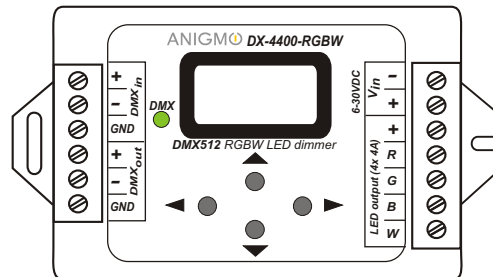


DX-4400-RGBW 4-CHANNEL DMX RGBW DIMMER / AUTO RGB SEQUENCER



Description

DX-4400-RGBW is a 4-channel LED dimmer controlled by a DMX-512 signal. It can operate in several modes, and easily selected by buttons and displayed on a unit's graphics display.

The unit's output driving stages are designed for smooth, flicker-free dimming of all constant voltage LED modules, including MR16 bulbs as well as 12V/24V Incandescent/Halogen bulbs, but is primarily designed for dimming RGBW LED lights, such as RGBW strips and spotlights.

DX-4400-RGBW includes several protection features against common wiring/lamp malfunctions that can protect the installation and be powered by a DC power supply or batteries. This makes them ideal for marine environments such as ships, boats, yachts, sailboats, and boat homes or other applications. It is also suitable for other commercial and industrial applications where high reliability and installation safety are needed.

Unlike many low-cost products on the market, the DMX control signals are fully isolated from the power and output voltages, increasing the reliability of the DMX signal connection.

In addition to the DMX-controlled RGBW dimmer, the unit can also function as an RGB controller, CT (White Color Temperature) controller, 4-channel dimmer, and DMX-controlled RGB sequencer. All functions are selected by buttons on the device and controlled by the DMX signal.

Additional functions include a 16-bit DMX dimming option for smoother color transition and a White Balance trimming option.

DX-4400-RGBW can also operate in a stand-alone mode. In this case, it functions as an autonomous RGB auto-sequencer. Several parameters of the sequencer operation can be selected on the device.

Features

- Controlled by DMX signal
- Easy-to-read display and buttons for simple function and DMX channel selection
- Proprietary Adaptive Pulse Modification (APM) PWM delivers flicker-free lighting and extended dimming range
- Smoothly dims any LED, including hard-to-dim MR16 and G4 lamps across the full (0-100%) dimming range
- Multiple functions in one device: RGBW dimmer, RGB dimmer, CT controller, color sequencer, 4-channel dimmer
- Can function in stand-alone mode as a versatile RGB auto-sequencer
- Superior safety features, including Overheating, No-load, Overload, and Short circuit protection with auto restart
- Isolated DMX inputs for greater connection reliability
- High efficiency, low power consumption

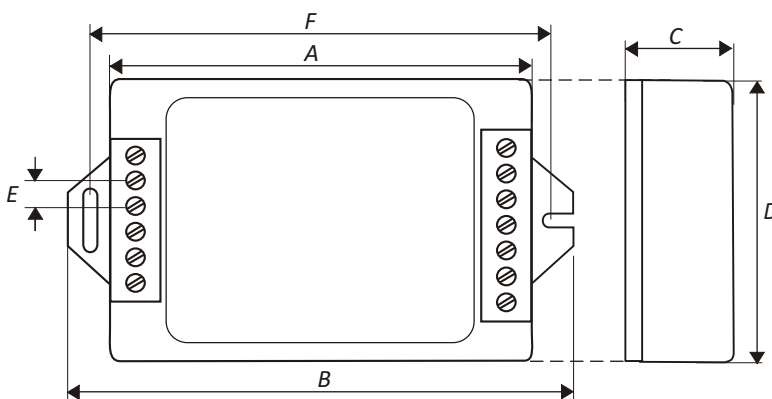
Applications

- Lighting controlled by DMX protocol, such as:
 - Low voltage decorative or industrial lighting, Nautical lighting, RV / caravan lighting
- Applications when high reliability and safety of installation is needed
- When extra smooth DMX dimming is required (16-bit dimming option) or precise RGBW color setting (White Balance option)
- Dimming of any 12/24V DC constant voltage RGBW module such as:
 - Flexible and Rigid Strips, Rope Light, Rigid Light Bars, Under-cabinet Lights, Spotlights, etc.

