EMS-51

ultra-compact two-way passive fill loudspeaker

Product User Manual
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EM ACOUSTICS

LOUDSPEAKERS REDEFINED

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DECLARATION OF CONFORMITY

The products contained within this manual conform to the requirements of the EMC Directive 89/336/EEC, amended by 92/31/EEC and to the requirements of the Low Voltage Directive 73/23/EEC amended by 93/68/EEC.

EMC Emission	EN55103-1:1996
Immunity	EN55103-2:1996
Electrical Safety	EN60065:1993

RECYCLING

This product and its packaging constitute the applicable product according to the WEEE directive. Please ensure that at the end of the working life of this product, it is disposed of sensibly in accordance with local and national recycling regulations. The packaging supplied with this product is recyclable. Please retain all packaging, however if disposing of this packaging please ensure that you comply with local recycling regulations. These products also all comply to the RoHS Directive 2002/95/EC.

1.0 - Introduction

Thank you for purchasing the highly acclaimed EMS-51 from EM Acoustics. This product has been designed and rigorously tested to give you the utmost in sonic performance and many years of reliable, trouble-free operation. Please take the time to read this user manual thoroughly to ensure you get the best performance from your system and to ensure you set it up correctly and safely. If you have any questions or are in any doubt whatsoever about any aspect of your new product, please do not hesitate to contact us directly or your local EM Acoustics representative.

The EMS-51 is an extremely compact 2-way loudspeaker, intended for a wide variety of discreet applications – from theatrical fills and delays right through to theme park attractions. The extremely compact enclosure houses a 5" LF drive unit and a 1.1" soft dome HF drive unit, along with an extremely comprehensive passive crossover network. This means the EMS-51 exhibits flat frequency and phase responses without the need of external corrective processing.

This manual contains all the information you should need on topics of set up, amplifier connection and basic service. If you feel we have missed anything, or you have a question not covered by this manual, please visit our website www.emacoustics.co.uk and send us a message or give us a call – we're only too happy to help.

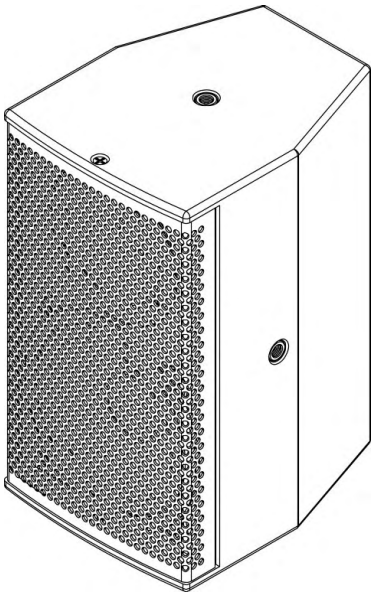
Unpacking

Please take care when unpacking your loudspeaker system. Once unpacked, please inspect each enclosure thoroughly for any transit damage and in the case of any damage please notify your carrier immediately. It is the responsibility of you, the consignee, to instigate any claim. Please retain all original packaging in case of future re-shipment.

2.0 – EMS-61 & Accessories

EMS-51

Ultra-compact passive loudspeaker



FEATURES & BENEFITS

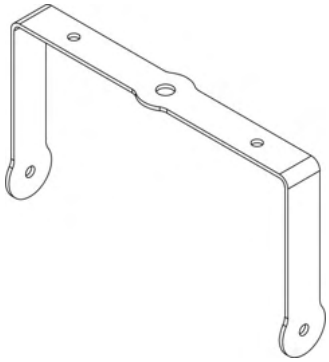
- Signature EM Acoustics "maximum headroom" design approach ensures consistency of performance regardless of SPL level.
- Multiple M8 threaded flying points for temporary and permanent installation.
- Enclosure available in black and white textured paint as standard.
- Horizontal and vertical mounting yokes included.
- Connections on NL4.
- Single amplifier channel required.

KEY SPECIFICATIONS

ENCLOSURE TYPE:	2-way passive, reflex loaded
DRIVE UNITS:	LF: 5" / HF: 1.1"
FREQUENCY RESPONSE:	80Hz – 20kHz +/-3dB
NOMINAL DISPERSION1:	75° conical
MAXIMUM SPL:	113dB continuous, 119dB peak
NOMINAL IMPEDANCE:	8 ohms
DIMENSIONS (HxWxD):	250 (9.9) x 140 (5.5) x 175 (6.9) mm/(ins)
NET/SHIPPING WEIGHT:	4.5/5.2kg (9.9/11.7lbs)

YK-51h

Horizontal mounting yoke



The YK-51h is a simple and effective means of mounting the EMS-51 in both temporary and permanent applications and is included with the EMS-51 loudspeaker.

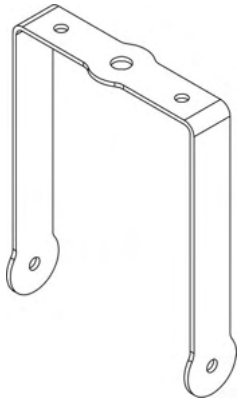
It is secured to the cabinet by means of M8 threaded locking knobs into the top and bottom of the loudspeaker to mount it in a landscape format.

The YK-51h is designed to support one single EMS-51 loudspeaker.

Weight (including fixings) 0.4kg / 0.88lbs

YK-51v

Vertical mounting yoke



The YK-51v is a simple and effective means of mounting the EMS-51 in both temporary and permanent applications and is included with the EMS-51 loudspeaker.

