEC / 100 hour)	Monitor Angle::	30 degrees
Active:	LF: 1250 W Continuous (IEC / 100 hour)	Construction:	18 mm, 11-ply Finnish birch plywood
	HF: 100 W Continuous (IEC / 100 hour)		10 mm, 11 p., 1 mm. 5 mm p., 1000
		Grille:	Powder Coated 14 gauge hex-perforated
Maximum Peak Output ² :	136dB (Preset: VTX M20 FR)		steel with acoustically-transparent black
			cloth backing
System Latency ³ :	3.33ms	Input Connectors	
System Processing:	Crown Audio I-Tech 5000HD	Passive:	Neutrik [®] Speakon [®] NL-4 (4x):
oystern Processing.	Crown Audio I-Tech 9000HD		Selectable: Pins 1 \pm or Pins 2 \pm
	Crown Audio I-Tech 12000HD	Active:	Neutrik [®] Speakon [®] NL-4 (4x):
	Crown Audio I-Tech 4x3500HD		Pins 1 ± (LF) Pins 2 ± (HF)
		Dimensions (H x W x D):	344.9 mm x 575.0 mm x 515.3 mm
System Impedance			(13.6 in x 22.6 in x 20.32 in)
Passive:	4 ohms	Net Weight:	23 kg (51 lbs)
Active:	LF: 4 ohms		
	HF: 8 ohms		

Footnotes:

1: IEC Standard: IEC shaped noise with 6dB crest factor based on Nominal impedance and a duration of 100 hours

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VTX M20 Dimensions







JBL continually engages in research related to product improvement. Some materials, production methods and design refinements are introduced into existing products without notice as a routine expression of that philosophy. For this reason, any current JBL product may differ in some respect from its published description, but will always equal or exceed the original design specifications unless otherwise stated.

VTX M22 Specifications

ystem		Transducers	
Frequency Range (-10 dB): Coverage Pattern (-6dB)	45 Hz - 19.5 kHz	Low Frequency:	2 x 2262H, 304 mm (12 in) diameter, dua 76 mm (3 in) diameter voice coil, NDD [®] , Direct Cooled ™
Horizontal: Vertical:	60 60	High Frequency:	
System Input Power Rating		Enclosure	
Passive:	1500 W Continuous (IEC / 100 hour)	Monitor Angle:	30 degrees
Active:	LF: 1500 W Continuous (IEC / 100 hour) HF: 100 W Continuous (IEC / 100 hour)	Construction:	18 mm, 11-ply Finnish birch plywood
Maximum Peak Output ² :	138dB (Preset: VTX M22 FR)	Grille:	Powder Coated 14 gauge hex-perforated steel with acoustically-transparent black cloth backing
System Latency ³ :	3.33ms	Input Connectors	5
System Processing:	Crown Audio I-Tech 5000HD Crown Audio I-Tech 9000HD	Passive:	Neutrik [®] Speakon [®] NL-4 (4x): Selectable: Pins 1 ± or Pins 2 ±
	Crown Audio I-Tech 12000HD Crown Audio I-Tech 12000HD Crown Audio I-Tech 4x3500HD	Active:	Neutrik [®] Speakon [®] NL-4 (4x): Pins 1 ± (LF) Pins 2 ± (HF)
Custom Investores		Dimensions (H x W x D):	380.1 mm x 670.8 mm x 555.0 mm (15.0 in x 26.4 in x 21.8 in)
System Impedance Passive:	4 ohms	Net Weight:	· · · · · ·
Active:	LF: 4 ohms		
	HF: 8 ohms		

Footnotes:

1: IEC Standard: IEC shaped noise with 6dB crest factor based on Nominal impedance and a duration of 100 hours

2: Peak, unweighted SPL, measured under half-space conditions at 1 meter using broadband pink noise with a 10dB crest factor and specified preset 3: Average delay of linear-phase region >200Hz.

VTX M22 Dimensions







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SpeakON Connectors

M Series products include four Neutrik SpeakON type STX series NL4 connectors (two on each side). All four NL4 connectors are wired in parallel and can be used interchangeably depending on the stage layout and desired cabling.







