

MARTIN AUDIO LE SERIES

LE100/LE200 USER GUIDE



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APPROVALS



This equipment conforms to the requirements of the EMC Directive 89/336/EEC, amended by 92/31/EEC and 93/68/EEC and the requirements of the Low Voltage Directive 72/23/EEC, as amended by 93/68/EEC.

EMC Emission: EN55103-1:2009

EMC Immunity: EN55103-2:2009

Electrical Safety: IEC60065:2002 + A2:2010

UNPACKING THE UNIT

Thank you for purchasing a Martin Audio LE Series stage monitor. Every Martin Audio loudspeaker is built to the highest standard and thoroughly inspected before it leaves the factory. After unpacking the monitor, examine it carefully for any signs of transit damage and inform your dealer if any is found. It is suggested that you keep the original packaging so that the system can be repacked at a future date if necessary. Please note that neither Martin Audio nor its distributors can accept any responsibility for damage to any returned product which arises through the use of non-approved packaging.



Please think of our environment.

When the product has reached the end of its useful life, please dispose of it responsibly through a recycling centre.

INTRODUCTION

Thank you for purchasing this Martin Audio LE Series stage monitor, the latest evolution of a long line of famous, industry standard products under the LE brand (including the hugely successful LE400).

The Martin Audio LE Series fulfils the need for affordable, high performance on-stage monitoring in a compact, low-profile package. The LE Series use Coaxial Differential Dispersion® Technology to overcome the common constraints of wedge monitor speaker designs: it provides sound coverage at head height which is consistent both in sound level and frequency response, yet sufficiently extensive to allow the performer natural freedom of movement.

The cabinets are styled to be unobtrusive, with a low profile to improve audience sight lines. The enclosures are constructed from strong birch/poplar ply, with steel brace reinforcement behind the grille and a black textured finish to minimise reflections from stage lighting. The grilles are black perforated steel with an acoustically transparent black scrim cloth backing. Despite their power handling and SPL output, LE Series monitors are light in weight to aid handling, transportation and set-up.

The LE Series use two-way, full-range co-axial drivers, incorporating Martin Audio's exclusive Differential Dispersion® horn technology. There are two models: the LE100, rated at 300 W*, has a 12" driver; the LE200, rated at 400 W*, uses a 15" driver. Passive crossovers optimised for the drivers are fitted, though the larger LE200 may be bi-amped if wished. The passive crossover frequency is 1.6 kHz (LE100) or 1.2 kHz (LE200).

Multiple NL4 connectors are fitted to both models for ease of on-stage cabling and to facilitate daisy-chaining.

While primarily intended for use as an on-floor wedge monitor, both models are fitted with M8 inserts to permit flying if required; eyebolts are available as a standard accessory. Additionally, the LE100 is fitted with a 35 mm top hat socket permitting it to be pole-mounted and used as a versatile PA system.

Both end faces have moulded rubber feet to protect the monitor during set-up and break-down.

This User Guide provides a detailed explanation of the various features of the LE Series. Please take the time to read through the Guide even if you are experienced with other Martin Audio products.

Thank you again for placing your confidence in Martin Audio products.

* AES power ratings

SAFETY NOTE

It is important that loudspeaker systems are used in a safe manner. Please take some time to review the following points concerning safe use of LE Series loudspeakers:

- Professional loudspeakers are capable of producing extremely high sound levels and should be used with care.
- Hearing loss is cumulative, and can result if people are exposed to levels above 90 dB SPL for a long period.
- Never stand close to loudspeakers driven at high level.

COAXIAL DIFFERENTIAL DISPERSION® TECHNOLOGY

LE Series monitors feature Martin Audio's unique, patented Coaxial Differential Dispersion® technology. The design augments the 'point-source' benefits of coaxial drivers with the consistency of coverage which Coaxial Differential Dispersion® technology can deliver.

Non-coaxial systems can suffer from uneven frequency response in the crossover region because of interference between the LF and HF sections; this causes off-axis variations, undesirable in a stage monitoring environment. In contrast, coaxial systems aim to sum LF and HF contributions at all positions off-axis, and over a range distances from the loudspeaker.

A disadvantage of conventional coaxial devices can be HF beaming, where the HF dispersion reduces at higher frequencies. This is primarily because the HF energy emerges through a narrow tube in the pole-piece of the magnet system. Coaxial Differential Dispersion® drivers overcome this by the use of a static waveguide that merges seamlessly with the unique cone shape – maintaining the dispersion pattern even at very high frequencies.