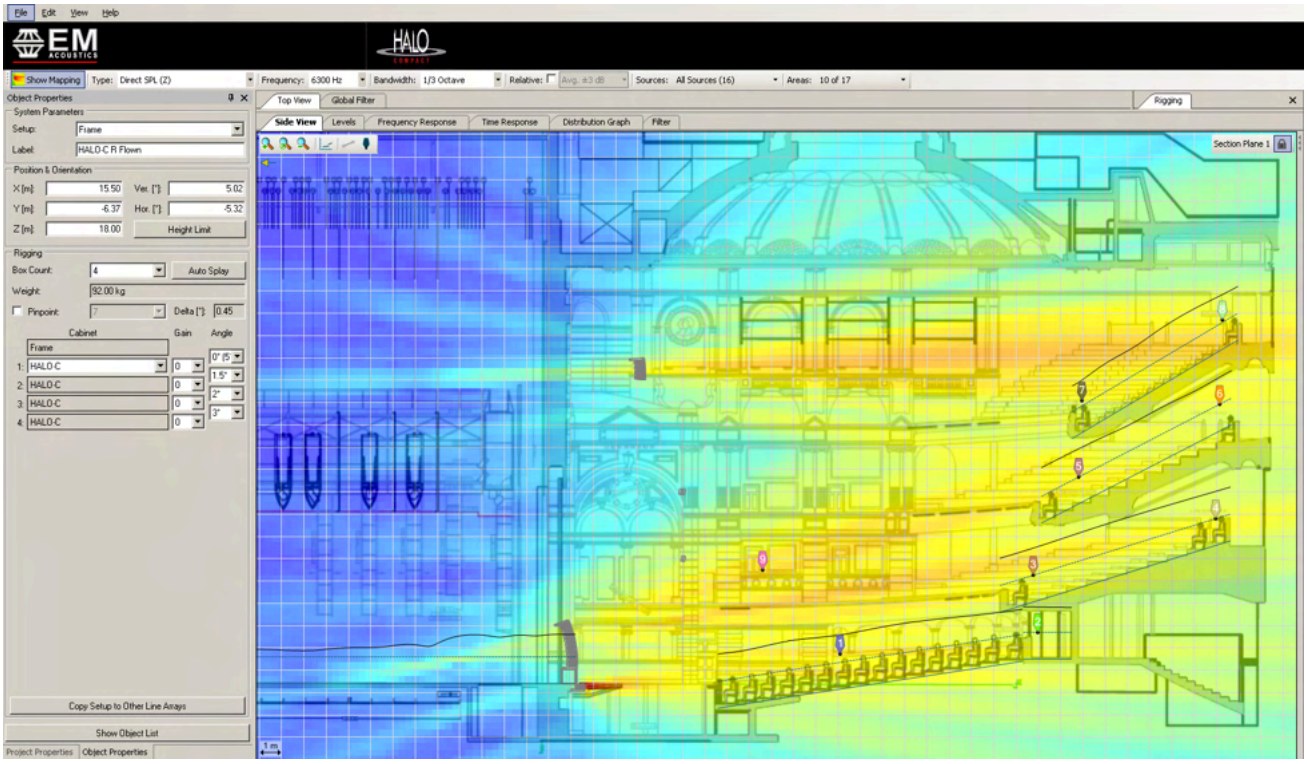
It is secured to the cabinet by means of M8 threaded locking knobs into the sides of the loudspeaker to mount it in a portrait format.

The YK-51v is designed to support one single EMS-51 loudspeaker.

Weight (including fixings) 0.4kg / 0.88lbs

3.0 – Simulation

Ease Focus 3



For acoustic reasons it is advised that users familiarize themselves with Ease Focus 3 – this system provides the user with accurate simulations for setting up EMS-51 loudspeakers.

Ease Focus 3 can be downloaded for free from the AFMG website at http://focus.afmg.eu and is currently available as a stand-alone application for Windows (XP or Higher) only. It can also be downloaded directly from the EM Acoustics website with all the current product files embedded.

Tutorials for Ease Focus 3 are available from with the application itself.

For training on the design and implementation of EMS-51 loudspeakers including the specific use of Ease Focus 3, please contact your local distributor.

4.0 - Safety Considerations

General Considerations in use

Loudspeaker systems are potentially dangerous objects if used incorrectly. Please ensure that you read this section fully, and contact EM Acoustics or your local dealer should you be in any doubt over correct operation procedures.

Personal Injury

Never stand in the immediate vicinity of loudspeakers when in use at high level. Professional loudspeaker systems are capable of producing sound pressure levels which can cause permanent damage to human hearing. Levels in excess of 90dB can cause hearing damage if people are exposed to them over a long period of time, so care and attention must be used for both staff and audience members.

When deploying loudspeaker systems on the ground or when flown, please take careful note of the following important safety considerations:

- Only use accessories and flying hardware supplied or approved by EM Acoustics for flying or transporting loudspeaker systems. Pay close attention to specific instructions, especially those considering maximum load capabilities as detailed in the appropriate user manuals or on the legend labels on the accessories themselves.
- Ensure all additional accessories, fasteners and secondary safeties are of an appropriate size, working load limit and safety factor.
- All loudspeakers and accessories should be regularly inspected for signs of wear and tear, and any damaged parts should be replaced.
- All load bearing parts and assembly bolts on accessories should be regularly checked to ensure they are tight and not worn.

Stand Mounting

When mounting loudspeakers on a stand, please take note of the following important considerations:

- Ensure your stand height is locked off and the tripod legs are positioned so as to be stable.
- Check the weight loading of your stands before attempting to mount the loudspeaker.
- Do not stack a second loudspeaker on top of the stand-mounted one.
- Ensure cables are run so as to leave enough slack to enable neat wiring, and thus reduce the risk of the speaker being pulled over. Loose cables should be covered or taped down wherever possible to reduce trip hazards.
- If stands are being used outdoors, it may be necessary to add ballast to the base of the stand to prevent it toppling over.
- When using poles on top of subwoofer systems, please observe similar precautions.

Ground Stacking

- Ensure that the floor or stage surface can withstand the weight of the system.
- Wherever possible, avoid high stacks and use ratchet straps to secure loudspeakers together. Please also remember that vibrations from subwoofer systems can shake other loudspeakers out of place, which may present a toppling hazard. The use of ratchet straps and non-slip material is recommended to prevent this.