M Series left side connectors

M Series speaker connector plate

M Series right side connectors

Speaker cables and connectors

M Series products require standard NL4 four conductor cables. The minimum recommended wire gauge for distances up to 25 meters is 2.5mm (13 AWG) and 4.0mm (11 AWG) for longer cable runs. Choose a cable that was designed for touring applications with the outer jacket made out of flexible and flame retardant PVC.



The Neutrik speakON STX Series connectors were specifically designed for heavy duty amplifier-loudspeaker applications like professional touring. They are durable and feature an all metal housing which makes them the recommended connectors for VTX Series loudspeakers.



Mode Selection Switch

The VTX M20 and M22 feature a set of easily accessible selection switches.



Dual-Channel (Bi-Amp) Mode



Single-Channel (Passive) Mode Input A (Channel 1)



Single-Channel (Passive) Mode Input B (Channel 2)

The first switch is a **Mode Selection** switch that allows for selecting between **Single-Channel (Passive)** and **Dual-Channel (Bi-Amp)** operating modes. In Single-Channel (Passive) mode an internal crossover network is engaged that allows powering M Series monitors with a single amplifier/DSP channel reducing the amplifier channel requirements. In Dual-Channel (Bi-Amp) mode, two amplifier/DSP channels are used, one for the low frequency section and one for the high frequency section. Depending on the available amplifier channels, budget, or artists requirements a user can easily switch from one mode to the other.

The second switch is a **Channel Selection** switch that it is only active when the **Mode Selection** switch is set to **Single-Channel (Passive)** mode. The channel selection switch allows for selecting which set of the NL4 Pins (Pin 1± or Pin 2±) are used for powering the monitor. Using this switch and Crown Audio I-Tech HD amplifiers, a user can select which amplifier channel is driving a set of monitors. When using 2-channel I-Tech HD amplifiers and CH-1 NL4 output on the amplifier, when the switch is set to **Input A** the a monitor is driven by **Channel 1** and when the switch is set to **Input B** a monitor is driven by **Channel 2**. This configuration allows for one NL4 cable run from the amplifier to drive up to 4x VTX M Series monitors in two independent monitor mixes. When using the 4-Channel I-Tech 4x3500HD amplifier and the NL4 outputs, the switches can be used to select between **Channels 1 or 2** for the first NL4 and **Channels 3 or 4** for the second NL4 output. This allows for powering up to 8x VTX M Series monitors with one amplifier.

A cover for the switch access panel is included and can be used to visually cover the switch panel for customers that choose not to frequently use this feature, or for fixed installations.









Mode Selection Switch Wiring

Below is a wiring diagram showing how the Wiring Mode selection switch is connected to the M Series internal passive network and transducers.





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One of the best features of M Series is the inclusion of a new Single-Channel (Passive) mode. In this mode, up to two M20 or M22 monitors can be powered with a single Crown Audio I-Tech HD amplifier channel without any performance penalties. Unlike typical passively driven monitors, M Series splits the speaker preset responsibilities into two sections. Part of the speaker preset is processed in the Crown I-Tech HD amplifier and part of the preset is performed internally in the speaker enclosure by a passive high-pass and a lowpass filter. The external DSP is responsible for frequency response correction, phase response linearizion and component protection.



The combination of internal and external processing duplicates Bi-Amplified speaker preset performance while using only one amplifier and DSP channel. The frequency response, phase response and maximum SPL capabilities of M Series are identical in both the Single-Channel and Dual-Channel modes.

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VTX M20 | Dual-Channel (Bi-Amp)



Amplification and Processing

Like all other VTX products, M Series is powered exclusively by Crown iTech HD power amplifiers, providing optimum performance and consistency across the world. Standard V5 level presets are available for Single-Channel (Passive) and Dual-Channel (Bi-Amp) modes. The most up to date presets are distributed with the latest version of JBL's Performance Manager control software and are also available as standalone downloads at <u>www.jblpro.com</u>

Crown Audio I-Tech 4x3500HD

Crown Audio I-Tech HD





The Crown I-Tech HD series amplifiers feature BSS Audio OMNIDRIVEHD[™] processing for each amplifier channel, including the acclaimed LevelMAX[™] Limiter Suite and support for complex phase FIR filters as used in the latest JBL V5 loudspeaker presets. All M Series processing is done using I-Tech HD internal processing and no other external DSP is required. Crown amplifiers include a user adjustable input section that can be used for additional equalization and adjustments if needed.

