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1. General

The DMX interface is designed to control a single DMX512 universe, allowing multiple daisy-chained lighting fixtures to be controlled through one interface. Typically, this feature is used to add DMX lighting to interactive installations, allowing lighting effects to respond intelligently to sensor input. This document provides an explanation of the available functionalities and instructions on how to install and integrate the interface into your digital signage installation.

The information in this document is created for users who are familiar with the Nexmosphere API and are able to control a basic setup with a Nexmosphere API controller. If this is not the case yet, please read the general documentation on the Nexmosphere serial API first.

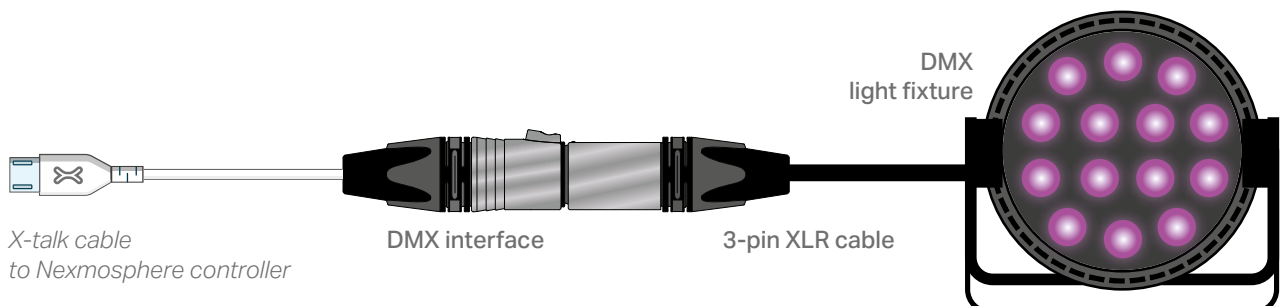
2. Product overview

The IX DMX Interface is available in 2 models:

	IX-DM3	IX-DM6
Control one DMX512 universe	✓	✓
Direct ramps of 4 channels	✓	✓
Transition between 4-channel states	✓	✓
Transition between 6-channel states	✗	✓
Transition between 48-channel scenes	✗	✓



The DMX interface is housed inside a 3-pin female XLR connector. It can be connected to a DMX fixture via an industry-standard 3-pin XLR cable. The DMX interface can control one DMX512 universe. Multiple DMX interfaces can be connected to a Nexmosphere controller to control multiple DMX universes.



3. Functionalities and API commands

The IX DMX interface provides the following functionalities:

1. **Direct ramps** - of 4 DMX channels
2. **Define states** - of up to 6 DMX channels
3. **State transitions** - with a settable ramp time
4. **Define Master scenes** - of up to 48 DMX channels (*only on IX-DM6*)
5. **Scene transitions** - with a settable ramp time (*only on IX-DM6*)

The following sections will cover each of these functionalities in detail. Please note that for each API example in this document, X-talk address 001 is used (X001). When the DMX interface is connected to another X-talk channel, replace the "001" with the applicable X-talk address.

3.1 - Direct ramps

The DMX interface can drive DMX channels to a specific value within a specific ramp time. It can do so for a group of up to 4 channels, typically used to drive RGB(W) light fixtures to specific color and brightness. The API command for a direct ramp is as follows:

X001B[Rx LIN NN XXX AAA BBB CCC DDD] Direct ramp of 4 DMX channels

R	fixed	indicates it is a ramp command
x	value between A-Z	Ramp identifier
LIN	fixed	indicates it is a linear ramp
NN	value between 00-90	Ramp time 0.1 seconds
XXX	value between 001-512	DMX channel start number
AAA	value between 000-255	value 1st channel
BBB	value between 000-255	value 2nd channel
CCC	value between 000-255	value 3rd channel
DDD	value between 000-255	value 4th channel

When implementing direct ramps, consider the following:

- A direct ramp command is immediately executed.
- Multiple ramp commands can be executed simultaneously by using different Ramp identifiers. For example, the first three commands on the right can be sent consecutively. Please note that most Nexmosphere controllers require a 50ms delay between each command.
- It is not required to fill in all 4 channels. A direct ramp command can also be used to control just 1, 2 or 3 channels. See the 4th and 5th example on the right.
- To set all 512 DMX channels immediately to 000 (without a ramp), a dedicated command is available:

X001B[DMX ALL OFF]

Example API messages

Start ramp A with a 1.0 second ramp time, to drive channel 001, 002, 003 and 004 all to 255.

