User Manual

RGB6000 laser light

Introduction

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

LASER RADIATION
AVOID EYE OR SKIN EXPOSURE TO
DIRECT OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT
IEC 60825-1

DANGER

LASER RADIATION
AVOID EYE OR SKIN EXPOSURE
TO DIRECT OR SCATTERED RADIATION
CLASS IV LASER PRODUCT

Diode Laser
__ W MAX OUTPUT AT __ nm
__ W MAX OUTPUT AT __ nm
__ W MAX OUTPUT AT __ nm
TOTAL MAX OUTPUT
W AT _____ nm
IEC 60825 - 1:2007

CAUTION
RISK OF ELECTRIC
SHOCK DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER OR BACK PANEL.
SERVICEABLE PARTS INSIDE. REFER SERVICING TO
QUALIFIED SERVICE PERSONNEL.

CAUTION
LASER LIGHT IS BRIGHT AND
BLINDING DO NOT SHINE AT
AIRCRAFT OR VEHICLES AT
ANY DISTANCE

CAUTION
CLASS 4 VISIBLE
LASER RADIATION WHEN OPEN
AND INTERLOCKS DEFEATED
AVOID EYE OR SKIN EXPOSURE TO
DIRECT OR SCATTERED RADIATION

Caution

! 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?

What is a LASER?

The laser is a bunch of energy waves (streams of photons called radiation) with the same amplitude and faze 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!

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

~~2: Install the system only to mounting point that is strong, stable 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

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

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.
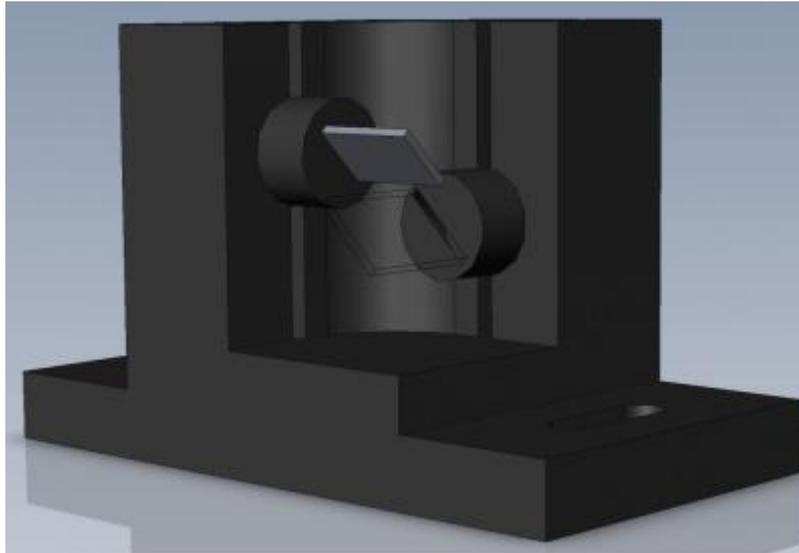
An effect such as tunnel (circle) is displayed by a repetitive mechanical movement of the scanners. For each scanning system and effect, there's a maximal scan rate that is defined by mechanical load, scanner mirror size and weight, complexity of displayed picture and size of the projection (an angle 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 3of these stars beside each other within one single laser effect and that it would be quite close to the scanner limit (3 × 10.500 = 31.500pps). 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 points / 35 Frames Per Second = 1.000 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).
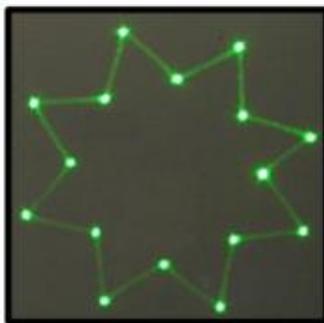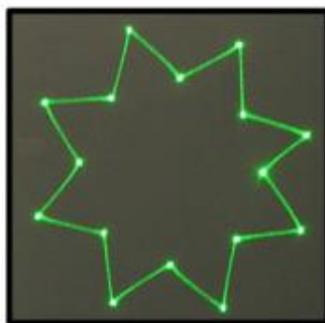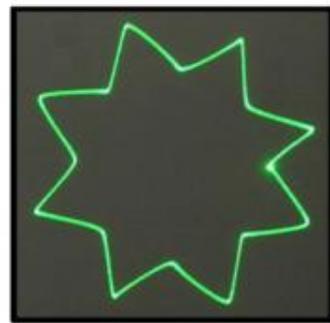
picture 1   picture 2   picture 3