Rigging and Suspension

Please see Chapter 5 for further information on the detailed rigging options for your loudspeaker system.

WARNING: The overhead suspension of loudspeakers is a very serious issue with potentially lethal consequences should anything go wrong. Rigging should only be carried out by experienced personnel following safe working practice. Should you be in any doubt whatsoever, please contact your local dealer who will be able to refer you to a suitable rigging company.

To ensure the highest standards of safety, the following information on array assembly must be exactly followed and understood.

Only use EM Acoustics recommended rigging hardware and accessories, which are specifically designed for the purpose. Do not use these accessories for any other loudspeaker system – the components are specifically designed to work with this product and are not interchangeable with any other EM Acoustics loudspeaker product (unless where specifically stated) or any other loudspeaker system. The use of EM Acoustics accessories with other manufacturers' systems may compromise the safety standards and EM Acoustics is in no way liable for any loss, damage or injury caused by such practice.

Do not modify or alter the EMS-51 loudspeaker or accessories, nor use them in any way other than that described in this manual. Rigging components supplied with the EMS-51 are in no way interchangeable and should not be used as such.

The component parts of the EMS-51 and its accessories should only be assembled in the manner described in this manual, using the fasteners and fixings stated herein. The use of fasteners and methods of assembly not described in this manual may result in an unsafe assembly and as such EM Acoustics will not be responsible for any loss, damage or injury caused by such practice. Welding, drilling or any other means of modifying any part of the flying hardware or permanently fixing components to each other is strictly forbidden.

Rigging assemblies must only be assembled using the appropriate parts and fixings as described in this manual, explicitly following the assembly instructions given herein. Rigging components must only be fixed to the EMS-51 loudspeaker, using the correct cabinet location points, assembly methods and fasteners specifically described within this manual.

Walls, floors and ceilings must be capable of supporting the actual load placed upon them. The rigging hardware must be safely and securely fixed to both the loudspeaker system and the supporting structure.

Secondary Safeties

It is imperative that all loudspeakers flown in any given environment should be provided with a second, independent and properly rated safety suspension point in addition to the principle load bearing means of suspension. Steel wire ropes or steel chains of an approved construction and load rating only may be used as secondary safeties. Plastic covered steel chains may not be used as secondary safeties under any circumstances. Also ensure that all local and national laws are complied with when determining your primary and secondary suspension points.

Safety Inspections

Carefully inspect all flying system components prior to use for defects or signs of damage prior to installing or mounting your loudspeaker. If any components damaged or **you suspect them to be damaged, DO NOT USE THEM.**

Regular scheduled tests – which are much more rigorous than visual inspections – of all rigging components must also be carried out. Safety legislation, and test/inspection requirements, will vary from country to country and as such it is the user's responsibility to ensure that local regulations are adhered to. In most cases, annual independent tests & inspections carried out by a suitably approved and qualified inspector will be required.

EM Acoustics recommends detailed logbooks be kept of all inspections and load tests to ensure an accurate record is kept of the testing for each EM Acoustics rigging accessory.

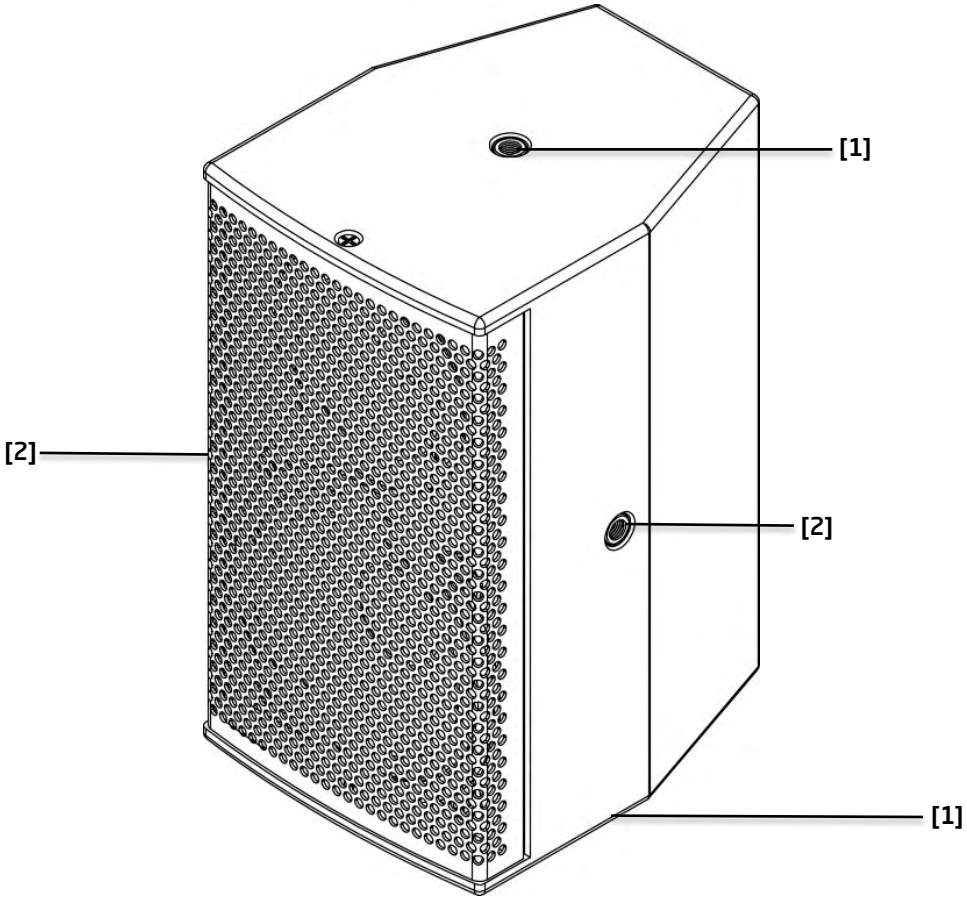
When flying any loudspeaker system, always wear protective headwear, footwear and eye protection in accordance with local regulations.

