

经营理念 Business Idea

创一流企业 创一流技术 创一流质量 创一流服务

Creating first-class enterprise, first-class technology,
first-class quality and first-class service

管理理念 Management Idea

人才为本 科技为先 不求最大 只求最优

Talent centered and technology first;
not the biggest but the best

公司简介

Introduction

01

STRONG
AUTOMATIC CONTROL TECHNOLOGY

武汉四创自动控制技术有限公司成立于1995年，是致力于电力生产过程自动控制设备的设计、制造和服务的高新技术企业。公司的主导产品-水轮机微机调速器和水电站辅机控制系统被列为水电工程主要机电设备推荐厂家，是国内具有较强竞争实力和产品优势的发电控制设备专业生产厂家之一。

Wuhan Strong Automatic control Technology Co., Ltd., incorporated in 1995, is a hi-tech enterprise engaged in design, manufacture and service of auto-control equipment for the power generation. Our main products named water turbine microcomputer-based governors and hydropower station auxiliary device control system series have been listed as manufacture references for main mechanical and electrical facilities in hydropower projects. Thus Strong is one of special enterprises with powerful competitive force and product advantages in generating control equipment manufacture in China.

公司充分发挥武汉地区人才、技术、制造和检测的强大优势，重视高新技术及产品的研发和投入，加快高新技术成果的转化。十余年来，公司开发的微机调速器系列产品可以满足所有类型的水轮发电机组，其中无油电转可编程微机调速器通过省级科技成果鉴定，具有国内先进水平，无油电转具有国际先进水平；引导阀活塞自动复位装置、双冗余伺服机构和位移与流量输入冗余控制的调速器获国家实用新型专利。公司开发的水电站计算机监控系统、辅机控制系统、水电站（泵站）闸门控制系统、船闸控制系统、工业电视监控系统和其它相关产品也得到了广泛的应用。产品立足国内市场的同时，大力扩展国外市场，已有相关产品在越南、挪威、阿富汗、马其顿、埃塞俄比亚等多个国家成功投入运行。

The Corporation takes full advantages of local talents, technology, manufacture and inspection in Wuhan, emphasizes on hi-tech and products' research and investment, and accelerates hi-tech result transfer. In recent some ten years, self-developed microcomputer-based governor series products can meet needs for all hydroelectric generating units. The PLC-based governors with oil free electro-hydraulic transducer has passed the provincial science and technology results appraisal. The appraisal conclusion is that this type of governor has reached the national advanced level (especially, the oil free electro-hydraulic transducer is at world advanced level). The pilot distributing valve piston with automatic reset device, duplicating servosystem, and governors with redundant control of displacement and flow inputs have got national practical and new pattern patents. The products developed by our company, namely, hydropower station computer-based supervision and control systems, auxiliary device control systems, gate control system for hydropower (pumping) stations, shiplock control systems, industrial television monitoring systems and other products, have been widely used. Basing on the domestic market, the Corporation is engaged in extending abroad market. What's more, our products have been successfully put into use in many countries such as Vietnam, Norway, Afghanistan, Macedonian Ethiopia and so on.

公司坚持贯彻ISO9001:2000质量管理体系,建立了一套完善的ERP企业信息管理系统,对产品的设计、生产、检验和服务等各个环节实施全过程控制,严把产品质量检验关,确保为用户提供高质量、高性能的产品。公司在不断发展的同时,也注重不断对生产能力的扩大与提高,建立了一流的生产基地,调试和试验设备先进、齐全。

The corporation abides the quality management system of ISO9001:2000, and established a set of perfect ERP industry information management. Many steps including design, manufacture, examination, service and so on have been well controlled in order to keep high quality to finally provide our clients with high quality and performance products. With continuous development, the Corporation also pays much attention to productivity enlargement and improvement by building first rank manufacturing workshops, and configuring advanced and complete debugging and testing devices.

公司有一个充满活力与朝气的团队,平均年龄28岁,大学学历以上占90%,同时聘请了一批资深的专家作为公司的技术顾问。公司以"人才为本,科技为先,不求最大,只求最优"为管理理念。

The Corporation possesses a throbbing and youthful team on the average age of 28 among who 90% are B.A./B.S. or above. At the same time, a group of senior experts are employed as technical consultants in the corporation. Our management idea is: Talent centered and technology first; not the biggest but the best.

公司一直将"创一流企业、创一流技术、创一流质量、创一流服务"作为企业发展宗旨,始终如一地秉着"用户至上"的服务宗旨,将用户的利益永远摆在第一位,不断提高企业自身的竞争实力和市场的应对能力,满足客户个性化的需求,提升售前、售中和售后的服务质量;有效地将现代化企业管理及前沿技术应用到企业运作中,在企业运行机制上形成了一整套符合企业特色的、行之有效的现代企业管理机制。

The Company always abides the development principles of "creating first-class enterprise, first-class technology, first-class quality, and first-class service" and the service principle of clients first by putting their benefits at the first place, continuously improves self competition and market adaptive capacity, satisfies clients with individual demands, promotes pre-sale, on-sale and after-sale service, and efficiently applies modern industrial management and advanced technology to corporation operation so that a set of useful modern industrial management system with individual characters has been built.

逆水行舟,不进则退。我们有义务、有责任将产品做得更加完美,为我国乃至世界水电事业的发展做出一份微薄的贡献。我们期待与用户真诚的合作,同时我们将以更热诚的服务、完美的产品及合理的价格来回报用户。

It is just like sailing against the stream, either forging ahead or falling behind. It is our responsibility to perfect products and contribute what we can to Chinese even the world's hydropower development. We sincerely expect cooperation with clients; meanwhile we will return clients more zealous service, perfect products and rational prices.