A Coaxial Differential Dispersion® horn has a trapezoidal dispersion pattern in both vertical and horizontal planes which covers the target area more evenly than a system with a conventional, fixed-dispersion type horn. A conventional horn tends to produce an imperfect coverage pattern which misses out some areas — particularly side areas close to the loudspeaker.

In contrast, a Coaxial Differential Dispersion® system as implemented in the LE Series produces a near rectangular coverage pattern at head height. The consistency of frequency response and SPL thus achieved throughout the target area is exceptional, and furthermore the area itself is more extensive than with conventional monitors, allowing the performer a great deal more flexibility of movement while remaining in the sound field.

THE LE SERIES - OVERVIEW

There are two models in the LE range: one based on a 12" driver, the other on a 15" driver. Both models are 8 ohms impedance. The basic characteristics of the two models are summarised below (full specifications at "LE Series Specifications" on page 1):

Model	LF driver (dia.)	HF driver (dia.)	LF -3 dB point	Power rating*
LE100	12" (300 mm)	1" (25 mm)	78 Hz	300 W
LE200	15" (380 mm)	1.4" (35 mm)	68 Hz	400 W

* AES power ratings

LE100



NL4 (handles)



NL4 (base)

The LE100 is designed to be driven by a full-range amplifier. It has an internal passive crossover at a frequency of 1.6 kHz. The LE100 is fitted with five paralleled NL4 type connectors: two at the front (facing the performer), one at each end recessed in the handles, and one in the base (for use when it is pole-mounted).

LE200



The LE200 may either be bi-amped or driven by a single full-range amplifier. For full-range use, it uses an internal crossover at a frequency of 1.2 kHz. The LE200 is fitted with four paralleled NL4 type connectors: two at the front (facing the performer) and one at each end.

CONNECTIONS

LE Series monitors are fitted with low-profile, NL4-type four-pin push-lock connectors, rated at 30 A. All the connectors (five on the LE100, four on the LE200) are wired in parallel: use whichever connector(s) suit the stage cabling layout. The multiple connectors permit simple interconnection between monitors on the same circuit; they can be used to “daisy-chain” the amplifier output to the next speaker.

Important: please ensure that the total impedance of multiple LE Series monitors connected in this way is not less than the minimum load impedance the amplifier channel can drive:

No. of monitors	Total impedance
1	8 ohms
2	4 ohms
3	2.7 ohms
4	2 ohms

Wire the mating connectors according to the following pinout table:

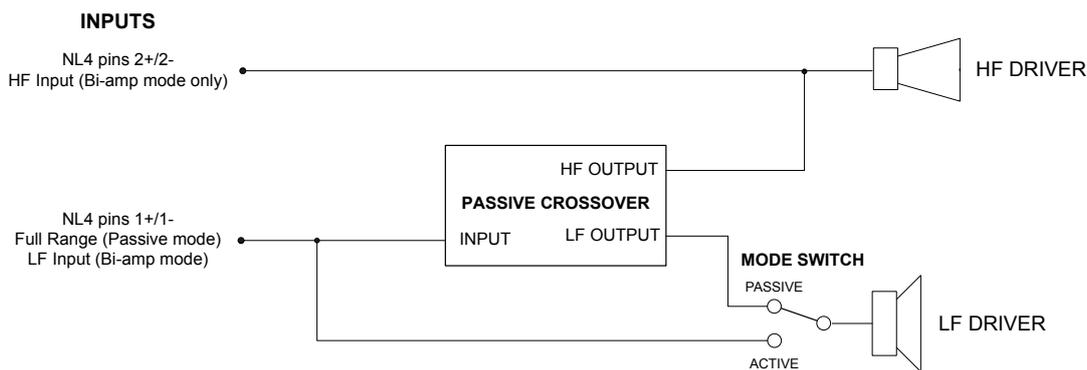
Pin	LE100	LE200	
		Passive x-over	Bi-amped
1+	Input '+'	Input '+'	LF input '+'
1-	Input '-'	Input '-'	LF input '-'
2+	(not used)	(no connection)	HF input '+'
2-	(not used)	(no connection)	HF input '-'

Note that as pins **2+** and **2-** are unused on the LE100, standard four-core speaker cables terminated in NL4s may be used without a problem. However, note that all four pins on each connector - including those that are unused by the speaker itself - are wired in parallel to all other connectors on the cabinet.

