

ARTNET 8™

Contents

Introduction	2
Welcome	2
Safety	2
Supplied items	3
Installation.....	4
Key steps to setting up ARTNET 8	4
Mounting	4
DMX connections	4
Ethernet connections	5
Power connection	5
The front panel	6
Standby screens	6
Indicators	6
The main menu	7
Setting the operation mode	8
Network settings	9
IP Address	9
Netmask	9
Mode Presets	10
DMX Port Settings	12
Configuring other items	14
Rename device	14
Set ID number	15
Set LCD backlight	15
Further information.....	16
Troubleshooting	16
Fuse replacement	16
Specifications	17
What is...	18
...DMX	18
...a Universe	18
...RDM	18
...Art-Net	18
...an IP address	19
...a Netmask	19
Limited product warranty	20

Introduction

Welcome

Welcome to the ARTNET 8 from Acclaim Lighting. This compact, rack mountable (only 1U high) module offers highly flexible support for your DMX, RDM and Art-Net network (*for background information on all these terms, see page 18*). Thanks to its intuitive setup menu, it can quickly be configured as any of the following:

- A simple DMX repeater (dual 3-port or single 7-port, as required), or
- An eight universe DMX to Art-Net converter (or vice versa), or
- A sixteen to eight universe merger with DMX output, or
- A four universe DMX repeater with Art-Net input/output, or...

These are just some of the standard modes. By modifying each of the port settings, you can configure the ARTNET 8 any way you want it.

ARTNET 8 fully supports universe merging using either *Latest Takes Precedence* (LTP) or *Highest Takes Precedence* (HTP) schemes, ideal for controlling house lights from multiple locations. Additionally, you can use ARTNET 8 to provide operational redundancy by having it mediate between a principal control source and a backup link, with automatic switching between the two if the first line is lost.

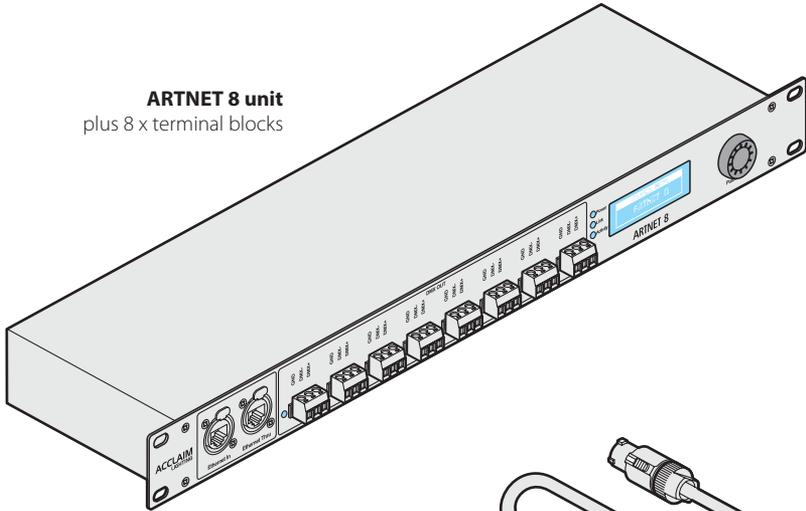
ARTNET 8 also gives you fine control over the rate at which DMX data streams are sent to external devices. When controlling fixtures that are not quite up to the task, ARTNET 8 can provide the fix.

The internal auto-sensing power supply can accept mains inputs between 100 to 240VAC at 50 or 60Hz. Total power consumption is just 7W. ARTNET 8 uses a locking power connector (supplied) to guard against accidental disconnection from mains power.

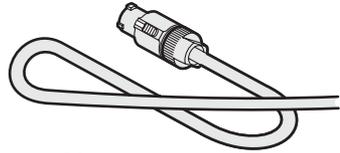
Safety

- Ensure that the power input is supplied from a correctly fused and earthed location.
- The ARTNET 8 unit has an IP20 rating, which means that it is not suitable for external mounting.

Supplied items



ARTNET 8 unit
plus 8 x terminal blocks



Power cable
with locking connector and country-
specific wall socket plug

Plus 2 x Neutrik Ethercon NE8MC
protective shells for your Ethernet connectors

Installation

Key steps to setting up ARTNET 8

Please follow this checklist to ensure ARTNET 8 is correctly connected and configured:

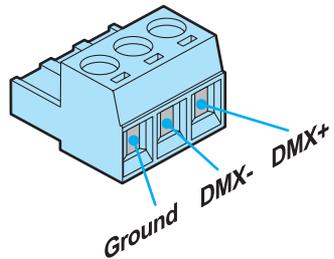
- 1 Connect ARTNET 8 to:
 - Your DMX links. *See below*
 - Your Ethernet network. *See opposite*
 - The mains power. *See opposite*
- 2 Set the operating mode:
 - Choose the Mode Preset that most closely resembles your layout. *See page 10*
 - Adjust individual DMX ports, as required. *See page 12*
- 3 Set the IP address and netmask. *See page 9*
- 4 Rename ARTNET 8, if necessary. *See page 14*
- 5 Change the ID number, if necessary. *See page 15*

Mounting

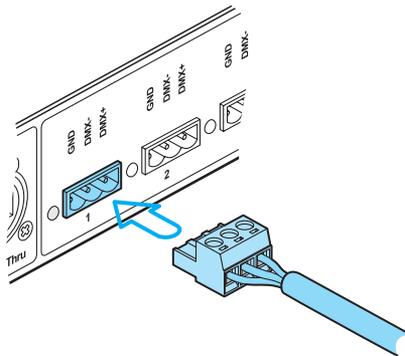
ARTNET 8 is designed to be housed in a 1U space within a standard 19" rack mount chassis. Use four standard rack bolts (not supplied) to fix ARTNET 8 into the chassis.

