## 技术说明

喷泉主要采用高喷、数控喷泉、直流喷泉等喷泉,材料以不易锈蚀,耐久性好的 304 不锈钢为主,喷嘴的进水口径和 管道设计在合理流速以内,以减少管路阻力,水泵采用喷泉专用水泵。用最小的水泵功率来达到最高和最远射程;喷嘴 出水内径采用精加工技术,表面粗糙不高于 Ra1.6,以保证出水形状完整、均匀、整齐。在管路系统中,管径每一点的 过水流量都经过精确的计算。选择合适的管径可将管路阻力控制在许可范围内。每组喷嘴喷水的整齐性靠管道科学合理 布置,以及我们丰富的实践经验和喷嘴内部的光洁度来保证。喷泉不同水型之间没有任何联系,各自采用独立的水泵、 管道、喷嘴组成系统。不同水型根据扬程和流量需要选择合适的水泵,水泵工作情况点选择在最高效率工作区域上,以 节约电能。我们对水泵的控制方法是: 计算机或者喷泉操作人员根据音乐信号内容编程, 来决定喷水水型的水泵, 其余 水泵停机备用。然后用采用变频调速来控制音乐信号强度运行水泵转速。

#### 电路、控制系统说明

我公司研制的音乐喷泉控制系统由工业控制计算机、音频控制器、变频器、控制柜五组成。

系统控制流程是这样的:工业控制计算机作为控制中心,整个系统程序和控制程序都装载其中。当播放音乐喷泉时,控 制命令及数据通过工控机串和口传输到音频控制器,再经音频控制器处理后传输到下一级控制设备——变频器、软启动 器、控制柜。再由这些控制设备控制水泵和水下彩灯等设备。

#### 音乐喷泉控制系统具备:

1):全自动音乐喷泉。2):全自动程控喷泉。3):手动控制喷泉等三种功能。

A. 音乐喷泉控制系统采用电脑智能化管理,能自行识别乐曲的旋律、节奏、乐感和音乐强弱度,具备完善的多功能艺术 表现力和音源的亲结合力,实现了喷泉与音乐内涵完全一致的效果。业主可以自由根据现场实际表演来设计新的音源的输入。

B. 可编程控制器采用进口产品, 有友好的人机介面, 广泛的控制选择性。

C. 全整套控制系统在设备组合上采用了当今最先进的控制技术与产品,操作界面十分友好,操作方式安全、简单。可以实 现数字式联网控制。

D. 整套控制系统包含过压、过流保护装置和漏电保护装置。

E. 整套喷泉采用多媒体电脑控制, 声、光、水形同步变化, 误差小于 0.1 秒。

F. 喷泉照明灯采用 LED 变色灯功率为 30W/24V/盏和 15W/24V/盏。针对水景及其寓意,加以光的配合表现出喷泉水景的内涵。灯光随着喷泉水型的变化,相应的色彩层层展放,交相辉映。视具体水型及寓 意配置相应色彩的灯光,确保了水景完善的艺术效果。控制系统安装低压变压器,工作时由于电流较小,从而有效地避免电流或电压对人身造成的伤害。确保了整套设备的安全运行

G. 控制系统的精髓在于软件的功能发挥,整个音乐喷泉控制软件由本公司开发研制。该软件由音乐喷泉编辑系统,播放系统,调试系统三部分组成。

#### 控制系统硬件系统工程各部件的优点:

### 1 、多媒体电脑C-PLC 控制

多年来我公司一直采用电脑工控机作为系统控制机,主要是因为它具有性能稳定、速度快、防尘、防震及对环境条件要求低等优点。虽然工控机价格稍贵,但多年的使用效果证明我们的选择是正确的。同时 工控机的操作界面还可以给出烟花控制设备的起动信号, 使烟花与水景的控制相得益彰。

音乐喷泉的成败最重要的是水流是否有音乐感。音频控制器的主要功能是对音乐信号进行处理,再将处理后的信号传输到下一级控制设备,这样就要以控制所需的水型按照音乐的节奏高低起伏,使音乐喷泉 真正达到了水下芭蕾的艺术效果。该控制器件关键部件采用进口商品,容量可增减,兼容性强,故障率极低,经久耐用且维护简单。