Specifications

TECHNICAL DATA	DX-4400-RGBW	DX-4448-RGBW
Supply input voltage range nom:	12 - 24 V DC	48 V DC
Supply input voltage (min - max):	6 - 30 V DC	30 - 48 V DC
Supply Input current:	16A	16A
Output current max:	4x 4A	4x 4A
Output load max:	4x48W@12VDC (192W) 4x 96W@24VDC (348W)	4x192W@12VDC (768W)
Control:	DMX-512 signal	
DMX channels used	2-8, depending on the selected function	
Dimming mode:	PWM	
Operating frequency:	390 Hz	
Dimming range:	0-100%	
Dimming resolution:	65 000 steps	
Temperature range:	0 °C to +50 °C	
No-Load proof:	Yes	
Short circuit protection:	Yes, automatic shutoff, reversible	
Overload protection:	Yes, automatic shutoff, reversible	
Overheating protection:	Yes, reversible	
Input and output connections:	Screw terminal for wire 2mm ² (AWG 14) max.	
Housing dimensions (W x D x H):	52mm x 95mm x 21mm (2" x 3.75" x 0.8")	

Dimensions



A (top housing length)	78 mm (3")
B (overall length)	95 mm (3.75")
C (height)	21 mm (0.8")
D (width)	52 mm (2")
E (connector pitch)	5 mm (0.2")
F (mounting hole pitch)	86 mm (3,4")

Installation

Connect the DMX control signal, power supply, and load wires (see connection diagrams below).

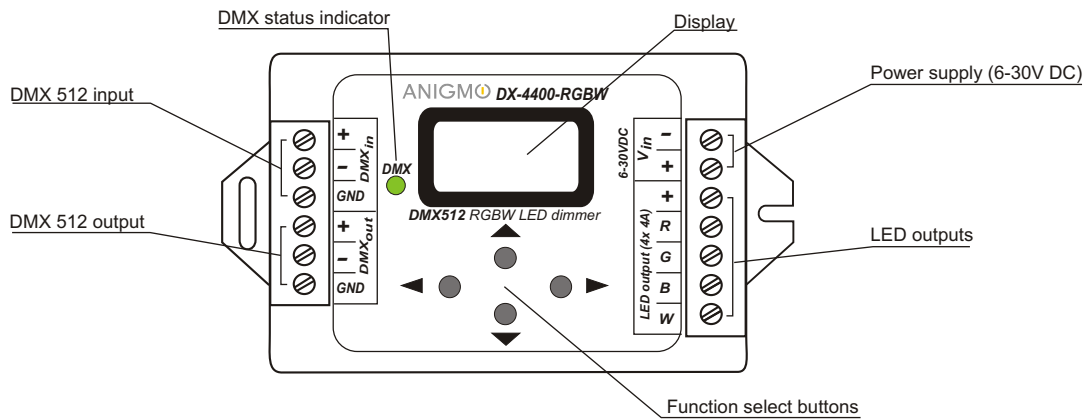
A unit can be mounted using two screws, double-sided tape or cable ties.

Sufficient heat dissipation of the device needs to be ensured. The ambient temperature must not exceed 50°C.

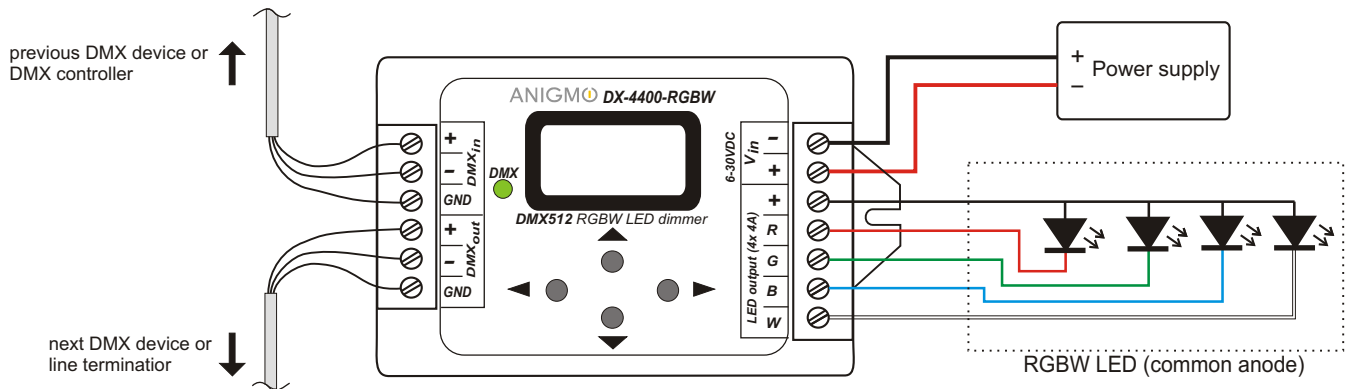
Power supply and load wires should have a sufficient diameter to minimize a voltage drop across the wires. If the voltage drop is too large, flickering of the lights and unstable operation is possible.

