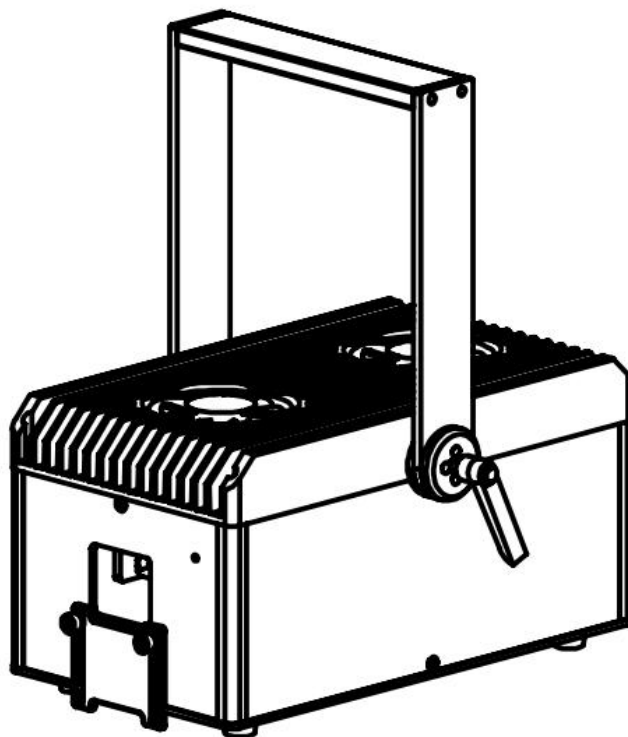


# User Manual

## RGB4000 laser light



### Introduction

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Thank you for purchasing our product.

To ensure proper operation, please read this manual carefully before using the product.

After reading it, keep it in a safe place for future reference.

## General Information

\* The following chapters explain important information about lasers in general, basic laser safety and some tips about how to use this device correctly. Please spend some time reading these information as some of them are critical for safe and efficient operation of this laser display system.



## Caution

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! This laser entertainment system is rated as a Class IV laser product and manufactured in accordance to EN 60825-1:2007. Avoid eye or skin exposure to direct or scattered radiation. Wear protective goggles of suitable optical density if necessary.

! If the laser is operated in a situation where health or property injury may occur the operation must be stopped immediately.

! The manufacturer and its distributors cannot be held responsible for any damages caused by improper use or misuse of this laser system. The owner/user is fully responsible for using this product in accordance to laser safety regulations of the country or state where the system is being used.

Please note that some other optical devices such as cameras, camcorders, video projector etc. can be damaged if exposed to excessive laser radiation.

### Handling precautions

This laser system is a precision device that contains some sensitive opto-electronics components. DO NOT drop it or subject it to physical shock.

This laser system is not waterproof or dust-proof. Make sure to use an appropriate cover or enclosure if it is used in the rain, snow or similar severe environment conditions.

Do not leave the laser system in excessive heat such as in a car whilst in direct sunlight. High temperatures could cause some serious damage to the system.

The laser system contains precision electronic circuitry. Never attempt to disassemble the laser yourself.

If the laser is suddenly brought in from the cold into a warm room, condensation may form on the laser and internal parts. If condensation forms on the laser body, do not use the laser as this may damage the laser system. If there is condensation, wait until it has evaporated before using it.

# What is a laser and how does it work?

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## What is a LASER?

The laser is a bunch of energy waves (streams of photons called radiation) with the same amplitude and phase that are flowing in the same direction; meaning they are coherent – they stick together and form a laser beam.

The width of a single wave is measured in nano-meters and defines the colour and visibility of the laser beam. The visible spectrum of the human eye is roughly between 400nm and 700nm, going from violet to a dark red colour. A human eye is most sensitive to a green light of around 555nm, meaning that a 1W of green laser will always appear more visible than 1W of any other colour laser. 1W of quality laser light is very powerful and although it doesn't sound like much it can burn eye retinas, skin and clothes or even start a fire!

## What makes the laser visible?

Mainly it is the particles of dust in the air that the laser beam hits on its path. That's why we "laserists" use haze or smoke machines to make lasers more visible. Too much of the haze or smoke will kill it, but the right amount will make all the difference between no show and a great show. When outdoors, lasers mainly reflect off dust and mist in the air but due to unpredictable wind conditions we can never make sure the hazers or smoke machines will be effective enough. And that's why we use high power lasers for outdoor shows – to substitute for the lack of dust, haze and smoke.