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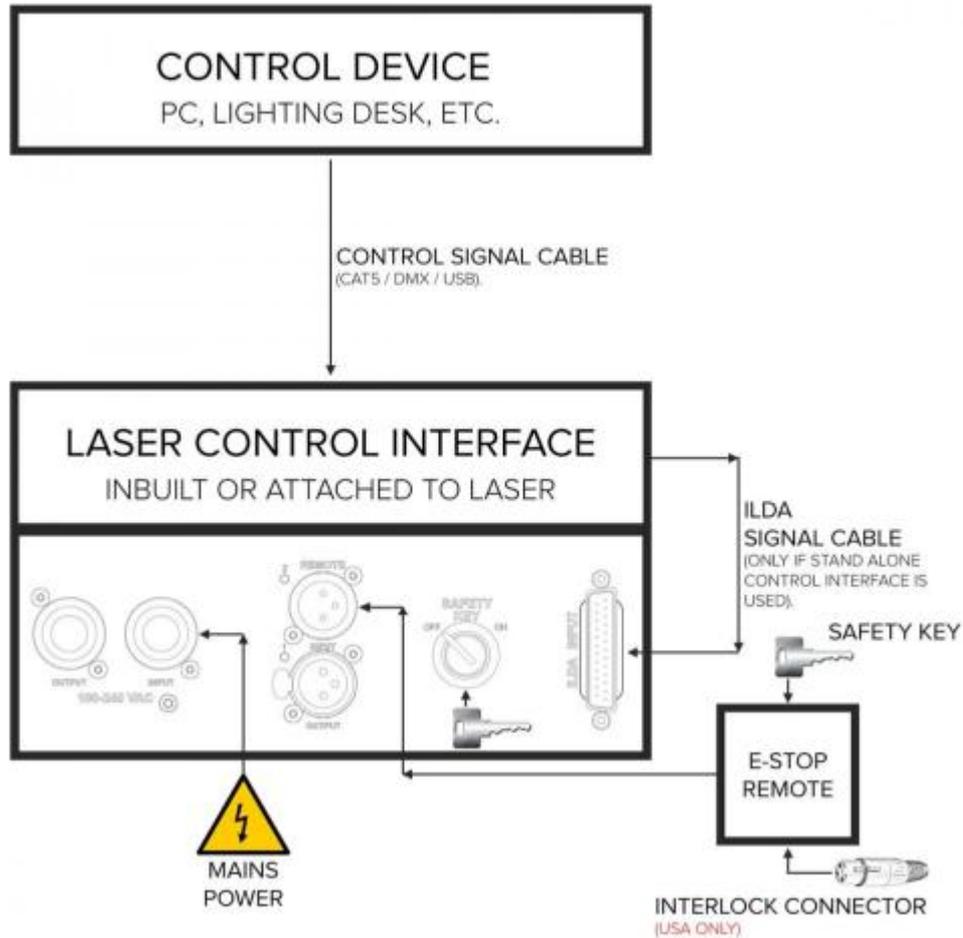
* Both E-STOP Remote safety key and laser system safety key must be inserted and switched to ON position in order to disable the interlock.