Material Damage from Magnetism

Loudspeakers produce a static magnetic field at all times – even when not in use. Certain devices are susceptible to external magnetism, and as such a safe distance should be maintained to prevent damage. It is recommended that a safe distance of 0.5m (1.5ft) is maintained from loudspeakers when stored, transported and in use, from devices such as computer hard drives, magnetic media, bank cards to remove the risk of corruption. Larger distances may be required for some older cathode ray tube displays.

5.0 – Rigging & Mounting Options

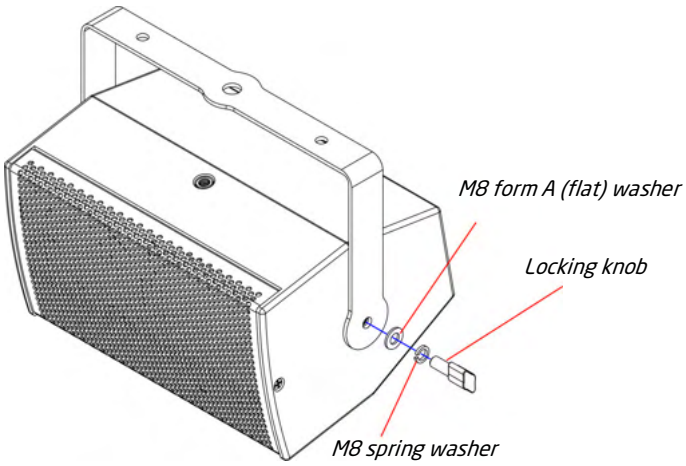
5.1 – EMS-51 Cabinet Overview



1 Top/Bottom M8 mounting point
2 Left/Right M8 mounting point

5.2 – Using the YK-51h or YK-51v

The EMS-51 is supplied with both the YK-51h horizontal and YK-51v vertical mounting yokes, and the relevant locking knobs. Before use, check that the yokes have both rubber washers attached as these grip the side of the loudspeaker cabinet as well as protecting the paint finish. The procedure for use is the same with either orientation of yoke.

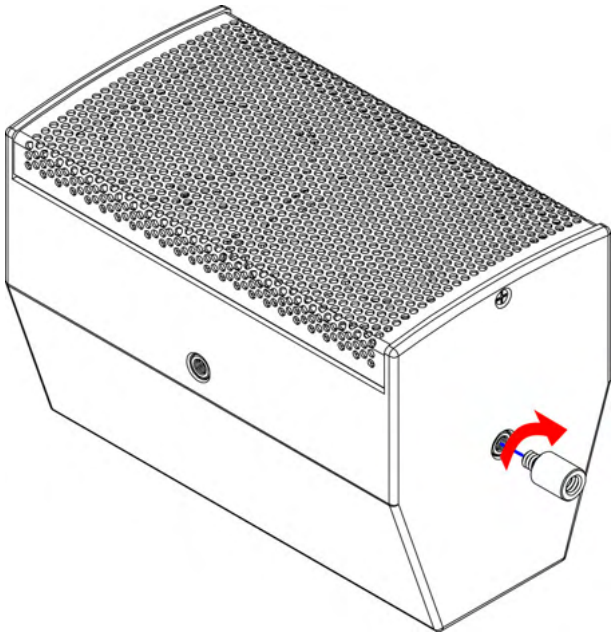


Ensure that the washers are in the correct order – form A (flat) in contact with the frame, and then the spring washer between the flat washer and the locking knob. Tighten the knobs on both sides to lock the desired angle for the EMS-51.

Always ensure that a secondary safety is used when suspending any loudspeaker.

5.5 – Using thread adapters

Various thread adapters are available to convert the M8 thread on an EMS-51 to a 3/8" UNC thread to fit standard microphone stands. The threaded point has a depth of 15mm, and is a standard M8 thread.



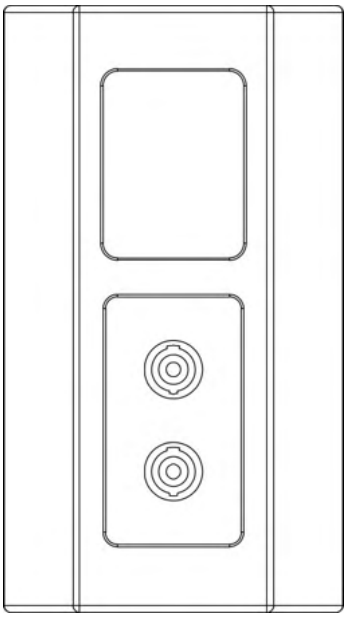
6.0 – Powering the System

The EMS-51 can be powered from any amplifier & DSP combinations with the relevant high & low pass filter, and limiter settings. However, due to the self-contained nature of the package, the use of DQ Series advanced system amplifiers is highly recommended. The use of DQ Series amplifiers provides a neat and flexible system that will encompass all requirements for the system to function correctly, as well as providing user control for room EQ and system alignment.

6.1 - Amplifier and Processing Requirements

6.1.1 - Connections

The EMS-51 requires only a single amplifier channel. Inputs to the EMS-51 enclosure are on Neutrik SpeakON NL4 as illustrated below.



Two-core cable should be used for connecting EMS-51 loudspeakers, and the connections are as follows:

SpeakON connection	1+	1-	2+	2-
Drive unit connection	LF +	LF -	Link Through	Link Through

6.1.3 – Amplifier Requirements

The EMS-51 is a highly efficient loudspeaker, however appropriate available power is critical to ensure full system headroom. It is good practice to ensure that your amplifier can deliver at least double the RMS power handling of the loudspeaker to ensure full headroom, and as such the amplifier requirement is:

Product	RMS Power Handling	Recommended Min. Amplifier Power
EMS-51	200W @ 8 ohms	400W @ 8 ohms

A loudspeaker is far more likely to be damaged by an under-powered amplifier working too hard, than an over-powered amplifier working well within its limits.