X001B[RA LIN 10 001 255 255 255 255]

Start ramp B with a 2.5 second ramp time, to drive channel 005 to 050, channel 006 to 100, channel 007 to 150 and channel 008 to 200.

X001B[RB LIN 25 005 050 100 150 200]

Start ramp C with a 0.3 second ramp time, to drive channel 509 to 187, channel 510 to 064, channel 511 to 000 and channel 512 to 235.

X001B[RC LIN 03 509 187 064 000 235]

Start ramp D with a 0.7 second ramp time, to drive channel 001 to 000, channel 002 to 180, channel 003 to 255

X001B[RD LIN 07 001 000 180 255]

Start ramp E with a 3.2 second ramp time, to drive channel 013 to 070 and channel 014 to 165

X001B[RE LIN 32 013 070 165]

3.2 - Define states

The DMX interface offers the option to define a state of 6 DMX channels (on the IX-DM6) or 4 DMX channels (on the IX-DM3). Via a separate state transition commands, the DMX interface can ramp to the predefined state. The API command to define a state is as follows:

X001B[Sy XXX AAA BBB CCC DDD EEE FFF]			Define a state of up to 6 DMX channels
S	fixed	indicates it is a state definition	
y	value between A-Z	State identifier	
XXX	value between 001-512	DMX channel start number	
AAA	value between 000-255	value 1st channel	
BBB	value between 000-255	value 2nd channel	
CCC	value between 000-255	value 3rd channel	
DDD	value between 000-255	value 4th channel	
EEE	value between 000-255	value 5th channel (only on IX-DM6)	
FFF	value between 000-255	value 6th channel (only on IX-DM6)	

When defining states, consider the following:

- A state definition command does not change the DMX output. A state transition command is required for this. See section 3.3 "State transitions"
- A total of 26 states (A-Z) can be defined.
- It is not required to fill in all 4 or 6 channels. A state definition command can also be used to control just 1, 2 or 3 channels. See the 3rd example on the right.

Example API messages

Define state A as channel 001 at 120, channel 002 at 008, channel 003 at 255 and channel 004 at 255.

```
X001B[SA 001 120 008 255 255]
```

Define state B as channel 017 at 000, ch. 018 at 255, ch. 019 at 147, ch. 020 at 067, ch. 021 at 030 and ch. 022 at 241.

```
X001B[SB 017 000 255 147 067 030 241]
```

Define state C as channel 510 at 040, channel 511 at 230, channel 512 at 190.

```
X001B[SC 510 040 230 190]
```

3.3 - State transitions

Once a state has been defined (see section 3.2 "Define states"), the DMX interface can transition to that state with a settable ramp time. The API command to transition to a state is as follows:

X001B[Rx LIN NN Sy]			Transition to a state with settable ramp time
R	fixed	indicates it is a ramp command	
x	value between A-Z	Ramp identifier	
LIN	fixed	indicates it is a linear ramp	
NN	value between 00-90	Ramp time 0.1 seconds	
S	fixed	indicates it is a state	
y	value between A-Z	State identifier	

When transitioning states, consider the following:

- A state transition command is immediately executed.
- Multiple ramp commands can be executed simultaneously by using different Ramp identifiers. For example, the first three commands on the right can be sent consecutively. Please note that most Nexmosphere controllers require a 50mS delay between each command.

