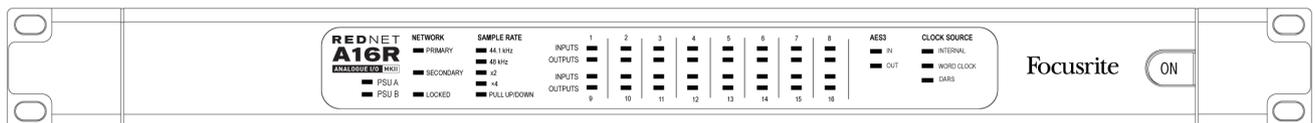


REDNET A16R

ANALOGUE I/O MKII

User Guide



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About this User Guide

This User Guide applies to the RedNet A16R MkII analogue interface. It provides information about installing and using the unit and how it can be connected into your system.

Should this User Guide not provide the information you need, then please consult: <https://pro.focusrite.com/technical-support>, which contains a comprehensive collection of common technical support queries.

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Box Contents

- RedNet A16R MkII unit
- 2 x IEC AC mains cables
- Safety information cut sheet
- Focusrite Pro Important Information Guide, which provides links to:
 - RedNet Control
 - RedNet PCIe drivers (included with RedNet Control download)
 - Audinate Dante Controller (installed with RedNet Control)
 - Dante Virtual Soundcard (DVS) Token and download instructions

Safety Warning



Warning – Shock Hazard

RedNet A16R MkII incorporates dual mains power supplies. Always ensure that both power supply cables are disconnected from the rear panel before opening unit (eg., for servicing)

INTRODUCTION

Thank you for purchasing the Focusrite RedNet A16R MkII.



RedNet A16R MkII is a 1U 19in rack-mount interface featuring 16 channels of A-D & D-A plus one AES3 channel-pair, for the Dante audio-over-IP network. The operating level is switchable between 18 dBu and 24 dBu, and Mute/Dim and Level controls are provided on each input and output channel. Specifically tailored for the road, live-sound and broadcast environments, each unit features network and power redundancy, rugged construction with latching connectors, remote control and remote monitoring.

Dual Ethernet connectors (primary and secondary) on the rear-panel allow maximum network reliability with seamless switchover to a secondary network in the unlikely event of a network failure. These ports may alternatively be used to daisy-chain additional units when operating in Switched mode.

Redundant power supplies (PSU A and B) with separate input sockets on the rear panel allow one supply to be connected to an uninterruptible source. Each PSU's status can be monitored remotely over the network or from the front panel.

RedNet A16R MkII has a Sample Rate Converter (SRC) on the AES3 input pair allowing instant operation with any AES3 source irrespective of the sample rate or clocking of the Dante network.

Audio interface is provided by four standard 8-channel (AES59) Combined Analogue I/O DB25 connections. In addition, channels 17-18* act as the AES3 channels.

**When operating at quad sample rates the inputs to channels 17-18 will not be available. The user can then select either: 1-16 analogue or 1-14 analogue and 15-16 AES3.*

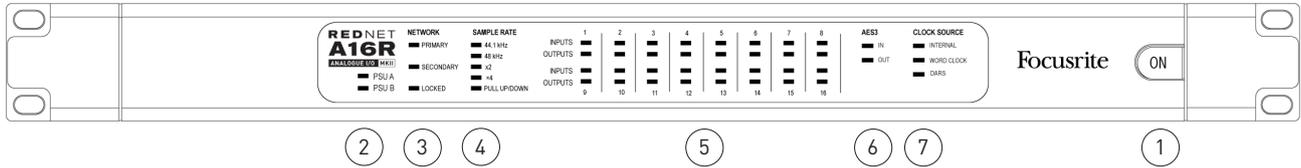
Word Clock I/O on BNC connectors allows synchronisation of the Dante network to house clock, or the syncing of external equipment to the Dante network. DARS reference can also be accepted via the XLR-3 input connector.

The RedNet A16R MkII front panel contains a set of LEDs to confirm PSU status, network status, sample rate, clock sources and signal presence on both input and output.