All of the DQ Series advanced system amplifiers can be used to power the EMS-51.

The following table shows the maximum number of EMS-51 that can be connected per channel on the various different amplifiers:

Amplifier	Max EMS-51 per channel
DQ6	4
DQ10	4
DQ20	4

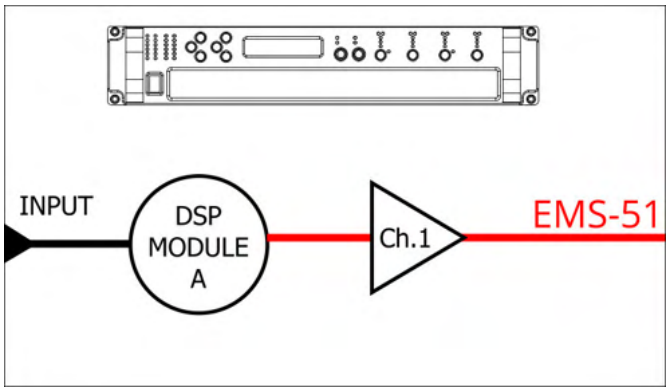
6.1.4 – Processing Requirements

Whilst the EMS-51 is a passive loudspeaker and therefore requires no corrective processing, in all but the lowest SPL applications it does require an active high pass filter and appropriate limiter settings to avoid damage. If not using DQ Series amplifiers, or the DSC48 Digital System Controller, then a suitable DSP system must be used in conjunction with your EMS-51 to prevent damage to the loudspeaker. Check the EM Acoustics website for the most up-to-date DSP settings for the EMS-51.

6.2 - Presets and Settings

6.2.1 – Standard EMS-51 Preset

When used with a DQ Series amplifier EMS-51 loudspeakers require only a single amplifier channel, and as such the preset recalled will only require one output from your DQ Series amplifier.



6.2.2 - Geometric Delay

Appropriate delay will need to be applied to account for physical location differences between different elements of your system – for example time-aligning subwoofers to the main system. The use of SMAART or similar can make this task a great deal simpler and faster.

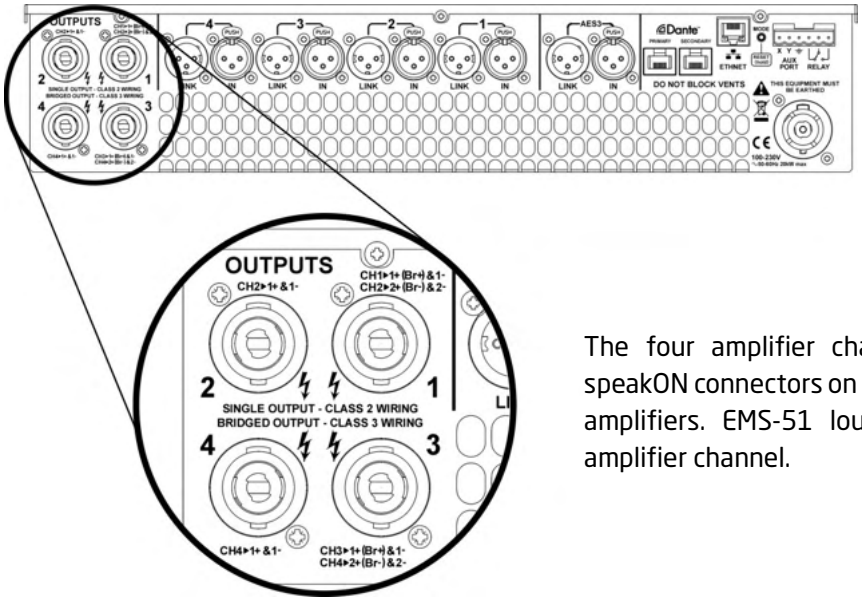
6.2.3 - Applying EQ

The presets are intended to be a starting point for your system and will almost certainly require tuning on-site dependent on room characteristics, the rest of your system design and the system voicing you are aiming for. The EMS-51 is designed with a significant amount of system headroom, so applying EQ is perfectly acceptable within sensible limits.

6.3 - Use with the DQ Series Advanced System Amplifiers

The EMS-51 will perform best when using DQ Series advanced system amplifiers, as not only are they state-of-the-art amplifiers, but the onboard DSP provides appropriate high/low pass filter settings and limiters to get the best from your subwoofers. Please refer to the DQ Series User Manual for detailed information on using the amplifiers and the System Engineer software.

6.3.1 - Connections



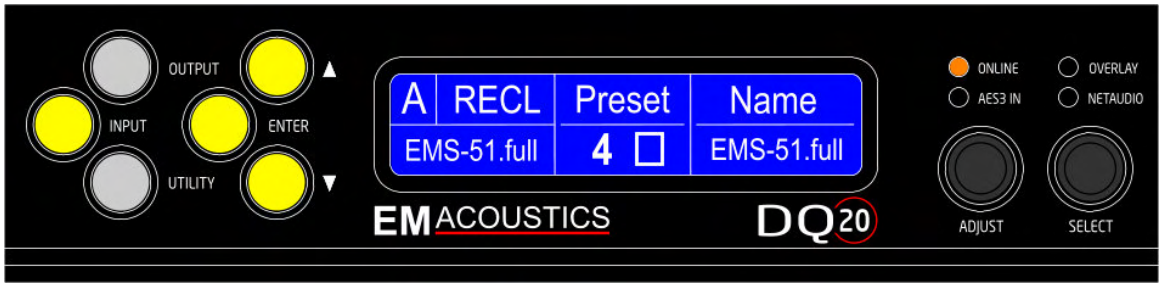
The four amplifier channels appear on four speakON connectors on the rear of the DQ Series amplifiers. EMS-51 loudspeakers require one amplifier channel.

6.3.2 - Preset Recall

The EMS-51 preset is pre-installed on the DQ amplifiers, and as such can be used following the normal preset recall procedure. The presets available are:

EMS-51.full Standard EMS-51 preset

As mentioned above, these presets are intended to be a starting point and additional work may be required depending on the venue, the style of content and the end result you are looking for.