主要资质

Main qualifications

企业主要荣誉

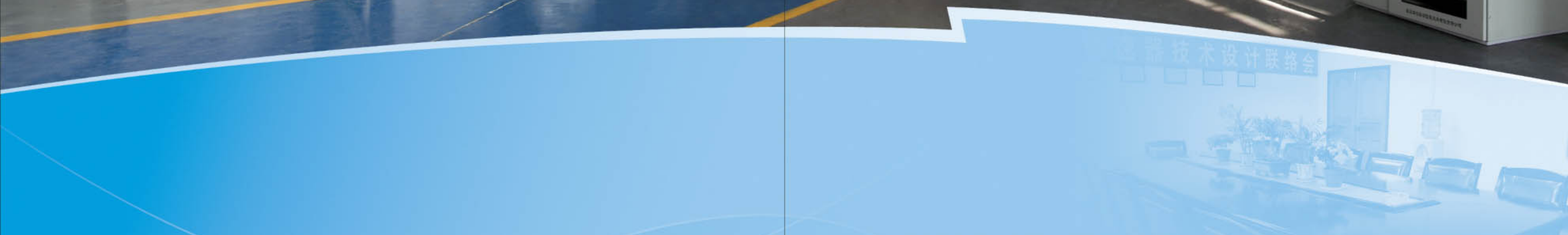
Main honors obtained by the Corporation Strong



产品主要荣誉

Main products honors





水轮机微机调速器型号说明

Hydraulic Turbine Microcomputer-based Governor Model Description

| | |
|--|--|
| 基本代号 Basic code | <ul style="list-style-type: none"> WT单调速器 WT governor for Francis turbine WZT转桨式调速器 WZT governor for Kaplan turbine YWT带有接力器及压力罐微机调速器 YWT microcomputer-based governor with servomotor and pressure tank WCT冲击式微机调速器 WCT microcomputer-based governor for Pelton turbine |
| 规格代号 Specification code | <ul style="list-style-type: none"> 对于WT单调速器，表示导叶主配压阀直径(mm) For WT governor for Francis turbine, it represents the diameter (mm) of wicket gate main distributing valve of wicket gates. 对于WZT转桨式调速器，表示导叶主配压阀直径(mm)/轮叶主配压阀直径(mm)，如果导叶和轮叶主配压阀直径相同，轮叶主配压阀直径可不表示 For WZT governor for Kaplan turbine, it represents the diameter (mm) of main distributing valve of wicket gates/ the diameter (mm) of main distributing valve of runner blades. If the diameter of the two main distributing valves are the same, it is not necessary to show the diameter of main distributing valve for runner blade. 对于YWT带有接力器和压力罐的调速器，表示接力器容量(N.M) For YWT microcomputer-based governor with the servomotor and pressure tank, it represents servomotor capacity (N.M). 对于WCT冲击式调速器，表示喷嘴配压阀直径(mm) × 喷嘴配压阀数量/折向器配压阀直径(mm) × 折向器配压阀数量；若配压阀数量为1，则可省略 For WCT microcomputer-based governor for Pelton turbine, it represents the diameter (mm) of needle distributing valve × the quantity of needle distributing valve/diameter (mm) of deflector distributing valve × the quantity of deflector distributing valve; if the quantity of distributing valve is 1, it can be omitted. |
| 额定油压代号 Code of rated oil pressure | <ul style="list-style-type: none"> 主要有以下几种代号：2.5、4.0、6.3、16 (单位：Mpa) There are the main following codes: 2.5, 4.0, 6.3, 16 (unit: Mpa) |
| 制造厂代号 Code of the manufacture | <ul style="list-style-type: none"> SC武汉四创自动控制技术有限公司 Wuhan STRONG Automatic Control Technology Co., Ltd. |
| 产品特征代号 (电液转换形式) Characteristic code (Electro-hydraulic Transducer form) | <ul style="list-style-type: none"> 用数字表示电液转换形式 Numbers show the electro-hydraulic transducer forms |
| 产品特征代号 (控制器型号) Characteristic code (Model of controller) | <ul style="list-style-type: none"> 用数字表示控制器型号 Digits show model of controller |

WZT 80 4.0 SC 0 0

以上举例的调速器型号为WZT-80-4.0-SC 00，表示转桨式调速器，导叶和桨叶主配均为80，油压为4.0Mpa，制造厂为武汉四创自动控制技术有限公司，电液转换器采用步进式无油电转，控制器采用FX2N单PLC。
The model of abovementioned governor is WZT-80-4.0-SC 00 which means the governor is for Kaplan governor, the diameters of maindistributing valves of both wicket gate and runner blade are 80mm; the oil pressure is 4.0Mpa, the manufacturer is Wuhan Strong Automatic Control Technology Co., Ltd. And the electro-hydraulic transducer is step-by-step oil free one and the controller is FX2N with single PLC.

水轮机调速器通用技术说明

Universal Technical Description of Hydraulic Turbine Governor

主要技术标准

- 《水轮机调速器与油压装置技术条件》GB/T9652.1-1997
- 《水轮机调速器与油压装置试验验收规程》GB/T9652.2-1997
- 《水轮机电液调节系统及装置技术规程》DL/T563-2004
- 《水轮机电液调节系统及装置调整试验导则》DL/T496-2001
- 《水轮机控制系统试验》IEC60308-2005
- 《水轮机控制系统技术规范导则》IEC61362

主要技术参数

- 测频误差 $\leq 0.00083\%$
- 永态转差系数 $bp=0\sim 10\%$ (调整分辨率为1%)
- 比例增益 $Kp=0\sim 20$
- 积分增益 $Ki=0\sim 10\ 1/s$
- 微分增益 $Kd=0\sim 5\ s$
- 频率给定范围 $FG=45\sim 55\ Hz$ (调整分辨率为0.01Hz)
- 频率死区范围 $E=0\sim 0.5\ Hz$ (调整分辨率为0.01Hz)
- 功率死区范围 $i=0\sim 5\%$
- 电气开度限制范围 $L=0\sim 100\%$ (调整分辨率 $\leq 1\%$)
- 功率给定范围 $P=0\sim 120\%$ (调整分辨率 $\leq 1\%$)
- 工作电源 DC 220V/110V $\pm 15\%$, AC 220V $\pm 15\%$ 50HZ/60HZ
- 接力器开关机时间 2~60 S

主要性能指标

1. 动、静态指标
 - 空载工况自动运行时，机组转速摆动相对值，对大型调速器 $\leq \pm 0.15\%$ ，对中小型调速器 $\leq \pm 0.25\%$ ，对特小型调速器 $\leq \pm 0.3\%$ ；
 - 机组甩100%额定负荷后，在转速变化过程中，超过稳态转速3%额定转速值以上的波峰不超过两次；
 - 机组甩100%额定负荷后，从接力器第一次向开启方向移动起，到机组转速摆动相对值不超过 $\pm 0.5\%$ 为止所经历的时间，应不大于40s；
 - 转速或指令信号按规定形式变化，接力器不动时间 $\leq 0.2s$ ；
 - 静态特性曲线近似为一直线，转速死区 α ，对大型调速器 $\leq 0.02\%$ ，对中型调速器 $\leq 0.06\%$ ，对小型调速器 $\leq 0.10\%$ ，对特小型调速器 $\leq 0.20\%$ ；