DMX connections

ARTNET 8 has eight DMX ports on its front panel, each with a 3-pin terminal block. For best results always use data-rated cables with a characteristic impedance of 120Ω, preferably where the DMX + and DMX – data lines are twisted around each other and the ground link exists as a coaxial screen surrounding the inner cores. Connect the DMX cables to each terminal block as shown here:



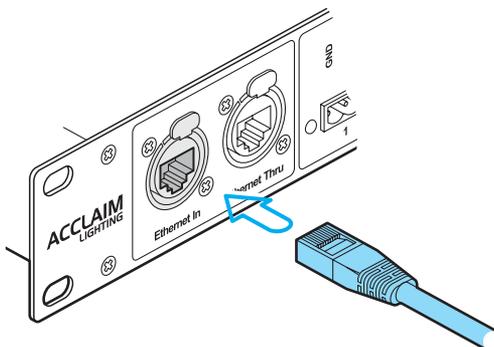
Insert the terminal block into the corresponding front panel socket and ensure that it fully clicks into place.



Ethernet connections

Two network sockets are provided on the front panel labelled **Ethernet In** and **Ethernet Thru**. Use Ethernet In to connect ARTNET 8 to your network switch and Ethernet Thru to link out to the next ARTNET 8 unit (if used).

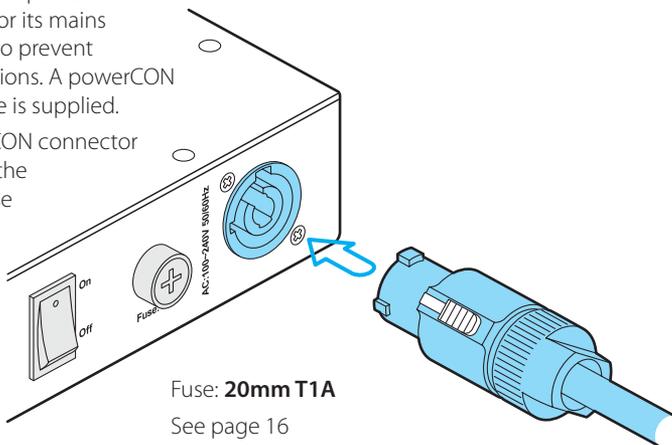
Two Neutrik™ NE8MC Ethercon shells are provided with ARTNET 8. These help to make your Ethernet connections more robust when fitted to your cables. For fitting instructions, visit www.neutrik.com and search for NE8MC.



Power connection

ARTNET 8 uses a Neutrik powerCON® (NAC3MPA-1) socket for its mains power input in order to prevent accidental disconnections. A powerCON equipped power cable is supplied.

- 1 Line up the powerCON connector with the socket on the rear panel (its release button should be about 45 degrees counterclockwise of the upright position).
- 2 Insert the connector fully and rotate clockwise until it locks firmly into place.
- 3 Connect the lead to the nearest earthed mains outlet. Avoid creating a trip hazard.
- 4 Click the power switch to its On position.



To disconnect the powerCON

- 1 Click the rear panel switch to the Off position and remove the mains plug from the power wall outlet.
- 2 Pull back the release button on the powerCON and while doing so, rotate the powerCON body 45 degrees counterclockwise.
- 3 Pull the powerCON out from the socket.

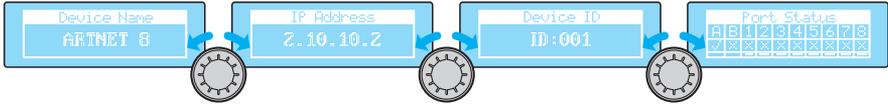
For fuse information - see page 16.

The front panel

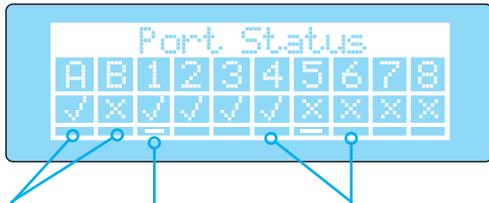
The ARTNET 8 front panel uses a clear LCD display plus multiple indicators to provide status information about its operation.

Standby screens

When you are not performing a task within a menu, ARTNET 8 will display one of four standby screens that show a variety of operational information. Turn the rotary dial clockwise or counterclockwise to change between the screens:



The Port Status screen in particular provides very useful operational feedback:



The two Ethernet ports are shown as A and B. A tick here indicates a valid network signal has been sensed.

A line indicates that the DMX port is set as an Input.

Input ports: A tick indicates a valid input connection/signal has been sensed coming into the port.

Output ports: A tick indicates that a valid DMX stream, originating either from another DMX port or from an Art-Net universe, is being fed through to this port.

In all cases, a cross indicates a lack of suitable signal or data stream.

Indicators

- **Power**
- **Link**
- **Activity**

To the left of the screen are three indicators. The red **Power** indicator is on whenever ARTNET 8 is switched on. The other two relate to the Ethernet network links. The green **Link** indicator is on whenever one (or two) valid network links are sensed (this performs the same role as the ticks against A and/or B in the Port Status screen). The amber **Activity** indicator will flash as network activity occurs.