When long supply wires are used, it is recommended that a buffering capacitor of several 10 000µF (low ESR type) of appropriate voltage is used. The capacitor should be connected to the dimmer power supply input. Using a buffering capacitor will also filter and significantly decrease RFI emitted from supply wires.

Device description



Connection diagram

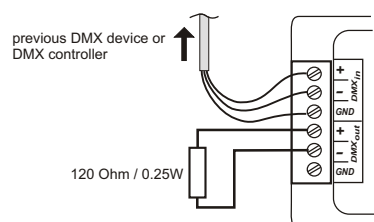


OUTPUT CONSIDERATIONS:

Output wires should be as short as possible. If possible, connect the dimmer close to the load. If mounting the dimmer close to the load is not possible, make sure that positive and negative load wires do not form a large loop area. Load wires should run as close as possible to reduce EMI. For further reduction of EMI, positive and negative load wires can be twisted or shielded and grounded cable can be used.

DMX line termination

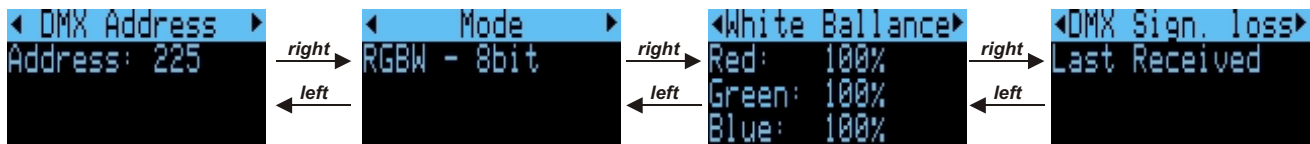
If the dimmer is the last device in a DMX line, the DMX line must be terminated by a line termination resistor. This termination can be done by using a DMX line terminator device or by connecting a resistor to the **DMX Out** connectors of the dimmer, shown on a diagram below.



Connection of the line termination resistor

Device setup

The device is set up by selecting options and parameters in the device's setup menu. Options are selected and modified using four buttons on the device. The Up/Down buttons are used for selecting the parameter we wish to change, Left/Right buttons are used for cycling through values for the selected parameter. The selected parameter is highlighted. If the menu is selected (topmost line), we cycle through all menu options.



1. Setting the DMX channel

To set the DMX channel address, select the "DMX Address" option in the menu. Then press the DOWN button to select the Address line. By pressing the LEFT/RIGHT buttons, the channel number can be increased or decreased. If buttons are pressed for longer than 1s, the number increments/decrements automatically. By holding the button for even longer (about 3s) the speed of increment/decrement increases, allowing for easy selection of larger channel numbers.

The DMX channel becomes active as soon as it is displayed.

NOTE: if the unit is connected to the active DMX controller while changing the channel number, the output could be unpredictable during the channel increment/decrement.

2. Mode of operation

The dimmer can work in different dimming modes. To select the Dimmer Mode, select the "Mode" option in the menu. Then press the DOWN button to select the second line, where the Mode is selected.

2.1. RGBW (8-bit)



In this mode, the dimmer acts as an RGBW dimmer where each color is independently controlled by a single DMX channel.

This mode uses four consecutive DMX channels.

DMX ch	+0	+1	+2	+3
Funct.	Red	Green	Blue	White

2.2. RGBW (16-bit)



In this mode, the dimmer acts as a RGBW dimmer but each color is controlled by a 16-bit value. This allows for much smoother dimming. Each color is controlled by two DMX channels. The first four channels are used for Hi-Bytes of the dimming value, next four channels are used for Lo-Bytes of the dimming value.