采用变频器进行电机的控制是本公司一项成熟而先进的控制技术。我公司采用音频解码板,对音乐信号的成分进行分析,识别出其中的频率、幅值、包络线等信息,通过这些信息控制变频器的频率,间接控 制水泵的工作频率,从而达到了水柱能够随着音乐的高低、节奏的快慢而高低起伏,达到了音乐喷泉特殊的艺术效果。

#### 4、控制柜

控制柜用于潜水泵、水下灯的开关驱动。控制柜的各控制回路核心元件主要采用半导体可控硅,它具有寿命长、体积小、无噪音、成本低、散热良好、无误动作等特点。电磁阀和水下灯的控制回路具有熔断 保护功能,潜水泵的控制回路具有过流、缺相保护功能。控制柜具有良好的强力通风冷却装置,可以在较潮湿、室温较高的环境下稳定运行。整个水景控制系统均采用 GGD 标准低压柜箱体,质量为国家机电 专业认证全格产品。多年来的使用实践表明其不仅符合国家标准,工艺考究,而且安全可靠。

由我公司设计的专用配电系统,它更适合于水景操作的特点。根据控制的数量、分配功率和负荷性质,配电柜可以为每台控制

柜分别提供供电回路。同时,配电柜具有对地,对零漏电保护;过流保护;缺相保护;消防强切;远程控制等功能。对应控制柜

另外需要指出的是,水景配电系统应使用电业部门提供的独立变压设备,并且提供一次柜和相应的补偿柜。

## 6、软件系统说明

整个音乐喷泉控制软件由本公司开发部研制。在国内喷泉界是绝无仅有的。该软件由音乐喷泉编辑系统,播放系统,调试系统三部分组成。下面我简单介绍一下它强大的功能。

## 1 ) 音乐喷泉编辑系统

对于每一个音乐喷泉,我们根据现场的喷泉布局,在编辑系统中都相应有一张布局图,每一台水泵和每一组水下灯都有一特定的符号。在编辑系统中,用户可以根据个人喜好,设置自己喜爱的喷泉控制程序 。编辑系统还备有一些子程序,用户可以方便的调用。用户编辑好喷泉控制程序后,可以先模拟执行,即在不开喷泉的情况下,运行编辑好的喷泉控制程序,预先体会一下喷泉运行的效果,如果认为不理想

## ,可以随时进行修改,直到满意为止,再实时播放,从而达到了节约能源的目的。

### 2 ) 音乐喷泉播放系统

进入播放系统,喷泉布局清晰的显示在我们的面前,每一台水泵,每一组灯都有相应的、统一的符号。只要轻松用鼠标单击播放按钮,即可同步播放音乐喷泉。同时计算机可同步显示喷泉实时动作情况。免 去了监控系统。系统有白天和夜晚两种播放方式,白天播放方式灯光自动关闭。也可以只开音乐不开喷泉。当系统发生故障时(如电源缺相、欠压),计算机控制界面可以发出报警提示,同时硬件自锁,以 免损害人身安全并保护所有控制设备。

#### 3 ) 音乐喷泉调试系统:

进入调试系统,可打开所需的水泵或水下彩灯,用于故障检测或水型调试。当某一负载不工作时,可以将这一路控制信号打开,来逐级检测故障所在,安装完喷头后可以逐一打开每一台水泵,进行水型调试 。在不需要开音乐喷泉时,可以打开一些固定水型供游人欣赏。由于充分运用了计算机多媒体技术,其音源种类、操作的透明程序、韵律编辑的所见即所得物性得到充分的展现。音源种类可分独立音源(如 CD 机)、计算机音源(包括\*.wav、\*.mid、及 mp3 等)两大类。操作的透明程序表现为:用户只需用鼠标轻击按键即能完成播放过程。韵律编辑的所见即所得体现为:用户可根据自己的意愿非常形象直观 的编辑韵律文件并即时模拟播放,突破了一贯喷泉只有几首乐曲的瓶颈。计算机多媒体音乐喷泉控制系统包括高档计算机(配高性能声卡)、串行通讯适配器、可编程工业控制器(PLC)、光电隔离电力驱动 器、各色光源、各种水泵电机、变频器及其它控制电器等,外部音源(如 CD 机)、音频处理设备、音箱等。随着多媒体技术的再发展,计算机多媒体音乐喷泉控制系统将更加丰富、完善。控制软件简单易 学,即使无计算机操作基础,也可以在短时间内学会。