Adjacent to each DMX port is a green indicator whose meaning changes depending on how the port is configured:

Input ports: The indicator will be off until a valid termination/load between the DMX + and DMX- lines is sensed, at which point the indicator will be on full (*Note: This is a basic electrical check, NOT confirmation of a suitable signal*). When valid DMX data are sensed, the indicator will flicker rapidly (this will coincide with a tick being shown for the port in the Port Status screen).

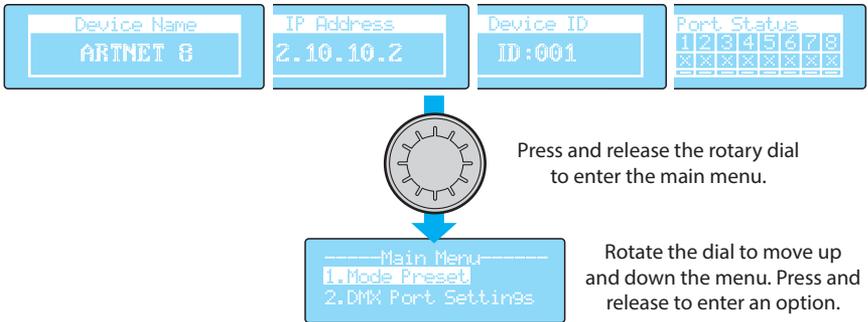
Output ports: The indicator will be on whenever the port is set as an output.

The main menu

The main menu is where all of the configuration details for ARTNET 8 are located.

To enter the main menu

1 From any of the four standby screens, press and release the rotary dial.



2 Turn the rotary dial clockwise/counterclockwise to move the highlight down/up the list of options, respectively.

3 When the required item is highlighted, press and release the rotary dial to enter.

Note: After 3 minutes of inactivity, the unit will return to the last displayed standby screen.

Main menu contents

The main menu contents are arranged as follows:

- 1. Mode Preset** Provides quick access to commonly used configurations of DMX ports and Art-Net universes. See page 10.
- 2. DMX Port Settings** Allows various key settings to be altered for each of the eight DMX ports. See page 12.
- 3. Set IP Address** Allows you to change the address of the ARTNET 8 unit on the network. The address used must be unique within the network to which it is connected. See page 9.
- 4. Set Netmask** In conjunction with the chosen IP address, the netmask completes the detail of how ARTNET 8 is integrated with the network. See page 9.
- 5. Set ID Number** Useful when multiple ARTNET 8s are used. See page 15.
- 6. Rename Device** Allows you to change the name that is displayed on one of the standby screens and is also declared to other Art-Net devices. See page 14.
- 7. Set LCD Backlight** Turns the screen off when not used. See page 15.
- 8. Factory Reset** Returns all values to those set at manufacture. The default mode preset is 'ArtNet Output 8'.
- 9. Version** View the current ARTNET 8 firmware version. See page 15.
- 10. Exit** Escapes to the last viewed standby screen.

Setting the operation mode

You could configure each DMX port from scratch using the *DMX Port Settings* menu option (see page 12). However, a quicker method is to first choose a **Mode Preset** that most closely resembles your installation and then fine tune the settings for each port (and their relationships with Art-Net universes) so they exactly match your requirements.

To set the operation mode

- 1 From any standby screen, press and release the rotary dial to enter the main menu.
- 2 Enter the **Mode Preset** menu and choose the option that most closely resembles your installation layout (see page 10 for more detail on each option):
 - **ArtNet Output 8** - Arranges all eight DMX ports as outputs and directs Art-Net universes 000 to 007 to the eight output ports respectively.
 - **ArtNet Input 8** - Arranges all eight DMX ports as inputs and directs their incoming data to eight separate Art-Net universes, between 000 and 007, respectively.
 - **ArtNet In 4 Out 4** - Configures DMX ports 1 to 4 as inputs and ports 5 to 8 as outputs. Incoming data on ports 1 to 4 are sent to ports 5 to 8 respectively and are also sent to Art-Net universes 000 to 003 respectively.
 - **DMX Split 1-7** - Configures DMX port 1 as an input and shares its data with ports 2 to 8 (as well as Art-Net universe 000).
 - **DMX Split 1-3** - Configures DMX ports 1 and 5 as inputs and all others as outputs. Port 1 data inputs are sent to ports 2 to 4 (and Art-Net universe 000) while port 5 data inputs are sent to ports 6 to 8 (and Art-Net universe 001).
 - **Output HTP** - Arranges all eight DMX ports as outputs, with each port fed by two separate Art-Net universes. Between those two universes, each port will output the highest value presented for every DMX address.
 - **Output LTP** - Arranges all eight DMX ports as outputs, with each port monitoring two separate Art-Net universes. Between those two universes, each port will output the most recently changed value for every DMX address.
 - **Output Backup** - Arranges all eight DMX ports as outputs, with each port monitoring two separate Art-Net universes. Each port will output the 'Principal' universe until such time as no data are received from that source, whereupon it will switch to outputting data from the 'Secondary' universe.

The standard settings within the chosen Mode Preset will be applied to each DMX port.

- 3 If any DMX ports in your installation need to operate differently from the chosen Mode Preset option, enter the **DMX Port Settings** menu and select the required DMX port (1 to 8).

Common items to alter include:

- **Port Status** - Change the port status between *Input*, *Output* and *Disabled*.
- **Port Mode** - Choose between standard operation (Input: *Normal*, Output: *Single*) or invoke numerous special options such as *HTP* or *LTP* merging - See page 12.
- **Principal** - Determines the Art-Net universe that will be allied with the port.
- **Secondary** - This option is only used for output ports when the *HTP*, *LTP* or *Backup* modes are chosen.