This mode uses eight consecutive DMX channels.

DMX ch	+0	+1	+2	+3	+4	+5	+6	+7
Funct.	Red Hi-Byte	Green Hi-Byte	Blue Hi-Byte	White Hi-Byte	Red Lo-Byte	Green Lo-Byte	Blue Lo-Byte	White Lo-Byte

2.3. RGBW + dimming



In this mode, the dimmer acts as an RGBW dimmer where each color is independently controlled by a single DMX channel. In addition to that, a fifth channel is used for dimming all four colors simultaneously. This allows for a specific color to be set by the four color channels and then the color can be dimmed independently by a fifth channel. The ratio between RGBW channels remains the same while dimmed. This preserves the set color and changes its intensity.

When the Dimming channel value is set to 0, all outputs are zero, regardless of RGBW input. When the Dimming channel value is set to 255, RGBW channels are not dimmed (not modified)

This mode uses five consecutive DMX channels.

DMX ch	+0	+1	+2	+3	+4
Funct.	Red	Green	Blue	White	Dimm

2.4. White Color temperature control (CT) + dimming



In this mode, the dimmer acts as a Color Temperature regulator with the dimmer. The first (CT) channel sets the White Color Temperature by varying the ratio between Odd outputs (R, B) and Even outputs (G, W). By connecting LEDs with different color temperatures on Odd and Even channels, the CT channel changes the proportion between outputs of both LEDs, smoothly varying the CT.

If the CT channel value is set to 0, Even outputs (G, W) are set to maximum, and Odd outputs (R, B) are set to zero. If the CT channel value is set to 255, Odd outputs are set to maximum, and Even outputs are set to zero.

The second channel dims the output while preserving the CT ratio set by the first input.

This mode uses two consecutive DMX channels.

DMX ch	+0	+1
Funct.	White CT	Dimm

2.5. Logarithmic Output (4 x universal dimming output)



In this mode, the dimmer acts as a 4-channel Universal dimmer with Logarithmic output. Each output is controlled by is independently controlled by a single DMX channel. In this mode, the output uses a proprietary dimming method, that can smoothly dim any LED, including hard-to-dim MR16 and G4 lamps across the full (0-100%) dimming range.

To achieve optimal dimming range, the minimum dimming level can be set. To set the minimum dimming level, follow the following procedure:

1. Connect lamps to be dimmed on the dimmer output
2. Set all the DMX channels to the value 1



3. In the menu select the "Min level" option and change the value using the LEFT/RIGHT buttons, observing the light output of the lamps. Stop when the desired minimum output of the lamps is achieved. The value range is 0-250.

Output is logarithmically dependent on the input value. This, coupled with the proprietary dimming method, is suitable to dim lamps used for illumination. Due to the logarithmic nature of the output, this mode is not suitable for color mixing.

This mode uses four consecutive DMX channels.

DMX ch	+0	+1	+2	+3
Funct.	Ch 1	Ch 2	Ch 3	Ch 4

2.6. Fade effect (auto color changer / sequencer)

When the Fade effect is selected, the output channels are not directly controlled by the input. Output automatically cycles through predetermined color combinations. Input channels set the color-changing parameters.

There are two fade effect / color-changing modes:

1. RGB



The color-changing sequence in this mode cycles through the classical RGB color palette with all the intermediary Colors:



2. RGBWT



The color changing sequence in this mode the White color is intermixed with the RGB color palette. The White color is added at different points in the sequence for it to mix with all the basic RGB colors in one sequence repetition.