## Technical description

#### Description of nozzle design, piping system technology:

The fountain mainly uses high-spray, numerical control fountain, DC fountain and other fountains. The material is mainly made of stainless steel 304 which is not easy to rust and has good durability. The inlet diameter and pipeline design of the nozzle are within a reasonable flow rate to reduce the pipeline resistance. As for fountain pump, usually using special fountain submersible water pump. The minimum pump power is used to achieve the highest and longest range; the inner diameter of the nozzle outlet is made by finishing technology, and the surface roughness is not higher than Ra1.6 to ensure that the shape of the water is complete, uniform and tidy. In the piping system, the flow of water at each point of the pipe diameter is accurately calculated. Choosing the right pipe diameter will keep the pipe resistance within the allowable range. The uniformity of the water spray in each group of nozzles is ensured by the scientific and rational arrangement of the pipes, as well as our rich practical experience and the internal finish of the nozzles. There is no connection between the different water shapes of the fountain, and each water shape uses separated pump, pipe, and nozzles to form a system. Different water shapes select the appropriate water pump according to the head and flow required. The pump working condition is selected on the highest efficiency working area to save energy. Our control method for the water pump is: the computer or fountain operator make the program according to the content of the music signal to determine the water spray type of the water pump, while the rest of the water pump is stopped for use. Then use the frequency conversion speed control to control the strength of music signal to run speed of the pump.

Description of circuit, control system: The music fountain control system developed by our company consists of industrial control computer, audio controller, frequency converter and control cabinet. The system control is that the industrial control computer acts as the control center and the entire system program and control program are loaded. When the music fountain is played, the control commands and data are transmitted to the audio controller through the serial port and the port of the

industrial computer, and then processed by the audio controller and transmitted to the next-level control device—inverter, soft starter, and control cabinet. These control devices control the equipment such as pumps and underwater lights.

1): Fully automatic music fountain. 2): Fully automatic program-controlled fountain. 3): Manually control the fountain

A. The music fountain control system adopts computer intelligent management, which can recognize the melody, rhythm, music sense and music intensity of the music. It has perfect multi-functional artistic expression and the affinity of the sound source to realize the completely consistent effect of the fountain and music connotation. The owner is free to design new source inputs based on actual performances on site.

B. The programmable controller adopts imported products, has a friendly man-machine interface, and has wide control selectivity.

C. The whole control system adopts the most advanced control technology and products in the equipment combination. The operation interface is very friendly and the operation mode is safe and simple. Which realize the digital networking control.

D. The complete control system includes overvoltage, overcurrent protection and leakage protection.

E. The whole set of fountains is controlled by multimedia computer, and the sound, light and water shape change synchronously with an error of less than 0.1 second.

F. Fountain lighting uses LED color changing lamps with powers of 30W/24V/piece and 15W/24V/piece. In view of the waterscape and its meaning, the combination of light shows the connotation of the fountain waterscape. The light changes with the water type of the fountain, and the corresponding color layers are displayed in layers. Depending on the specific water type and the meaning of the corresponding color of the lights, to ensure the perfect artistic effect of the waterscape. The control system is equipped with a low-voltage transformer. Due to the small current during operation, the current or voltage is effectively prevented from harming the human body. Finalize the safe operation of the entire equipment

G. The essence of the control system lies in the function of the software. The entire music fountain control software is developed by the company. The software consists of three parts; music fountain editing system, playback system and debugging system.