For full explanations of the options for each DMX port, see page 12

Network settings

In order to operate successfully within a network, ARTNET 8 must be assigned a unique IP address and matching netmask.

IP Address

To set the IP Address

- 1 From any standby screen, press and release the rotary dial to enter the main menu.
- 2 Enter the **Set IP Address** menu; the current IP address setting will be shown:



- 3 Turn the rotary dial to move the highlight to the required section of the address; then press and release the rotary dial to select it:



- 4 Turn the rotary dial clockwise or counterclockwise to increment or decrement the enlarged number shown. Press and release the rotary dial to fix the number.
- 5 Repeat steps 3 and 4 until the IP address is correct and then move the highlight to the Enter option; press and release the rotary dial to save and exit to the main menu.

Choosing a suitable IP address

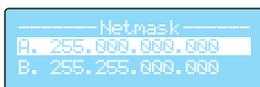
The Art-Net standard recommends that all Art-Net devices on a private network use the IP addresses within the range 2.0.0.1 to 2.255.255.254. This is good practice and will promote good communication between the devices, however, if required you could assign almost any unique IP addresses. Ensure that the netmask for each device is also correctly set.

Note: For background information on IP addresses, see page 19.

Netmask

To set the Netmask

- 1 From any standby screen, press and release the rotary dial to enter the main menu.
- 2 Enter the **Set Netmask** menu; the three netmask options will be shown, with the currently selected one highlighted:



- 3 Turn the rotary dial to move the highlight to the required netmask; then press and release the rotary dial to select it. The menu will exit automatically.

Choosing the right netmask

The netmask defines which part of the IP address identifies the network and which part refers to the position of the device (or *host*) within that network. The IP address that you choose must be matched with a corresponding netmask. If you follow the recommendations of the Art-Net standard and apply an IP address in the range 2.0.0.1 to 2.255.255.254, then that must be accompanied by a Class A netmask of 255.0.0.0.

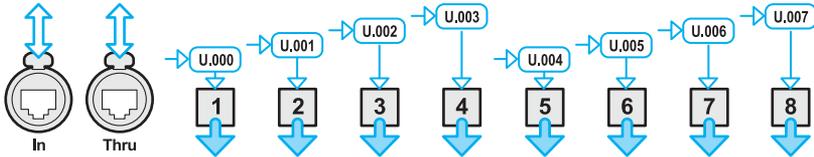
Note: For background information on netmasks, see page 19.

Mode Presets

The Mode Presets menu provides a number of standard configurations that utilize the eight DMX ports and the Art-Net links in various commonly used ways. After applying a Mode Preset, you can adjust any of the port settings to adapt that preset to suit your installation, see page 12 for details.

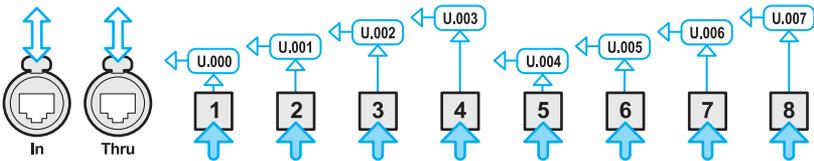
ArtNet Output 8

This mode arranges all eight DMX ports as outputs and directs Art-Net universes 000 to 007 to the eight output ports, respectively.



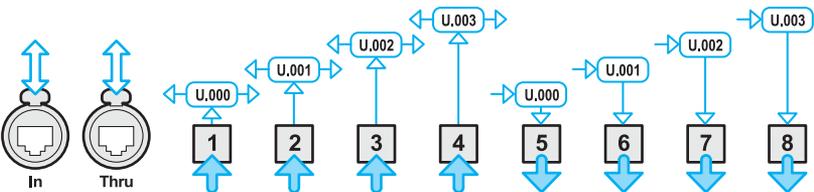
ArtNet Input 8

This mode arranges all eight DMX ports as inputs, with their resulting signals being routed through to multiple Art-Net universes via the Ethernet ports. By default, the eight DMX ports will be incrementally assigned to separate Art-Net universes, e.g. DMX port 1 to Universe 000, DMX port 2 to Universe 001, etc.



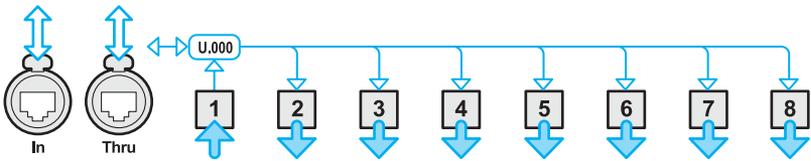
ArtNet In 4 Out 4

This mode configures DMX ports 1 to 4 as inputs and ports 5 to 8 as outputs. Incoming data on ports 1 to 4 are sent to ports 5 to 8, respectively as well as being sent to Art-Net universes 000 to 003, respectively via the Ethernet ports.



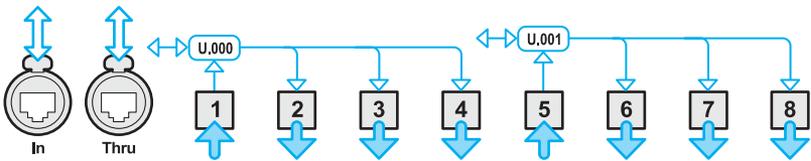
DMX Split 1-7

This mode configures DMX port 1 as an input and directs the data stream received from it to all of the other seven DMX ports, which are all configured as outputs. The input from DMX Port 1 is also directed to Art-Net universe 000 via the Ethernet ports.