Example API messages

Start ramp A with a 1.3 second ramp time, to drive to state A

```
X001B[RA LIN 13 SA]
```

Start ramp B with a 0.7 second ramp time, to drive to state D

```
X001B[RB LIN 07 SD]
```

Start ramp C with a 9.0 second ramp time, to drive to state G

```
X001B[RC LIN 90 SG]
```

Start ramp A with a 0.1 second ramp time, to drive to state F

```
X001B[RA LIN 01 SF]
```

3.4 - Define Master scenes (only on IX-DM6)

The DMX interface offers the option to define a Master scene which can contain up to 48 DMX channels. Via a separate scene transition command, the DMX interface can ramp to the predefined Master scene.

The API commands to define a Master scene can contain up to 6 DMX channels. Therefore, to fill a Master scene, multiple commands have to be sent. The API command to define 6 channels within a Master scene is as follows:

X001B[My XXX AAA BBB CCC DDD EEE FFF]			Define 6 DMX channels in a Master scene
M	fixed	indicates it is a Master scene definition	
y	value between A-F	Scene identifier	
XXX	value between 001-512	DMX channel start number	
AAA	value between 000-255	value 1st channel	
BBB	value between 000-255	value 2nd channel	
CCC	value between 000-255	value 3rd channel	
DDD	value between 000-255	value 4th channel	
EEE	value between 000-255	value 5th channel	
FFF	value between 000-255	value 6th channel	

When defining Master scenes, consider the following:

- Please note that most Nexmosphere controllers require a 50mS delay between each command.
- A Master scene definition command does not change the DMX output. A scene transition command is required for this. See section 3.5 "Scene transitions"
- A total of 6 Master scenes (A-F) can be defined.
- It is not required to fill all 48 channels. A Master scene can also be used to control less channels (for example 14).
- The 48 channels in a Master scene do not need to be consecutive channels (see first example on the right).
- When a channel in a Master scene has been filled, it cannot be overwritten. To overwrite, the Master scene first needs to be cleared. This can be done by sending the following command:

```
X001B[DMX CLR My]
```

y value between **A-F** Scene identifier

- A DMX channel can be filled in multiple different Master scenes (A-F)
- In the same Master scene, a DMX channel can only be filled once

Example API messages

Define Master scene A as channel 001-012 at value 180, channel 125-142 at value 230 and channel 143-160 at value 10.

Fill channel 001-006

```
X001B[MA 001 180 180 180 180 180 180]
```

Fill channel 007-012

```
X001B[MA 007 180 180 180 180 180 180]
```

Fill channel 125-130

```
X001B[MA 125 230 230 230 230 230 230]
```

Fill channel 131-136

```
X001B[MA 131 230 230 230 230 230 230]
```

Fill channel 137-142

```
X001B[MA 137 230 230 230 230 230 230]
```

Fill channel 143-148

```
X001B[MA 143 010 010 010 010 010 010]
```

Fill channel 149-154

```
X001B[MA 149 010 010 010 010 010 010]
```

Fill channel 155-160

```
X001B[MA 155 010 010 010 010 010 010]
```

Example API messages

Define Master scene B as channel 014-022 at value 255.

Fill channel 014-019

```
X001B[MB 014 255 255 255 255 255 255]
```

Fill channel 020-022

```
X001B[MB 020 255 255 255]
```

3.5 - Scene transitions (only on IX-DM6)

Once a Master scene has been defined (see section 3.4 "Define Master scenes"), the DMX interface can transition to that scene with a settable ramp time. The API command to transition to a Master scene is as follows:

X001B[Rx LIN NN My]			Transition to a Master scene with settable ramp time
R	fixed	indicates it is a ramp command	
x	value between A-Z	Ramp identifier	
LIN	fixed	indicates it is a linear ramp	
NN	value between 00-90	Ramp time 0.1 seconds	
M	fixed	indicates it is a Master scene	
y	value between A-F	Master scene identifier	

When transitioning scenes, consider the following:

- A scene transition command is immediately executed.
- Multiple ramp commands, both for states and Master scenes, can be executed simultaneously by using different Ramp identifiers. For example, the first three commands on the right can be sent consecutively. **Please note that most Nexmosphere controllers require a 50mS delay between each command.**