## How far does it go?

Depending on the power output of the system and weather conditions, the laser can be visible for miles – that is why we need to be cautious about aircrafts when performing outdoor shows. And if you get a system that is powerful enough then yes, it can reach the Moon.

## Colours

Standard full colour analogue lasers use three primary colours: Red, Green and Blue. By mixing those together you can pretty much get any secondary colour:

Red + Blue = Magenta

Red + Green = Yellow

Green + Blue = Cyan

Red + Green + Blue = White

Of course the number and precision of the colours is determined by the modulation, stability and linearity of the system. If the system is not stable enough, it will produce different colours every time it is used, making it virtually impossible to match the colours of two systems at any one time. This is very often the case with systems from far east manufacturers and with re-branded lasers that are being presented as European makes.

## Scanning System

A scanning system is essentially two tiny mirrors, each moving on X or Y axis. By working together they can "scan" the laser beam in all directions. Once a shape is scanned more than 20 times per second, it appears static to the human eye. So any shape drawn by a laser is actually produced by one single laser beam running around like crazy. Every scanning system has a mechanical limit of how fast it can move its mirrors and therefore how many points it can display at any one second and that is usually represented in Points Per Second at a certain scanning angle, i.e. 8 degrees.

# Laser Safety First!

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! Before proceeding any further, please read the following safety page very carefully. It could help you avoid dangerous and hazardous situations which could lead to serious injury or property damage.

! Any laser system classified as a Class 4 laser must be used with caution. If you are not an experienced laser operator we would strongly recommend that you attend a laser display safety course as soon as possible, and ideally before this laser system is used in public areas. There are various places in Europe where you can attend quality training and even a one day course will give you a good amount of valuable information to safely start with.

Unless you are very competent with the use of lasers and about the laser safety, make sure you follow these basic laser safety rules:

- 1: Never look directly into a laser beam.
- 2: Never look directly into laser aperture if the laser system is switched on.
- 3: Be aware that lasers can burn the eye retina, skin or cause fires if not used correctly.
- 4: Never perform Audience Scanning – that's when laser beams and effects hit an audience directly. Always project with the laser above audience head level – at least 3m above floor level.
- 5: When performing outdoors, avoid pointing the laser at aircrafts, buses, trains, etc.
- 6: Never leave the laser system unattended when it's switched on.
- 7: Always check for reflective surfaces within the laser range – these can be very dangerous (i.e. mirror behind the bar in a club could bounce the beam into bar attendant's eye).
- 8: Never hesitate to use the Emergency STOP if you think there's a fault within the laser system or a potential danger to a person/object caused by the laser performance.

## Installation of the System

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**!** The manufacturer is not liable for damages or a injury caused by improper installation of the system.

The installation should be carried by a qualified installer who should follow the Laser Safety Regulations of respective country.

Please follow these rules during the installation:

- 1: Do not connect the device to power supply during the installation.
- 2: Mount the system only to mounting point that is strong, secure and away from places where non-authorised person could get an access to.
- 3: Always make sure the system is properly tighten down and that it cannot get loose and move as a result of sound vibrations, cable pull or similar.
- 4: Always use a safety rope.
- 5: Ensure that all the cables have enough leverage just in case they get caught.
- 6: Ensure that the system is placed at least 20cm away from walls or any other objects including drapes etc.
- 7: Ensure that the system is placed well away from any heat sources including spotlights, moving heads, radiators, etc. Make sure there is a sufficient air-flow around the laser system.
- 8: It is essential that the fan openings are never covered during the laser operation.
- 9: Always follow the Laser Safety Regulations of respective country where the laser is being used.

## Control System

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The overall performance of any our laser system is also dependent on the control system that you use for operating the laser as well as the correct device configuration in the laser control software. There are many laser control options on the market but we mainly recommend control systems from these two manufacturers:

Pangolin Laser Systems

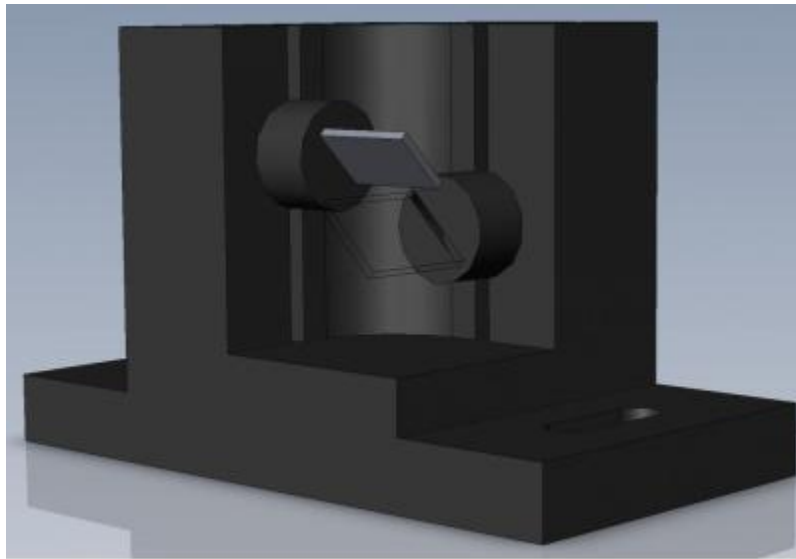
Showtacle

## Scanning System

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The product warranty does not cover the damages to the scanning system caused by improper use of the scanning system or by incorrect programming. Therefore it is essential to understand how the scanning works and where are the limits of it. In this manual we will explain only the basics of it but it is the responsibility of every user to educate themselves so they can avoid damage being caused to the scanning system and costly repairs.

A laser beam comes from a laser module and hits the two moving mirrors of the scanning system. These mirrors are mounted on the scanner shafts and are moved by the scanner rotors, one on X and one on Y axis.



An effect such as tunnel (circle) is displayed by a repetitive mechanical movement of the scanners. For each scanning system and effect, there's a maximal scan rate that is defined by mechanical load, scanner mirror size and weight, complexity of displayed picture and size of the projection (an angle under the laser beam is being projected). A different scanning systems have different scan- rate limits. It is essential to operate the scanning system at scan-rates within its maximal limit at all times to prevent it from overload damage.

### How to establish correct Scan-rate and maximal number of points in an effect

Each effect (picture) contains a different number of graphical points which defines the actual shape of the effect. The more points an effect contains, the lower the maximum scan rate will be in relation to the scanning angle.

As an example we ' ll work with the star effect shown below and with the parameters of quality scanning system:

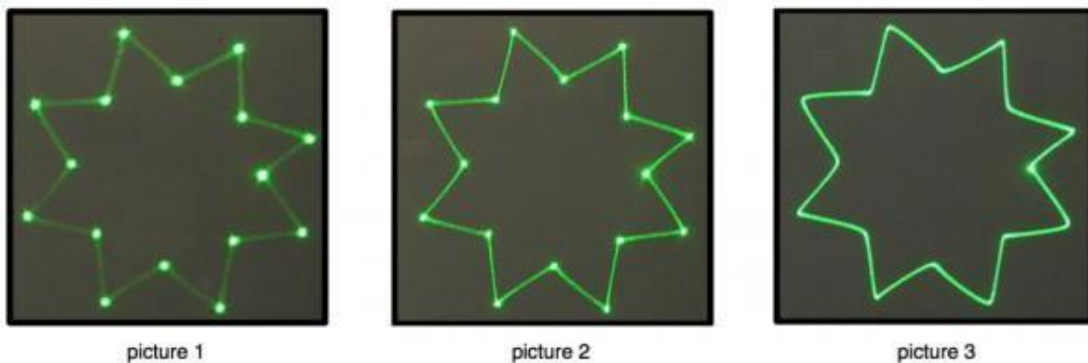
Let ' s say the star effect is made of 300 graphical points (including non-visible blanking points) and we know that the maximal scan-rate of our scanning system is 35kpps @ 8 degrees (= 35.000 points per second at 8 degrees projection angle). We also know that we display the star 35 times per second which is a default frame rate of the control software we are using.

So we need to display 300 points 35 times per second = 10.500 pps. This means that we could display 3 of these stars beside each other within one single laser effect and that it would be quite close to the scanner limit ( $3 \times 10.500 = 31.500\text{pps}$ ). This however applies than 8 degrees on both axes! If we start to increase the size of the projection (scanning angle) it is necessary to either lower the number of points within the effect or drop down the scan-rate in the control software (FPS) to a safe level – which may result in flicker.

From the example above we can also determine how many points this scanning system is able to project if the scanning angle is not more than 8 degrees:

$35.000 \text{ points} / 35 \text{ Frames Per Second} = 1.000 \text{ pps}$ . This is the absolute maximum of how many points we should be using when programming an effect if the scanning angle is not more than 8 degrees.

In the following pictures you see the same star effect scanned at different scan rates at full scanning angle (60 degrees).