INSTALLATION GUIDE

RedNet A16R MkII Connections and Features

Front Panel



1 AC Power Switch

2 Power Indicators:

- **PSU A** – Illuminates when an AC input is applied and all DC outputs are present.
- **PSU B** – Illuminates when an AC input is applied and all DC outputs are present.

When both supplies are functioning and have AC inputs PSU A will be the default supply.

3 RedNet Network Status Indicators:

- **PRIMARY** – Illuminates when the device is connected to an active Ethernet network. Also illuminates to indicate network activity when operating in Switched mode.
- **SECONDARY** – Illuminates when the device is connected to an active Ethernet network. Not used when operating in Switched mode.
- **LOCKED** – Illuminates when a valid sync signal is received from the network, or when the RedNet A16R MkII unit is the Network Master. Flashes if external clock is selected but not connected.

4 RedNet Sample Rate Indicators

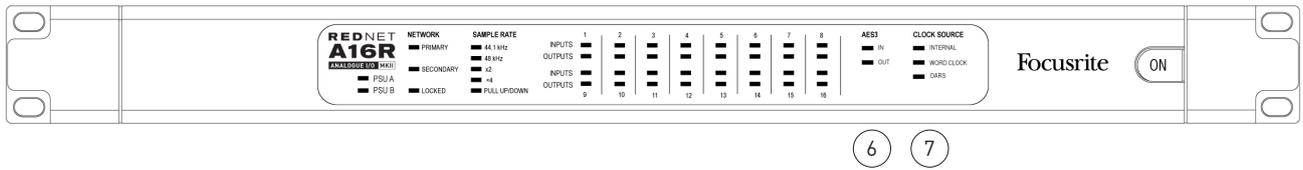
Five orange indicators: **44.1 kHz**, **48 kHz**, **x2** (multiple of 44.1 or 48), **x4** (multiple of 44.1 or 48) and sample rate **PULL UP/DOWN**. These Indicators illuminate individually or in combination to indicate the sample rate being used. For example, for a 96kHz Pull Up/Down setting, the 48kHz, x2 and Pull Up/Down indicators will illuminate.

5 Signal Level Indicators:

- **INPUTS** – Tri-colour LEDs indicate audio signal levels at the inputs to the network:
 - Green: Signal present (illuminates at -42 dBFS)
 - Orange: -6 dBFS
 - Red: 0 dBFS
- **OUTPUTS** – Tri-colour LEDs indicate audio signal levels at the outputs from the network:
 - Green: Signal present (illuminates at -42 dBFS)
 - Orange: -6 dBFS
 - Red: 0 dBFS

When operating at quad sample rates, the indications for LEDs 15 and 16 will depend on the signal mode selected

Mode	LED 15	LED 16
Analogue	Analogue ch 15	Analogue ch 16
AES3	AES3 Left	AES3 Right



6 AES3 Signal Presence Indicators

Green LEDs indicate if an AES3 signal is present **IN** to the network, and **OUT** from the network; each illuminates at -126 dBFS.

When operating at quad sample rates, the IN and OUT LEDs don't illuminate if Analogue mode has been selected.

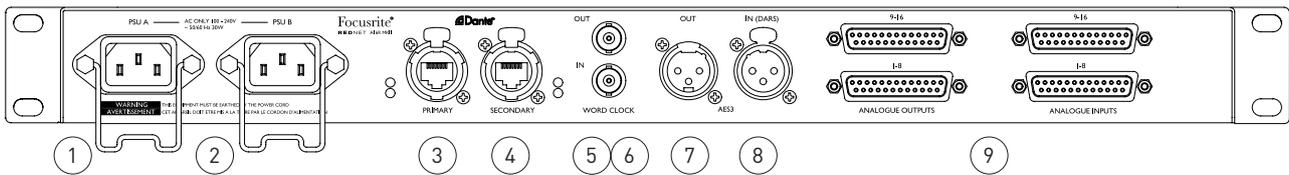
Mode	'IN' LED	'OUT' LED
Analogue	Off	Off
AES3	Analogue ch 15/16	Analogue ch 15/16

7 Clock Source

Three orange indicators: **Internal**, **Word Clock** (BNC input) and **DARS** (XLR-3 input). Whichever is lit identifies the clock reference being used. When an incoming clock source is invalid, the 'Locked' indicator will flash to indicate that the unit has reverted to using its internal clock.