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

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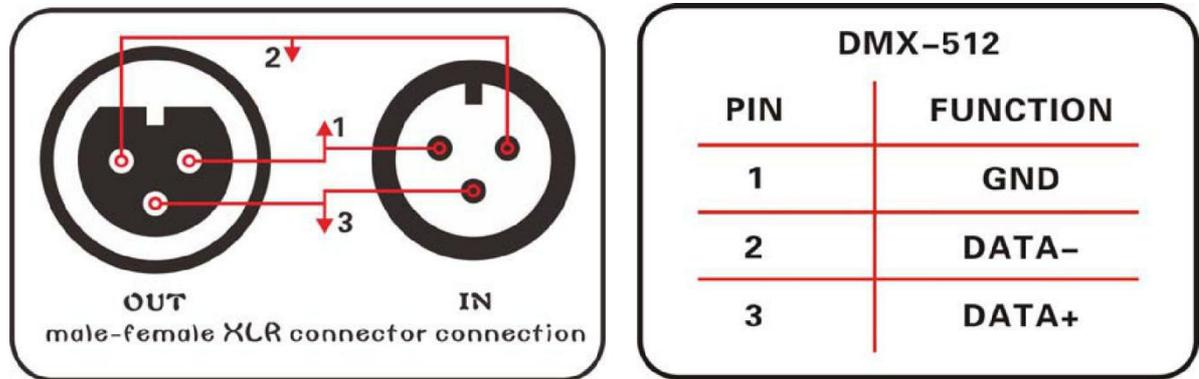
DMX control signal connection must be made with a two core-screened cable,with each core having at least a 0.5mm diameter.Please use the product's signal cable OUT and IN as connection.The signal OUT and IN cables connection shown as above picture.

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

Two Core Shield male-female XLR connection
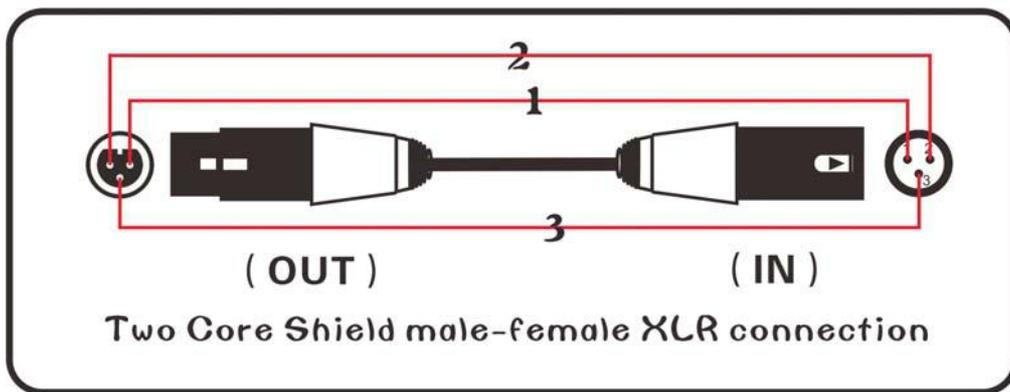
This product accepts digital control signals in protocol DMX512(1990).The amount of lighting fixtures connected in parallel is no more than 32.Connect the DMX controller's **Output** to the first lighting fixture's **Input** cable with a 2 core XLR signal cable(Shown as above),connect the first lighting 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 120Ω(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.
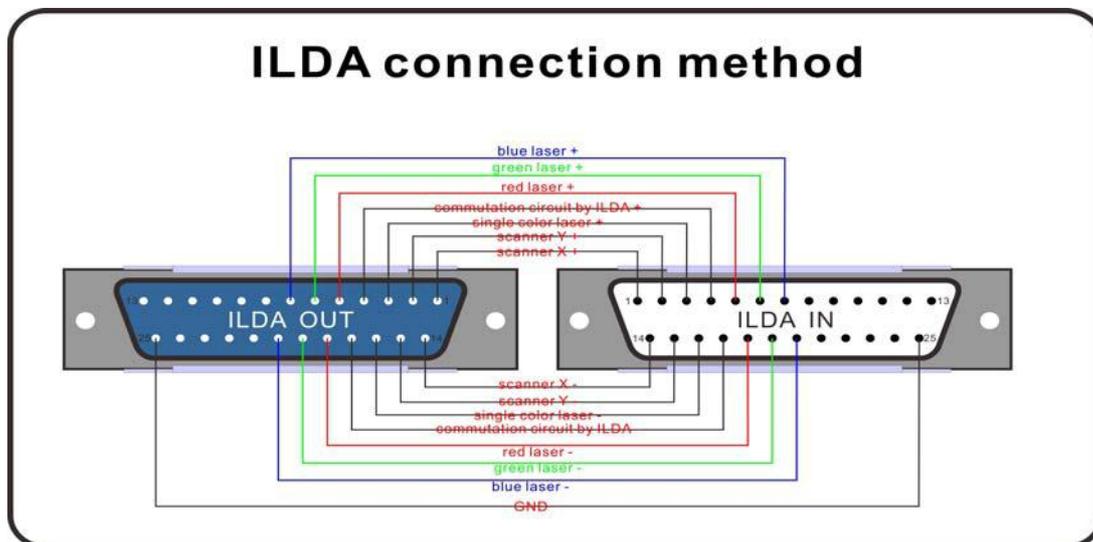
ILDA control signal connection method:
Connection built through product male/female DB 25 degree socket.Like above picture. In addition to the above connections, ILDA signal cannot be connected in any other way.

