

## Introduction

DMX is the primary method we use to control lighting fixtures such as dimmers, moving lights, LEDs and smoke machines etc. In fact, any device controllable via a DMX signal can be assigned as a fixture within ZerOS.

The name “DMX” covers the cabling (“DMX cable”), which connects your console to your lighting rig, and the data signal running through those cables (“DMX signal”), which lets your console and your lighting rig talk. To understand DMX, you must understand “DMX addresses” and “DMX universes”.

## DMX channels (and DMX start address)

DMX can control up to 512 channels down a single cable. Each function of a fixture, known as a parameter, will require at least one channel, so a simple fixture may take up a single channel (for example, a dimmer) and a more complex fixture may take up a large range of channels (for example an LED or moving light). So ZerOS knows which device to control, each fixture on the cable must have a unique “DMX start address” between “1” and “512”. For example, if a fixture has 14 parameters, it will take up 14 DMX channels. If that fixture has a “DMX start address” of 101, it will therefore take up channels 101 – 114. No other fixture in the rig should be set to use these channels, meaning the next fixture must be addressed 115 or above. Depending on the fixture you are using, the DMX address may be configured using DIP switches, on-screen menus or remotely using various configuration tools. For information on addressing your fixtures, please consult the user manual of the fixtures.

A typical DMX addressing of a small system may look like this:

- 001 – 024 – Dimmers 1 to 24
- 025 – 100 – Empty
- 101 – 114 – Fixture 1 (14 channels)
- 115 – 128 – Fixture 2 (14 channels)
- 129 – 142 – Fixture 3 (14 channels)
- 143 – 156 – Fixture 4 (14 channels)

## DMX universes

The 512 DMX channels down a single cable is known as a “DMX Universe”. Therefore, when more than 512 channels are needed, a second DMX Universe is required to be plugged into the console. The fixtures on this universe are also addressed between channels 1 – 512, but on “Universe 2” rather than “Universe 1”.

## 16 bit channels

Each DMX parameter (512 per universe) can be a value between 0 and 255 (known as “8-bit”). This is sufficient for the majority of parameters (for example, a gobo wheel may only have 7 or 8 different gobos to select from, so 256 possible values is plenty) however in more advanced control equipment, 256 values is not enough. In these situations, two channels are linked together to create a “16-bit” parameter.

These channels are paired together internally and processed as a single control parameter. When output, the second channel (sometimes called the “Fine Channel” or the “LSB” – Least Significant Byte) is faded between 0 and 255, then returned to 0 as the first channel (sometimes called the “Course Channel” or the “MSB” - Most Significant Byte) is increased by 1, then the pattern continues. This process gives 65536 possible values for a parameter instead of the 256 possible using 8-bit control.



For more information on DMX & RDM, take a look at this session.

[https://youtu.be/F\\_6ANCol8dg](https://youtu.be/F_6ANCol8dg)

Some devices such as pyrotechnics have the option to be remotely controlled from a lighting console using DMX.

You should however be aware of points 1.4 and 1.5 of E1.11 - 2008 (R2013) DMX512-A.

These are set out below...

**1.4 Classes of data appropriate for transmission over links designed to this Standard**

*DMX512 is designed to carry repetitive control data from a single controller to one or more receivers. This protocol is intended to be used to control dimmers, other lighting devices and related non-hazardous effects equipment.*

**1.5 Classes of data not appropriate for transmission over links designed to this Standard**

*Since this Standard does not mandate error checking, DMX512 is not an appropriate control protocol for hazardous applications.*