Two DMX channels are used to control the color-changing effect:

DMX ch	+0	+1
Funct.	Change Freq.	Transit. Time

1. The **Change Frequency** parameter sets the duration each color is displayed (the frequency of the color change).

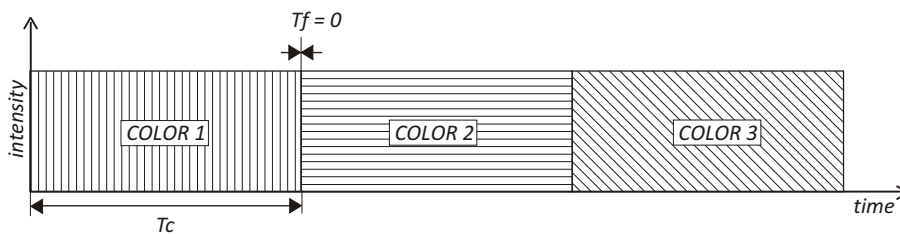
0 - Minimum color changing frequency ($f = 0.014\text{Hz}$ - time between color changes $T_c = 71\text{ s}$)

255 - Maximum color change frequency ($f = 5.8\text{ Hz}$ - time between color changes $T_c = 170\text{ ms}$)

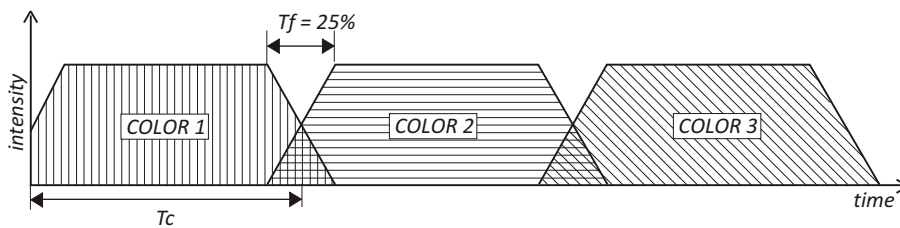
2. The **Transition time** parameter sets the transition time between two colors, expressed as % of the total color time

0 - 0% transition time (instant color changes)

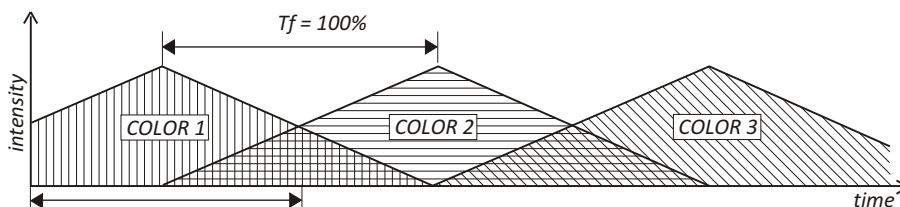
255 - 100% transition (transition is constantly in progress)



Transition time - 0% (DMX channel value of 0), switching between colors is instant



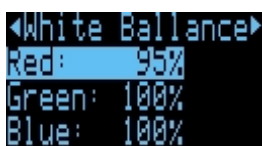
Transition time is 25% of the T_c (DMX channel value of 64)



Transition time is 100%, equal to T_c (DMX channel value of 255), colors are in constant motion

3. White Ballance

When Red, Blue, and Green lights are combined into white light, it is important that the ratio of each color is exact for the resulting color to be the correct temperature and without tint. Some RGB light sources don't have RGB LEDs matched. In that case, the White balance option of the dimmer can be used to set relative outputs of each RGB channel to set the desired white light color/temperature.



Select each color by moving "DOWN" and change the value using the "LEFT/RIGHT" buttons. The value range is from 0% to 100%. When all colors are set to 100%, the output of RGB channels is unmodified (White Balance is off).

White balance influences RGB color mixing in all modes, except in "Fade effect/color-changing" modes.

4. DMX signal loss

When the DMX signal is lost or is invalid, the dimmer enters into a predetermined mode of operation. In this menu, we can select following modes:

1. Last Received



```
<DMX Sign. loss>
Last Received
```

When the DMX signal is lost, the last valid received DMX values determine the output. If there were no DMX values received the default value for each DMX channel is 0

2. All Channels Off



```
<DMX Sign. loss>
All chan. Off
```

When the DMX signal is lost, all outputs are switched off.

3. Fade Effect



```
<DMX Sign. loss>
Fade Effect RGB
Speed: 100
Transition: 255

<DMX Sign. loss>
Fade Effect RGBW
Speed: 100
Transition: 255
```

There are two Fade Effect options, RGB and RGBW. Both have the same properties and perform the same color-changing function as described in chapter 2.6. Both options have two additional parameters, identical to the two control DMX channels described in Chapter 2.6.:

1. **Speed** (corresponds to the DMX control channel **Change Frequency**)
2. **Transition** (corresponds to the DMX control channel **Transition time**)