The I-Tech 4x3500HD amplifier features four independent inputs (Analog, AES3 or CobraNet[™]) and are fully routable to any one of the 4 outputs. The four inputs allow the I-Tech 4x3500HD to drive up to four independent monitor mixes (in Single-Channel mode) reducing the number of amplifiers required.

Crown Audio I-Tech 4x3500HD Rear Panel



Crown Audio I-Tech HD Rear Panel



Crown Audio I-Tech HD Output Wiring

The 4-channel Crown Audio I-Tech 4x3500HD includes 2 x NL4 connectors and has Channels 1 & 2 bi-wired to the left NL4 and Channels 3 & 4 bi-wired to the right NL4. An NL8 output connector is also available that contains all 4 amplifier channels on Pins 1 ± through 4 ± respectively. Output connector wiring configurations are shown below:



Both NL4 connectors can be used to power M Series products. For this specific application (stage monitoring) the NL8 connector is typically left unused. Since the NL4 connectors contain two amplifier channels, simple four-conductor NL4 cables can be used to connect the amplifiers to the speakers.

A similar wiring scheme applies to the 2 Channel Crown I-Tech HD amplifiers however it is important to note that only the Channel 1 NL4 output is bi-wired.



Crown Audio I-Tech 4x3500HD Configurations

Dual-Channel (Bi-Amp) Mode

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The Crown Audio I-Tech 4x3500HD amplifier can power up to four M20 or M22 monitors in Dual-Channel (Bi-Amp) mode. In this configuration, channels 1 & 3 power the low frequency section and channels 2 & 4 power the high frequency section. Up to two independent monitor mixes can be achieved using inputs 1 and 3 of the amplifier. All M Series Mode Selection switches should be set to Dual-Channel (Bi-Amp) mode.





Single-Channel (Passive) Mode

The Crown Audio I-Tech 4x3500HD amplifier can power up to eight M20 or M22 monitors in Single-Channel (Passive) mode. In this configuration each channel is powering a pair of monitors. Up to four independent monitor mixes can be driven using inputs 1 - 4 of the I-Tech HD amplifier. In this configuration, all Mode Section switches should be set to Single-Channel (Passive) mode and the Channel-Selection switches as illustrated below.



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Single-Channel (Passive) Mode - Stereo Mix

Stereo monitor mixes can be set using Crown Audio I-Tech 4x3500HD amplifiers and the channel selection switches. In this configuration, each amplifier channel is driving a single M Series monitor. The Mode Selection switches should be set to Single-Channel and the Channel Selection switches should be set as illustrated below. This will create two independent stereo monitor mixes.



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Crown Audio I-Tech 9000HD & 12000 HD Configurations

Dual-Channel (Bi-Amp) Mode

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Crown Audio I-Tech 9000HD and 12000HD amplifiers can power up to two M20 or M22 monitors in Dual-Channel (Bi-Amp) mode. In this configuration channel 1 is powering the low frequency section and channel 2 powers the high frequency section. A single monitor mix can be achieved in the configuration using input 1 of the amplifier. All M Series Mode Selection switches should be set the Dual-Channel (Bi-Amp) mode and the bi-wired CH-1 NL4 output connector should be used.



Single-Channel (Passive) Mode

Crown Audio I-Tech 9000HD and 12000HD amplifiers can power up to four M20 or M22 monitors in Single-Channel (Passive) mode. In this configuration each channel is powering a pair of monitors and up to two independent monitor mixes can be achieved using inputs 1 and 2 of the I-Tech HD amplifier. All mode selection switches should be set to Single-Channel (Passive) and the Channel-Selection switches as illustrated below.





Dual-Channel (Bi-Amp) Mode

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Crown Audio I-Tech 5000HD amplifiers can power up to one M20 or M22 monitor in Dual-Channel (Bi-Amp) mode. In this configuration, channel 1 is powering the low frequency section and channel 2 powers the high frequency section. A single monitor mix can be achieved in this configuration using input 1 of the amplifier. All M Series Mode Selection switches should be set the Dual-Channel (Bi-Amp) mode.







Single-Channel (Passive) Mode - Stereo Mix

The Crown Audio I-Tech 5000HD amplifier can power up to two M20 or M22 monitors in Single-Channel (Passive) mode. In this configuration each channel is powering a single monitor. Up to two independent monitor mixes can be achieved using inputs 1 and 2 of the I-Tech HD amplifiers. In this configuration, all Mode Section switches should be set to Single-Channel (Passive) and the Channel-Selection switches as illustrated below.