DMX Split 1-3

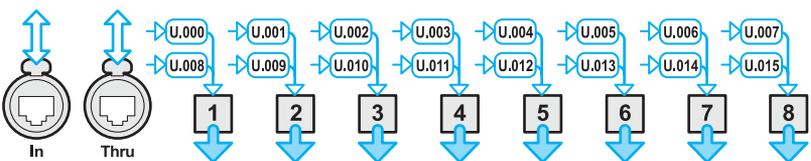
This mode configures DMX port 1 as an input and directs the data stream received from it to DMX ports 2 to 4, which are all configured as outputs. Similarly, DMX port 5 is configured as an input and the data stream from it is directed to DMX ports 6 to 8. Additionally, the input from DMX Port 1 is also directed to Art-Net universe 000, while the input from DMX Port 5 is also directed to Art-Net universe 001, via the Ethernet ports.



Output HTP, Output LTP & Output Backup

These three modes are useful for situations where fixtures need to be controlled from two sources. All eight DMX ports are configured as outputs, with each port fed by two separate Art-Net universes. Between those two universes, designated as the 'Principal' and the 'Secondary', each output port will use data from them, according to the following criteria:

- **Output HTP** - (Highest Takes Precedence) The highest value presented for every DMX address will be output (on a DMX channel by channel basis). This option is best suited to installations where the fixtures have intensity channels only.
- **Output LTP** - (Latest Takes Precedence) The latest value to be presented by either universe will be output (on a DMX channel by channel basis). This option is best suited for the control of moving head fixtures.
- **Output Backup** - Each port will output the 'Principal' universe until such time as it is no longer available, whereupon the port will switch to data from the 'Secondary' universe (after roughly four seconds). If the principal universe recovers, then the port will immediately revert to outputting its data.



DMX Port Settings

This option provides access to the key settings for each DMX port. Once entered, choose the required DMX port to view the settings for it:

1. Port Status

Determines the basic state for the port: *Input*, *Output* or *Disabled*.

2. Port Mode

The options available here depend on whether the port has been set as an input or an output. As an **input**, the choices are:

- **Normal** - Data received at the port will be sent to the Art-Net universe specified in the *Principal* option.
- **Backup** - Data received at the port will be sent to the Art-Net universe specified in the *Principal* option only if that universe is not receiving data from an alternative source.

When the port is set to be an **output**, the choices are:

- **Single** - Data from the Art-Net universe specified in the *Principal* option will be output via this DMX port.
- **HTP** - (Highest Takes Precedence) Data will be merged from the Art-Net universes specified in the *Principal* and *Secondary* options. For each of the 512 DMX channels, the highest value from each universe will be transmitted. This option is best suited to installations where the fixtures have intensity channels only.
- **LTP** - (Latest Takes Precedence) Data will be merged from the Art-Net universes specified in the *Principal* and *Secondary* options. For each of the 512 DMX channels, the value that changed most recently from each universe will be transmitted. This option is best suited for the control of moving head fixtures from two sources.
- **Backup** - Data from the Art-Net universe specified in the *Principal* option will be output until it becomes unavailable; after roughly four seconds, data from the Art-Net universe specified in the *Secondary* option will be output instead. If the principal universe subsequently becomes available again, then output will immediately switch back to that.
- **RDM** - When selected, this mode will pass RDM (*Remote Device Management*) messages received at the port (from connected fixtures) through to the chosen principal universe, to allow features such as remote addressing and other services to be used.
- **Zero** - Used for testing, the port will output zero values for all of the 512 DMX channels.

- 3. Frames/sec** Some devices are unable to process DMX data at the full frame rate, so this option allows you to reduce the number of frames sent per second from the port. Choices are 10 to 40 fps (in 5 fps steps). The normal setting is 40fps.
- 4. Net** To provide full compatibility with the Art-Net III standard and its support for up to 32,768 DMX universes, this option allows you to choose between 128 *Net* addresses. In Art-Net terms, each *Net* consists of 16 possible *Sub-Nets*, each of which in turn consists of 16 addressable *DMX Universes* (16 x 16 = 256). The selection of the Sub-Net and Universe combination (000 to 255) for the chosen port is handled by the *Principal* option (see below). The Net setting then allows you to place the chosen Principal within any of the 128 possible Nets. The default Net address is 000.
- 5. Principal** Determines the Art-Net universe to which the DMX port is linked. In all but HTP, LTP and Backup modes (when set as an output), this is the only Art-Net universe that will be linked with the port.
- 6. Secondary** Used to define an alternative Art-Net universe only when the DMX port is set to be an output and the mode is configured as either HTP, LTP or Backup.
- 7. Resend** When the port is set to output and the mode is set to either HTP or LTP (in order to merge data from the principal and secondary universes), you can optionally use this setting to send the resulting merged data stream to a third Art-Net universe (as well as out through this DMX port). If required, the newly merged universe could then be separately merged with a further universe (HTP or LTP) to establish a 'triple merge'.
- Simply use this option to choose the universe number to which the merged data stream from this port should be sent - or leave it set to Disabled if the resend facility is not required.
- 8. DMX State** Determines how the DMX outputs from ARTNET8 should behave when the control signal input to the ARTNET8 is lost. Options are:
- Blackout - Forces all DMX channel values to zero in order to blackout connected fixtures during the signal loss period. *Note: If fixtures with non-intensity channels (e.g. moving lights) are connected, this option may cause inappropriate behavior/movement in the event of an input signal loss.*
 - Last - Preserves the last received DMX channel state in the event of an input signal loss.
- 9. Display Mode** Determines whether Art-Net universe numbers are expressed as decimals, e.g. 10 or hexadecimal, e.g. 0.F, etc.
- 10. Exit** Returns to the main menu level.