LE200 ONLY – CROSSOVER MODES

The LE200 may be bi-amped if wished. Configuration data for external electronic crossovers or system controllers can be found at “Speaker Parameters”).

The LE200 may be switched between passive (full-range) mode and bi-amped mode with the switch on the recessed front panel between the two connectors.



- Set the switch to **PASSIVE** if driving the LE200 with a full-frequency range amplifier channel, and wire only the **1+** and **1-** pins of the NL4 connectors.
- Set the switch to **BI-AMP** if using an external electronic crossover or system controller in conjunction with separate amplifiers (or amplifier channels) for LF and HF. Wire the LF amplifier channel to pins **1+** and **1-**, and the HF amplifier channel to pins **2+** and **2-**.

CABLE LENGTHS

When connecting any loudspeaker system to an amplifier, it is recommended that the return resistance of the cable used is less than one tenth of the nominal impedance of the loudspeaker or loudspeakers in parallel. The table below gives an indication of the maximum permissible cable runs for various conductor cross-sectional areas.

Conductor CSA	Maximum Cable Run	
	4 ohms	8 ohms
1.0 mm ²	11 m	22 m
1.5 mm ²	17 m	34 m
2.0 mm ²	22 m	44 m
2.5 mm ²	29 m	58 m
4.0 mm ²	44 m	88 m
6.0 mm ²	66 m	132 m

RECOMMENDED AMPLIFIERS

Martin Audio MA Series two and four channel power amplifiers are recommended for use with LE Series stage monitors. These amplifiers work well at 4 ohms, making it possible to power two cabinets in parallel from each amplifier channel. Models are available with power ratings from 700 W/ch. to 4000 W /ch. (into 4 ohms). We recommend amplifier models MA5.2K or iK81 if more than two LE Series monitors need to be connected in parallel, as these amplifiers can comfortably drive 2 ohm loads.

Other manufacturers' power amplifiers may be used provided they are capable of delivering the necessary power into the combined impedance of the monitors in use. Note that many amplifiers suffer sonic degradation when driving low load impedances or, worse still, shut down. Always check your intended power amplifier's specifications and conduct listening tests before committing to a very low impedance system design.

The table below specifies the recommended minimum amplifier rating for the LE100 and LE200 when used in pairs. The "Recommended models" column lists the Martin Audio MA Series amplifier models suitable for each speaker model.

Model	Rating, AES	Rating, Peak	Impedance	Minimum amplifier	Recommended models
LE100	300 W	1200 W	8 ohms	2400 W into 4 ohms	MA2.0, MA3.0, MA5.0Q
LE200	400 W	1600 W	8 ohms	3200 W into 4 ohms	MA3.0, MA5.0Q

Care should be taken to avoid amplifier clipping. It is important to understand that a low power amplifier driven into clipping is more likely to damage a loudspeaker than a higher power amplifier used within its ratings. This is because music signals have a high peak-to-average "crest" factor. When an amplifier is severely overdriven, its output waveform is clipped (its peaks are squared off) – reducing the crest factor. In extreme cases, the waveform can approach that of a square wave. An amplifier is normally capable of producing far more power under these conditions than its undistorted rated power output.

The use of very high power amplifiers with outputs greater than those recommended is discouraged.

Care should be taken to avoid switch-on surges, which can result in momentary power peaks in excess of specified ratings. When powering up a sound system it is important to switch on the amplifiers after the mixer and control electronics have stabilised. When powering the system down, reverse the sequence and switch the amplifiers off first.

RECOMMENDED CONTROLLER

The Martin Audio DX0.5 Loudspeaker Management System is the approved controller for use with LE Series stage monitors. The internal speaker preset library includes two presets for each model:

- LE100 standard use or pole mounted
- LE200 passive or bi-amped

For more information on how to connect and operate of the DX0.5 please refer to its User Guide (which can be downloaded from <https://martin-audio.com/userguides2015/>)

SPEAKER PARAMETERS

Alternative high quality loudspeaker management systems may be used. The table on the following page lists the parameters for each LE Series monitor that need to be entered into the controller for safe and optimised operation. Please note that the data provided is based on the algorithms used by Martin Audio DX Series Loudspeaker Management Systems; third-party systems are likely to use different algorithms which may result in both sub-optimal performance and reduce loudspeaker protection.

