

# DMX250

## **Features of the DMX250**

- X/Y (Horizontal/Vertical) mirror control
- 7 gobos  
(squares, tunnel, dots, star, triangle, segments, spiral, circle)
- 7 dichroic colours  
(magenta, yellow, cyan, pink, red, green, blue) and white
- Blackout shutter and lamp on/off control
- 100W halogen lamp with dichroic reflector
- Adjustable Focus
- DMX control
- 0-10V Analogue Control

## IMPORTANT

### Installer and Users please note:

**These instructions should be read carefully and left with the user of the product for future reference.**

### Installation

Fix the DMX250 with the hanging bracket provided. To conform to Health & Safety Regulations, a safety wire must also be employed.

**The DMX250 must be installed by a competent electrician in accordance with the current IEE wiring regulations.**

Connect the DMX250 to the mains supply with the lead provided. The wires are colour-coded as follows:

- Brown = Live (phase)
- Blue = Neutral
- Green/Yellow = Earth
- The DMX250 must be earthed for safe and reliable operation.

The supply must be fitted with an isolating switch, or plug and socket, and protected by fuse or circuit breaker rated at between 6A and 16A. If the DMX250 circuit is connected via an MCB then it is recommended that a time-delay MCB is used (Type 3 or Type C to BS3871). This will reduce the possibility of "nuisance tripping" due to the large inrush current of the halogen lamp.

This symbol means that in order to reduce the risk of fire, the DMX250 should be installed more than 0.8 metres from any object that it is illuminating.



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It is also possible to connect the DMX250 to a switching pack such as the NJD SP10000 but this is not recommended. If connecting via a power pack, the outputs of the power pack should be de-rated by 50% from its "resistive load" capacity to allow for the large inrush current of the halogen lamp. The DMX250 should not be connected to a dimming pack or light dimmer. The DMX250 is an inductive load.

Adjust the hanging bracket until the light beams are in the best position. The DMX250 may be moved whilst it is operating provided that it is done carefully, the lamp is most vulnerable mechanical damage immediately after it has been switched off, before it has fully cooled. It is recommended that the DMX250 is allowed to cool for 5 minutes after switching off before moving.

### **Changing the lamp.**

Disconnect from the mains supply. Unscrew the fixing knob from the lamp cover on the front of the product and withdraw the lamp assembly. Remove the lamp from the fixing clip and remove the connector from the lamp. Replace with a new lamp, type A1/259, being careful not to touch the glass envelope of the lamp. Connect the lamp connector to the lamp and replace in the fixing clip. Replace the lamp cover and tighten the fixing knob.

### **Changing the fuse.**

Occasionally, when the lamp fails the fuse may also blow. If this occurs, replace with a new fuse type 20mm x 5mm 3.15 Amp antisurge, high breaking capacity. This type of fuse has a ceramic case. Do not replace with any other type or value of fuse. If the new fuse blows consult a dealer. The fuse is located next to the incoming mains cable.

### **Focusing.**

To focus slacken the focusing control on the front of the unit, move forwards or backwards as required, and re-tighten the screw when the best image is obtained.

### **Cleaning.**

The DMX250 should be cleaned periodically as the light output will become less intense as smoke fluid residues build up on the mirror and lenses. Disconnect from the mains supply and remove the cover. Clean the lens and the mirror using a soft lint-free cloth and methylated spirit, isopropyl alcohol or hi-fi cleaning fluid. Also, make sure that the fan is not becoming obstructed - use a brush to remove any build-up of dust.

## Setting up.

The DMX250 may be operated in one of five different Modes.

### Independent (internal microphone)

The DMX250 will move to each bass beat, going through a sequence of patterns at random, including up/down, side-to-side, square, octagon, diamond, figure-of-eight, random and chevron, along with colour and gobo changing.

### Synchronized (internal microphone)

The DMX250 will perform the above patterns either synchronized together, or with the movement mirrored. In addition, the colours and gobos will operate in one of three modes: random, synchronized or chasing. The movement can be controlled by setting the control switches in order that two rows of DMX250s can be set up opposed to each other, and will continue to move in synchrony. The DMX250 can be synchronized with IQ-500, IQ-250, Microbeam or Dmx250.

### Externally controlled from IQ-MX80, IQ-MX60, IQ-MX40, Merlin, or any DMX output controller.

The DMX250 can be controlled from the Merlin, or any of the NJD IQ-MX range of controllers or any lighting desk with DMX or 0-10V analogue outputs.