Configuring other items

Various other settings allow further customization of your ARTNET 8 installation.

Rename device

The name of the device is displayed within one of the standby screens, but it is also declared across the Art-Net network space to identify the ARTNET 8 unit. The device name can be up to sixteen characters (including spaces) in length.

To rename the device

- 1 From any standby screen, press and release the rotary dial to enter the main menu.
- 2 Enter the **Rename device** menu; the current name will be shown:



- 3 Turn the rotary dial to move the highlight to the required character; then press and release the rotary dial to select it:



- 4 Turn the rotary dial clockwise or counterclockwise to move forward or back through the available characters, numbers and punctuation marks, which are ordered as follows:

- Lowercase **a** to **z**
- Space
- ! " # \$ % & ' () * + , - . /
- **0** to **9**
- ; : < = > ? @
- Uppercase **A** to **Z**
- [\] ^ _ `

The characters wrap around to the beginning of the list.

- 5 Press and release the rotary dial to fix the currently displayed character.
- 6 Repeat steps 3 thru 5 until you are happy with the device name and then move the highlight to the Enter option; press and release the rotary dial to save and exit to the main menu.

Perform a factory reset

Use this function to return all aspects of operation back to the default factory settings. The main default settings are: Mode Preset: *ArtNet Output 8*, IP Address: *2.10.10.2*, Netmask: *A.255.255.255.0*, Device Name: *ARTNET 8*, Device ID Number: *001*.

To perform a factory reset

- 1 From any standby screen, press and release the rotary dial to enter the main menu.
- 2 Enter the **Factory Reset** menu.
- 3 Rotate the rotary dial clockwise until the Enter option is highlighted.
- 4 Press and release the rotary dial to perform the reset and exit to the main menu.

Set ID number

The ID number is used to differentiate between individual ARTNET 8 units when multiple units are installed.

To set the ID number

- 1 From any standby screen, press and release the rotary dial to enter the main menu.
- 2 Enter the **Set ID Number** menu then press and release the rotary dial again to edit the current number:



- 3 Turn the rotary dial to change the ID number (options range from 000 to 255); then press and release the rotary dial to choose the displayed number.
- 4 Turn the rotary dial to move the highlight to the Enter option; press and release the rotary dial to save and exit to the main menu.

Set LCD backlight

Once ARTNET 8 is configured and running you may wish to drowse the screen backlight when it is not being used. When this option is set to Auto Off, the screen backlight will automatically switch off roughly 30 seconds after the last use of the rotary dial. When you next use the rotary dial, the screen will re-light.

To set the LCD backlight

- 1 From any standby screen, press and release the rotary dial to enter the main menu.
- 2 Enter the **Set LCD backlight** menu
- 3 Turn the rotary dial to move the highlight to the required setting: Always On or Auto Off, then press and release the rotary dial to save the setting and exit to the main menu.

View the version number

If you need to determine the firmware version number, use this option to view it.

To view the version number

- 1 From any standby screen, press and release the rotary dial to enter the main menu.
- 2 Enter the **Firmware Version** menu. Two numbers will be shown, for instance: *B1.0 V0.4*
- 3 Press and release the rotary dial to exit to the main menu.

Further information

Troubleshooting

If an issue arises, take steps to isolate the problem. At all times work from the basis of 'known good' before moving to the next step - data networks can become very complex in no time at all. Wherever possible, simplify the situation until a cause is isolated.

No output from devices connected to ARTNET 8

- Does ARTNET 8 have power? Are the front panel indicators lit? If not, see Fuse replacement below.
- Do you have an independent method to prove 'known good' the control feed and the fixture(s) being controlled? Wherever possible, as a temporary measure, directly connect the control feed to the fixtures being controlled.

Lighting fixtures are strobing, jittering or moving unexpectedly

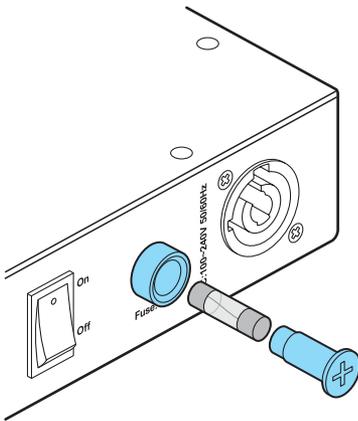
- On the ARTNET 8 DMX output feeding those fixtures, try reducing the frame rate of the DMX port. See page 12.

Fuse replacement

ARTNET 8 uses a 20mm fuse rated at 1A slow blow. Do not replace with any other type.

To replace the fuse

- 1 Switch off and isolate ARTNET 8 from the mains supply - remove the power cable.
- 2 Using a small screwdriver (flat blade or Philips), twist the internal face of the fuse housing counterclockwise until the center section releases from the holder.



- 3 Remove the fuse from the holder and fit an exact replacement (20mm 1A slow blow: T1A).
- 4 Insert the fuse holder into the housing and rotate until it becomes tight.
- 5 Restore power and switch on. The front panel indicators should light.