Rear View
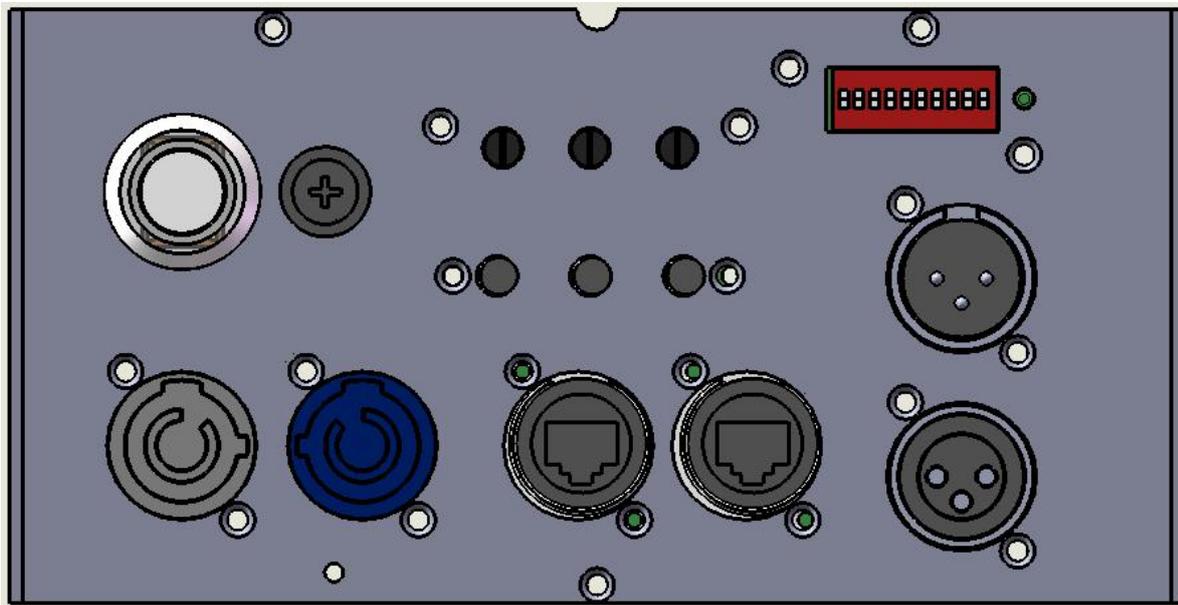
IN / OUT: connect software
AC IN/OUT: AC input 110-240v 50/60Hz
DMX-ILDA: DMX change to ILDA
FUSE: fuse
Power: power switch on/off
X INVERT Y :   X / Y invert
Laser Power Control: Each color power adjust
DMX IN / OUT: connect DMX
DMX/Linking: Dip switch