Main technical standards

- 《Specifications of Governors and Pressure Oil Supply units for Hydraulic Turbines》GB/T9652.1-1997
- 《Test Acceptance Codes of Governors and Pressure Oil Supply Units for Hydro-turbines》GB/T9652.2-1997
- 《Specifications of Electro-hydraulic Regulating System and Unit for Hydraulic Turbines》DL/T563-2004
- 《Regulating and Testing Guide of Electro-hydraulic Regulating System and Device for Hydraulic Turbines》DL/T496-2001
- 《Hydraulic turbines - Testing of Control System》IEC60308-2005
- 《Guide to Specification of Hydraulic Turbine Control System》IEC61362

Main Technical Parameters

- Frequency measurement error $\leq 0.00083\%$
- Permanent speed droop $bp=0\sim 10\%$ (The adjusting resolution is 1%)
- Proportional gain $Kp=0\sim 20$
- Integral gain $Ki=0\sim 10\ 1/s$
- Derivative gain $Kd=0\sim 5\ s$
- Frequency setting range $FG=45\sim 55\ Hz$ (The adjusting resolution is 0.01Hz)
- Frequency dead band range $E=0\sim 0.5\ Hz$ (The adjusting resolution is 0.01Hz)
- Power dead band range $i=0\sim 5\%$
- Electrical opening limit range $L=0\sim 100\%$ (The adjusting resolution $\leq 1\%$)
- Power setting range $P=0\sim 120\%$ (The adjusting resolution $\leq 1\%$)
- Operating power supply DC 220V/110V $\pm 15\%$, AC 220V $\pm 15\%$ 50HZ/60HZ
- The servomotor opening and closing time 2~60 S

Main Performance Indexes

1. Dynamic and static indexes
 - When the governor is automatically operating at no-load condition, the relative values of speed swing of unit: $\leq \pm 0.15\%$ for large governors; $\leq \pm 0.25\%$ for mid-small governors; $\leq \pm 0.3\%$ for mini-governors;
 - After 100% rated load rejection, the wave peaks surpassing 3% rates speed shall be no more than 2;
 - After 100% rated load rejection, the time from the servomotor's first movement to opening direction to the relative value of speed swing that is no more than $\pm 0.5\%$ shall be no more than 40s;
 - The speed or command signals are changed by the stipulated forms, and the servomotor dead time is $\leq 0.2s$;
 - The static characteristic curve is close to a line; and the speed dead band, is $\leq 0.02\%$ for large governor, $\leq 0.06\%$ for middle governor, $\leq 0.10\%$ for small governor, $\leq 0.20\%$ for mini-governor;

- 转桨式水轮机调速系统，转叶随动系统的不准确度 $\leq 0.8\%$ ，实测协联曲线与理论协联关系曲线的偏差 \leq 桨叶接力器全行程的1%；
- 在稳态工况下，对多喷嘴冲击式水轮机的任何两喷嘴之间的位置差，在整个范围内均 $\leq 1\%$ ，每个喷嘴位置对所有喷嘴位置平均值的偏差 $\leq 0.5\%$ ；
- 对每个导叶单独控制的水泵水轮机，任何两个导叶接力器位置的偏差 $\leq 1\%$ ；每个导叶接力器位置对所有导叶接力器位置平均值的偏差 $\leq 0.5\%$ ；
- 大型和中小型调速器综合漂移量折算为转速相对值分别不超过0.3%和0.6%。

2. 一次调频性能指标

- 一次调频负荷响应滞后时间 $< 3s$ ；
- 一次调频负荷调整幅度：在15s内达到理论计算的一次调频的最大负荷调整幅度的90%；
- 调整幅度的偏差：在电网频率变化超过机组一次调频死区时开始的45s内，机组实际出力与响应目标偏差的平均值在理论计算的调整幅度的 $\pm 3\%$ 内；
- 稳定时间：机组参与一次调频过程中，在电网频率稳定后，机组负荷达到稳定所需的时间为一次调频稳定时间，小于60s。

3. 可靠性指标

- 自动工况可利用率 $\geq 99.99\%$ ；
- 自动方式+手动方式可利用率100%；
- 平均无故障连续运行时间 $\geq 35000h$ ；
- 大修间隔时间 ≥ 8 年；
- 退役前的使用年限大于30年。

- For Kaplan turbine governor system, the inaccuracy of runner blade servo system shall be no more than 0.8%; and the deviation between actual coordinating curve and theoretical coordinating curve shall be no more than 1% of the total stroke of the runner blade servomotor;
- Under steady state operation, for multi-needle Pelton turbine, the position tolerance between needles shall be no more than 1% in the whole scope, and the tolerances between every needle opening and average value of all needles openings shall be $\leq 0.5\%$;
- For the pumped storage units whose wicket gate is individually controlled, the position tolerance between any wicket gate servomotors shall be no more than $\leq 1\%$; and the tolerances between every wicket gate servomotor opening and average value of all wicket gate servomotors openings shall be $\leq 0.5\%$;
- The comprehensive drift of large and mid-small governors converted into relative values of the speed shall be no more than 0.3% and 0.6% respectively.

2. Performance index for primary frequency regulation

- The load responding delay time of primary frequency regulation shall be less than 3s;
- Load adjusting range of primary frequency regulation: obtaining 90% of max theoretically calculated load adjusting range of primary frequency regulation in 15s;
- Error of adjusting range: In 45s when the change of network frequency begins to transcend frequency dead band of the primary frequency regulation, the average value of tolerances between units' actual power and the desired responding one shall be in $\pm 3\%$ of theoretically calculated adjusting range;
- Stabilizing time: In the course of units participating the primary frequency regulation, the time when units' load reaches the steady state following the steady state of network frequency is the stabilizing time for primary frequency regulation, it shall be less than 60s.

3. Reliability indices

- The availability under automatic operation shall be $\geq 99.99\%$;
- The availability under "automatic + manual operation" is 100%;
- MTBF shall be $\geq 35000h$;
- The interval of overhaul shall be ≥ 8 years;
- The lifetime of service shall be > 30 years.