#### Control system hardware system engineering components of the advantages:

#### Multimedia computer C-PLC control

For many years, our company has been using computer industrial computer as the system control machine, mainly because it has the advantages of stable performance, fast speed, dustproof, shockproof and low environmental requirements. Although the price of industrial computer is slightly more expensive, the use of many years proves that our choice is correct. At the same time, the operation interface of the industrial computer can also give the starting signal of the fireworks control equipment, which makes the control of the fireworks and the waterscape complement each other.

The most important thing about the success or failure of a musical fountain is whether the water has a musical sense. The main function of the audio controller is to process the music signal, and then transfer the processed signal to the next level control device, so that the water type required for control should be ups and downs according to the rhythm of the music, so that the music fountain can truly reach The artistic effect of underwater ballet. The key components of the control device are imported, the capacity can be increased or decreased, the compatibility is strong, the failure rate is extremely low, durable and easy to maintain.

The use of frequency converters for motor control is a mature and advanced control technology of the company uses audio decoder board to analyze the components of music signals, identify the frequency, amplitude, envelope and other information. By controlling the frequency of the inverter and indirectly controlling the working frequency of the pump, the water column is reached. It can rise and fall with the level of music and the speed of the rhythm, reaching the special artistic effect of the music fountain.

The control cabinet is used for the switching drive of submersible pumps and underwater lights. The core components of each control loop of the control cabinet mainly use semiconductor thyristor, which has the characteristics of long life, small size, no noise, low cost, good heat dissipation and no malfunction. The control circuit of the solenoid valve and the underwater lamp has a fuse protection function, and the control circuit of the submersible pump has an overcurrent and phase loss protection function. The control cabinet has a good powerful ventilation cooling device, which can operate stably in a humid and high room temperature environment. The entire waterscape control system adopts the GGD standard low-voltage cabinet box, and the quality is the national electromechanical professional certification. The practice of use over the years has shown that it not only conforms to national standards, but also has a sophisticated process and is safe and reliable.

#### **Distribution Cabinet**

A special power distribution system designed by our company, which is more suitable for the operation of waterscape operation. Depending on the number of controls, the power distribution and the nature of the load, the power distribution cabinet can provide a separate power supply loop for each control cabinet. At the same time, the power distribution cabinet has the functions of grounding, zero leakage protection, overcurrent protection, phase loss protection, strong fire protection, and remote control. The power distribution cabinet is designed to correspond to the number of control cabinets. It should also be pointed out that the waterscape distribution system should use the independent transformer equipment provided by the electric industry department, and provide the primary cabinet and the corresponding compensation cabinet

The entire music fountain control software was developed by the company's development department. In the domestic fountain world is unique. The software consists of three parts: music fountain editing system, playback system and debugging system. Let me briefly introduce its powerful features.

#### Music fountain editing system

Software system description

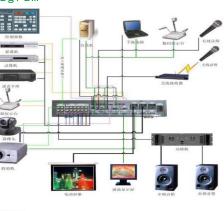
For each music fountain, we have a layout map in the editing system according to the fountain layout on site. Each pump and each group of underwater lights have a specific symbol. In the editing system, users can set their favorite fountain control program according to their personal preferences. The editing system also has some subroutines that the user can call conveniently. After editing the fountain control program, the user can simulate the execution first, that is, run the edited fountain control program without opening the fountain, and experience the effect of the fountain operation in advance. If it is not ideal, you can modify it at any time until it is satisfied. So far, real-time playback, thus achieving the goal of saving energy.

## Music fountain playing system

Entering the playback system, the fountain layout is clearly displayed in front of us. Each pump and each set of lights has corresponding and uniform symbols. The music fountain can be played simultaneously by simply clicking the play button with the mouse. At the same time, the computer can simultaneously display the real-time action of the fountain. The monitoring system was removed. The system has two play modes, daytime and nighttime, and the daytime playback mode lights are automatically turned off. You can also just open the music without opening the fountain. When the system fails (such as power phase loss, under voltage), the computer control interface can issue an alarm prompt, and the hardware is self-locking, so as not to damage personal safety and protect all control devices. Music fountain testing system