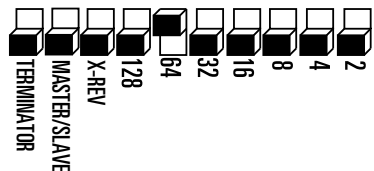
**Remote control** (from the AR1) or controlled from a low Voltage Switch panel

### Analogue control (0 - +10V)

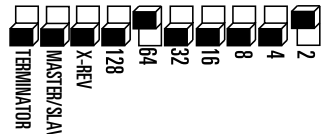
## Independent mode.

1) To allow the DMX250 to select a colour and pattern at random, set the MASTER/SLAVE switch OFF and all DMX address switches to OFF.

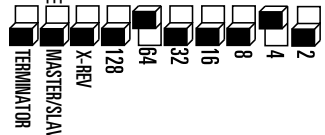
2) If you wish to select the operating mode, then turn switch 64 ON, then either turn the following switches on to decide which operating mode you would like.



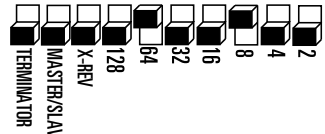
To select magenta, yellow, cyan or pink turn switch 2 ON on the DMX250



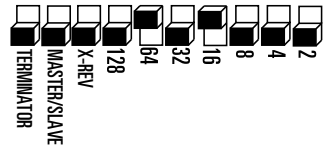
To select red, green, blue and white turn switch 4 ON on the DMX250



To select change-colour-to-sound, beam stationary, turn switch 8 ON



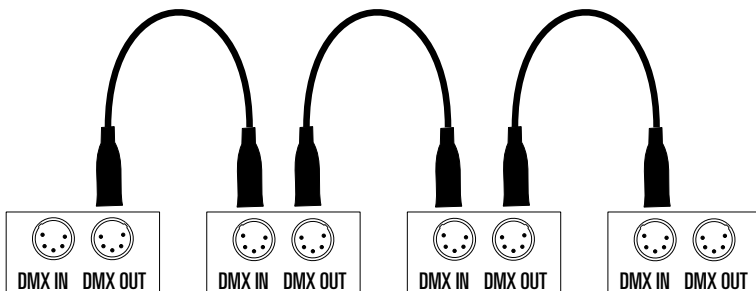
To select flash-to-sound, turn switch 16 ON on the DMX250



If more than one switch is turned ON the DMX250 will sequence through all the selections in turn.

### Synchronized operation without a controller

To synchronize DMX250s without a controller, connect a DMX lead from the **DMXout** socket on the first Dmx250 to **DMXin** on the second, from **DMXout** on the second Dmx250 to **DMXin** on the third, and so on. DMX leads must never be joined (apart from end-to-end) or split. Using a 2-to-1 splitter or similar will prevent the system working.



### Setting the DIL switches.

The first DMX250 in the chain is the MASTER, set its DIL switches as described on the previous page in "independent mode". The other DMX250s are SLAVES. Set their switches as described below.

To obtain the the correct movement the switches on the back of each DMX250 must be adjusted to tell it which channel it is set to. The switches are labelled 128, 64, 32, 16, 8, 4, and 2. These normally set the DMX address.

The MASTER/SLAVE switch should be set to "ON".

The TERMINATOR switch should be set to "ON" on the last unit (the one with no plug in its DMXout socket), and "OFF" on all others.

**Either:** If it is intended that all the DMX250s should operate identically, set all the address switches OFF on the slaves (MASTER/SLAVE should still be ON).

**Or:** To obtain four channel colour changing sequences, set the DIL switches as shown in the table below: (DMX250s 5 to 8 repeat the actions of numbers 1 to 4)

#### DMX250.

2 or 6  
3 or 7  
4 or 8  
5

#### Switches ON

(other switches OFF)  
4  
8  
8, 4  
all switches OFF

Movement may be reversed by setting the "X-REV" switch.

Reversing the movement is useful if two or more DMX250s are facing each other. Reversing the direction of movement makes the beams from both units move the same way in the air.

## **DMX operation**

### **Background information**

The DMX system is a high-speed digital data system, which can transmit all the information required for light dimmers, multi-motor lighting effects etc. down a single cable. It was invented in 1986 by the United States Institute of Theater Technicians for the control of dimming theatre lighting, and has since been adapted for the control of intelligent lighting.

The DMX250 outputs a DMX signal when operating from its own microphone, which can be used to synchronize other DMX250s. Up to 32 units that can be connected to the DMX signal, but it is not recommended that the total cable length should exceed 250m.