None of the indicators will be lit when the device is operating as a Dante Slave.

Rear Panel



1 IEC Mains Inlet A

Standard IEC receptacle for connection of AC mains. RedNet A16R MkII features 'Universal' PSUs, enabling it to operate on any supply voltage of between 100 V and 240 V.

2 IEC Mains Inlet B

Input connector for backup mains power source. Power supply B remains on standby but will seamlessly take over if PSU A develops a fault or loses its mains input supply.

If an uninterruptable power supply (UPS) is available, it is recommended that this is applied to inlet B.

3 Primary Network Port

RJ45 etherCON connector for the Dante network. Use standard Cat 5e or Cat 6 network cables to connect RedNet A16R MkII to the Ethernet network switch. Adjacent to each network socket are LEDs which illuminate to indicate a valid network connection plus network activity.

4 Secondary Network Port

Secondary Dante network connection where two independent Ethernet links are being used (Redundant mode), or an additional port on an integral network switch on the primary network (Switched mode).

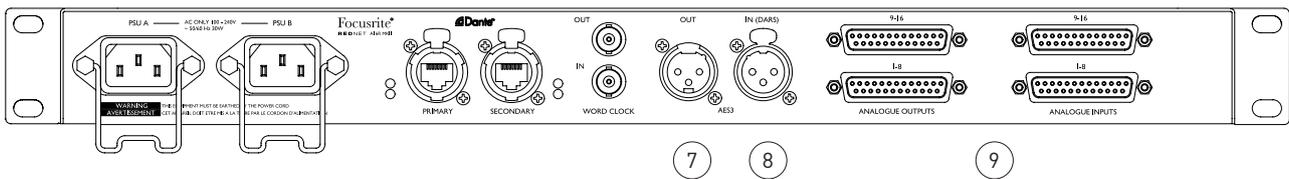
5 Word Clock Out

Provides an output of the chosen system clock reference (can be switched between base rate or network rate).

6 Word Clock In

Allows synchronisation of the Dante network to house word clock.

Refer to the Appendix on page 16 for connector pinouts.



7 AES3 Out

Permanent AES3 output of audio channel pair 17-18.

When operating at quad sample rate, channels 17-18 become duplicates of channels 15-16. The output is always available when operating in either AES3 or Analogue mode.

8 AES3 In

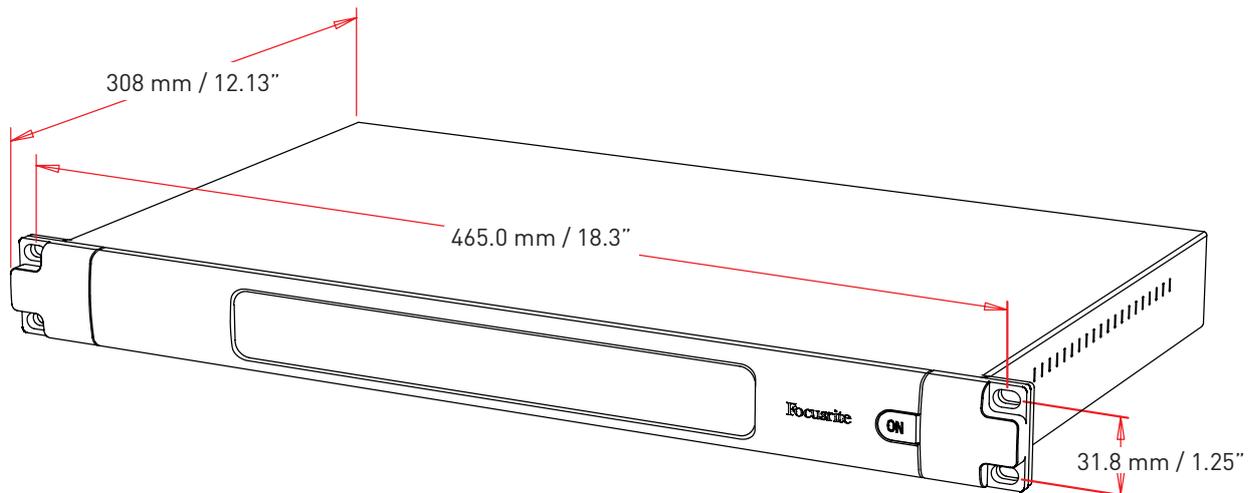
AES3 source for channels 17-18. May also be used as a clock source when fed with either AES3 or DARS (Digital Audio Reference Signal – AES3 distributed clock as per AES11). Software selectable.