6.4 - System Connectivity

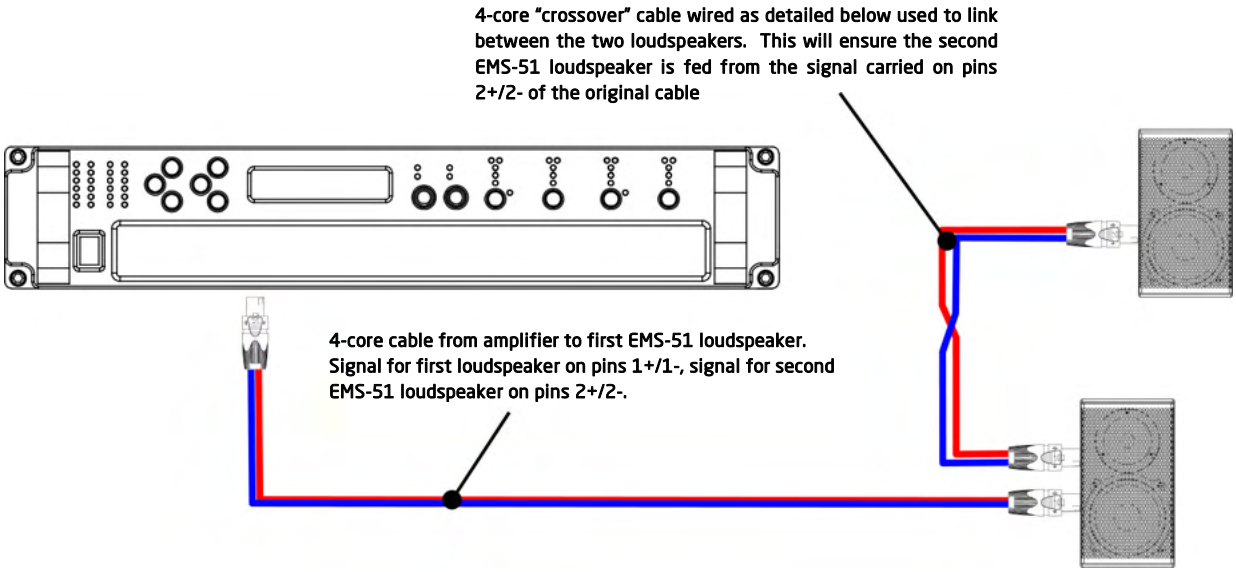
6.4.1 - Cable Length and Specification

All cables add to the system impedance, and as such careful selection is required depending on your amplifier setup and overall system impedance. Cables with a cross sectional area of less than 2.5mm^2 should not be used. Recommended maximum cable lengths are given below:

Conductor Area	Maximum Recommended Cable Length		
	2 ohms	4 ohms	8 ohms
2.5mm^2 (14 AWG)	15m	30m	60m
4.0mm^2 (12 AWG)	20m	40m	80m
6.0mm^2 (10 AWG)	30m	60m	120m

6.4.2 – Crossover Cable Use

The use of a pin-swap or "crossover" cable can allow for neater cable solutions when sending different amplifier signals to the same location. Because pins 2+/2- are linked through inside all EM Acoustics loudspeakers, using a 4-core cable to one loudspeaker (carrying two different signals) allows a crossover cable to be used to link out of the first loudspeaker into another, thereby feeding it from a separate signal.



Crossover cable specifications

Connector A Pin	Connector B Pin
1+	2+
1-	2-
2+	1+
2-	1-

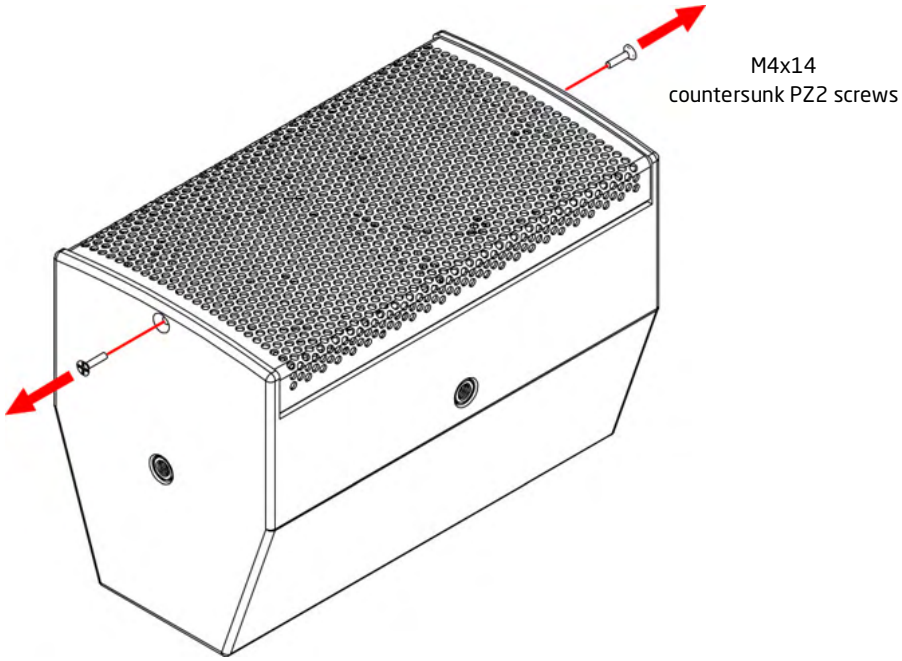
7.0 – Servicing Information

All EMS-51 components can be removed for service purposes if required, using the minimum of tools.

7.1 – EMS-51: Removing the grille

TOOLS REQUIRED: Pozidrive PZ2 screwdriver

1. Lie the enclosure on its' back and remove the two M4x20 countersunk screws using a Pozidrive PZ2 screwdriver, and then lift the grille clear of the cabinet.

