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**1. General**

The Nexmosphere Selection LED range offers a variety of Elements which allow you to divide a pixel LED strip into multiple segments and control each of those segments separately. This document offers explanation, instructions, and examples of how the Selection LED functionality can be controlled.

*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 Selection LED range consists of 2 main products:

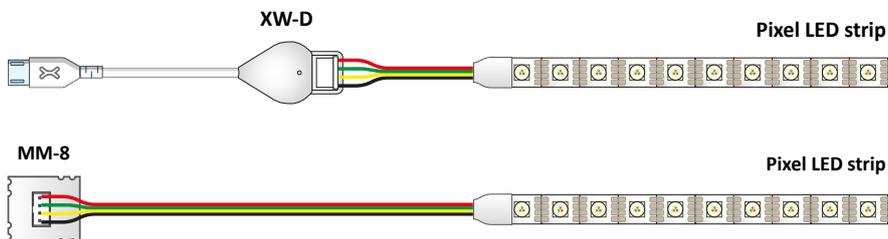


XW-DS.



MM-8S

The XW-DS and MM-8S are Selection LED interfaces to which a flexible pixel LED strips can be connected. The maximum amount of LEDs which one Selection LED interface can *control* is 120 LEDs. Please note that next to this, the maximum amount of LEDs also needs to be calculated from a *power* perspective (see page 6).



## 3. Functionality

All products in the Selection LED range provide the following functionality:

1. **Creating custom LED colors** - program custom colors with RGB values
2. **Define LED segments** - virtually divide the pixel LED strip into multiple segments
3. **Define ON and OFF state** - define the color, intensity and ramp time for both the ON and OFF state
4. **Control LED segments** - set each LED segments in ON or OFF state

The following sections will cover each of these functionalities in detail and provide specific examples for each functionality.

### 3.1 - Creating custom LED colors

Each Selection LED interface has 16 pre-programmed colors, labeled from 0 to F. These color labels are used in the LED output commands to indicate the color(s) to which the pixel LED should be set. On the right, an overview of the default color palette is provided.

In case a non-default color is required, a custom color can be created and stored in one of the 16 available labels. Storing a custom color will over-write a default color that was previously stored in the label.

The API command for programming a color label is as follows:

#### X001B[1ARRGGBB]

- 1 = **Command type** - fixed - indicating the command type, which in this case is "program custom color" (1)
- A = **Color label** - value between 0-F - indicating the color label
- RR = **RGB Red value** - hex value between 00-FF
- GG = **RGB Green value** - hex value between 00-FF
- BB = **RGB Blue value** - hex value between 00-FF

On the right, some example commands for programming custom colors are provided. When creating custom colors, consider the following:

- Programming a custom color does not set the LED output. Thus when sending one of the example commands (on the right), the LED output of the Selection LED interface does not change. Only when sending a "Control LED segment" command in which the color label of a custom color is used, the LEDs will be set to the custom color (see next pages).
- After a power cycle, the color labels are set back to default. Thus each time the system is started, the custom color commands need to be re-send.

#### Default colors

0	R: 255   FF G: 255   FF B: 255   FF	4	R: 255   FF G: 255   FF B: 0   00	8	R: 255   FF G: 0   00 B: 128   80	C	R: 0   00 G: 128   80 B: 255   FF
1	R: 255   FF G: 0   00 B: 0   00	5	R: 255   FF G: 0   00 B: 255   FF	9	R: 128   80 G: 255   FF B: 0   00	D	R: 255   FF G: 179   B3 B: 179   B3
2	R: 0   00 G: 255   FF B: 0   00	6	R: 0   00 G: 255   FF B: 255   FF	A	R: 0   00 G: 255   FF B: 128   80	E	R: 179   B3 G: 255   FF B: 179   B3
3	R: 0   00 G: 0   00 B: 255   FF	7	R: 255   FF G: 128   80 B: 0   00	B	R: 128   80 G: 0   00 B: 255   FF	F	R: 179   B3 G: 179   B3 B: 255   FF

#### Example commands

All examples assume the Selection LED interface is connected to an Xperience controller on X-Talk interface 1 (address 001).

Program color label 0 to RGB #3C96FF (60, 150, 255)

```
X001B[103C96FF]
```

Program color label 3 to RGB #AAFF90 (170, 255, 144)

```
X001B[13AAFF90]
```

Program color label A to RGB #FF9090 (255, 144, 144)

```
X001B[1AFF9090]
```

Program color label F to RGB #B22598 (178, 37, 152)

```
X001B[1FB22598]
```

## 3.2 - Define LED segments

The Selection LED interfaces can virtually divide a pixel LED strip into multiple segments (26 max). The command to do so needs to be sent once after each power cycle.