Each unit connected to the DMX signal is given an address, and it compares this to the data being sent on the DMX cable, so it can determine which data is addressed to it. It then uses this data to move a motor or set a brightness level as required by the controller.

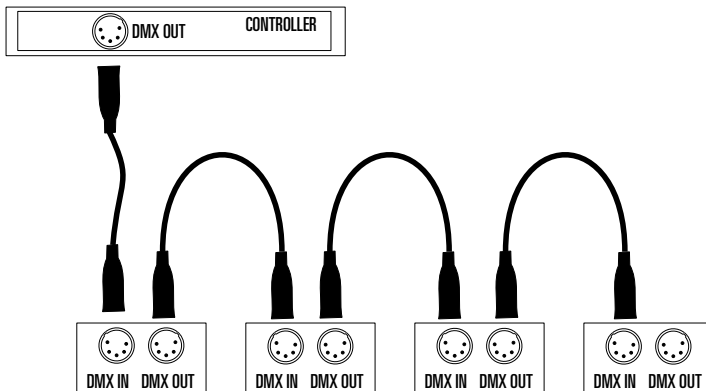
As the DMX system can transmit as much information as 512 analogue control wires down a single cable, it has to transmit very quickly, in fact, at a frequency 12 times higher than the highest audio frequency. Anyone who has used long leads for audio will realize that it is difficult to do without losing the higher frequencies. To make the DMX system work at such high frequencies, it requires special circuitry and special cable. Cable can be designed to pass high frequencies with no loss if it has the correct resistance connected at each end, this resistance is called the characteristic impedance of the cable. DMX cable has a characteristic impedance of  $120\Omega$ . The TERMINATOR switch allows this resistor to be switched in when required. Without it, the signal reflects off the end of the cable and interferes with the new data coming the other way. If the cable is not correct, the system will not work. Most good quality low-capacitance screened twisted pair cables will work, but twin individually screened will not. Also, if the cable is split or joined other than end-to-end, the system will stop working.

If making your own leads, it is important to use good quality

connectors and make sure that the soldering is of a high standard.

### Using the DMX250 with NJD's dedicated DMX controllers (IQ-MX range)

To connect to a controller: Connect a DMX lead from the **DMXout** socket on the controller to **DMXin** on the first DMX250. Connect a DMX lead from the **DMXout** socket on the first DMX250 to **DMXin** on the second. Connect from **DMXout** on the second DMX250 to **DMXin** on the third, and so on. DMX leads must never be joined (apart from end-to-end) or split. Using a 2-to-1 splitter or similar will prevent the system working.



Set the **DMXCONTROL** switch **OFF**, and if the DMX250 is the last unit in the DMX chain set the **TERMINATOR** switch ON otherwise set if OFF. Refer to the User Guide accompanying your controller for information on how to set the DMX address switches. Refer to the User Guide accompanying your controller for information on how to set the switches.

The X-REV switch reverses the movement in the x direction. Use this to make the DMX250 move the same way as the controller joystick, which depends on whether the DMX250 is facing towards or away from the controller.

### **Connecting to Merlin or any Lighting control desk with DMX output.**

The DMX system has 512 addresses, each address can be the brightness of a single dimmer, or a position on a motor. Because the DMX250 controls 3 motors and the lamp, it requires four DMX addresses.

The DMX250 can be programmed to any address from 1 to 255 in steps of two, so there can be up to 64 DMX250s on a controller. Any number of DMX250s can be assigned to each channel or address. If two DMX250s are assigned to the same address then they will perform identically.

Each DMX250 occupies four DMX channels. The switches are labelled 128, 64, 32, 16, 8, 4 and 2. Add up the numbers of the switches that are on and add 1, to give the start address. Set the **MASTER/SLAVE** switch **ON**, and if the DMX250 is the last unit in the DMX chain set the **TERMINATOR** switch ON otherwise set if OFF.

The X-motor appears at the start address, the Y-motor at start address plus 1, gobo/colour motor at start address plus 2 and blackout/lamp control at start address plus 3. (i.e. If switches 32 and 8 are ON, then start address is  $32+8+1 = 41$ , the X motor is on channel 41, the y-motor on channel 42 and the gobo-colour motor on channel 43, channel 44 controls the blackout and lamp switching.)

The X-REV switch reverses the movement in the x direction. Use this switch to make the DMX250 move the same way as the controller joystick, which depends on whether the DMX250s is facing towards or away from the controller. This switch has no effect on the DMX address set on the other 7 switches.