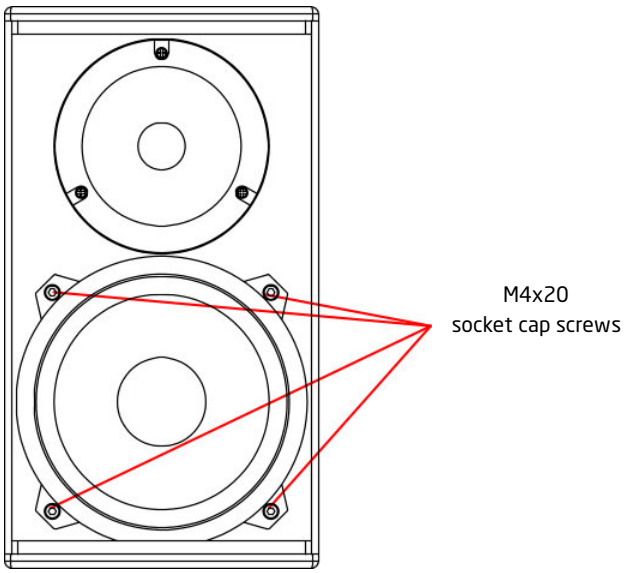


2. To replace the grille, position the grille on the front of the EMS-51 and ensure the threaded fittings on the grille are lined up with the mounting holes – gentle pressure may be required. Replace both of the M4x20 countersunk screws and ensure they are both are started in their threads before beginning to tighten. Ensure they are all tightened evenly so that the grille sits straight and flat and does not rattle. Be careful not to over-tighten as this will distort the grille.

7.2 - EMS-51: Removing the LF drive unit

TOOLS REQUIRED: 3mm Allen key

1. Complete step 7.1 above to remove the grille.
2. Using a 3mm Allen key, remove the four M4x20 socket cap screws that secure the drive unit. Ensure that you collect both the spring washers and the flat washers as well as the machine screws.

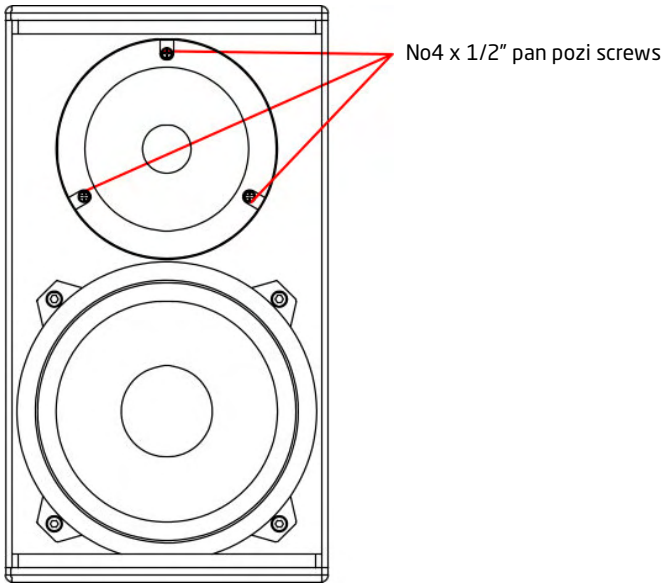


3. Lift the drive unit clear of the mounting hole and disconnect the cables - note the polarity for reconnection (brown to LF positive, blue to LF negative).
4. To replace the drive unit, ensure the 5" gasket is intact and complete - replace if necessary. Reconnect the cables to the drive unit (note the polarity detailed above) and then sit the drive unit into its mounting location, ensuring that the mounting holes line up.
5. Replace the M4x20 socket cap machine screws with their spring washers and flat washers and ensure all machine screws are started in their threads before tightening. Tighten opposing bolts, working around the drive unit until all bolts are appropriately tightened. Be careful not to overtighten as this will distort the drive unit chassis.
6. Replace the grille as described above.

7.3 - EMS-51: Removing the HF drive unit

TOOLS REQUIRED: PZ1 screwdriver

1. Complete step 7.1 above to remove the grille.
2. Using a PZ1 screwdriver, remove the three No4 x 1/2" pan pozi screws that secure the drive unit.



3. Lift the drive unit clear of the mounting reccess and disconnect the cables - note the polarity for reconnection (white to positive, yellow to negative).
4. To replace the drive unit, ensure the gasket is intact and complete - replace if necessary. Reconnect the cables to the drive unit (note the polarity detailed above) and then sit the drive unit into its mounting recess, ensuring that the terminals sit within the recess and the existing holes line up.
5. Replace the No4 screws, ensuring you do not overtighten as this may crack the drive unit fascia.
6. Replace the grille as described above.