9 DB25 Analogue Connectors

Analogue inputs and outputs on DB25 female connectors; eight channels per connector. Wired to the AES59 analogue standard (also known as the Tascam standard).

Refer to the Appendix on page 16 for connector pinouts.

Physical Characteristics



RedNet A16R MkII dimensions are illustrated in the diagram above.

RedNet A16R MkII requires 1U of vertical rack space. Allow an additional 75mm of rack depth behind the unit to allow for cables. Each unit weighs 4.75 kg and for installations in a fixed environment (eg., a studio rack), the front-panel rack mountings* will provide adequate support. However, if the unit is to be used in a mobile situation (eg., flight-cased for touring, etc.), it is recommended that side support rails or shelves are used within the rack.

**Always use M6 bolts and cage nuts specifically designed for 19" equipment racks. An Internet search using the phrase "M6 cage nuts" will reveal suitable components.*

Cooling is by fan assistance from side to side. The fans used are low-speed and low-noise.

Note. The maximum operating environmental temperature is 45°C / 113°F.

Ventilation is via slots in the enclosure at both sides. Do not mount RedNet A16R MkII immediately above any other equipment which generates significant heat, for example, a power amplifier. Also, ensure that when mounted in a rack, the side vents are not obstructed.

Power Requirements

RedNet A16R MkII is mains-powered. It incorporates 'Universal' power supplies which can operate on any AC mains voltage from 100 V to 240 V. The AC connections are made via standard 3-pin IEC connectors on the rear panel.

When PSU A & PSU B are both connected, PSU A becomes the default supply and therefore draws more current than B. If a backup mains supply is provided from an uninterruptable source, it is recommended that this is connected to input B.

Mating IEC cables are supplied with the unit; these should be terminated with mains plugs of the correct type for your country.

The AC power consumption of the RedNet A16R MkII is 41 W.

Please note that there are no fuses in RedNet A16R MkII, or other user-replaceable components of any type. Please refer all servicing issues to the Customer Support Team (see "Customer Support and Unit Servicing" on page 18).

REDNET A16R MKII OPERATION

First Use and Firmware Updates

Your RedNet A16R MkII may require a firmware update* when it is first installed and switched on. Firmware updates are initiated and handled automatically by the RedNet Control application.

**It is important that the firmware update procedure is not interrupted – either by switching off power to the RedNet A16R MkII unit or the computer on which RedNet Control is running, or by disconnecting either from the network.*

From time to time Focusrite will release RedNet firmware updates within new versions of RedNet Control. We recommend keeping all RedNet units up to date with the latest firmware version supplied with each new version of RedNet Control.

Digital Clocking

Each RedNet A16R MkII will automatically lock to a valid Network Master via its Dante connection. Alternatively, if a Network Master is not present, then the unit can be chosen as the Network Master by the user. *Also see “Clock Source” on page 6.*

Pull Up and Pull Down Operation

RedNet A16R MkII is able to operate at a specified pull up or pull down percentage as selected in the Dante Controller application.