The API command for defining the LED segments is as follows:

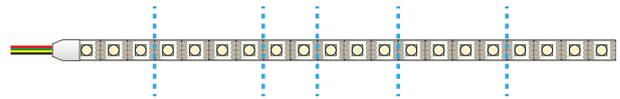
### X001B[0SSS...]

**0** = **Command type** - fixed - indicating the command type, which in this case is "define LED segments" (0)

**SSS** = **number of LEDs per segments**- value between 1-F every subsequent character indicates the number of LEDs for a segment, starting with segments A, going up to segment Z (max).

On the right, example commands for defining the LED segments are provided. When defining LED segments, take the following into account:

- Only the segments which will be used need to be defined. As a result, the length of the command is variable.
- For each segment, a maximum amount of 15 (F) LEDs can be allocated. If in practice a segment needs to be larger than 15 LEDs, 2 segments should be used.
- An API command for defining LED segments always overwrites previously defined segments.
- Defining LED segments does not set the LED output. Thus when sending one of the example commands (on the right), the LED output of the Selection LED interface does not change. Only when sending a "Control LED segment" command, the LED output is set.



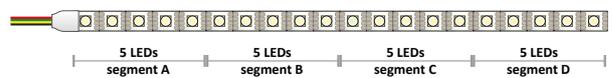
### Example commands

All examples assume the Selection LED interface is connected to an Xperience controller on X-Talk interface 1 (address 001). The visualizations of the LED outputs in the examples are based on the default color palette.

Define LED segments A-D as **5 LEDs each**

```
X001B[05555]
```

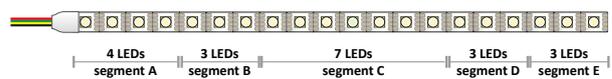
LED output result



Define LED segments A-E as **4, 3, 7, 3 and 3 LEDs**

```
X001B[043733]
```

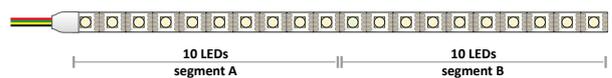
LED output result



Define LED segments A & B as **10 LEDs each**

```
X001B[0AA]
```

LED output result



**3.3 - Define ON and OFF state**

Before a LED segment can be controlled, the ON and OFF states need to be defined. The command to do so needs to be sent once after each power cycle.

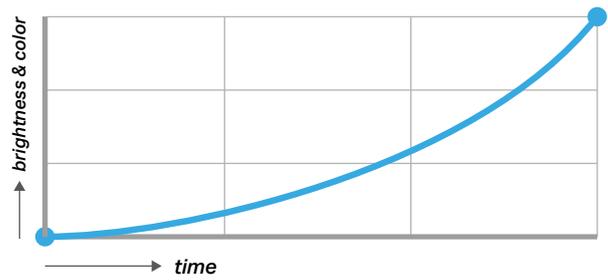
The API command for defining the ON and OFF state is as follows:

**X001B[5+2IIC TT-2IIC TT]**

- 5 = **Command type** - fixed - indicating the command type, which in this case is "Define ON/OFF state" (5)
- + = **ON state character** - fixed - indicating the ON state
- 2 = **X-Wave command type 2** - fixed - "single ramp"
- II = **LED intensity ON state** - value between 00-99
- C = **Color label ON state** - value between 0-F
- TT = **Ramp time towards ON state** - value between 00-99
- = **OFF state character** - fixed - indicating the OFF state
- 2 = **X-Wave command type 2** - fixed - "single ramp"
- II = **LED intensity OFF state** - value between 00-99
- C = **Color label OFF state** - value between 0-F
- TT = **Ramp time towards OFF state** - value between 00-99

On the right, example commands for defining the ON and OFF state are provided. When defining the ON and OFF state, take the following into account:

- Defining the ON and OFF state does not set the LED output. Thus when sending one of the example commands (on the right), the LED output of the Selection LED interface does not change. Only when sending a "Control LED segment" command, the LED output is set.



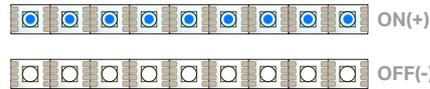
**Example commands**

All examples assume the Selection LED interface is connected to an Xperience controller on X-Talk interface 1 (address 001). The visualizations of the LED outputs in the examples are based on the default color palette.