Appendix A – Technical Specifications

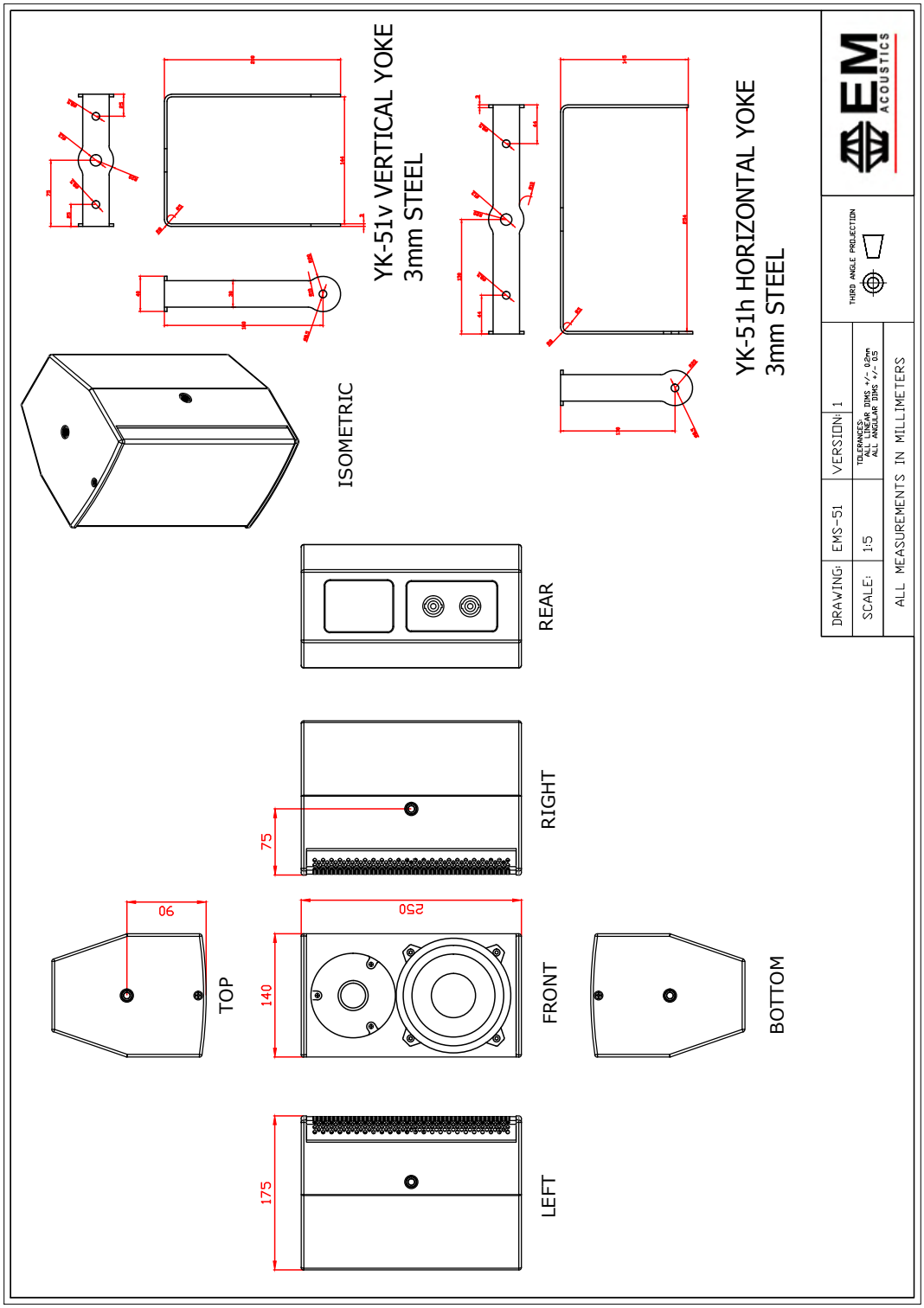
EMS-51 ultra-compact passive loudspeaker

Dimensions (HxWxD):	250 x 140 x 175mm (9.9" x 5.5" x 6.9")
Net/Shipping Weight:	4.5kg/5.2kg (9.9/11.7lbs)
Frequency Response (+/- 3dB)[1]:	80Hz – 20kHz
Dispersion[3]:	75° conical
Drive Units:	5" (127mm) LF drive unit 1.1" (28mm) HF soft dome tweeter
Power Handling:	LF: 200W RMS, 400W program
Maximum SPL:	113dB continuous, 119dB peak
Nominal Impedance:	8 ohms
Crossover:	Asymmetric internal passive
Enclosures per amp channel:	DQ6: 4 DQ10: 4 DQ20: 4
Connectors:	2 x Neutrik SpeakON™ NL4
Enclosure:	12mm (1/2") multi-laminate birch plywood, rebated, pinned and glued. Finished in black or white textured paint
Rigging & Hardware:	4 x M8 threaded rigging points. YK-51h horizontal yoke included. YK-51v vertical yoke included
Grille:	Perforated steel
Options:	Colours

Notes on measurement conditions:

[1]Measured on-axis at 2m in an anechoic environment and referenced to 1m. [2]Measured in half-space at 2m with 4W sine wave input and referenced to 1m. [3]Nominal dispersion, measured in an anechoic environment and averaged over stated bandwidth. [4]Calculated and verified by subjective listening test of familiar program material.

Appendix B – Technical Drawings



Appendix C – Spare Parts List

Order Code	Description
01A507	CAD-401 replacement 4”/0.85” coaxial drive unit
04A049	RFG-41 replacement grille for EMS-41

Appendix D – Warranty Information

Limited Warranty

This EM Acoustics loudspeaker product is warranted to the original end-user purchaser and all subsequent owners for a period of **five (5) years** from the original date of purchase.

Warranty Coverage

This warranty covers defects in materials and workmanship. It does not include:

- Damage or failure caused by accident, misuse, neglect, abuse or modification by any person other than an authorised EM Acoustics representative.
- Damage or failure caused by operating the loudspeaker product contrary to the instructions contained within this manual.
- Damage caused during shipment.
- Claims based on any misrepresentation by the seller.
- Products which contain anything other than the original components (or EM Acoustics factory supplied spare parts).
- Products on which the serial number has been removed, altered or defaced.

Returning your EM Acoustics loudspeaker

Should your EM Acoustics loudspeaker develop a fault, please return it (freight prepaid) in its original packaging, along with proof of purchase to your local dealer or to:

EM Acoustics (Returns Department), Building 19.11, Dunsfold Park, Cranleigh, Surrey, GU6 8TB, UK

including a description of the suspected fault. Serial numbers must be quoted in all correspondence relating to the claim. EM Acoustics or its representatives are in no way liable for any loss or damage in transit, and hence it is recommended that the sender insure the shipment. EM Acoustics will pay for return freight should the repair be covered under warranty.

EM Acoustics' liability is to the replacement or repair (at our discretion) of any defective components, and as such are not liable for any incidental and consequential damages including (without limitation) injury to persons, damage to property or loss of use.

This warranty is exclusive and no other warranty is expressed or implied. This warranty is also in addition to – and in no way detracts from – your statutory rights as a consumer.