Picture 1: the scan rate and/or number of points is too low. The corner points are more visible than the lines between them and the whole effect flickers. The scan-rate and/or number of points needs to be increased.

Picture 2: the scan-rate and/or number of points is about right. The whole effect has more or less the same intensity and does not flicker.

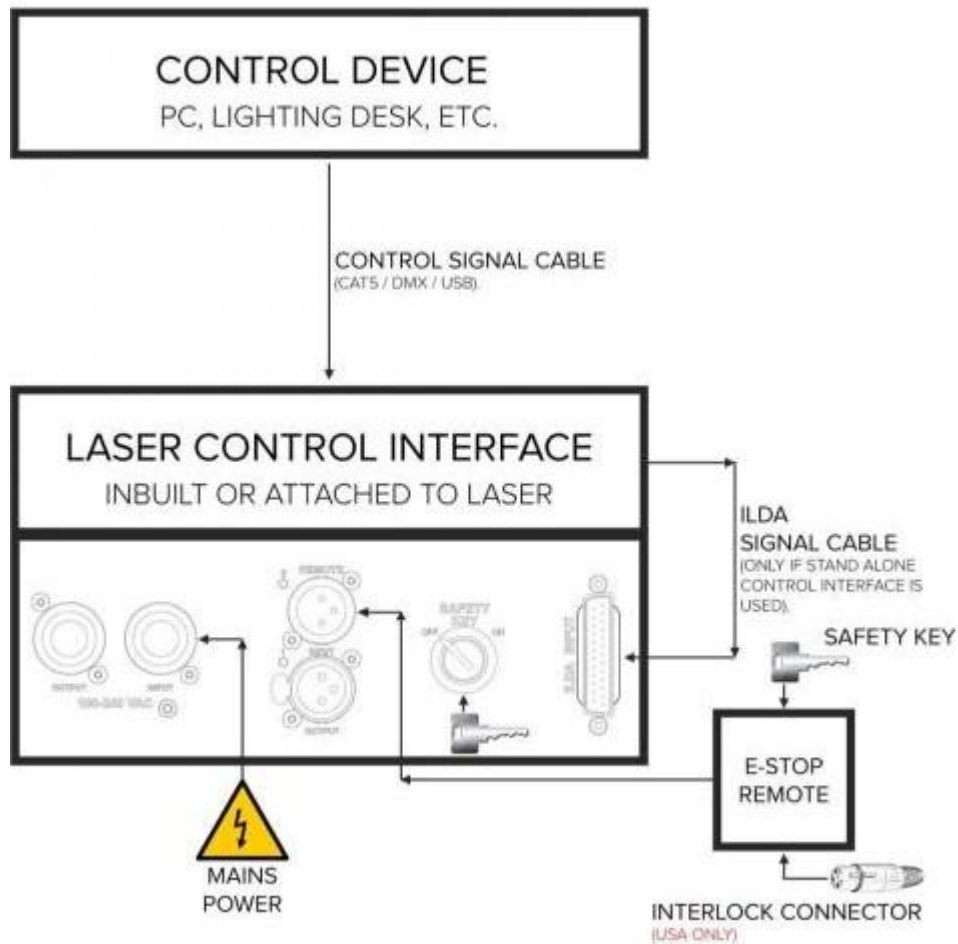
Picture 3: further increasing of the scan-rate and/or number of points results in the effect starting to distort, firstly around corners only. This indicates that you are exceeding the maximal scan rate of the scanning system! If you operate the scanning system at scan-rates higher than the maximum scan-rate of the scanning system the scanners will get damaged irreversibly due to overheated coils damaging rotor magnets.



## Connection Diagram

Please check that all the signal and power leads are correctly installed and that the safety keys are inserted in all necessary positions.

Basic connection diagram



\* Both E-STOP Remote safety key and laser system safety key must be inserted and switched to ON position in order to disable the interlock.