Product technical parameters

1.Voltage:AC90~240V 50~60HZ±10%
2.Power consumption:120W
3.Laser source: diode.
4.Laser power /wavelength:
1x2000mW   Red(638nm)
1x2000mW   Green (520nm)
1x2000mW   Blue (445nm)
5.Beam size: 4mm at aperture
6.Divergence: <1.5mrad-full angle
6.Colors:RGB full color
7.External Modulation:Analog 100k
8.Scanner system: 40kpps
9.Control signal: ILDA international standard signal
10.Control mode: ILDA Control
13.Cooling system:air cooling
14.Operation environment :Indoor
15.Operation temperature:-10℃～40℃
16.Net Weight :7kg
17.Dimension Size : 28(L)x 20.5(w) x 13.5(H) cm

DIP switch: Address 1-10 Pin

1 ~ 10	Function
0,0,0,0,0,0,0,0,0,0	Sound Mode
1,0,0,0,0,0,0,0,0,0	Auto Mode
0,0,1,0,0,0,0,0,0,0	Slave Mode
1,1,0,0,0,0,0,0,0,0	Graphic Mode
x,x,x,x,x,x,x,x,x,1	DMX 512 Control

DMX Channel Chart :

Channel	DMX 512 value	Control Function
1.Mode Select	0~49	Music Trigger
	0--49	Music trigger
	50--99	Auto trigger（Beam）
	100--149	Auto trigger（Pattern）
	160--199	Manual mode，Music trigger
	200--255	Auto mode
2.Blank/Laser off	0--255	Single color (laser off-No blank- Flow blank-Strobe blank-- Default color---
	0--255	3color (laser off—red—green--yellow--Default color—single color(random)—3 color(random)-Flow blank-default color)
	0-255	7 color (laser off—white-red--yellow--green-cyan-blue-purple—single color(random)—7 color(random)-Flow blank-default color)
3 Pattern select	0--255	Max 256 pieces Patterns
4.X-axis movement	0--127	Manual movement
	128--191	Auto Move Down, The moving speed of the plunger proportional to the value
	192--255	Auto Move Up, The moving speed of the plunger proportional to the value
5.Y-axis Movement	0--127	Manual movement
	128--191	Auto Move Right, The moving speed of the plunger proportional to the value
	192--255	Auto Move Left, The moving speed of the plunger proportional to the value
6.Vertical invert	0--127	invert by hand
	128--255	invert auto
7.horitional invert	0--127	invert by hand
	128--255	invert auto

	0--127	Rotation by hand
8. Rotation	128--191	Clockwise rotation auto
	192--255	Counterclockwise rotation auto
	0--85	From small to big
9.Zoom	86--170	From big to small
	171--255	Alternately zoom
10. Pattern size	0--255	0: original size; 1:smallest;255:biggest
11.A hot point	0--255	0:disappear; 1:darkest;255:brightest
12.gradually drawing	0--127	Auto gradually drawing1
	128--255	Auto gradually drawing2

The detail of CH2:

Single color

	0~15	laser off
	16~25	No blank
*2:*Blank/Laser off	26~135	Flow blank from slow to fast
	136~245	Strobe blank from slow to fast
	246~255	Default color

Three color

	0~5	laser off
	6~15	red
	16~25	green
	26~35	yellow
*2:*Blank/Laser off	36~105	single color(random) slow to fast
	106~175	3 color(random) slow to fast
	176~245	Flow blank slow to fast
	246~255	default color

Seven color

	0~5	laser off
	6~10	white
	11~15	red
	16~20	yellow
	21~25	green
	26~30	cyan
	31~35	blue
*2:*Blank/Laser off	36~40	purple
	41~110	single color(random) from slow to fast
	111~180	7 color(random) from slow to fast
	181~250	Flow blank from slow to fast
	251~255	default color

Maintenance

To prolong the life of the product, it is very important to do maintenance work. The environment is hash 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 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.