Redbox Passive Splitters
User Handbook

RB-AES4X3	Quad 3 Way Passive Digital AES3 Splitters with XLR connections in a 19" rack.
RB-AES4B3	Quad 3 Way Passive Digital AES3ID Splitters with BNC connections in a 19" rack.
RB-MS4X3	Quad 3 Way Microphone Splitter in a 19" rack.

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REDBOX PASSIVE SPLITTERS USER HANDBOOK

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This handbook is for use with the following products:

RB-AES4X3 Quad 3 Way Passive Digital AES3 Splitters, with XLR connections in a 19" rack.
RB-AES4B3 Quad 3 Way Passive Digital AES3ID Splitters, with BNC connections in a 19" rack.
RB-MS4X3 Quad 3 Way Microphone Splitter

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Warranty

Warranty and Liability

Important: the purchaser is advised to read this clause

(a) The Company agrees to repair or (at its discretion) replace Goods which are found to be defective (fair wear and tear excepted) and which are returned to the Company within 12 months of the date of despatch provided that each of the following are satisfied:

(i) notification of any defect is given to the Company immediately upon its becoming apparent to the Purchaser;

(ii) the Goods have only been operated under normal operating conditions and have only been subject to normal use (and in particular the Goods must have been correctly connected and must not have been subject to high voltage or to ionising radiation and must not have been used contrary to the Company's technical recommendations);

(iii) the Goods are returned to the Company's premises at the Purchaser's expense;

(iv) any Goods or parts of Goods replaced shall become the property of the Company;

(v) no work whatsoever (other than normal and proper maintenance) has been carried out to the Goods or any part of the Goods without the Company's prior written consent;

(vi) the defect has not arisen from a design made, furnished or specified by the Purchaser;

(vii) the Goods have been assembled or incorporated into other goods only in accordance with any instructions issued by the Company;

(viii) the defect has not arisen from a design modified by the Purchaser;

(ix) the defect has not arisen from an item manufactured by a person other than the Company.

In respect of any item manufactured by a person other than the Company, the Purchaser shall only be entitled to the benefit of any warranty or guarantee provided by such manufacturer to the Company.

(b) In respect of computer software supplied by the Company the Company does not warrant that the use of the software will be uninterrupted or error free.

(c) The Company accepts liability:

(i) for death or personal injury to the extent that it results from the negligence of the Company, its employees (whilst in the course of their employment) or its agents (in the course of the agency);

(ii) for any breach by the Company of any statutory undertaking as to title, quiet possession and freedom from encumbrance.

(d) Subject to conditions (a) and (c) from the time of despatch of the Goods from the Company's premises the Purchaser shall be responsible for any defect in the Goods or loss, damage, nuisance or interference whatsoever consequential economic or otherwise or wastage of material resulting from or caused by or to the Goods. In particular the Company shall not be liable for any loss of profits or other economic losses. The Company accordingly excludes all liability for the same.

(e) At the request and expense of the Purchaser the Company will test the Goods to ascertain performance levels and provide a report of the results of that test. The report will be accurate at the time of the test, to the best of the belief and knowledge of the Company, and the Company accepts no liability in respect of its accuracy beyond that set out in Condition (a).

(f) Subject to Condition (e) no representation, condition, warranty or other term, express or implied (by statute or otherwise) is given by the Company that the Goods are of any particular quality or standard or will enable the Purchaser to attain any particular performance or result, or will be suitable for any particular purpose or use under specific conditions or will provide any particular capacity, notwithstanding that the requirement for such performance, result or capacity or that such particular purpose or conditions may have been known (or ought to have been known) to the Company, its employees or agents.

(g) (i) To the extent that the Company is held legally liable to the Purchaser for any single breach of contract, tort, representation or other act or default, the Company's liability for the same shall not exceed the Price of the Goods.

(ii) The restriction of liability in Condition (g)(i) shall not apply to any liability accepted by the Seller in Condition (c).

(h) Where the Goods are sold under a consumer transaction (as defined by the Consumer Transactions (Restrictions on Statements) Order 1976) the statutory rights of the Purchaser are not affected by these Conditions of Sale.