主要特点及功能

- 结构：采用积木式结构，功能扩展、维护、检修方便；
- 电源：交、直流电源同时供电，互为热备用，切换无扰动；
- 电液转换控制：采用棒棒式控制方式，无D/A转换环节，提高了系统可靠性；
- 通讯及网络接口：可提供RS232、RS422、RS485标准接口；协议可采用MB+、Modbus、Profibus等标准协议；
- 测频：数字式测频方式，测量精度高，抗干扰能力强；
- 调节控制规律：采用基本型逻辑控制器（俗称九点控制器）实现调速器的自适应变参数变结构PID调节规律；
- 运行方式和控制模式：具有自动、电手动、机手动运行方式，切换无扰动；具有频率调节、功率调节、开度调节、水位调节控制模式，切换无扰动；
- 开机：自适应闭环开机规律，对不同机组均能自动迅速安全地将机组开启至空载状态。无超调，不过速；
- 停机：自动正常停机，事故紧急停机，手动停机；
- 频率跟踪：空载时机组自动跟踪电网频率，迅速达到同期要求；
- 大、小电网识别：自动识别大、小电网；自动选择最优调节规律及调节参数，满足电网的稳定运行；
- 一次调频：具有一次调频功能，能满足电网对一次调频的各项技术要求；
- 双调协联：电气数字协联；
- 人机交互界面：采用触摸屏或工业平板PC机。友好的中文或英文操作界面，具有各种显示、设置、记录、查询、试验、操作及帮助等功能；
- 故障诊断：具有在线自诊断和离线诊断功能；
- 自动容错：具有各种故障容错功能，保证了调速系统安全可靠的运行；
- 试验：可完成所有动、静态试验，并可记录试验参数和试验曲线；
- 可靠的电磁兼容性；
- 远程维护能力。

Main Characters and Functions

- Structure: modular organization, and available for functional extension, maintenance, examination and repair;
- Power supply: DC and AC can be supplied simultaneously and standby for each other without any changeover disturbance;
- Electro-hydraulic transducer control: it adopts bang-bang control mode without D/A conversion, but more reliable;
- Communication and network interface: RS232, RS422, and RS485 standard interfaces can be provided and MB+, Modbus, Profibus etc. protocols can be used;
- Frequency sensing: digital frequency measurement with high accuracy and powerful anti-disturbance;
- Regulation and control strategy: it uses basic logic controller (so-called nine-point controller) to realize the adaptive PID regulation and control strategy with variable parameters and structures;
- Operation modes and control modes: there are three operation modes: automatic, electric manual and mechanical manual and with bumpless transfer. There are four control modes: frequency control, power control, opening control, and water level control and also with bumpless transfer;
- Startup: it can adapt a closed-loop startup strategy, and automatically and safely starts units to no-load behaviour, fast and without overshoot, for different units;
- Shutdown: automatic normal shutdown, emergency shutdown and manual shutdown;
- Frequency trace: under no-load operation, the units will automatically trace the network frequency to quickly meet synchronization requirements;
- Identification of large or local network: automatically identifying large or local network; automatically choose optimal regulating rules and parameters to make network stable;
- Primary frequency regulation: it has primary frequency regulation function and satisfies network with all technical requirements of primary frequency regulation;
- Coordination between wicket gate and runner blade for Kaplan turbine: electrical and digital coordination;
- Human-machine interface: it adopts touched display or industrial slab PC with friendly operation interface in English or in Chinese. It has many functions such as displaying, setting, recording, inquiring, testing, operating and assisting etc;
- Faults diagnosis: it can online self-diagnose and offline diagnose;
- Automatic tolerance: it has different faults tolerance functions to guarantee the governor's safe and reliable operation;
- Tests: it can conduct all dynamic and static tests and record test parameters and curves;
- Reliable electromagnetic compatibility;
- Remote maintenance ability.

W(Z)T系列无油电转微机调速器

W(Z)T Series Oil-free Electro-hydraulic Transducer Microcomputer-based Governor

W(Z)T系列无油电转微机调速器是以进口工业控制器PLC/PCC为控制核心，以伺服式无油电转作为电液转换环节，以机械液压系统作为执行机构，组成的一种安全可靠的微机调速器。适用于大中型水轮发电机组的调节与控制。

W(Z)T series microcomputer-based governor with oil-free electro-hydraulic transducer is a reliable and safe governor which adopts imported industrial controller PLC/PCC as the control core, servo oil-free electro-hydraulic transducer as electro-hydraulic transducer link, and mechanical hydraulic system as the actuator. This kind of governor is suitable for the adjusting and control of large and middle hydroelectric generating units.

电气控制系统

- 微机采用进口PLC或PCC，可选双PLC或PCC；
- 可选进口知名品牌步进电机或交流伺服电机及驱动器；
- 无油电转采用独特的绝对定位控制，精度高，响应快；
- 测频采用残压测频与齿盘测频，互为主/备用；
- 电气反馈可选绝对式编码器、直线位移传感器、电位器等；
- 友好的人机界面。

Electrical control system

- The microcomputer-based adopts imported PLC or PCC (optional duplicating PLC or PCC);
- Imported famous stepping motor or AC servomotor and driver are optional;
- The oil-free electro-hydraulic transducer adopts unique absolute positioning control with high accuracy and quick response;
- Two frequency measurements are adopted: PT and toothed disc. They are host/standby for each other;
- Absolute encoder, linear displacement sensor and potentiometer and so on can be used for electrical feedback;
- Friendly human-machine interface.

机械液压系统

- 液压系统采用集成块式设计，直联式结构，无明管，无杠杆；
- 主配压阀阀体采用全锻钢件结构，体积小，强度高，通流面积大；
- 具有纯机械手动操作机构；
- 电液转换器采用具有自主知识产权的专利产品，断电自动复中，无油耗，不卡塞，受温度影响小，抗油污能力强；
- 双联滤油器；
- 可选双无油电转，切换无扰动；
- 油压等级：2.5MPa、4.0MPa、6.3MPa；
- 主配阀直径：φ60、φ80、φ100、φ150、φ200、φ250。

Mechanical hydraulic system

- The Mechanical hydraulic system adopts Integrated design, directly connected structure, without external pipes and levers;



- The body of the main distributing valve employs full forged steel structure that is small in volume, hard intensity and large through-flow area;
- It has purely mechanical manual control mechanism;
- The electro-hydraulic transducer adopts self-developed patent products, which can be automatically reset if power off, no oil consumption, no blockage, little influence by the temperature and satisfactory dirt proofing;
- Oil filter with two channels;
- Optional: duplicating oil-free electro-hydraulic transducers with bumpless transfer;
- Oil pressure: 2.5MPa, 4.0MPa, 6.3MPa;
- The diameter of main distributing valves: φ60, φ80, φ100, φ150, φ200, φ250.