Enter the commissioning system to open the required pump or underwater lights for fault detection or water type commissioning. When a certain load does not work, this control signal can be turned on to detect the fault step by step; after installing the nozzle, each pump can be turned on one by one to perform water type debugging. When you don't need to open a music fountain, you can open some fixed water types for visitors to enjoy. Due to the full use of computer multimedia technology, the sound source type, the transparent program of operation, and the WYSIWYG property of the prosody editor are fully demonstrated. The source types can be divided into independent audio sources (such as CD players), computer audio sources (including \*.wav, \*.mid, and mp3, etc.). The transparent program of operation is as follows: the user can complete the playback process by simply tapping the button with the mouse. The WYSIWYG of the rhythm editor is reflected in: the user can edit the rhythm file very intuitively and intuitively according to his own wishes and simulate the play in real time, breaking through the bottleneck of only a few pieces of music in the fountain. The computer multimedia music fountain control system includes high-end computer (with high-performance sound card), serial communication adapter, programmable industrial controller (PLC), photoelectric isolation power driver, various color light sources, various water pump motors, inverters and other control appliances., external audio sources (such as CD players), audio processing equipment, speakers, etc. With the further development of multimedia technology, the computer multimedia music fountain control system will be more abundant and perfect. The control software is easy to learn and can be learned in a short time even without the basics of computer operation

### System Connection Diagram











# 1 JINGHONG STAR: WATER SPRAY HEIGHT 100M "DIRECT INJECTION TYPE" 景洪之星: 喷水高度为m 100m "直喷式"

喷泉主体中央,设置一个中心主喷,最高度达 100 米的中心水柱拔地而起,拉开整个喷泉的序幕。喷出的水雾爆发力强,在湖面中显得格外醒目,烘托出喷泉的磅礴气势。

Set up a central main spray in the center of the fountain main body, and the center water column with a height of up to 100 meters rises up and kicks off the entire fountain. The sprayed water mist has a strong explosive force, and it is particularly eye-catching in the lake surface, which makes the fountain's majestic momentum.

# **2** EMERGED MOUNTAINS: WATER SPRAY HEIGHT 50M "DIRECT INJECTION TYPE" 群峰峥嵘: 喷水高度为 50m "直喷式"

与中心主峰并行,由四组特制高喷组成的水型如巨帆耸立在纵轴线上,粗大的水柱从湖面喷涌而出,水势雄伟壮观,苍劲饱满、健壮古朴,如斗雪傲霜,风骨气节令人耸然起敬。

In parallel with the main highest mountain of the center, the water type consisting of four special high-spray jets stands on the longitudinal axis, and the large water column spurts out from the lake surface. The water is majestic, vigorous and full of vitality, such as fighting snow and proud frost, integrity of character is awe-inspiring.



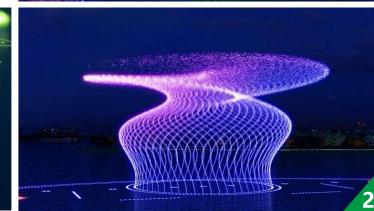












## **1** FLOURISHING: WATER SPRAY HEIGHT 16-18M "DIRECT INJECTION TYPE" 蒸蒸日上: 喷水高度为16-18m "直喷式"

蒸蒸日上水形喷水时齐头并进 , 努力拼搏 , 相互之间齐心协力 , 水型以粗大浓厚 、 美观大方为主题意境 。 在电脑的音序控制下 ,组合成各种造型的水形,喷水时如一首委婉的情歌,似水缠绵,同时也象征 景洪 人民的生活水平像水柱一样蒸蒸日上。

Advance side by side, work hard, and work together with each other. The water type is characterized by big and thick, beautiful and generous as theme of artistic conception. Under the control of the computer's sequence, it is combined into a variety of water shapes. When the water is sprayed, it is like a euphemistic love song, like soft and touching water. It also symbolizes that people's living standard is more and more prosperous as the water column.