**! USA ONLY : Interlock Connector must be inserted in the E-order to disable the interlock.**

## Power Connections Method

Please connect power as following :

L ( live wire ) =brown wire

E( earth wire )=yellow/green double color wire N

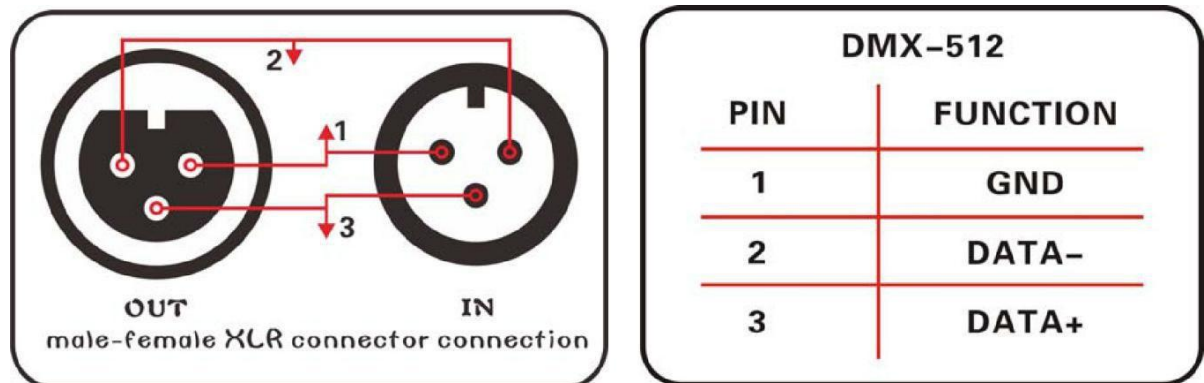
( null line ) =blue wire

When connecting,ensure that the voltage and frequency of power supply match the power requirement of the product.

This product is Class 1 protection equipment.The yellow-green double colors wire must be earthed by qualified personnel. Before installation,ensure that the voltage and frequency of power supply match the power requirements of product.In power supply and voltage fluctuation large areas,we suggest you to use 110V or 220V or use voltage regulator to supply power.After electrical connection,this product will have a few seconds self-check action, self-check finished can be used.

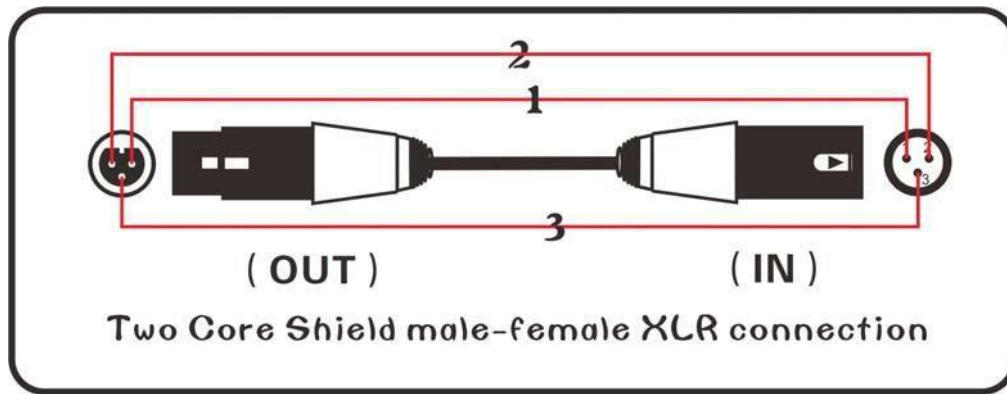
**Important:**It is essential that Yellow/green double color wire is correctly earthed and that electrical installation conforms to all relevant standards

## DMX Connection method



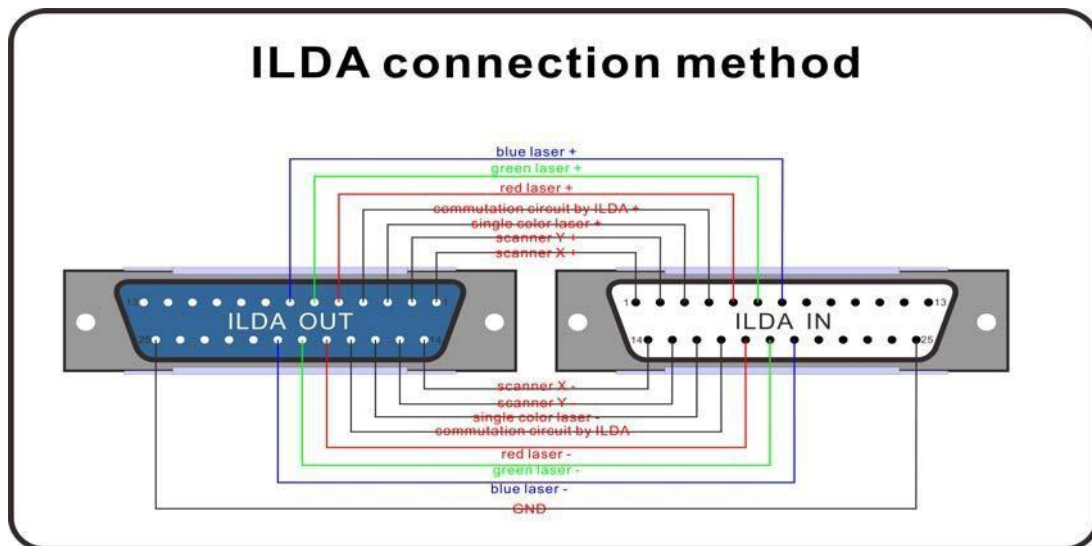
DMX control signal connection must be made with a two core-screened cable,with each core having at least a 0.5mm diameter.Please use the product's signal cable OUT and IN as connection.The signal OUT and IN cables connection shown as above picture.