The DMX dimmer levels control the movement as follows:

X-motor: 0 is extreme left (right for X-REV selected), 255 is extreme right (left for X-REV selected), 128 is central.

Y-motor: 0 is reflected back down lens, 128 is central, 255 is fully up.

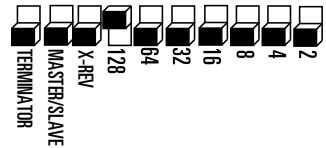
Colour/gobo:           0 - 31 is magenta squares  
                               32 - 63 is yellow tunnel  
                               64 - 95 is cyan dots  
                               96 - 127 is pink star  
                               128 - 159 is green triangle  
                               160 - 191 is red segments  
                               192 - 207 is blue spiral  
                               208 - 255 is white circle

The gobo is always centralized.

### Direct Analogue control (0-10V)

The dish rotation and dimmer may be controlled directly using analogue channels 1 and 3 and 4. The microphone circuitry is disabled.

Set the DMXCONTROL switch ON, and DMX address switches with switch 128 ON and all other switches OFF.



The 0-10V inputs control the DMX250 as follows:

Channel 1: (pin 3) moves the beam left to right

Channel 2: (pin 5) moves the beam up and down

Channel 3: (pin 4) controls the colours and gobos.

Channel 4: (pin 1) controls the blackout shutter and lamp.

The 0-10V dimmer levels control the movement as follows:

X-motor: 0 is extreme left (right for X-REV selected), +10V is extreme right (left for X-REV selected), +5V is central.

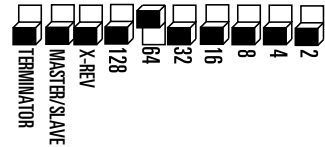
Y-motor: 0 is reflected back down lens, +5V is central, +10V is fully up.

When using analogue control, units can be synchronized together using the DMX outputs - refer to the "Synchronized operation without a controller" section.

voltage	colour/gobo:
(8.75V - 10V)	white circle
(7.5V - 8.75V)	blue spiral
(6.25V - 7.5V)	red segments
(5V - 6.25V)	green triangle
(3.75V - 5V)	pink star
(2.5V - 3.75V)	cyan dots
(1.25V - 2.5V)	yellow tunnel
(0-1.25V)	magenta squares

**Control from a low-voltage switch panel** (such as Logic S12lv, Logic X12 or Logic T12) **or the AR1 remote control**

Set the DMX Address switches as follows:



Turn the DMXCONTROL switch ON, switch “64” on and all other switches OFF.

Connect the output from the controller to the 5-pin DIN socket.

Connect to channel 4 (pin 1) (or turn on switch #1 on the AR1) if you want to select flash to sound.

Connect to channel 1 (pin 3) (or turn on switch #2 on the AR1) if you want to select patterns in magenta, cyan yellow and pink.

Connect to channel 2 (pin 5) (or turn on switch #3 on the AR1) if you want to select patterns in red, green, blue and white.

Connect to channel 3 (pin 4) (or turn on switch #4 on the AR1) if you want the DMX250 to select change colour to sound, with the beam stationary.

Connect 0V from the controller to pin 2 of the DIN socket.

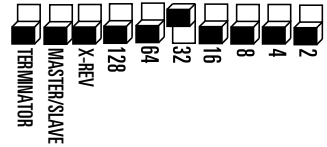
More than one channel can be connected to the touch panel, so that different pads may be used to select different effects. If more than one input is enabled at once, the DMX250 will sequence through the selected modes in turn.

When all four channels are off (or all four switches off on the AR1) the lamp is turned off.

### Voltage Control

The DMX250 may be controlled by two analogue channels from a lighting desk such as the Stage 12 or the Fade-4.

Set the DMXCONTROL switch ON, and DMX address switches with switch 32 ON and all the other switches OFF.



Connect the 0-10V input to channels 1 and 3 of the 5-pin DIN socket.

Channel 1 controls the pattern and channel 3 controls the colour, or the colour chasing mode. The levels that select various patterns and colours are explained overleaf.

Additionally, if required, channel 4 can be used to override the sound circuitry for applications where there is no sound available. Pulsing the voltage from 0V to 10V and back to 0V will advance one step in the pattern.