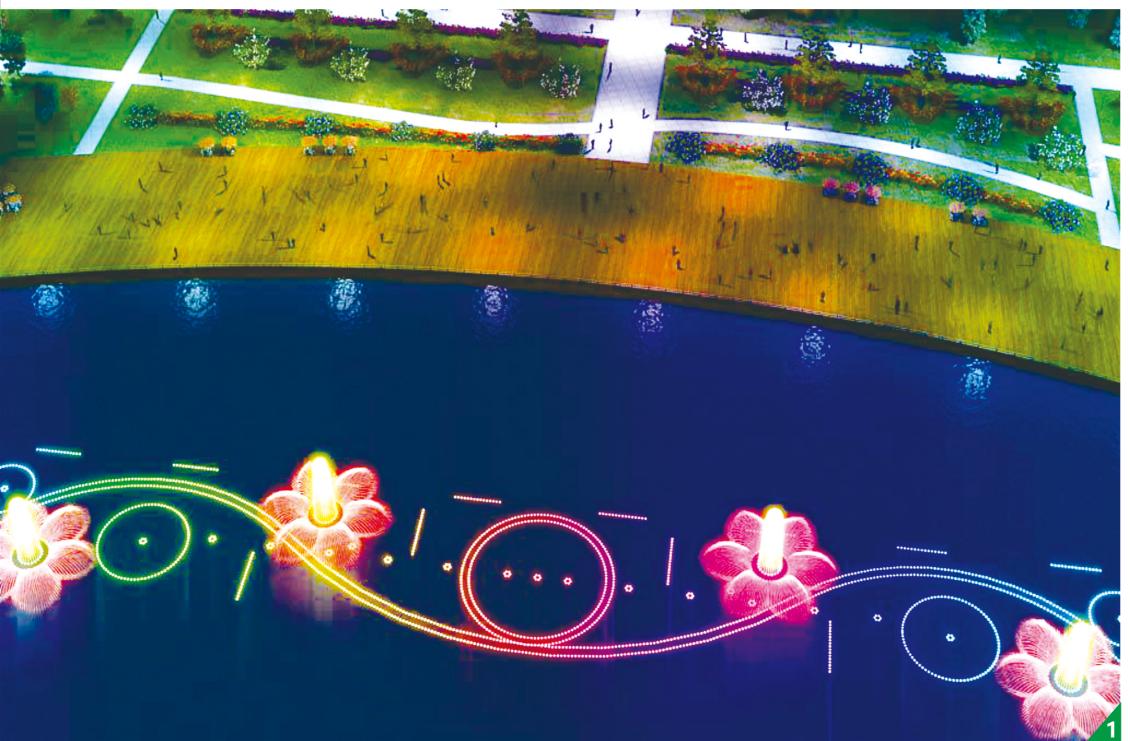
## **2** SONG AND DANCE OF THE DAI NATIONALITY: WATER SPRAY HEIGHT 15-16M " 3D SWING TYPE" 傣族歌舞: 喷水高度为15-16m "二维摇摆式 "

圆形二维数码喷泉, 喷水造型独特, 艺术性能强, 喷泉水型全方位摆动, 喷水时水姿轻颖、 优美, 尤如碧波荡漾, 更似风拂杨柳, 晚间在彩灯的映照下更显多姿多彩, 如能歌善舞的傣族姑娘跳起欢快的傣族歌舞, 喜气洋洋的水景观使游人忘记了一天的疲劳, 赏心悦目的水景给人们带来轻松、欢快和愉悦。

The circular 3D digital fountain has unique water spray shape and strong artistic performance. The water of fountain dance in all directions. When the water is sprayed, the water movement light and beautiful, especially like the blue waves, but more like the wind blows aspen and willow. When it comes to the evening, the fountain would be more colorful in the reflection of the colored lights. Just like the Dai girl sing the joyful songs and dance. The joyful water landscape would make the visitors forget the fatigue of the day, but bring relaxation, joy and delight to people.









PU'ER FRAGRANCE: WATER SPRAY HEIGHT 8-10M, THE "CIRCULAR ARCH SPRAY TYPE" WATER SPRAY HEIGHT 3-4M, "ROUND SHOT TYPE"

普洱飘香: 喷水高度为 8-10m, "圆形拱喷式""喷水高度为 3-4m, "圆形外射式"

圆形外射水形迎风招展,与其它水型交叉互补,刚柔相济,粗细结合,极富感染力,盛赞景洪普洱茶文化的繁荣昌盛。在音乐旋律的带动下 犹如 普洱茶香

The circular outward shot water shape is fluttered in the breeze and is complemented by other water shapes. Firm and soft, thick and thin, it is very infectious. It praises the prosperity of Jinghong Pu'er tea culture. Under the melody of music, it is like fragrance of Pu'er tea.