Note:Please do not connect the signal cable OUT and IN in other way except above shown.



This product accepts digital control signals in protocol DMX512(1990).The amount of lighting fixtures connected in parallel is no more than 32.Connect the DMX controller's **Output** to the first lighting fixture's **Input** cable with a 2 core XLR signal cable(Shown as above ),connect the first lighting fixture's **Output** cable to the second lighting fixture's **Input cable** and connect the rest light fixtures in the same way.Eventually,connect the last lighting fixture's Output cable to a DMX terminator

Under DMX-512 signal control mode,the last lighting fixture's DMX Output must be connected with a DMX terminator.This prevents electrical noise from disturbing and corrupting the DMX control signals.The DMX terminator is simply an XLR connector with a 120 $\Omega$ (ohm) resistor connected across pins 2 and 3,which is then plugged into the output socket on the last projector in the chain.Then connections are illustrated above.



ILDA control signal connection method:

Connection built through product male/female DB 25 degree socket.Like above picture. In addition to the above connections, ILDA signal cannot be connected in any other way

## LCD Menu and function introduction

### \* Main panel displays:

Version: Software version ;

DMX Address: DMX address code;

Mode: Current working mode;

File: The current working file;

1. In the main panel, click the button to enter the menu.
2. In the main panel, ILD and PRG mode, double-click the button to change the folder.
3. After entering the menu, you can double-click the button to exit.

### \* LCD setting of menu:

NO.	First-grade menu	Menu description	Setting item	Setting instructions	Note
1	DMX Address	DMX address setting	1-512	DMX address value	
2	Show Mode	Play mode	ILD	ILD program single loop playback	Automatically switch to DMX mode when connected to DMX
			PRG	Play according to PRG list order	
			Auto	Self-propelled mode	
			Sound	Voice control mode	
3	Program	Select a self-propelled program	progr0	Program 0	Programs 1 to 3 need to be edited with the console and imported
			progr1	Program 1	
			progr2	Show 2	
			progr3	Program 3	
			progr4	Program 4	
4	SD FILE	Folder inside SD card	Folder name	The currently selected folder name	Only valid when playing SD card
5	Size X	Graphic size	-100-100	Built-in program phase	Only valid for Auto mode/DMX mode
6	Size Y	Graphic size	-100-100		
7	Speed	Play speed	8-40	Speed of built-in shows	Set according to the galvanometer

8	DMX State	State without DMX signal	Show	Set playback according to Show Mode	
			Black	No light	
9	Slave Mode	Master-slave status	Slave	Slave	Set to Slave state when not connected
			Master	Host	
10	Y Phasic	Y direction	Positive	positive	Valid for signals from this unit and ILDA
			Reverse	anti-	
11	X Phasic	X direction	Positive	positive	
			Reverse	anti-	
12	Color Mode	Color mode	RGB	color	
			White	monochrome	
13	Laser Lock	Laser light lock	ON	open	Closed laser protection when the laser angle is too small
			OFF	turn off	
14	Sound sense	Voice control sensitivity	0-100	Voice control sensitivity percentage	
15	SD Sound	Animation content voice control switch	ON	open	
			OFF	turn off	
16	Highlight	Brightness setting	0-100	Highlight setting percentage	Set as a highlight at the color junction
17	ILDA Lock	ILDA mode lock	ON	Locked as input signal from ILDA	Select lock to switch to ILDA input when using RJ45 interface
			OFF	Not locked	
18	Load Flash	Load FLASH	ON	Import ILD programs from SD card	Import programs from the SD card's <LOAD> folder
			OFF		
19	Update Prog	Update built-in shows	OFF	Don't update	Import shows from show1.yuq-show4.yuq
			progr1	Update show 1	
			progr2	Update 2	
			progr3	Update 3	
			progr4	Update 4	
			all	Update Program 1-Program 4	