Sample Rate Converters

SRC will need to be switched in if the AES3 source is not using the current system clock as a reference signal.

Note that engaging the sample rate converter will increase the overall latency of the device.

Level Controls

All analogue and digital I/O channels can be individually attenuated by up to 78 dB in 1 dB steps via the RedNet Control graphical interface. Each channel can also be muted or dimmed; the Dim function attenuates a channel by 20 dB.

Operating Level

The analogue I/O operating level can be set globally to either 18 or 24 dBu at 0 DBFS via the RedNet Control ‘Tools’ menu. *See page 13.*

OTHER REDNET SYSTEM COMPONENTS

The RedNet hardware range includes various types of I/O interface and the PCIe/ PCIeR digital audio interface cards which are installed in the system's host computer or in a chassis. All the I/O units can be considered as "Break-Out" (and/or "Break-In") boxes to/from the network, and all are built in mains-powered, 19" rackmount housings, unless otherwise stated. There are also three software items, RedNet Control (see below), Dante Controller and Dante Virtual Soundcard.

REDNET CONTROL 2

RedNet Control 2 is Focusrite's customisable software application for controlling and configuring RedNet and Red range interfaces. The system presents an image for each hardware unit, showing its control levels and function settings, signal meters, as well as critical status indicators for power supplies, clock status and the primary/secondary network connections.

The operator's manual for the RedNet Control 2 application can be found here: www.focusrite.com/downloads

Please refer to the section 'Device Control' for additional details of device operation and setup using the software.

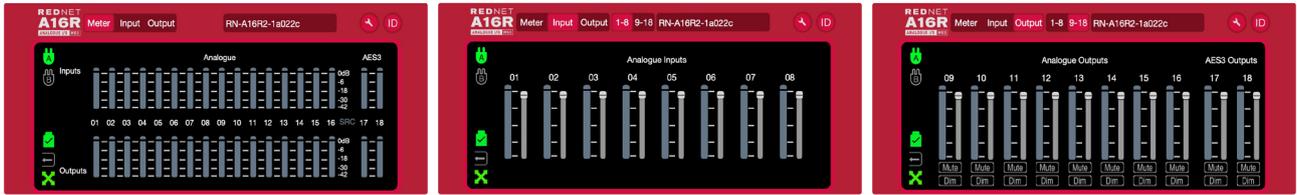
The single-tab GUI for the RedNet A16R MkII unit is shown below:



The image shows the Level control sliders, level meters and the Mute/Dim buttons for each of the 18 inputs and outputs.

Status icons for the PSUs and the network are shown at the left. See next page for icon descriptions.

When a RedNet A16R MkII is added to a tab containing either 6 or 12 devices, the graphical controls are separated into three pages: 'Meters', 'Inputs' and 'Outputs', with I/O split into channels 1-8 or 9-18.



At full scale, 0 dBFS is indicated by a red bargraph segment on each level meter. 'SRC' Indicates that the sample rate converters are switched in for the AES3 channel pair.

Status Icons

Status icons for the PSUs and the network are shown at the left of each device window:

-   PSUs A & B – Each illuminates if PSU has power input and all DC outputs are present
-   Networks – Each illuminates if a valid connection is present
-   Locked – Unit is successfully locked to the network (changes to the red cross if not locked)
-    External Clock – Green: unit is locked to the external source, Yellow: unit is locking, Red: unit is attempting to identify a network, Off: no network
-   Network Master – Illuminates if a unit is the network master