W(Z)T系列伺服比例阀微机调速器

W(Z)T Series Servo Proportional Valve Microcomputer-based Governor

W(Z)T系列伺服比例阀微机调速器是以进口工业控制器PLC/PCC为控制核心，以伺服比例阀作为电液转换环节，以机械液压系统作为执行机构，组成的一种安全可靠的微机调速器，适用于大中型水轮发电机组的调节与控制。

The microcomputer-based governor of W(Z)T series, with servo proportional valve, is a reliable and safe one which adopts imported industrial controller PLC/PCC as the control core, servo proportional valve as electro-hydraulic transducer link, and mechanical hydraulic system as the actuator. This kind of governor is suitable for the regulation and control for large and middle hydroelectric generating units.

电气控制系统

- 微机采用进口PLC或PCC，可选双PLC或PCC；
- 电液转换器具有冗余功能，稳定可靠；
- 测频采用残压测频与齿盘测频，互为主/备用；
- 电气反馈可选绝对式编码器、直线位移传感器、电位器等；
- 友好的人机界面。

Electrical control system

- The microcomputer-baseds adopt imported PLC or PCC (optional: duplicating PLC or PCC);
- The electro-hydraulic transducer with redundancy function is stable and reliable;
- PT frequency measurement and toothed disc frequency measurement are adopted, which are host/standby for each other;
- Absolute encoder, linear displacement sensor and potentiometer and so on can be used for electrical feedback;
- Friendly human-machine interface.

机械液压系统

- 液压系统采用集成块式设计，直联式结构，无明管，无杠杆；
- 主配压阀阀体采用全锻钢件结构，体积小，强度高，通流面积大；
- 具有纯机械手动操作机构；
- 电液转换器采用伺服比例阀+数字阀的冗余结构，也可选用伺服比例阀+无油电转的冗余结构，切换无扰动；
- 系统断电时，主配可自动复中；
- 双联滤油器；
- 油压等级：2.5MPa、4.0MPa、6.3MPa；
- 主配阀直径：φ60、φ80、φ100、φ150、φ200、φ250。



Mechanical hydraulic system

- The Mechanical hydraulic system adopts integrated design, directly connected structure, without external pipes and levers;
- The body of the main distributing valve employs full forged steel structure, which is small in volume, hard intensity and large through-flow area;
- It has purely mechanical manual control mechanism;
- The electro-hydraulic transducer adopts either "proportional valve+ digital valve" or "proportional valve+ oil-free electro-hydraulic transducer" redundant structure, and no disturbance during switchover;
- The main distributing valve can automatically recover to zero position when the system is power off;
- Oil filter with two channels;
- Oil pressure: 2.5Mpa, 4.0Mpa, 6.3Mpa;
- The diameter of main distributing valves: $\phi 60$, $\phi 80$, $\phi 100$, $\phi 150$, $\phi 200$, $\phi 250$.

WCT系列冲击式微机调速器

WCT Series Microcomputer-based Governor for Pelton turbine

WCT系列冲击式微机调速器，是本公司在大中型调速器中取得丰富经验的基础上，结合冲击式机组的特点，而开发的一种专用调速器。适用于冲击式水轮发电机组的调节与控制。

WCT series microcomputer-based governor for Pelton turbine is a self-developed specialized governor based on abundant experiences concerning large and middle governors and on the characters of Pelton turbines. It is suitable for the regulation and control for Pelton turbine/generator units.

电气控制系统

- 微机采用进口PLC或PCC，可选双PLC或PCC；
- 直接数字控制；
- 测频采用残压测频与齿盘测频，互为主/备用；
- 开机喷嘴可任意选择组合，并网根据机组出力自动投切喷嘴，喷嘴之间自动同步；
- 喷嘴和折向器采用数字协调；
- 电气反馈可选绝对式编码器、直线位移传感器、电位器等；
- 友好的人机界面。

Electrical control system

- The microcomputer-based adopt imported PLC or PCC (optional: duplicating PLC or PCC);
- Direct digital control;
- PT frequency measurement and toothed disc frequency measurement are adopted, which are host/standby for each other;
- The startup needles can be freely combined; when the unit operates in the grid, automatically put on/off needles according to the units' active power. Needles will be synchronized automatically;
- The needles and deflectors adopt digital coordination;
- Absolute encoder, linear displacement sensor and potentiometer etc. can be used for electrical feedback;
- Friendly human-machine interface.



机械液压系统

- 每个喷嘴/折向器分别采用对应的标准液压单元，通过液压单元的叠加，实现多喷嘴多折向器组合控制；
- 高速开关阀作为电液转换元件，可选伺服比例阀+数字阀作为冗余电液转换机构；
- 采用集成式结构设计，取消了引导阀、主配压阀等中间结构，环节少、速动性好、灵敏度高；
- 抗油污能力强； ■ 无需机械零位调整，安装调试便捷、免维护； ■ 采用双滤油器，在运行中能方便的拆洗及更换；
- 油压等级：2.5Mpa、4.0Mpa、6.3Mpa； ■ 系统形式（喷嘴数量）/（折向器数量）：n/n。

Mechanical hydraulic system

- Select corresponding standard hydraulic module for each needle/deflector. And realize combination control of multi-needles/deflectors via connection of hydraulic modules;
- High-speed switch valve is chosen as electro-hydraulic transducer, and "servo proportional valve + digital valve" can be chosen as redundant electro-hydraulic transducer;
- It adopts integrated structure design, eliminates several intermediate structures such as pilot distributing valve, main distributing valve. Thus it has less links, satisfactory rapidity and higher sensitivity;
- Satisfactory dirt proofing;
- It is not necessary to adjust the mechanical zero position, so it is convenient for installation and debugging, especially no maintenance;
- It adopts oil filter with two channels, which can be conveniently cleaned and replaced during operation;
- Oil pressure: 2.5Mpa, 4.0Mpa, 6.3Mpa;
- System mode (needles' quantity)/(deflectors' quantity): n/n.