20	Red dimmer	Red brightness	0-255		Only valid for Auto mode/DMX mode, no valid for ILDA
21	Green dimmer	Green brightness	0-255		
22	Blue dimmer	Blue brightness	0-255		
23	DMX mode	Dmx mode select	6ch/19ch/32ch/29ch/52ch	Dmx mode	Note: 19CH/32CH is available only
24	language	Language select	中文/English	Language	

**\* DMX-512 Channel function**

**19CH mode:**

Channel	Function	Value	Description
CH1	Dimmer	0-255	Dimmer from dark to bright
CH2	Mode selection	0-49	Auto
		50-99	Voice control mode
		100-149	PRG file sequential playback
		150-199	ILD file loop playback
		200-255	Built-in graphics
CH3	Graphics selection	0-255	Graphic selection, one graphic for every two values
CH4	Display mode	0-63	Normal
		64-127	Highlight display
		128-191	Segmented display
		192-255	point display
CH5	Selection of color	0-16	white
		17-33	red
		34-50	green
		51-67	blue
		68-84	yellow
		85-101	purple
		102-118	cyan
		119-135	White, red, green, and blue color segments
		136-152	Blue, yellow, purple and cyan color segments
		153-169	White red green blue yellow purple cyan color segmentation
		170-186	White, red, green, blue colors flowing
		187-203	Blue, yellow, purple, and cyan colors flow

		204-220	White red green blue yellow purple cyan color flow
		221-237	Color breaks based on graphic breakpoints
		238-255	Voice-controlled color change
CH6	X move	0-125	Adjust the position manually
		126-175	Automatic left and right circular motion
		176-225	Automatic jump left and right circular movement
		226-245	Automatic irregular jumping
		246-255	Voice-controlled irregular jump
CH7	Y move	0-125	Adjust the position manually
		126-175	Automatic up and down cycle movement
		176-225	Auto jump up and down cyclic movement
		226-245	Automatic irregular jumping
		246-255	Voice-controlled irregular jump
CH8	Zoom	0-10	No scaling
		11-87	Resize manually
		88-150	zoom
		151-200	Zoom out
		201-255	Loop zoom
CH9	X rotation	0	No rotation
		1-128	Manual adjustment
		129-255	Automatic rotation
CH10	Y rotation	0	No rotation
		1-128	Manual adjustment
		129-255	Automatic rotation
CH11	Center rotation	0	No rotation
		1-128	Manual adjustment
		129-192	Automatic clockwise rotation
		193-255	Automatic counterclockwise rotation
CH12	Gradual painting	0-10	No fade
		10-74	Adjust the fader manually
		75-104	Auto-grading (increase)
		105-144	Automatic fade (minus)
		145-184	Automatic loop fade
		185-224	End-to-end loop drawing gradually (increase)
		225-255	End-to-end loop gradual drawing (minus)
CH13	X wave	0-9	No waves
		10-69	Small amplitude wave
		70-129	Medium amplitude wave
		130-189	Large wave
		190-255	Maximum amplitude wave
CH14	Y wave	0-9	No waves
		10-69	Small amplitude wave
		70-129	Medium amplitude wave
		130-189	Large wave

		190-255	Maximum amplitude wave
CH15	strobe	0-10	No strobe
		11-199	Auto strobe (from slow to fast)
		200-255	Strobe by Voice
CH16	Red modulation	0-255	Red light from brightest to dark
CH17	Green modulation	0-255	Green light from brightest to dark
CH18	Blue modulation	0-255	Blue light from brightest to dark
CH19	Movement out of bounds effect	0-49	Out of bounds rebound
		50-99	Out -of -bounds to be line
		100-149	Out-of-bounds blanking
		150-255	Out-of-bounds pass through

### 32CH mode:

CH1 to CH19 is same as 19Chs mode above. From CH20 to CH32, the laser light will output second Graphics at same time, CH20 to CH32 is for second Graphics as below:

Channel	Function	Value	Description
CH20	Graphics selection	0-255	Graphic selection, one graphic for every two values
CH21	Display mode	0-63	Normal
		64-127	Highlight display
		128-191	Segmented display
		192-255	point display
CH22	Selection of color	0-16	white
		17-33	red
		34-50	green
		51-67	blue
		68-84	yellow
		85-101	purple
		102-118	cyan
		119-135	White, red, green, and blue color segments
		136-152	Blue, yellow, purple and cyan color segments
		153-169	White red green blue yellow purple cyan color segmentation
		170-186	White, red, green, blue colors flowing
		187-203	Blue, yellow, purple, and cyan colors flow
		204-220	White red green blue yellow purple cyan color flow
		221-237	Color breaks based on graphic breakpoints
		238-255	Voice-controlled color change
CH23	X move	0-125	Adjust the position manually
		126-175	Automatic left and right circular motion
		176-225	Automatic jump left and right circular movement
		226-245	Automatic irregular jumping
		246-255	Voice-controlled irregular jump



CH24	Y move	0-125	Adjust the position manually
		126-175	Automatic up and down cycle movement
		176-225	Auto jump up and down cyclic movement
		226-245	Automatic irregular jumping
		246-255	Voice-controlled irregular jump
CH25	Zoom	0-10	No scaling
		11-87	Resize manually
		88-150	zoom
		151-200	Zoom out
		201-255	Loop zoom
CH26	X rotation	0	No rotation
		1-128	Manual adjustment
		129-255	Automatic rotation
CH27	Y rotation	0	No rotation
		1-128	Manual adjustment
		129-255	Automatic rotation
CH28	Center rotation	0	No rotation
		1-128	Manual adjustment
		129-192	Automatic clockwise rotation
		193-255	Automatic counterclockwise rotation
CH29	Gradual painting	0-10	No fade
		10-74	Adjust the fader manually
		75-104	Auto-grading (increase)
		105-144	Automatic fade (minus)
		145-184	Automatic loop fade
		185-224	End-to-end loop drawing gradually (increase)
		225-255	End-to-end loop gradual drawing (minus)
CH30	X wave	0-9	No waves
		10-69	Small amplitude wave
		70-129	Medium amplitude wave
		130-189	Large wave
		190-255	Maximum amplitude wave
CH31	Y wave	0-9	No waves
		10-69	Small amplitude wave
		70-129	Medium amplitude wave
		130-189	Large wave
		190-255	Maximum amplitude wave
CH32	Movement out of bounds effect	0-49	Out of bounds rebound
		50-99	Out -of -bounds to be line
		100-149	Out-of-bounds blanking
		150-255	Out-of-bounds pass through

## Product technical parameters

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- 1.Voltage:AC90~240V 50~60HZ±10%
- 2.Power consumption:120W
- 3.Laser source: diode.
- 4.Laser power /wavelength:  
1x1000mW Red(638nm)  
1x1000mW Green (520nm )  
1 x 2000mW Blue (445nm )
- 5.Beam size: 4.5mm at aperture
- 6.Divergence: <1.0mrad-full angle
- 7.Colors:RGB full color
- 8.External Modulation:100K Analog
- 9.DMX Channel:19CH/32CH
- 10.Scanner system: 30kpps
- 11.Control signal:DMX-512 international standard signal
- 12.Control mode:Music,auto,master-slave and DMX-512,ILDA Control
- 13.Cooling system:fan
- 14.Operation environment :Indoor
- 15.Operation temperature:-10°C~40°C
- 16.Net Weight :4.5kg
- 17.Dimension Size : 27(L)\*15(W)\*13(H)cm

## Maintenance

To prolong the life of the product, it is very important to do maintenance work. The environment is harsh outdoors, or if the product is idle for a long time, damp, smoke or particularly dirty surroundings can cause greater accumulation of dirt on its cover and housing. So it should be cleaned to maintain an optimum light output and at the same time to prevent it from being corrupted by acid gas. Cleaning frequency depends on the environment in which the fixture operates. Soft cloth and typical glass cleaning products should be used for cleaning. It is recommended to clean product at least once every 20 days. Friendly notice: Do not use any organic solvent, e.g. alcohol to clean housing of the apparatus.

## Troubleshooting

Problems	Action
The product doesn't switch on	Power connection is not correct. Re-connect the power.
	Power supply is damaged or abnormal. Call a qualified personnel to fix it.
	Connection of control board is not correct. Call a qualified personnel to fix it.
The product can turn on, but no light coming out.	Control mode is wrongly setting up. Resetting it according to instruction book
	Control section is damaged. Call a qualified personnel to fix it.
The beam appears dim	The product is too hot. Take ventilation measures to make it cool.

**Note:** This product is under warranty for 1 year (From the date of delivery), 1 years after can provide paid maintenance services. But if it is because of natural disasters or user's operation not according to manual. We won't provide warranty.