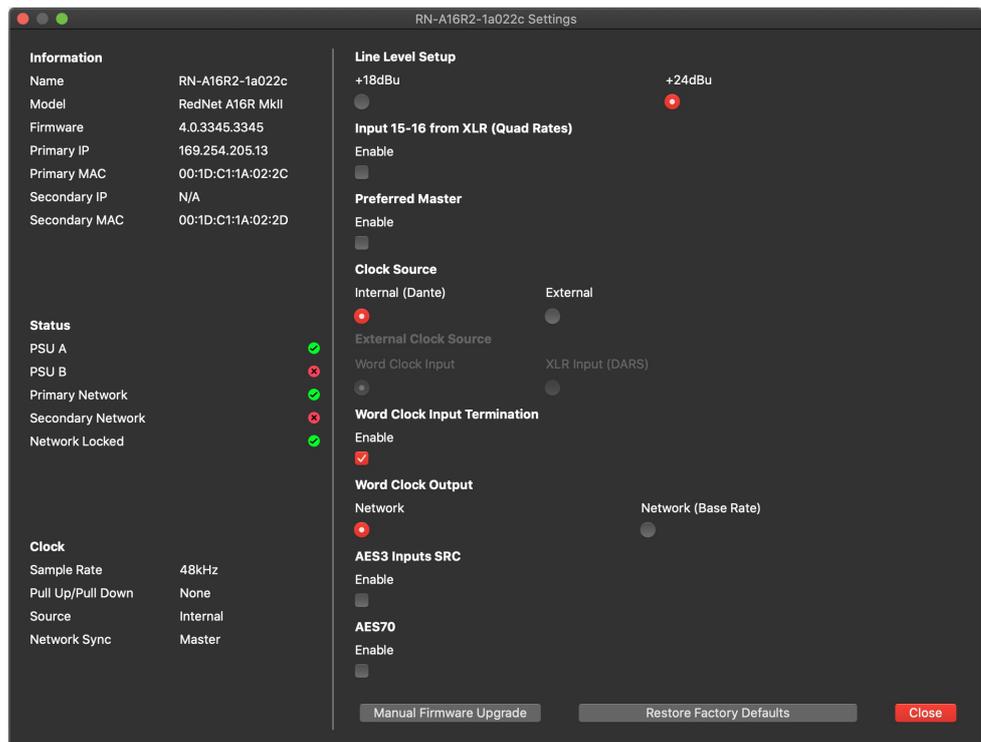
ID (Identification)

Clicking on the ID icon  will identify the device being controlled by flashing its front panel LEDs.

Tools Menu

Clicking on the Tools icon  will open the System Settings window:

The unit's hardware and firmware details, as well as the current device settings, are displayed in the left pane of the window.



Tools Menu ...

Line Level Setup – Sets the analogue line output level at 0 dBFS:

- +18dBu
- +24dBu *Factory default setting*

Inputs 15 & 16 from XLR (Quad Rates) – Tick option. When selected, analogue channels 15 and 16 are replaced by the AES3 channel pair.

Note: Option is only functional when unit is operating at quad sampling rate.

Preferred Master – On/Off state.

Clock Source – Only one of the following can be selected at any time:

- Internal (RedNet is network master but running from internal clock) *Factory default setting*
- External – Word Clock
- External – XLR-3 Input (DARS or Audio)

Note: When selecting any clock source, RedNet AI 6R MkII will become a preferred master.

Word Clock Input Termination – Tick option On/Off. (Terminates word clock input BNC with 75Ω.)

Word Clock Output – One can be selected at any time.

- Network
- Network (Base Rate)

AES3 Input Sample Rate Converter – On/Off state. Applicable to channels 17 & 18.

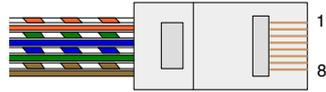
AES70 – On/Off state.

APPENDIX

Connector Pinouts

Ethernet Connector

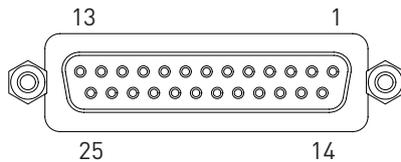
Connector type: RJ-45 receptacle
 Applies to: Ethernet (Dante)



Pin	Cat 6 Core
1	White + Orange
2	Orange
3	White + Green
4	Blue
5	White + Blue
6	Green
7	White + Brown
8	Brown