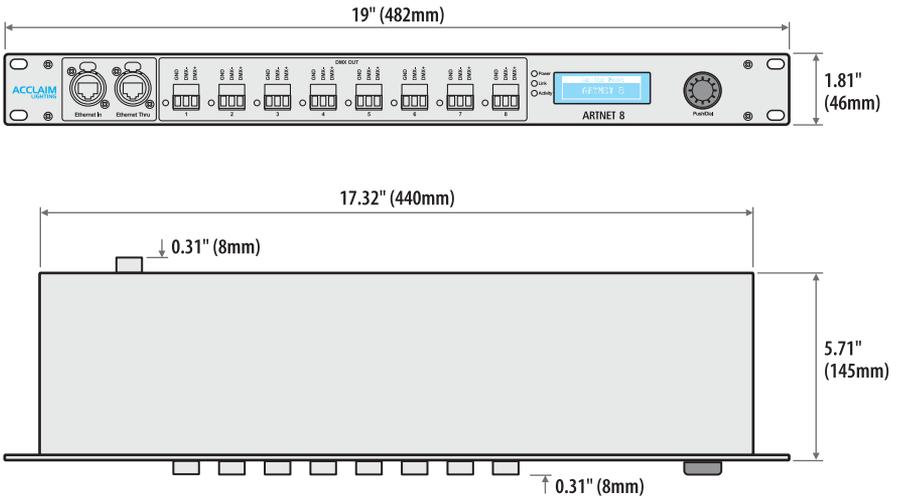
Specifications

Ingress protection	IP20
Power input	100 - 240VAC, 50/60Hz
Power consumption	7W maximum
Operating temperature	35.6°F to 113°F (2°C to 45°C)
Weight	4.6 lbs (2.1Kg)
Approvals	



RoHS

Dimensions



Art-Net™ Designed by and Copyright
Artistic Licence Holdings Ltd

Release 1.1a

What is...

...DMX

For the lighting industry, advances made possible by improvements in electronic technology became both a blessing and a curse. Many companies were trying to solve the same problems using varying methods, with the result that controllers and remote lighting equipment from different manufacturers could not be mixed. The situation was unsustainable and so in 1990 the USITT (United States Institute for Theater Technology) promoted a new independent standard that all manufacturers could adopt. This was called DMX512. DMX stands for **D**igital **M**ultiplex and the **512** refers to the number of dimmer channels that it could drive. Each of the 512 channels are sent values from 0 thru 255, which represent states from off to fully on (100%) respectively. DMX512 was a great success and helped to galvanize and expand the industry. For the first time, a fixture or dimmer unit from one manufacturer could work easily with the control desks from any other.

DMX512 or DMX, as it is mainly referred to, is transmitted by a three wires, one of which is the ground connection. The other two wires carry inverted copies of the same low voltage electrical signal - identical waveforms are sent along both wires, but when one goes positive, the other goes negative: DMX+ and DMX-. At the receiving end, one signal is subtracted from the other to reveal a clean data stream. This is called *Differential Signaling* and is very resilient to electrical interference - extremely handy in stage environments.

...a Universe

The ability to control 512 channels seemed quite a lot until moving lights and LED video panels became popular. These eat data channels for breakfast and so it became necessary to use more than one DMX link between the controller and the various sets of equipment being controlled. Thus, a single DMX link became known as a *Universe*, and multiple universes were given numbers to differentiate them. Each DMX universe is fed to a particular group of devices. The devices just know that they have an address between 1 and 512 on their respective DMX line (universe); they are totally isolated from a neighbouring device that might have the same DMX address on a different universe.

...RDM

RDM or *Remote Device Management* builds on the DMX standard to provide a way for intelligent devices to report back to the controller (original DMX is one way communication only). RDM allows devices to report on their condition and also allows controllers to remotely change the DMX addressing of devices - something that previously required a visit to the fixtures in their positions within the rig.

RDM is backward compatible with DMX-only devices. If a device doesn't respond to an RDM request, then that's fine, normal operation continues as before.

...Art-Net

With the rise of increasingly complex DMX devices, the need for multiple DMX feeds (or *universes*) became critical. However, sending many individual long runs was unwieldy, so in 1998, Wayne Howell of Artistic Licence Ltd in the UK, developed a strategy to collect DMX universes together and distribute them collectively using standard computer networking practices. Thus Art-Net I was born, followed in 2006 by Art-Net II which raised the number of supported universes from 40 to 256.

Thanks to the high speed of modern Ethernet networks (100Gb/s) compared to the relatively very low speed of each DMX feed (250Kb/s), aggregation of many universes is technically quite straightforward (but still clever).

Art-Net is copyright by Artistic Licence, but (like DMX itself) is generously made available for anyone to use on a royalty-free basis.

What is...

...an IP address

Computer networks come in all shapes and sizes; some are small, some are HUGE (think 'The Internet'). Small or large, what underpins them all is the ability (security issues aside) for any device to reliably find any other device on the network.

Key to making this happen is the IP address (*IP* stands for *Internet Protocol*). Every device on a network must be given a unique IP address that others can use to talk to it. IP addresses are usually expressed as four decimal numbers separated by periods, e.g. 2.10.10.2. This way of presenting them is just to make it easier for us to read; computers use the binary equivalent where each of those four decimal numbers represents a group of eight binary digits (bits).

On the open Internet there are strict rules governing who can use which IP addresses, however, most of us (via our devices) exist in small private networks connected to increasingly larger ones by routers that control the data flow. Within our individual networks (aka *Subnets*) we are assigned standard IP addresses, such as 192.168.123.132 or 200.128.24.234. Those addresses must be unique within our private network, but will most likely be repeated for other devices on separate networks. The various routers sort out how they are all stitched together in a logical manner that avoids clashes.