Unpacking the Redbox Passive Splitter

The Redbox Passive Digital Splitter is shipped with the following equipment. Please check your packaging to ensure that you have all of the items below. If anything is missing, please contact the supplier of your equipment immediately.

Item	Quantity Redbox Passive Splitter
Redbox Passive Digital Splitter	1
Handbook and warranty card	1

Fig A: Packing List

Each Redbox Passive Digital Splitter is shipped in protective packaging and should be inspected for damage before use. Where an item is found to have transit damage, notify the carrier immediately with all the relevant details of the shipment. Packing materials should be kept for inspection and also for if the product needs to be returned.

Returning the Warranty Card

In order to register the date of purchase so that we can keep you informed of any design improvements or modifications, it is important to complete the warranty registration document that is enclosed and return it to Sonifex Ltd in the UK.

For your own records you should write down the serial number (which can be found on the rear of the Redbox Passive Digital Splitter.

Serial Number	.....

Installation Information

Atmosphere

The units should be installed in an area that is not subject to excessive temperature variation (<0°C, >50°C), moisture, dust or vibration.

Fitting Redboxes

Redboxes can be fixed to the underside of a mixing desk, or other surfaces using 4.2mm holes in the sides and fixed with 2 x M4 screws or 2 x No. 6 countersink wood screws.

They can also be rack-mounted, with either the front, or rear of the Redbox positioned at the front of the rack:

Rear Mounting The Redbox Passive Digital Splitter: The **RB-RK3** 1U rear panel rack kit can be used for large Redboxes such as the Redbox Passive Digital Splitter.

Fig B: RB-RK3 Large Redbox Rear Rack-mount Kit

Note: When fitting the rear-mounting rack-kits, a notch has been left on the inside of the right-hand rack-piece for the mains cable to pass through. Make sure that the mains cable has been put through the notch before attaching the right hand rack-piece.

WEEE & RoHS Directives - Sonifex Statement

The Waste Electrical and Electronic Equipment (WEEE) Directive was agreed on 13 February 2003, along with the related Directive 2002/95/EC on Restrictions of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS).

The **Waste Electrical and Electronic Equipment Directive (WEEE)** aims to minimise the impacts of electrical and electronic equipment on the environment during their life times and when they become waste. It applies to a huge spectrum of products. It encourages and sets criteria for the collection, treatment, recycling and recovery of waste electrical and electronic equipment. All products manufactured by Sonifex Ltd have the WEEE directive label placed on the case. It gives a contact for individuals who are unsure about the correct procedure when the product has reached its "end of use".

Sonifex Ltd will be happy to give you information about local organisations that can reprocess the products, or alternatively all products that have reached "end of use" can be returned to Sonifex and will be reprocessed correctly free of charge.

Sonifex Ltd has phased out the use of certain hazardous substances identified in the European Union's **Restriction of Hazardous Substances (RoHS)** directive. The RoHS directive limits the use of certain hazardous substances currently used in EEE manufacture, including lead, mercury, cadmium, hexavalent chromium, and halide-containing compounds PBB (polybrominated biphenyl) and PBDE (polybrominated diphenyl ether). Elimination of these substances will result in more environmentally friendly recycling of electronic equipment. For the products which Sonifex manufacture, the main area where products were affected was in the use of lead for manufacturing and assembling electronics circuit boards.

Sonifex Ltd practices lead-free (LF) manufacturing processes. LF solder is used on the surface-mount PCB manufacturing processes and for hand soldering. The printed circuit boards (PCBs) used are either gold plated, or immersion tin plated, both of which use no lead. Historically the PCBs were hot air solder levelled (HASL) PCBs which used tin/lead based solder.

The manufacturing processes include the assembly of purchased components from various sources. Product is offered as RoHS compliant, or LF, only after sufficient evidence is received from the component manufacturers that their components are RoHS compliant. Sonifex Ltd relies solely on the distributor, or manufacturer, of the components for identification of RoHS compliance. Thus whilst every effort is made to ensure compliance, Sonifex Ltd makes no warranty, or certification, or declaration of compliance concerning said components.

Sonifex Ltd defines "Lead Free" as pertaining to any product, which has been manufactured by Sonifex Ltd using components which have been declared by the manufacturers as "Lead Free". All statements by Sonifex Ltd of RoHS compliance are based on component manufacturer documentation.