Example API messages

Start ramp A with a 0.8 second ramp time, to drive to Master scene A

X001B[RA LIN 08 MA]

Start ramp B with a 1.3 second ramp time, to drive to Master scene D

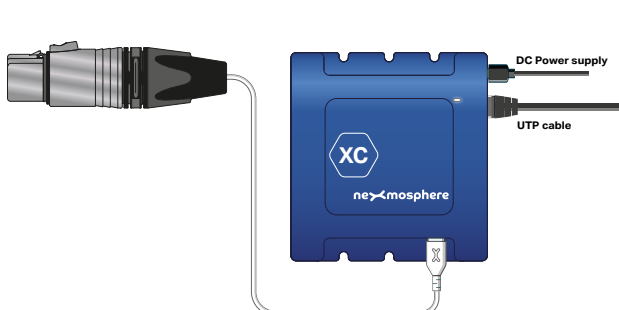
X001B[RB LIN 13 MD]

Start ramp C with a 5.0 second ramp time, to drive to Master scene F

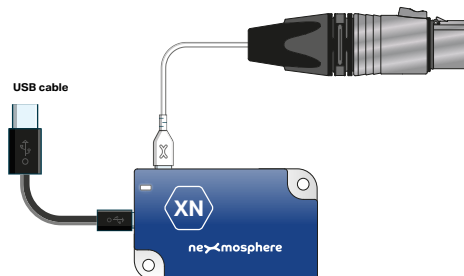
X001B[RC LIN 50 MF]

4.1 Connection Diagrams

The IX DMX interface can be connected to any X-talk channel and is therefore compatible with all Xperience controllers. Make sure the DMX interface is connected to the X-talk port before powering the Xperience controller. Otherwise, it will not be recognized by the Xperience controller and the DMX interface cannot be controlled.



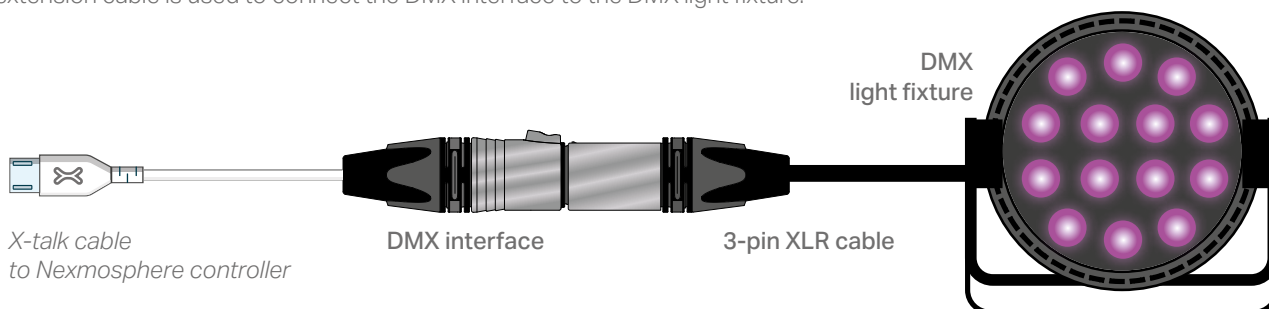
Example connection to XC-101U Controller (UDP API)



Example connection to XN Controller (USB API)

4.2 Hardware integration guidelines

The DMX interface is housed inside a 3-pin female XLR connector. Most DMX light fixtures have a 3-pin male XLR socket, labeled "DMX IN", to which the DMX interface can be directly plugged into. However, typically an industry-standard 3-pin XLR extension cable is used to connect the DMX interface to the DMX light fixture.



Most DMX light fixtures also have a "DMX OUT", which usually is a 3-pin female XLR socket. This can be used to daisy chain multiple DMX light fixtures onto one DMX interface. These can be different light fixtures. For example, an RGBW spot and RGBW bar can be daisy chained to the same DMX interface.

When daisy chaining DMX light fixtures, make sure that each DMX light is set to a different DMX channel that corresponds with the control commands you implement (see chapter 3 "Functionalities and API commands").