W(Z)T系列抽水蓄能微机调速器

W(Z)T Series Pumped-storage Microcomputer-based Governor

W(Z)T系列抽水蓄能微机调速器是以进口工业控制器PLC/PCC为控制核心，以伺服式无油电转或伺服比例阀作为电液转换环节，以机械液压系统作为执行机构，组成的一种安全可靠的微机调速器。适用于不同形式的抽水蓄能机组的调节与控制。

W(Z)T series microcomputer-based governor for pumped-storage unit is a reliable and safe governor which adopts imported industrial controller PLC/PCC as the control core, servo oil-free electro-hydraulic transducer or servo proportional valve as electro-hydraulic transducer link, and mechanical hydraulic system as the actuator. This kind of governor is suitable for the regulation and control for different pumped-storage units.

电气控制系统

- 微机采用进口PLC或PCC，可选双PLC或PCC；
- 电液转换器：可配步进电机或交流伺服电机及驱动器，也可配置伺服比例阀；
- 静止、发电、发电方向调相、抽水和抽水方向调相5种基本工况之间的切换快速平稳；
- 多种启动方式；
- 泵工况的出力限制及导叶开度优化（GVO）；
- 可选导叶开度不一致（MGV）设计，避开转轮的不稳定区；
- 测频采用残压测频与齿盘测频，互为主/备用；
- 电气反馈可选绝对式编码器、直线位移传感器、电位器等。



Electrical control system

- The microcomputer-based adopt imported PLC or PCC (optional: duplicating PLC or PCC);
- Electro-hydraulic transducer: stepping-motor or AC servo motor and driver can be configured, and so does servo proportional valve;
- Bumpless transfer between five basic operating behaviors as follows: stop, generating, compensation under generating, pumping and compensation under pumping;
- Various startup modes;
- Power output limit under pumping operation and optimization of wicket gate opening;
- Optional: A design of inconsistent wicket gate opening can avoid instable range of turbine;
- PT frequency measurement and toothed disc frequency measurement are adopted, which are host/standby for each other;
- Absolute encoder, linear displacement sensor and potentiometer and so on can be used for electrical feedback.

机械液压系统

- 液压系统采用集成块式设计，直联式结构，无明管，无杠杆；
- 主配压阀阀体采用全锻件结构，体积小，强度高，通流面积大；
- 具有纯机械手动操作机构；
- 可选导叶开度不一致 (MGV) 装置；
- 双联滤油器；
- 多种电液转换器可选；
- 油压等级：2.5Mpa、4.0Mpa、6.3Mpa；
- 主配阀直径：φ60、φ80、φ100、φ150、φ200。

Mechanical hydraulic system

- The Mechanical hydraulic system adopts integrated design, directly connected structure, without external pipes and levers;
- The body of the main distributing valve employs full forged steel structure that is small in volume, hard intensity and large through-flow area;
- It has purely mechanical manual control mechanism;
- Optional: device of inconsistent wicket gate opening (MGV);
- Oil filter with two channels;
- Optional: various electro-hydraulic transducers;
- Oil pressure: 2.5Mpa, 4.0Mpa, 6.3Mpa;
- The diameter of main distributing valves: φ60, φ80, φ100, φ150, φ200.

YWT系列低油压微机调速器

YWT Series Low Oil Pressure Microcomputer-based Governor

YWT系列低油压微机调速器，是以进口工业控制器PLC/PCC为控制核心，可选数字阀、无油电转或比例阀作为电液转换环节，以机械液压系统作为执行机构，组成的微机调速器，适用于中小型水轮发电机组的调节与控制。

YWT series microcomputer-based governor with low oil pressure is a governor, which adopts imported industrial controller PLC/PCC as the control core, optional digital valve, oil-free electro-hydraulic transducer or servo proportional valve as electro-hydraulic transducer link, and mechanical hydraulic system as the actuator. This kind of governors is suitable for the regulation and control of middle and small hydroelectric generating unit.

主要特点

- 油压装置和调速器一体化；
- 高度集成式液压系统；
- 电液转换器可选数字阀、无油电转或比例阀；
- 抗油污能力强；
- 零点无漂移，安装、调试便捷；
- 静态无油耗；
- 断电负荷无扰动；
- 不断流双联式滤油器，内置不锈钢折叠式滤网，通流量大、不易破损，方便清洗和更换；
- 油压等级：2.5Mpa、4.0Mpa、6.3Mpa；
- 调速功：6000N.m、10000N.m、18000N.m、30000N.m、50000N.m、75000 N.m、100000 N.m。



Main characters

- Incorporation of oil pressure device and the governor;
- Highly integrated hydraulic system;
- Digital valve, oil-free electro-hydraulic transducer or proportional valve are available for electro-hydraulic transducer;
- Satisfactory dirt proofing;
- No drift at zero position, and convenient for installation and debugging;
- No oil consumption in the static state;
- No disturbance of load when power off;
- Consistent oil filter with two channels that adopts built-in stainless steel and foldaway filtering grid: large through-flow, better quality, and convenient for washing and replacement;
- Oil pressure: 2.5Mpa, 4.0Mpa, 6.3Mpa;
- Governor capacity: 6000N.m, 10000N.m, 18000N.m, 30000N.m, 50000N.m, 75000 N.m, 100000 N.m.

YWT系列高油压微机调速器

YWT Series Microcomputer-based Governor with High Oil Pressure

YWT系列高油压微机调速器是以进口工业控制器PLC/PCC为控制核心，以数字阀或比例阀作为电液转换环节，以机械液压系统作为执行机构，组成的微机调速器，适用于中小型水轮发电机组。

YWT series microcomputer-based governor with high oil pressure is a governor that adopts imported industrial controller PLC/PCC as the control core, digital valve, or servo proportional valve as electro-hydraulic transducer link, and mechanical hydraulic system as the actuator. This kind of governors is suitable for middle and small hydroelectric generating unit.