**THOUSAND-HAND BODHISATTVA**: WATER SPRAY HEIGHT 10-12M "2D SWINGING TYPE" 干手观音: 喷水高度为 10-12m "一维摇摆式"

千手观音水型由一维摇摆组合而成 ,喷水时水型成 0 360 度旋转 ,呈现千手观音伸开双臂的优美景象 ,喷水在彩灯的映照下更显多姿多彩,赏心悦目的水景给游人带来轻松、愉快和欢悦。

The Thousand-hand Bodhisattva water shape is composed of 2D swing, rotate 360 degrees when the water spray, showing the excellent beauty of the Thousand-hand Bodhisattva. The water spray is more colorful under the illumination of the colored light. The pleasing water features bring relaxation, pleasure and joy to the visitors.









RAINBOW PENETRATION: WATER SPRAY HEIGHT 20-22M, WATER SPRAY DISTANCE 40-50M "ARCH SPRAY TYPE"

长虹贯日: 喷高 20-22m, 喷远 40-50m "拱喷式"

我们在音乐喷泉两侧用四组对喷大炮组合成两组彩虹状内射水形,喷水时在灯光的侧射下, 恍 如一道道亮丽的彩虹,向中心喷涌如长虹贯日,气势壮观夺目,如银练当空舞,喻意腾飞的巨龙,是景洪城市奋进的象征,鼓舞人心,夺人心魄。

We used four sets of spray cannons on both sides of the music fountain to form two sets of rainbow-shaped injecting water. When spraying water, water shot under the side of the light, such as a bright rainbow, which spurted into the center like a long rainbow, magnificent and spectacular, like the silver chain fly in the air, the dragon soaring, it is the symbol of the endeavor of Jinghong City, inspiring and captivating.

PEACOCK: WATER SPRAY HEIGHT 6-8M "SWINGING LEFT AND RIGHT" 孔雀开屏: 喷水高度为 6-8m "左右摇摆式"

孔雀开屏喷泉喷水造型别具一格 , 如一只只孔雀在竞相开屏 , 喷水时叮咚作响 , 悠扬古朴 , 充分表现云南孔雀舞的民族文化 特色,水型也秀美端庄,令人暇想。。

The peacock fountain has a unique style of water spray. Just like the peacocks is competing to open the screen, squeaking when spraying water, melodious and simple, fully expressing the national cultural characteristics of Yunnan Peacock Dance, and the water shape is also beautiful and dignified.











## BRIDGE DECK WATER CURTAIN 桥面水幕

一道道水光交错、七彩斑斓、动静结合,或宁静雅致,或磅礴大气,声、光、水、影、七彩色达到完美的结合。 Across the water, the colorful, colorful, dynamic and static, or quiet and elegant, or the atmosphere, sound, light, water, shadow, seven colors to achieve a perfect combination.

## OUNTAIN TYPE 喷泉水型篇



# THUNDERSTORM: WATER SPRAY HEIGHT 35M "DIRECT SPRAY RUNNING TYPE" 雷霆万钧: 喷水高度为 35m "直喷跑动式"

气爆喷泉结构独特 ,以压缩空气代替潜水泵作为动力 , 将压缩空气进入储水管瞬间急剧膨胀将水喷至高空 , 水形气势恢宏 、 风雷激荡、振奋人心,是景洪人民在大时代高奏的华彩乐章。

The structure of the gas blast fountain is unique. The compressed air is used to replace the submersible pump to be the power. Make the compressed air enters the water storage pipe and suddenly expands rapidly to spray the water to the sky. The water shape is magnificent, the wind and thunder is raging, and people are inspiring. It is the brilliant cadenza which Jinghong people ishighly playing in the big era.