This information is also included in Martin Audio's General Product parameter spreadsheet, which is available for download from:

<https://martin-audio.com/userguides2015/#ControllerLoadingSoftwarePresets>.

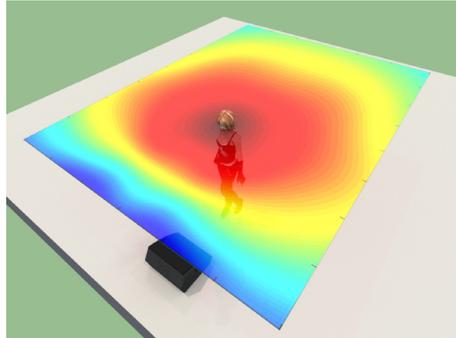
Note: Limiter threshold is calculated using an amplifier gain of 32 dB.

	Driver	Gain	Phase	Delay	High Pass Filter		Low Pass Filter		EQ			Limiter		
					Freq	Slope	Freq	Slope	Freq	Q	Gain	Threshold	Attack	Release
LE100 (Floor Monitor)	12"+1"	0dB	LF In	0.0ms	40Hz	24dB/ Oct LR	18kHz	24dB/ Oct LR	76Hz	1.8	+2dB	+4.0dBu	8.0ms	0.3s
			HF In		150Hz	3.4	=1.5dB							
LE100 (Pole Mount)	12"+1"	0dB	LF In	0.0ms	40Hz	24dB/ Oct LR	18kHz	24dB/ Oct LR	76Hz	3	+6dB	+4.0dBu	8.0ms	0.3s
			HF Out		475Hz	2	-1dB							
LE200 (Passive)	15"+1.4"	0dB	LF In	0.0ms	35Hz	24dB/ Oct LR	no filter	N/A	142Hz	3	-1dB	+5.0dBu	8.0ms	0.3s
			HF Out		394Hz	2.5	-2dB							
LE200 (Bi-amp)	15" LF	0dB	In	0.206ms	35Hz	24dB/ Oct LR	1.29kHz	24dB/ Oct LR	142Hz	3	-1dB	+5.0dBu	8.0ms	0.3s
					433Hz	2.5	-5dB							
LE200 (Bi-amp)	1.4" HF	-5dB	In	0.0ms	1.18kHz	24dB/ Oct LR	no filter	N/A	1.22kHz	4	-6.5dB	-1.0dBu	5.0ms	0.1s
					2.25kHz	10	-1.5dB							
LE200 (Bi-amp)	1.4" HF	-5dB	In	0.0ms	1.18kHz	24dB/ Oct LR	no filter	N/A	3.7kHz	14.2	-4dB	-1.0dBu	5.0ms	0.1s
					6.8kHz	1.5	5dB							

MOUNTING OPTIONS

As wedge monitors, LE Series monitors will most often be used as free-standing cabinets in “landscape orientation” at floor level. The enclosures are fitted with moulded rubber feet on the base which protect the stage and help the units to retain their position.

The coverage at ear height of the LE200 when used in “landscape” orientation (i.e., normal wedge mode) is shown below:



The coverage of the LE100 is similar.

PORTRAIT ORIENTATION

Alternatively, both the LE100 and LE200 may be used in “portrait orientation” if wished; the LE100 may be pole mounted for use as a portable PA system, and either model may be used in conjunction with a sub-woofer as, e.g., a drum fill. The rubber feet on the ends protect both the monitor and the sub-woofer.

The LE100 has a 35 mm top-hat socket in the rear to facilitate pole-mounting. The socket is protected by a removable rubber bung when not in use.

LE Series speakers are shipped from the factory ready for deployment as wedge monitors, in horizontal (“landscape”) orientation. For vertical orientation, the coaxial driver must be rotated through 90° to maintain the correct dispersion patterns. Inadequate coverage and generally sub-optimal performance will result from using an LE Series monitor with the driver incorrectly orientated.



It can be seen from the the views above that the coaxial driver is not symmetrical. For correct performance, the driver should always be orientated as shown, with the “butterfly wings” of the HF driver assembly biased towards the bottom of the enclosure.

To rotate the driver, proceed as follows:

1. Place the enclosure face-up on a bench, table or other suitable flat surface.
2. Follow the instructions for grille removal in the following section “Grille removal and replacement”.
3. Using a 5 mm AF hex key, remove the eight screws securing the driver to the baffle board.