1 Passive Digital Splitters Introduction

The Redbox Passive Digital AES Splitters are 1U rack-mount units, for splitting digital AES3/ AES3ID or microphone/line audio from a single source to up to 3 destinations.

There are three Redbox Passive Digital Splitter products:

RB-AES4X3 Quad 3 Way Passive Digital AES3 Splitters, with XLR connections in a 19" rack.
RB-AES4B3 Quad 3 Way Passive Digital AES3ID Splitters, with BNC connections in a 19" rack.
RB-MS4X3 Quad 3 Way Microphone Splitter in a 19" rack.

2 RB-AES4X3 Quad 3 Way Passive Digital AES3 Splitters with XLR

Fig 2-1: RB-AES4X3 Front Panel

The RB-AES4X3 is a passive digital splitter, designed to split a single AES3 source to up to three destinations, using Neutrik XLR connectors. 110Ω termination can be applied, if desired to unconnected outputs. The RB-AES4X3 is a quad "one-to-three" splitter housed in a 19" rack.

Block Diagram

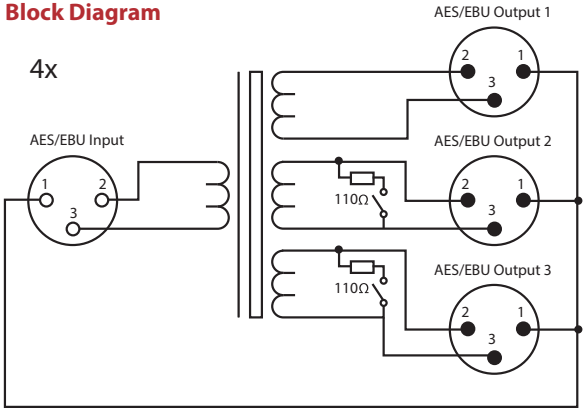


Fig 2-2: RB-AES4X3 Block Diagram

Controls & Connectors

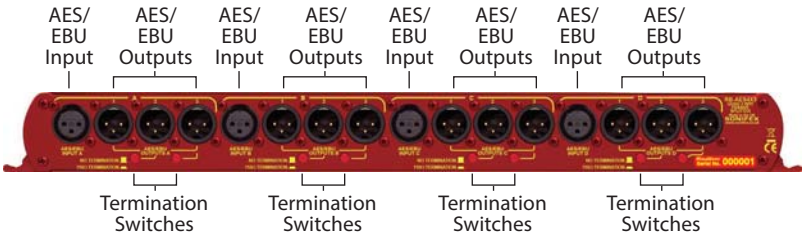


Fig 2-3: RB-AES4X3 Rear Panel

AES/EBU input(s)

The single digital audio input is via a female XLR connector with the following pin assignment:

Pin 1: 0V Common
Pin 2: Phase
Pin 3: Non Phase

AES/EBU outputs 1-3

The digital audio outputs are via male XLR connectors with the following pin assignment:

Pin 1: 0V Common
Pin 2: Phase
Pin 3: Non Phase

Termination switches

It is possible to terminate Output 2 and Output 3 with 110Ω in the event that they are not connected to a destination device. It may be necessary to remove termination from an unused output if a used output is connected to a destination via a long cable run, in order to increase the level of the AES3 carrier signal.

RB-AES4X3 Technical Specification

Cable drive capability

The table below sets out the minimum signal amplitude required to drive 100m (cumulative) of 110Ω twisted pair cable, based on the sample rate of the digital audio:

Sample Rate	Minimum Signal Amplitude
32kHz	*2Vpk-pk
44.1kHz	*2Vpk-pk
48kHz	*2Vpk-pk
88.2kHz	5Vpk-pk
96kHz	5Vpk-pk

** Minimum of 2Vpk-pk is defined by the AES3 format specification.*

The table below sets out the minimum signal amplitude required to drive 30m (cumulative) of 110Ω twisted pair cable, based on the sample rate of the digital audio:

Sample Rate	Minimum Signal Amplitude
176.4kHz	3Vpk-pk
192kHz	3Vpk-pk

Equipment Type

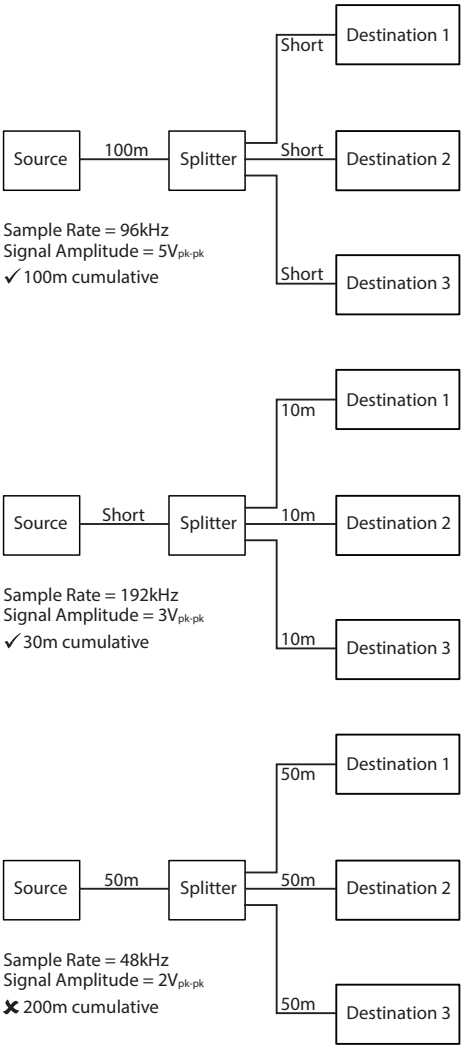
RB-AES4X3 Quad 3 Way Passive Digital AES3 Splitters, with XLR connections in a 19" rack.

Physical Specification

Dimensions (Raw):	48cm (W) x 10.8cm (D) x 4.2cm (H)(1U) 19" (W) x 4.3" (D) x 1.7" (H) (1U)
Dimensions (Boxed):	58.5cm (W) x 22.5cm (D) x 7cm (H) 23" (W) x 8.9" (D) x 2.8" (H)
Weight:	Nett: 1.02kg Gross: 1.38kg Nett: 2.25lbs Gross: 3.04lbs

2 RB-AES4X3 QUAD 3 WAY PASSIVE DIGITAL AES3 SPLITTERS WITH XLR

Examples of use of cumulative cabling:



3 RB-AES4B3 Quad 3 Way Passive Digital AES3ID Splitters, with BNC

Fig 3-1: RB-AES4B3 Front Panel

The RB-AES4B3 is a passive digital splitter, designed to split a single AES3ID source to up to three destinations, using BNC connectors. 75Ω termination can be applied, if desired to unconnected outputs. The RB-AES4B3 is a quad "one-to-three" splitter housed in a 19" rack.

Block Diagram

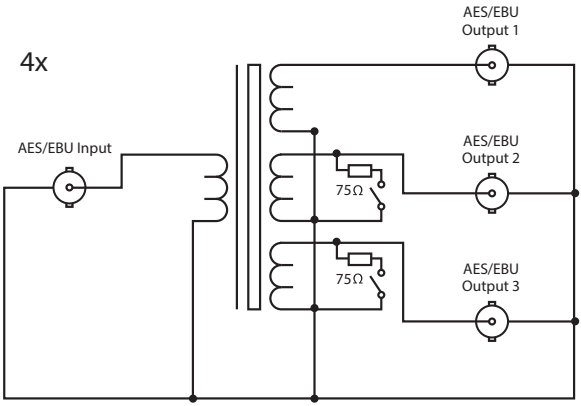


Fig 3-2: RB-AES4B3 Block Diagram

Controls & Connectors

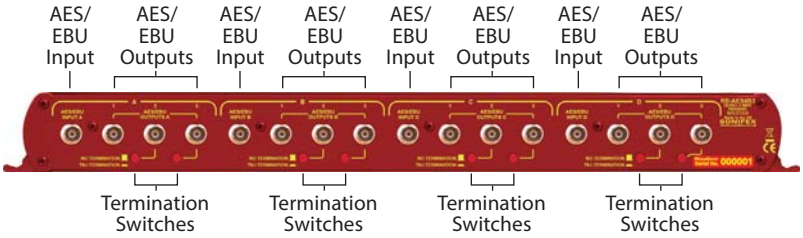


Fig 3-3: RB-AES4B3 Front Rear Panel

3 RB-AES4B3 QUAD 3 WAY PASSIVE DIGITAL AES3ID SPLITTERS WITH BNC

AES/EBU input(s)
The single digital audio input is via a female BNC connector with the following pin assignment:

Tip: Signal
Screen: 0V Common

AES/EBU outputs 1-3
The digital audio outputs are via a female BNC connectors with the following pin assignment:

Tip: Signal
Screen: 0V Common

Termination switches
It is possible to terminate Output 2 and Output 3 with 75Ω in the event that they are not connected to a destination device. It may be necessary to remove termination from an unused output if a used output is connected to a destination via a long cable run, in order to increase the level of the AES3ID carrier signal.

RB-AES4B3 Technical Specification

Cable drive capability

Cumulative cable drive capability of 100m of 75Ω coaxial cable at sample rates up to and including 96kHz.

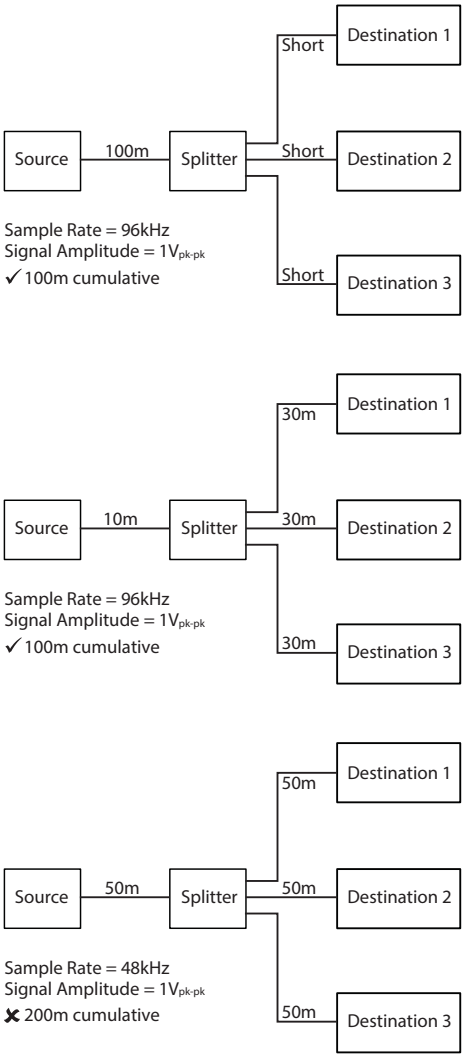
Equipment Type

RB-AES4B3 Quad 3 Way Passive Digital AES3ID Splitters, with BNC connections in a 19″ rack.

Physical Specification

Dimensions (Raw):	48cm (W) x 10.8cm (D) x 4.2cm (H)(1U) 19″ (W) x 4.3″ (D) x 1.7″ (H) (1U)
Dimensions (Boxed):	58.5cm (W) x 22.5cm (D) x 7cm (H) 23″ (W) x 8.9″ (D) x 2.8″ (H)
Weight:	Nett: 1.02kg Gross: 1.38kg Nett: 2.25lbs Gross: 3.04lbs

Examples of use of cumulative cabling:



4 RB-MS4X3 Quad 3 Way Microphone Splitter

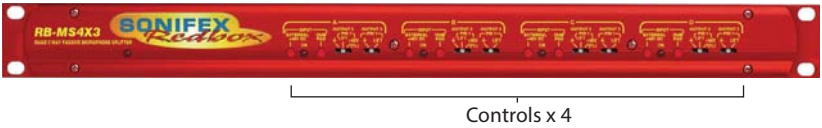


Fig 4-1: RB-MS4X3 Front Panel

The RB-MS4X3 is a passive microphone splitter, designed to split the signal from a single mic or line source, to up to 3 destinations, whilst allowing the operator to pass phantom power back from mic preamplifier inputs, or apply +48VDC power directly from the unit. Pin 1 "ground" lifts are provided to eliminate ground loop problems.