主要特点

- 油压装置和调速器一体化；
- 囊式蓄能器蓄能，无需空压机系统；
- 高度集成式液压系统；
- 电液转换器可选数字阀或比例阀；
- 采用集成式结构设计，取消了引导阀、主配压阀等中间结构；
- 抗油污能力强，静态无油耗；
- 无需机械零位调整，安装、调试便捷；
- 接力器布置灵活，可取消调速轴；
- 断电负荷无扰动；
- 采用双滤油器；
- 油压等级：16Mpa；
- 调速功：6000N.m、10000N.m、18000N.m、30000N.m、50000N.m、75000 N.m、100000 N.m。

Main characters

- Incorporation of oil pressure device and the governor;
- Energy is stored by bladder accumulator so that the air-compressor system is eliminated;
- High integrated hydraulic system;
- Digital valve or proportional valve are available for electro-hydraulic transducer;
- It adopts integrated structure design, and eliminates intermediate components such as pilot distributing valve, main distributing valve;
- Satisfactory dirt proofing and no oil consumption at static state;
- No drift at zero position, and convenient for installation and debugging;
- Flexible layout for the servomotor, and the speed-regulating shaft can be abolished;
- No disturbance of load when power off;
- Oil filter with two channels;
- Oil pressure: 16Mpa;
- Governor capacity: 6000N.m, 10000N.m, 18000N.m, 30000N.m, 50000N.m, 75000 N.m, 100000 N.m.



油压装置

Oil pressure device

油压装置是向水轮发电机组的调速系统供给压力的能源设备，是调速系统的重要组成部分。同时也可作为进水阀、调压阀以及液压操作元件的压力油源。

As an important part of the governing system, the oil pressure device is an energy device for supplying the pressure to the governing system of hydroelectric generating unit. It can also be used as pressure source of intake valve, pressure-regulating valve and hydraulic operational components.

主要配置

- 压力油罐、回油箱、油泵及电机、阀组及自动化元件。

Main Configurations

- Pressure oil tank, oil sump tank, oil pumps, motors, sets of valves and automatic components.

主要特点

- 标准化程度高，结构紧凑可靠，工艺优良；
- 自动化元件配置完整、合理、可靠；
- 具有地面式和悬挂式两种布置方式；
- 具有组合式和分离式两种结构；
- 可选常规继电器控制和PLC控制；
- 油压等级：2.5Mpa、4.0Mpa、6.3Mpa、16Mpa；
- 压力罐容积：0.3m³、0.6m³、1.0m³、1.6m³、2.5m³、4.0m³、6.0m³、8.0m³、10.0m³、12.5m³、16m³、16m³x2、20m³、20m³x2、25m³、25m³x2、32m³x2、40m³x2。

Main characters

- High standardization, compact and reliable structure, and excellent craftwork;
- Complete, rational and reliable automatic component configurations;
- Optional: Grounded and suspended layouts;
- Optional: Combined and separated structures;
- Optional: normal relay control and PLC control;
- Oil pressure: 2.5Mpa, 4.0Mpa, 6.3Mpa, 16Mpa;
- The volume of pressure tank: 0.3m³, 0.6m³, 1.0m³, 1.6m³, 2.5m³, 4.0m³, 6.0m³, 8.0m³, 10.0m³, 12.5m³, 16m³, 16m³x2, 20m³, 20m³x2, 25m³, 25m³x2, 32m³x2, 40m³x2.



水轮机调速器综合仿真测试仪

Comprehensive instrument for simulations and tests of hydraulic turbine governing system

水轮机调速器综合仿真测试仪集仿真和测试于一体，它既可仿真机械液压系统，也可仿真水轮机组，同时还可做水轮机调速器静态、动态及各种测试试验，适用于水轮机调速器的性能测试。

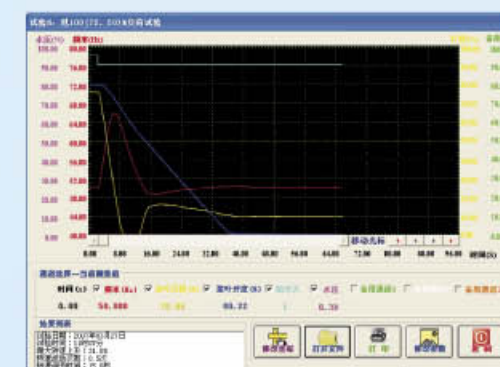
With integration of simulations and tests, the comprehensive instrument for simulations and tests of hydraulic turbine governing system can simulate mechanical hydraulic system and turbine-generator units, as well as conduct static, dynamic and various tests. It is suitable for testing the performance of hydraulic turbine governing system.

主要功能及特点

- 可阶跃法测转速死区；
- 常规方法测静特性；
- 空载频率扰动试验；
- 正交法优化空载控制参数；
- 甩负荷试验；
- 测PID控制特性；
- 记录开机、停机等动态过程；
- 可仿真调速器机械液压系统和水轮机组；
- 工频信号发生和测量仪；
- 带存储的通用示波器。

Main functions and characters

- Measuring the speed dead band by stepped change;
- Measuring static characteristic by conventional methods;
- No-load frequency disturbing test;
- Optimization of no-load control parameters by orthogonal method;
- Load rejection test;
- Measure the PID control performances;
- Recording the dynamic behaviours such as startup and stop;
- Simulation of governor mechanical hydraulic system and turbine units;
- Generator and measurer of frequency signal;
- Universal oscillograph with storage.



转速信号装置

Speed signal device

WZX型数字式转速信号装置采用进口单片机或可编程控制器（PLC）为核心，外加驱动、显示、存储、控制等元件所组成，集状态数据显示、参数设置于一体；功能完善，操作方便。适用于机组自动化控制。

Besides adopting imported microcontroller or PLC as the core, WZX digital speed signal device also configures drive, display, storage and control components. It integrates state and data display, and parameters setting. The device with perfect functions and convenient operation is suitable for units' automatic control.

主要特点

- 测频方式：残压测频和齿盘测频，并可输出模拟量转速信号；
- 多路转速信号输出，输出值可整定；
- 具有通讯接口。

Main characters

- Frequency measurement method: frequency measurements by PT and toothed disc, and outputting analog speed signal;
- Various speed signal outputs. The output value can be set;
- Communication interfaces.

主令开关控制器

Control master switch

一、机械式主令开关 Mechanical control master switch

JLK型机械式主令开关主要由接点组、凸轮组、传动装置及接线端子组成，用于水轮机导叶接力器开度位置的检测。适用于机组自动化控制。

Mainly composed of contact group, cam group, driving device and wiring terminal, JLK mechanical control master switch is used to detect the position of turbine wicket gate servomotor, and suitable for units' automatic control.