**Channel 1 (patterns)**

8.75V to 10V  
 runs through all patterns all colours  
 8.1V to 8.75V up-down  
 7.5V to 8.1V square  
 6.7V to 7.5V left-right  
 6.25V to 6.7V colour change  
 5.6V to 6.25V cross  
 5V to 5.6V diamond  
 4.4V to 5V figure of 8  
 3.75V to 4V octagon  
 3.1V to 3.75V up-down  
 2.5V to 3.1V square  
 1.8V to 2.5V left-right  
 1.25V to 1.8V random  
 0-1.25V shutdown

**Channel 3 (colours)**

9.3V to 10V white circle  
 8.75V to 9.3V blue circle  
 8.1V to 8.75V red circle  
 7.5V to 8.1V green circle  
 6.7V to 7.5V pink star  
 6.25V to 6.7V cyan dots  
 5.6V to 6.25V yellow tunnel  
 5V to 5.6V magenta squares  
 4.4V to 5V chase left  
 3.75V to 4.4V chase right  
 3.1V to 3.75V random  
 2.5V to 3.1V flash  
 1.8V to 2.5V chase left  
 1.25V to 1.8V chase right  
 0.6V to 1.25V random  
 0V to 0.6V sync

**Fault Finding.****Stand-alone mode.**

- Does not start and go through set-up procedure.

No mains supply - check mains lead

Fuse Blown - check fuse.

- Lamp not lit

Lamp failed - replace lamp.

In analogue control mode - make sure that the 4<sup>th</sup> channel is at the correct level.

- No response to sound

DMXCONTROL switch off - switch ON for stand-alone operation.

Analogue mode selected - make sure DIL switches 32, 64 and 128 are off.

- Erratic response to sound

Music not loud enough.

- Light output dim.

mirror and lens dirty - clean mirror and lens.

### **Synchronized mode**

- Moves left when it should move right

X-REV switch in wrong position

- Changes colour when it should move left-right, moves left-right when it should change colour

switch 2 ON, should be off

- Movement erratic.

Wrong type of cable - DO NOT use twin individually screened

Unterminated cable in DMXout socket of final lantern - do not connect to DMXout socket of final lantern.

Terminator switch not switched ON on last lantern

Terminator switch switched ON on more than one lantern

- No movement and lamp off

DMX lead broken or incorrectly wired. - check leads

DMX controlled mode (see also synchronized mode)

- No movement and lamp off

DMX address set wrongly - check DIL switches, or see if lantern responds to a different address.

- Lamp off but mirror moves

4<sup>th</sup> DMX channel at wrong level

Lamp failed

## **Standards**

The DMX250 complies with the following British and European Standards:

BS EN55015 - Electromagnetic Compatibility.

BS EN60598 - Electrical Safety Standard for Luminaires.

## Technical Specification.

Power supply: 230V nominal @ 50Hz 300VA (1.25A)  
210V minimum 255V maximum.

Fuse: T13.15A (3.15 Amp anti-surge) 5x20mm  
HBC to BS4265/IEC127

A HBC fuse has a ceramic case.

Switch-on surge: 2.1A (490VA)

Duration: 60ms (3 mains cycles)

Lamp: A1/59 (ELC)  
12V 100W dichroic reflector

Colours: 7 dichroic plus white

Gobos: 7

Beam intensity: 20,000 candela

Lamp life: 100 hours nominal @ 230V AC

Note: Although Britain has had a 230V mains supply since January 1st 1995, the voltage is usually 240V.

60 hours nominal @ 240V AC

Beam width: 260mm diameter at 1 metre  
(3" diameter at 1 foot)

Beam Angle: 15°

Motors: Unipolar Hybrid stepper: microstepping

Microstep size: 6'45" (1.95mrad)

DMX input/output: complies with DMX512 (1990) 4µsec  
and EIA RS-485

Connectors: 5-pin XLR

Data+: Pin 3

Data-: Pin 2

Earth: Pin 1

+12V output: Pin 5

A +12V output is provided on Pin 5 to run controllers.

## *Guarantee*

**This product is guaranteed for a period of 12 months against faulty components or manufacture from the date of purchase. Upon proof of purchase, NJD shall, at its own option, repair or replace the defective item at no cost to the purchaser.**

**This guarantee is contingent upon the proper use of the product in the application for which it is intended and does not cover products that have been modified, subjected to unusual physical conditions, or electrical conditions outside its specification, or damaged in any way.**

**This guarantee is limited to the product only and does not cover carriage costs, installation costs or travel expenses. Your statutory rights are not affected.**

**In the event of any problems with this product contact the retailer from which it was purchased for technical assistance, or e-mail [technical@njd.co.uk](mailto:technical@njd.co.uk)**

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