DB25 (AES59) Connector

Connector type: DB25 receptacle
 Applies to: Analogue I/O



Screw binding-posts use the standard UNC 4/40 thread

Pin	Signal
1	Channel 8 +
14	Channel 8 -
2	Ground
15	Channel 7 +
3	Channel 7 -
16	Ground
4	Channel 6 +
17	Channel 6 -
5	Ground
18	Channel 5 +
6	Channel 5
19	Ground
7	Channel 4 +
20	Channel 4 -
8	Ground
21	Channel 3 +
9	Channel 3 -
22	Ground
10	Channel 2 +
23	Channel 2 -
11	Ground
24	Channel 1 +
12	Channel 1 -
25	Ground
13	n/c

XLR Connectors

Connector type: XLR-3 receptacle
 Applies to: AES3, DARS Inputs

Connector type: XLR-3 plug
 Applies to: AES3 Outputs

Pin	Signal
1	Screen
2	Hot (+ve)
3	Cold (-ve)

PERFORMANCE AND SPECIFICATIONS

Line Inputs	
<i>All measurements taken at +24 dBu reference level, $R_s = 50 \Omega$</i>	
0 dBFS Reference Level	+18 or +24 dBu (switchable)
Level trim range	Mute, then -78 dB to 0 dB in 1 dB steps (per channel)
Frequency Response	20 Hz – 20 kHz ± 0.1 dB
THD + N	<-105 dB (0.00056%) unweighted, 20 Hz – 20 kHz; -1 dBFS input
EIN	-95 dBu 'A'-Weighted (typical)
Signal-to-Noise Ratio	119 dB 'A'-Weighted (typical)
Convertor Dynamic Range	120 dB 'A'-Weighted (typical), 10 Hz – 20 kHz

Line Outputs	
<i>All measurements taken at +24 dBu reference level, $R_L = 100 k\Omega$</i>	
0 dBFS Reference Level	+24 or +18 dBu switchable
Level trim range	Mute, then -78 dB to 0 dB in 1 dB steps (per channel)
Frequency Response	20 Hz – 20 kHz ± 0.1 dB
THD + N	<-100 dB (0.001%) unweighted, 20 Hz – 20 kHz, +23 dBu input
Noise in Presence of Signal	-94 dBu 'A'-Weighted (typical)
Dynamic Range	118 dB 'A'-Weighted (typical)
Convertor Dynamic Range	120 dB 'A'-Weighted (typical), 10 Hz – 20 kHz

Crosstalk	
Input to Output or Input	<-100 dB unweighted, 20 Hz – 20 kHz; +23 dBu input
Output or Input to Output	<-100 dB unweighted, 20 Hz – 20 kHz; -1 dBFS input

Input Sample Rate Converters	
Sample Rate Range	32 to 216 kHz
Gain Error	-0.3 dB
Dynamic Range	> 138 dB
THD+N	<-130 dB (0.00003%)
Latency	11 to 45 samples (network and input sample rate dependent)

Digital Performance	
Supported Sample Rates	44.1 / 48 / 88.2 / 96 / 176.4 / 192 kHz (-4% / -0.1% / +0.1% / +4.167%) at 24 bit
Clock Sources	Internal, Word Clock, DARS or from Dante Network Master
External Word Clock Range	Nominal sample rate $\pm 7.5\%$

Rear Panel Connectivity	
Analogue Audio	
Channel Count	16 channels input and output
Input and Output	4 x DB25 female connectors (AES59 / Tascam Analogue)
AES3	
Channel Count	2 channels input and output
Alternate Input (optional DARS)	1 x XLR-3 female [Switchable with analogue input channels 15 and 16 at quad rates]
Alternate Output	1 x XLR-3 male [Duplicate of analogue output channels 15 and 16 at quad rates]
Word Clock	
Input	1 x BNC 75 Ω port (switchable termination)
Output	1 x BNC 75 Ω port
PSU & Network	
PSU	2 x IEC Inputs with retaining clips
Network	2 x etherCON NE8FBH, also compatible with standard RJ45 connectors (Accommodates rugged etherCON NE8MC* – Does not mate with Cat 6 cable connector NE8MC6-MO and NKE65* cable)