M Series V5 presets are optimized to generate a flat frequency response down to 150Hz with a small LF shelving response increase below 150Hz for added LF impact. Two preset variations are available for each product and configuration modes:

Full-Range (FR): Full-Range (FR) presets allow M Series products to operate down to a safe low frequency limit that each monitor can reproduce. This set of presets can be used when a full range performance is desired (i.e. drum fill or bass monitor).

With Subwoofers (80): The 80 preset introduces a high-pass filter at 80Hz and can be used when M Series is combined with supported VTX Subwoofers (VTX F18S or the VTX S25). In this case, M Series is responsible for the spectrum above 80Hz and the added subwoofer contributes to frequencies below 80Hz and down to 30Hz. The 80 presets can also be used in situations where no subwoofers are present but reduced LF extension/energy is required such as vocal monitoring or when it is desirable to maximize A-weighted SPL output.

Supported VTX Series Subwoofers

When added low frequency extension is needed, M Series monitors can be used in conjunction with supported VTX Series subwoofers. Preset support is included for the dual 15" VTX S25 subwoofer enclosure and the single 18" VTX F18S. Preset time alignment is optimized for M Series products to be placed on top of the subwoofer enclosure as shown in the examples below. The orientation of the M Series monitors can be selected depending on the required throw distance.



Each product (M20 and M22) can be used with either one of the subwoofer enclosures (see preset summary sheets for more information). Multiple subwoofers enclosures can be used to achieve the desired low to mid-hi frequency contour and target MAX SPL.

VTX M Series with Subwoofers



The combination of M Series and subwoofers can also be used in stereo pairs. Applications for these configurations include stereo DJ monitoring systems, stereo drum monitoring and side fill systems for small stages.









Using Multiple Monitors

M Series factory presets are optimized to generate a flat frequency response for single cabinet operation. When more than one M Series monitor is used, there will be an increase in low-frequency energy and in general, when combining M Series products in monitor arrays, high-frequency energy increases by 3dB every time the box quantity is doubled, while the low-frequency energy increases by 6dB. This is due to the directivity characteristics of relatively small loudspeaker systems. Products of this size and type tend to be directional at higher frequencies and relatively omni-directional at lower frequencies which affects the rate of coupling for the different parts of the frequency spectrum. In some cases this extra increase of low-frequency energy is desired and this is the reason why multiple monitors are used. In other cases a flatter frequency response is desired.

When a flatter frequency response is the target, a shelving filter can be used to compensate for the extra low frequency coupling. The low frequency shelving filter can be implemented using the Input / User EQ section of Crown I-Tech HD amplifiers or an external processor or console prior to the I-Tech HD amplifier. The type and corner frequency of this filter remains the same for all configurations and M Series models and filter gain can be adjusted to achieve the desired frequency response.

When using two M Series monitors placed closely together, a 6dB/Oct shelving filter can be used to compensate for the low frequency build up. The gain of this filter can range from 0dB to -3dB depending on the desired frequency target.



JBL PROFESSIONAL

Using Multiple Monitors

When using four monitors closely placed together, the same 6dB/Oct 500Hz filter can be used with increased attenuation. In this configuration the gain of the filter can take values from 0dB to -6dB depending on the desired frequency target.















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Device File: VTX M Series V5 R1.I-TECH4x3500HD.Device