4. Gently lift the driver assembly out, rotate it through 90° and replace it.
5. Refit the screws removed in Step 3.
6. Follow the instructions for grille replacement in the section “Grille removal and replacement”.
7. Follow the instructions in the section “Badge rotation” on page 16.

Grille removal and replacement

Grilles on LE Series monitors are designed to be easy to remove to facilitate driver rotation. No screws are used to hold them in place; they are manufactured with a natural spring which holds them in place in slots in each side of the cabinets. The grilles have two or three gaps in the sides into which an appropriately-sized flat-bladed screwdriver can be inserted to assist in removal.



Insert the screwdriver blade into one of the gaps - either at the top or bottom of the cabinet (don't start in the middle).



Push the handle down. This will lift the grille out of the slot.



Now lift the handle up; this will ease the grille forward slightly to prevent the return on the grille dropping straight back into the slot:



Repeat this process for the remaining gaps in the grille to ease it out of the slot all the way up one side of the cabinet; when you get to the final gap the grill should pop out and away from the front of the cabinet.

To replace the grille, first insert one side into the slot on one side of the cabinet. Make sure the return on the grille is completely engaged in the slot. Push on the front of the grille with the flat of your hand, which will encourage the other edge of the grille to locate on the side of the cabinet close to the slot. Now push the edge of the grille back starting at the top or the bottom to engage the return in the slot; you may need to do this a little at a time, working down the length of the grille until it pops into place.

Badge rotation

The Martin Audio badge is spring loaded and can be rotated through 180 degrees to maintain a professional appearance. To do so, remove the grille and push the badge forward from the rear while turning it to the desired orientation. Once complete, refit the grille.



FLYING LE SERIES MONITORS

The LE100 and LE200 are also suitable for mounting at height: both models have two M8 inserts in each end of the enclosure into which eye bolts may be fitted, to allow them to flown from a truss using standard rigging techniques.

When flying loudspeaker, always observe standard industry guidance regarding truss loading and safety considerations. The weights of LE Series enclosures are:

Model	Weight
LE100	18 kg (39.7 lbs)
LE200	26 kg (57.3 lbs)

ACCESSORIES

The following Martin Audio accessories are available for the LE Series:

HTK00003	M8 Eye Bolt (galvanised finish)
LE100FCUK	Wheeled flightcase for 2 x LE100 (ROW spec)
LE100FCUS	Wheeled flightcase for 2 x LE100 (US spec)
LE200FCUK	Wheeled flightcase for 2 x LE200 (ROW spec)
LE200FCUS	Wheeled flightcase for 2 x LE200 (US spec)