Front Panel Indicators	
Primary PSU (A)	Green LED. Illuminates when an AC input is applied and all DC outputs are present
Secondary PSU (B)	Green LED. Illuminates when an AC input is applied and all DC outputs are present
Primary Network	Green LED. Indicates that a network connection is present on primary port when in redundant mode. When in Switched mode, a valid network connection at either Primary or Secondary network port will cause this LED to illuminate
Secondary Network	Green LED. Indicates that a network connection is present on secondary port when in redundant mode. Not used in switched mode
Network Locked	Green LED. When unit is network slave, shows valid network lock. When network master shows unit is locked to indicated clock source.
Sample Rate	Orange LED for each: 44.1 kHz, 48 kHz, x2, x4
Pull Up/Down	Orange LED. Indicates unit is set to operate on a Dante pull up/down domain
Channel Signal Level	16 Input and 16 Output tri-state signal level LEDs: green (>-42dB), orange (>-6dB), red (0 dB).
AES3	Green LEDs: input & output signal present indicators. Illuminate at >-127 dBFS
Clock Source	Orange LED for each: Internal, Word Clock, DARS

Network Modes	
Redundant	Allows unit to connect to two independent networks
Switched	Connects both ports to integrated network switch allowing daisy-chaining of devices

Performance and Specifications ...

Dimensions	
Height	43.5 mm / 1.71" (1RU)
Width	482 mm / 18.98"
Depth	352 mm / 12.80"

Weight	
Weight	5.0 kg / 11.1 lbs

Power	
PSUs	2 x Internal, 100-240 V, 50/60 Hz, consumption 30 W
Environmental	Maximum ambient operating temperature 50°C. Cooling by two-stage fan assistance

Focusrite Pro Warranty and Service

All Focusrite products are built to the highest standards and should provide reliable performance for many years, subject to reasonable care, use, transportation and storage.

Very many of the products returned under warranty are found not to exhibit any fault at all. To avoid unnecessary inconvenience to you in terms of returning the product please contact Focusrite support.

In the event of a Manufacturing Defect becoming evident in a product within 12 months from the date of the original purchase Focusrite will ensure that the product is repaired or replaced free of charge.

A Manufacturing Defect is defined as a defect in the performance of the product as described and published by Focusrite. A Manufacturing Defect does not include damage caused by post-purchase transportation, storage or careless handling, nor damage caused by misuse.

Whilst this warranty is provided by Focusrite the warranty obligations are fulfilled by the distributor responsible for the country in which you purchased the product.

In the event that you need to contact the distributor regarding a warranty issue, or an out-of-warranty chargeable repair, please visit: www.focusrite.com/distributors

The distributor will then advise you of the appropriate procedure for resolving the warranty issue. In every case it will be necessary to provide a copy of the original invoice or store receipt to the distributor. In the event that you are unable to provide proof of purchase directly then you should contact the reseller from whom you purchased the product and attempt to obtain proof of purchase from them.

Please do note that if you purchase a Focusrite product outside your country of residence or business you will not be entitled to ask your local Focusrite distributor to honour this limited warranty, although you may request an out-of-warranty chargeable repair.

This limited warranty is offered solely to products purchased from an Authorised Focusrite Reseller (defined as a reseller which has purchased the product directly from Focusrite Audio Engineering Limited in the UK, or one of its Authorised Distributors outside the UK). This Warranty is in addition to your statutory rights in the country of purchase.

Registering Your Product

For access to Dante Virtual Soundcard, please register your product at: www.focusrite.com/register

Customer Support and Unit Servicing

You can contact our dedicated Focusrite Pro Customer Support team free of charge:

Email: proaudiosupport@focusrite.com

Phone (UK): +44 (0)1494 836384

Phone (USA): +1 (310) 450-8494

Troubleshooting

If you are experiencing problems with your RedNet A16R MkII, we recommend that in the first instance, you visit our Support Help Centre at: <https://pro.focusrite.com/help-centre>