Block Diagram

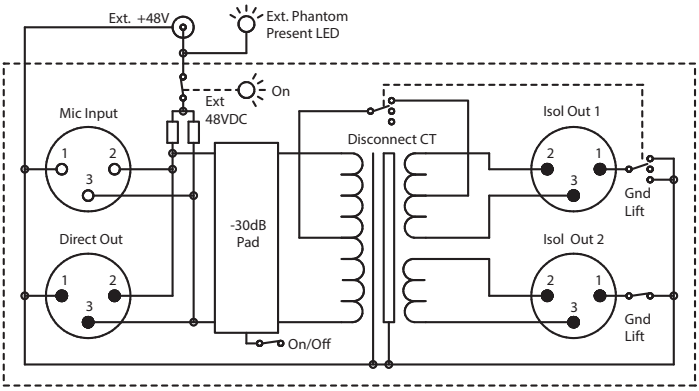


Fig 4-2: RB-MS4X3 Block Diagram

Controls & Connectors
Front Panel

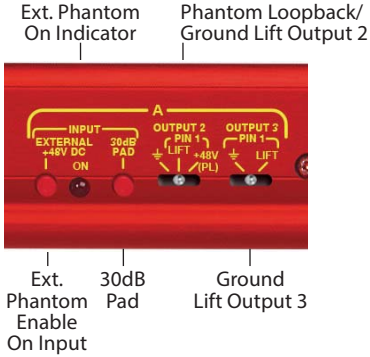


Fig 4-3: RB-MS4X3 Front Panel Connections

External +48VDC
This latching push switch applies the external +48V phantom power (if connected) to a microphone connected to the rear panel input connector.

ON LED
The ON LED illuminates when both external +48V phantom power is connected to the rear panel DC socket and the external power is switched to the input.

30dB Pad
It is possible to attenuate the incoming signal by 30dB for example when interfacing a line level signal into a microphone preamplifier. The latching push switch applies and removes the 30dB pad.

Important: Phantom power should be disabled when connecting a line level signal to the splitter input.

Output 2 Toggle switch
This switch controls both the grounding of the output 2 XLR connector (pin 1) and the ability to pass back phantom power (via the internal transformer's centre tap) from output 2 to a mic connected to the splitter's input.

Switch Position	Phantom Loopback (PL)	Output 2 XLR Pin 1
Left	Disabled	Grounded
Centre	Disabled	Lifted
Right	Enabled	Grounded

Output 3 Toggle Switch
This switch controls the grounding of the output 3 XLR connector.

Switch Position	Phantom Loopback (PL)
Left	Grounded
Right	Lifted

Phantom Powering Guidance
It is possible to pass phantom power to the splitter input by three different methods:

- Via the external +48V DC connector.
- From a mic pre-amp connected to direct output (output 1).
- From a mic pre-amp connected to output 2 (provided phantom loopback is enabled).

It is therefore possible to concurrently power the microphone using any two of the above methods (for power redundancy) without causing signal degradation. It is important the output connectors are grounded (and not lifted) should the external phantom power be connected, to prevent hum/hiss caused by ground loop currents.

Important: A maximum of two phantom powering methods can be used concurrently.

4 RB-MS4X3 QUAD 3 WAY MICROPHONE SPLITTER

Rear Panel

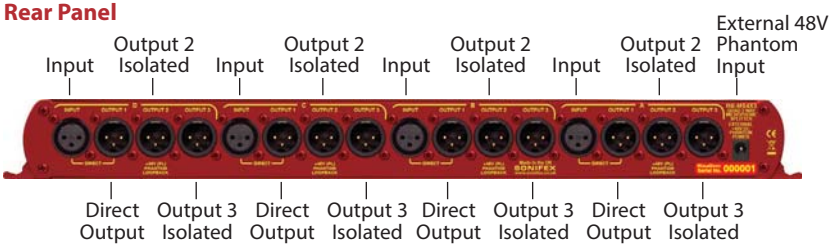


Fig 4-4: RB-MS4X3 Rear Panel Connections

Input

The XLR 3 pin input socket is transformer balanced and is capable of accepting a dynamic or phantom powered microphone, or a line level signal up to +18dBu (without the 30dB pad applied). The input socket has the following connections:

Pin 1: Screen
Pin 2: Phase
Pin 3: Non Phase

Output 1 (Direct)

The XLR 3 pin plug is a parallel connection of the input. It is therefore possible to supply phantom power to the splitter input by connecting output 1 to a phantom powered microphone preamplifier. The output 1 plug has the following connections:

Pin 1: Screen
Pin 2: Phase
Pin 3: Non Phase

Output 2 (+48V PL Phantom Loopback)

The XLR 3 pin plug is a transformer isolated output. A switchable centre tap connection makes it possible to supply phantom power to the splitter input by connecting output 2 to a phantom powered microphone preamplifier, and setting the front panel toggle switch to the correct position (see front panel controls). The output 2 plug has the following connections:

Pin 1: Screen (Can be grounded or lifted by front panel toggle switch)
Pin 2: Phase
Pin 3: Non Phase

Output 3

The XLR 3 pin plug is a transformer isolated output and has the following connections:

Pin 1: Screen (Can be grounded or lifted by front panel toggle switch)
Pin 2: Phase
Pin 3: Non Phase

RB-MS4X3 Technical Specification

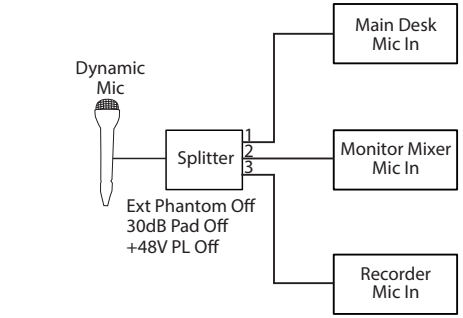
Test	Conditions	Result
Frequency Response	• Ref. -6dBu, 1kHz • Source Impedance = 150Ω • Load Impedance = 10kΩ	10Hz - 30kHz ±0.5dB
Total Harmonic Distortion	• Ref. +3dBu, 50Hz • Source Impedance = 150Ω • Load Impedance = 10kΩ	0.02%
Total Harmonic Distortion 0.1%	• Ref. 0.1%THD+N, 50Hz • Source Impedance = 150Ω • Load Impedance = 10kΩ	+13dBu
Total Harmonic Distortion 1%	• Ref. 1%THD+N, 50Hz • Source Impedance = 150Ω • Load Impedance = 10kΩ	+18dBu
Common Mode Rejection Ratio	• Ref. 20kHz • Source Impedance = 600Ω • Load Impedance = 10kΩ	>60dB

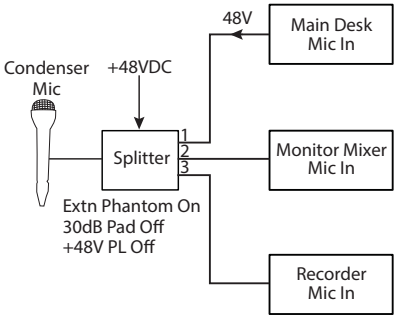
Equipment Type	
RB-MS4X3 Quad 3 Way Microphone Splitter.	

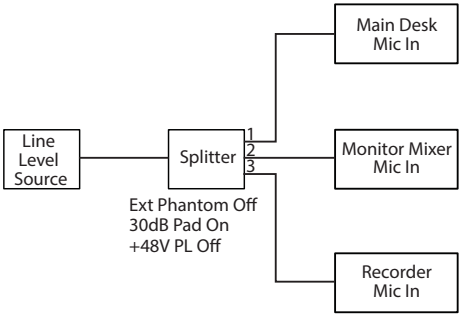
Physical Specification	
Dimensions (Raw):	48cm (W) x 10.8cm (D) x 4.2cm (H)(1U) 19" (W) x 4.3" (D) x 1.7" (H) (1U)
Dimensions (Boxed):	58.5cm (W) x 22.5cm (D) x 7cm (H) 23" (W) x 8.9" (D) x 2.8" (H)
Weight:	Nett: 1.02kg Gross: 1.38kg Nett: 2.25lbs Gross: 3.04lbs

4 RB-MS4X3 QUAD 3 WAY MICROPHONE SPLITTER

Examples of usage:







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