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			CH 1	CH 2	CH 3	CH 4	
Single-Channel (Passive)	FR						
VTX M20 FR	2	VTX M20 Full Range - Single-Channel (Passive) mode	M20 FR	M20 FR	M20 FR	M20 FR	
VTX M22 FR	3	VTX M22 Full Range - Single-Channel (Passive) mode	M22 FR	M22 FR	M22 FR	M22 FR	
VTX M20 - M22 FR	4	VTX M20 & M22 Full Range - Single-Channel (Passive) mode	M20 FR	M20 FR	M22 FR	M22 FR	
Single-Channel (Passive)	80H	2					
VTX M20 80	6	VTX M20 80Hz HPF - Single-Channel (Passive) mode	M20 80	M20 80	M20 80	M20 80	
VTX M22 80	7	VTX M22 80Hz HPF - Single-Channel (Passive) mode	M22 80	M22 80	M22 80	M22 80	
VTX M20 - M22 80	8	VTX M20 & M22 80Hz HPF - Single-Channel (Passive) mode	M20 80	M20 80	M22 80	M22 80	
Dual-Channel (Bi-Amp)	FR						
VTX M20 2W FR	10	VTX M20 Full Range - Dual-Channel (Bi-Amp) mode	M20 2W LF	M20 2W HF	M20 2W LF	M20 2W HF	
VTX M22 2W FR	11	VTX M22 Full Range - Dual-Channel (Bi-Amp) mode	M22 2W LF	M22 2W HF	M22 2W LF	M22 2W HF	
VTX M20 - M22 2W FR	12	VTX M20 & M22 Full Range - Dual-Channel (Bi-Amp) mode	M20 2W LF	M20 2W LF	M22 2W LF	M22 2W HF	
Dual-Channel (Bi-Amp)	Dual-Channel (Bi-Amp) 80Hz						
VTX M20 2W 80	14	VTX M20 80Hz HPF - Dual-Channel (Bi-Amp) mode	M20 2W LF 80	M20 2W HF 80	M20 2W LF 80	M20 2W HF 80	
VTX M22 2W 80	15	VTX M22 80Hz HPF - Dual-Channel (Bi-Amp) mode	M22 2W LF 80	M22 2W HF 80	M22 2W LF 80	M22 2W HF 80	
VTX M20 - M22 2W 80	16	VTX M20 & M22 80Hz HPF - Dual-Channel (Bi-Amp) mode	M20 2W LF 80	M20 2W LF 80	M22 2W LF 80	M22 2W HF 80	
Subwoofer Presets 80Hz	Subwoofer Presets 80Hz						
VTX F18S 80	18	VTX F18S 80Hz LPF - use with M Series 80 presets	F18S 80	F18S 80	F18S 80	F18S 80	
VTX S25 80	19	VTX S25 80Hz LPF - use with M Series 80 presets	S25 80	S25 80	S25 80	S25 80	

Arbitrary preset combinations can be created using JBL's HiQNet Performance Manager[™] control software





Crown Audio I-Tech HD Series Presets

Device File: VTX M Series V5 R1.I-TECHHD.Device

			CH 1	CH 2
Single-Channel (Passive)	FR			
VTX M20 FR	2	VTX M20 Full Range - Single-Channel (Passive) mode	M20 FR	M20 FR
VTX M22 FR	3	VTX M22 Full Range - Single-Channel (Passive) mode	M22 FR	M22 FR
VTX M20 - M22 FR	4	VTX M20 & M22 Full Range - Single-Channel (Passive) mode	M20 FR	M22 FR
Single-Channel (Passive)	80Hz			
VTX M20 80	6	VTX M20 80Hz HPF - Single-Channel (Passive) mode	M20 80	M20 80
VTX M22 80	7	VTX M22 80Hz HPF - Single-Channel (Passive) mode	M22 80	M22 80
VTX M20 - M22 80	8	VTX M20 & M22 80Hz HPF - Single-Channel (Passive) mode	M20 80	M22 80
Dual-Channel (Bi-Amp) FR	2			
VTX M20 2W FR	10	VTX M20 Full Range - Dual-Channel (Bi-Amp) mode	M20 2W LF	M20 2W HF
VTX M22 2W FR	11	VTX M22 Full Range - Dual-Channel (Bi-Amp) mode	M22 2W LF	M22 2W HF
Dual-Channel (Bi-Amp) 80	OHz			
VTX M20 2W 80	13	VTX M20 80Hz HPF - Dual-Channel (Bi-Amp) mode	M20 2W LF 80	M20 2W HF 80
VTX M22 2W 80	14	VTX M22 80Hz HPF - Dual-Channel (Bi-Amp) mode	M22 2W LF 80	M22 2W HF 80
Subwoofer Presets 80Hz				
VTX F18S 80	16	VTX F18S 80Hz LPF - use with M Series 80 presets	F18S 80	F18S 80
VTX S25 80	17	VTX S25 80Hz LPF - use with M Series 80 presets	S25 80	S25 80

Arbitrary preset combinations can be created using JBL's HiQNet Performance Manager[™] control software



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