Define the **ON(+)** state as **99%** brightness on color **C** (default sky blue) with a ramp time of **0.3** seconds and the **OFF(-)** state as **00%** brightness on color **C** with a ramp time of **0.3** seconds:

```
X001B[5+299C03-200C03]
```

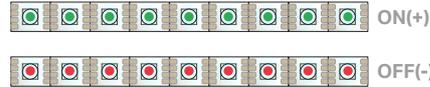
LED output result



Define the **ON(+)** state as **80%** brightness on color **2** (default green) with a ramp time of **0.4** seconds and the **OFF(-)** state as **80%** brightness on color **1** (default red) with a ramp time of **0.4** seconds:

```
X001B[5+280204-280104]
```

LED output result



Define the **ON(+)** state as **70%** brightness on color **7** (default orange) with a ramp time of **0.1** seconds and the **OFF(-)** state as **25%** brightness on color **7** (default orange) with a ramp time of **0.5** seconds:

```
X001B[5+270701-225705]
```

LED output result



## 3.4 - Control LED segments

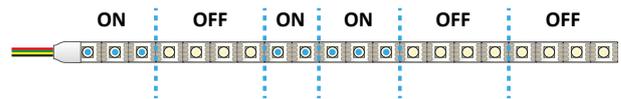
Each LED segment can be set to the ON or OFF state. The API for setting one or more segments to the ON or OFF state is as follows:

### X001B[6+SSS...-SSS...]

- 6 = **Command type** - fixed - indicating the command type, which in this case is "Control LED segments" (6)
- + = **ON state character** - fixed - indicating the ON state
- SSS = **LED intensity ON state** - letter between A-Z  
indicates which segment(s) should be set to the ON state
- = **OFF state character** - fixed - indicating the OFF state
- SSS = **LED intensity OFF state** - letter between A-Z  
indicates which segment(s) should be set to the OFF state

On the right, example commands for controlling the LED segments are provided. When setting the commands to the ON or OFF state, please take the following into account:

- When a LED segment is still ramping up or down, and a new control command for that LED segment is sent, the new command will be ignored. For example: if the ON state is defined with a ramp time of 0.7 seconds, the OFF command for a segment can only be sent 0.7 seconds or later after the ON command is sent to that segment.



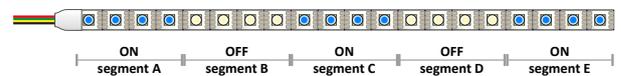
### Example commands

All examples assume the Selection LED interface is connected to an Xperience controller on X-Talk interface 1 (address 001). The visualizations of the LED outputs in the examples are based on the default color palette.

Set segment A, C, & E to the ON state and all other segments OFF:

```
X001B[6+ACE-##]
```

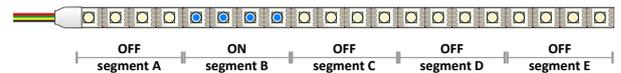
LED output result



Set segment B to the ON state and all other segments OFF:

```
X001B[6+B-##]
```

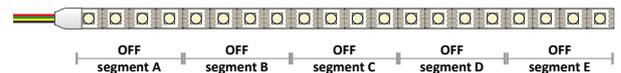
LED output result



Set all segments to the OFF state:

```
X001B[6-##]
```

LED output result



## 4. Power consumption Pixel LED strip

When creating an installation including Pixel LED strips, the power consumption of the LEDs, versus the max power that the Xperience controller and Selection LED interface can provide should be taken into account. Use the table below to calculate the power consumption of the Pixel LED strip.

Brightness	White - FFFFFF (mA per LED)	Red - FF0000 (mA per LED)	Green - 00FF00 (mA per LED)	Blue - 0000FF (mA per LED)
100%	50	22	18	19
80%	36	16	14	14
60%	23	10	9	9
40%	13	6	5	6
20%	5	3	2	2

### Example calculation

When using a Pixel LED strip of 32 LEDs, the maximum power consumption @100% white is:

$$32 \text{ (number of LEDs)} * 50\text{mA (power consumption @ 100\% white)} = 1600\text{mA}$$

The max power consumption of all Xperience controllers and interfaces are indicated on the datasheets under Electrical specifications. When in doubt if the power consumption of an installation falls within specification of the Xperience controller, contact [support@nexmosphere.com](mailto:support@nexmosphere.com) for advice.

## 5. Additional power supply

The XW-DS and MM-8S selection LED interfaces both have a maximum amount of power which they can provide:

XW-DSx                    **max 500mA**  
 MM-8Sx                   **max 1800mA**

In case the power consumption of the Pixel LED strip exceeds these values, an additional LED power cable can be mounted onto the Pixel LED strip. This cable is pre-mounted at Nexmosphere and can provide an additional 3A of power. A 2-way and 6-way splitter are available to connect multiple LED power cables to an additional 5V power supply. Below, an example schematic for a setup with additional LED power supply cables is provided.