The IP addresses mentioned above are historically known as *Class C* addresses. This is all part of a scheme that has since been superseded, but nevertheless remains relevant. It breaks down like this:

- Class A IP addresses use the range: 0.0.0.0 thru 127.255.255.255
- Class B IP addresses use the range: 128.0.0.0 thru 191.255.255.255, and
- Class C IP addresses use the range: 192.0.0.0 thru 223.255.255.255

The private network that you are using to transmit your Art-Net/DMX system will most probably remain totally unconnected to any larger network. This avoids complications and also allows Art-Net to fulfil its specific role without its important real-time operations being affected by other, unnecessary network traffic.

The Art-Net standard recommends that all related devices use the Class A address range of 2.xxx.xxx.xxx (where xxx can be any number between 000 and 255 (except 2.0.0.0 and 2.255.255.255 which have special uses). This is good practice, however, if required you could assign almost any address within a totally private network, just pay equal attention to the *Netmask*...

...a Netmask

The IP address is part of the story, but almost as important is the *Subnet Mask* or *Netmask*. The thing is, an IP address actually consists of two parts: a Network address and a Host address (the *Host* is your device within its particular private network or *Subnet*). But the dividing line between those two parts is moveable. The netmask, when applied over the top of an IP address makes it clear which portions relate to the network and which to the host. Netmasks usually consist of *255s* and *0s*, but to fully understand, you need to view them in binary:

IP address: 192.168.123.132 = 11000000.10101000.01111011.10000100 (*Class C*)

Netmask: 255.255.255.0 = 11111111.11111111.11111111.00000000 (*Class C*)

Where there's a '1' in the netmask, the corresponding part of the IP address is the Network address; the remaining '0's in the netmask highlight the Host address section. When setting addresses for your Art-Net devices, ensure that the netmask correctly matches the address range that you choose. For example, if you use a 2.xxx.xxx.xxx IP address, that is in the Class A address range and the corresponding Class A netmask is 255.0.0.0

Limited product warranty

A. Acclaim Lighting™ hereby warrants, to the original purchaser, Acclaim Lighting™ finished products to be free of manufacturing defects in material and workmanship for a standard period of:

- Fixtures: 5 Years (1,825 days) from the date of purchase.
- Flex Products: 3 Years (1,095 days) from the date of purchase.
- Controllers: 2 Years (730 days) from the date of purchase.

It is the owner's responsibility to establish the date and place of purchase and warranty terms by acceptable evidence, at the time service is sought.

B. For warranty service, send the product only to the Acclaim factory. All shipping charges must be pre-paid. If the requested repairs or service (including parts replacement) are within the terms of this warranty, Acclaim Lighting™ will pay return shipping charges only to a designated point within the United States. If the entire instrument is sent, it must be shipped in its original package. No accessories should be shipped with the product. If any accessories are shipped with the product, Acclaim Lighting™ shall have no liability whatsoever for loss of or damage to any such accessories, nor for the safe return thereof. Acclaim reserves the right to replace the item with same or similar product at its discretion.

C. This warranty is void if the serial number has been altered or removed; if the product is modified in any manner which Acclaim concludes, after inspection, affects the reliability of the product; if the product has been repaired or serviced by anyone other than the Acclaim Lighting™ factory unless prior written authorization was issued to purchaser by Acclaim Lighting™; if the product is damaged because not properly maintained as set forth in the instruction manual.

D. This is not a service contract, and this warranty does not include maintenance, cleaning or periodic check-up nor do we guarantee as part of this warranty any lumen performance during period. Parts not covered by this warranty include: fuses, external power supplies, third party items not manufactures by Acclaim lighting. During the period specified above, Acclaim Lighting™ will replace defective parts at its expense, and will absorb all expenses for warranty service and repair labor by reason of defects in material or workmanship. The sole responsibility of Acclaim Lighting™ under this warranty shall be limited to the repair of the product, or replacement thereof, including parts, at the sole discretion of Acclaim Lighting™. At no time will installation or re-installation or products labor or liability costs will be assumed by Acclaim Lighting. All products covered by this warranty were manufactured after January 1, 2012, and bear identifying serial number marks to that effect.

E. Acclaim Lighting™ reserves the right to make changes in design and/or improvements upon its products without any obligation to include these changes in any products theretofore manufactured. No warranty, whether expressed or implied, is given or made with respect to any accessory supplied with products describe above. Except to the extent prohibited by applicable law, all implied warranties made by Acclaim Lighting™ in connection with this product, including warranties of merchantability or fitness, are limited in duration to the warranty period set forth above. And no warranties, whether expressed or implied, including warranties of merchantability or fitness, shall apply to this product after said period has expired.

F. Marine or extreme weather location applications using Acclaim lighting products are subject to a 2 year limited warranty and Acclaim must be notified prior to delivery of units for such applications so that preventative treatment can be made to the products to ensure proper performance and product life with a special marine code coating / sealing process at an additional cost.

G. The consumer's and or dealer's sole remedy shall be such repair or replacement as is expressly provide above; and under no circumstances shall Acclaim Lighting™ be liable for any loss or damage, direct or consequential, arising out of the use of, or inability to use, this product. This warranty is the only written warranty applicable to Acclaim Lighting™ products and supersedes all prior warranties and written descriptions of warranty terms and conditions heretofore published.

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