LE SERIES SPECIFICATIONS

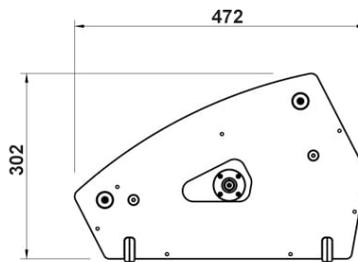
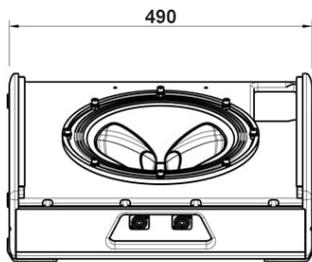
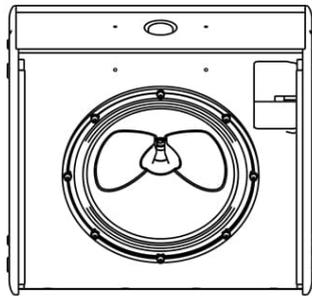
	LE100	LE200
TYPE	Two-way passive, Coaxial Differential Dispersion stage monitor	Two-way, bi-amp/passive Coaxial Differential Dispersion stage monitor
FREQUENCY RESPONSE (1)	78 Hz - 20 kHz \pm 3 dB; -10 dB @ 58 Hz	68 Hz - 18 kHz \pm 3 dB; -10 dB @ 50 Hz
DRIVERS	LF: 12" (300 mm)/2.5" (63.5 mm) voice coil, long excursion, shared ferrite motor system with HF HF: 1" (25 mm) exit/1.7" (44 mm) voice coil, polyimide dome compression driver	LF: 15" (380 mm)/3" (75 mm) voice coil, long excursion, shared ferrite motor system with HF HF: 1.4" (32 mm) exit/3" (75 mm) voice coil, titanium dome compression driver
RATED POWER (2)	300 W AES, 1200 W peak	400 W AES, 1600 W peak
RECOMMENDED AMPLIFIER	MA2.0, MA3.0, MA5.0Q	MA3.0, MA5.0Q
SENSITIVITY (1)	97 dB	LF: 100 dB, HF: 103 dB Passive: 100 dB
MAXIMUM SPL (3)	129 dB peak	133 dB peak
NOMINAL IMPEDANCE	8 ohms	LF/FR: 8 ohms, HF: 8 ohms
DISPERSION(-6 dB)	110° - 60° horizontal, 60° vertical	
CROSSOVER	1.6 kHz passive	1.2 kHz active/passive (switchable)
ENCLOSURE	Birch/poplar ply	
FINISH	Black textured paint	
PROTECTIVE GRILLE	Black perforated steel with scrim cloth backing	
BAFFLE ANGLE	27°	30°
CONNECTORS	5 x NL4 type	4 x NL4 type
PIN CONNECTIONS	1+/1-	LF/FR: 1+/1-, HF: 2+/2-
FITTINGS	2 x pocket handles Protective rubber feet on base and sides 4 x M8 inserts Pole-mount 35 mm socket	2 x bar handles Protective rubber feet on base and sides 4 x M8 inserts
DIMENSIONS	(W) 490 mm x (H) 302 mm x (D) 472 mm (W) 19.3 ins x (H) 11.9 ins x (D) 18.6 ins	(W) 610 mm x (H) 364 mm x (D) 562 mm (W) 24.0 ins x (H) 14.3 ins x (D) 22.1 ins
DIMENSIONS (INCLUDING FEET)	(W) 496 mm x (H) 305 mm x (D) 472 mm (W) 19.5 ins x (H) 12.0 ins x (D) 18.6 ins	(W) 616 mm x (H) 367 mm x (D) 562 mm (W) 24.2 ins x (H) 14.4 ins x (D) 22.1 ins
WEIGHT	18 kg (39.7 lbs)	26 kg (57.3 lbs)
ACCESSORIES	Eyebolts Flightcase	Eyebolts Flightcase

NOTES:

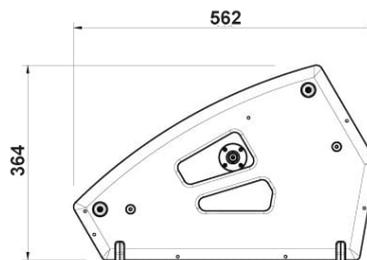
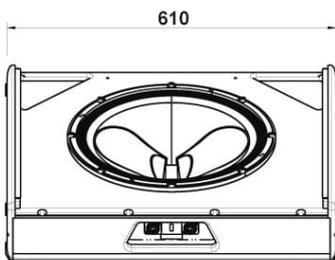
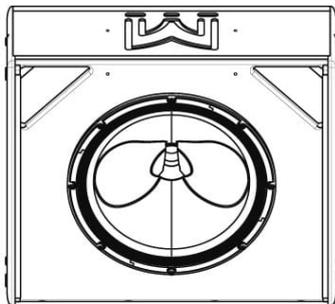
1. Measured in half (2pi) space at 2 metres with 1 watt input, using band limited pink noise, then referred to 1 metre.
2. AES Standard ANSI S4.26-1984.
3. Calculated at 1 m.

TECHNICAL DRAWINGS

LE100



LE200



WARRANTY

Martin Audio LE Series Stage Monitors are warranted against manufacturing defects in materials or craftsmanship over a period of 5 years from the date of original purchase.

During the warranty period Martin Audio will, at its discretion, either repair or replace products which prove to be defective provided that the product is returned in its original packaging, shipping prepaid, to an authorised Martin Audio service agent or distributor.

Martin Audio Ltd. cannot be held responsible for defects caused by unauthorised modifications, improper use, negligence, exposure to inclement weather conditions, act of God or accident, or any use of this product that is not in accordance with the instructions provided by Martin Audio. Martin Audio is not liable for consequential damages.

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Martin Audio Limited

Century Point

Halifax Road

Cressex Business Park

High Wycombe

Buckinghamshire

HP12 3SL

England

UK

Telephone: +44 (0)1494 535312

Facsimile: +44 (0)1494 438669

E-mail: info@martin-audio.com

NORTH AMERICA

Telephone: 519 747 5853

Facsimile: 519 747 3576

E-mail: info@martin-audio.com

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