主要特点

- 凸轮可360度旋转，侧面顶丝锁定，安装调整简便；
- 触点动作可靠，接点耐压等级高；
- 输出接点可根据用户要求提供。

Main characters

- The cam can rotate 360° with setscrew lock at the side, and is convenient for installation and adjustment;
- Reliable contact activity, high grade voltage resistance contact;
- Output contacts can be furnished according to clients' requirements.



旋转式主令开关
rotating control master switch



直线式主令开关
linear control master switch

二、电气型主令开关控制器 Electric controller for mater switch

ZL-WJ型主令开关采用单片机或可编程控制器（PLC）为核心，外加驱动、显示、存储、控制等元件所组成，集状态数据显示、参数设置于一体；功能完善，操作方便。适用于机组自动化控制。

Mainly composed of external drive, display, storage and control components, ZL-WJ the control switch adopts single-chip microprocessor or PLC as the core, integrates states and data display and parameter setting. The device with perfect functions and convenient operation is suitable for units' automatic control.

主要特点

- 用户可自行设置全关、空载、分段关闭点、全开值等参数；
- 具有多路位置接点输出，并有指示灯指示；
- 数码显示接力器开度信号。

Main characters

- The clients themselves can set parameters of full close, no-load, inflections for closing device with several rates, full open value etc.
- Multiple position contact outputs with indicators;
- Digital display for opening signals of the servomotor.

分段关闭装置FDG

Closing device with several rates FDG

我公司设计生产的该装置全部采用标准件集成，体积小、动作可靠，安装、调整简单，不渗油。

Self-designed and manufactured closing device with several rates are adopted integrated standard components. The device is with small size, reliable action, simple installation and adjustment, and no oil leakage.

主要特点

- 独创的“液控单向节流阀”具有液控、单向、节流三种功能；
- 可配置回复机构；
- 先导阀可选双线圈电磁换向阀；
- 油压等级：2.5Mpa、4.0Mpa、6.3Mpa；
- 直径：φ60、φ80、φ100、φ150、φ200、φ250。

Main characters

- The unique "hydraulic control one-directional throttle valve" owns hydraulic control, one-directional and throttle functions;
- Returning mechanism can be configured;
- The pilot-distributing valve can be solenoid commutative valve with double coils;
- Oil pressure grades: 2.5Mpa, 4.0Mpa, 6.3Mpa;
- Diameter: φ60, φ80, φ100, φ150, φ200, φ250.



事故配压阀SGP

Emergency distributing valve SGP

我公司研制的事故配压阀将传统过速限制器上的电磁配压阀、油阀、事故配压阀集成于一体。事故配压阀主阀是一个二位六通型换向阀，用于水轮发电机组的过速保护系统。

Our self-developed and manufactured emergency distributing valve incorporates solenoid distributing valve, oil valve and emergency distributing valve on traditional over-speed limiter. The main valve of emergency distributing valve is a binary six-way commutative valve, and used in over-speed protection system of hydroelectric generating unit.

主要特点

- 集成化程度高，体积小，重量轻，占用场地小，安装方便；
- 采用液压缓冲装置，无振动，使用寿命长；
- 节流装置整定好后，稳定可靠； ■ 油压等级：2.5Mpa、4.0Mpa、6.3Mpa；
- 直径：φ60、φ80、φ100、φ150、φ200、φ250。

Main characters

- High integration, small size, little weight, small holding place and simple installation;
- Hydraulic buffer, no vibration and long lifetime;
- After the adjustment of throttling gear, it is stable and reliable;
- Oil pressure: 2.5Mpa, 4.0Mpa, 6.3Mpa;
- Diameter: φ60, φ80, φ100, φ150, φ200, φ250.

重锤关闭装置ZCGJ

Weight shutdown device ZCGJ

重锤关闭阀是我公司针对灯泡贯流式机组设计的，体积小，重量轻，安装方便。用于水轮发电机组的过速保护系统。

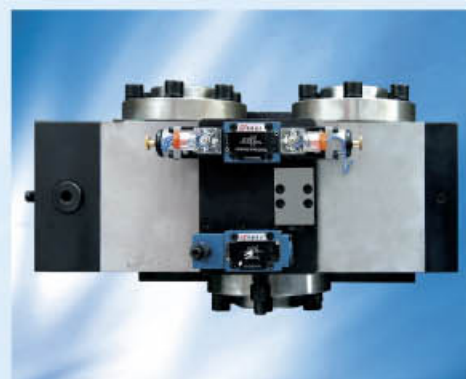
Our corporation designs the weight shutdown device for bulb turbines. It is a device with little weight, small holding place and simple installation and suitable for over-speed protection system of hydroelectric generating unit.

主要特点

- 将传统过速重锤关闭系统中的油阀、电磁配压阀集成于一体，体积小，重量轻，安装方便；
- 装置上留有与纯机械液压过速装置的接口； ■ 先导电磁阀带有定位装置； ■ 采用液压标准件；
- 油压等级：2.5Mpa、4.0Mpa、6.3Mpa； ■ 直径：φ60、φ80、φ100、φ150、φ200、φ250。

Main characters:

- Incorporate oil valve and solenoid distributing valve in the traditional over-speed weight shutdown system. And it is a device with small size, little weight, and convenient installation;
- The device has interfaces connecting the purely mechanical over-speed device;
- The guide solenoid valve configures positioning device; ■ Hydraulic standard components;
- Oil pressure: 2.5Mpa, 4.0Mpa, 6.3Mpa; ■ Diameter: φ60, φ80, φ100, φ150, φ200, φ250.



自动化元件

Automatic components

自动化元件包括各种压力、液位、位移、温度等检测传感器和各种阀体。请参见下列图片。

Automatic components include various detecting transducers such as pressure transducer, level transducer, displacement transducer and temperature sensor, and different valve bodies. Please refer to the following pictures.



压力变送器
pressure transmitter



压力开关
Pressure switch



一般压力表
Common manometer



电接点压力表
Electrical contact manometer



磁翻柱液位传感器
Magnetic column level transducer



浮球连续式液位传感器
Ball float continuous level transducer



投入式液位变送器
Throw-in level transmitter



绝对式光电编码器
Absolute optical-electronic encoder



直线位移变送器
Linear displacement transmitter



伺服电机直线位移传感器
Servo motor linear displacement transmitter



接近开关
Proximity switch



油混水信号器
Oil-water mixing signal indicator



自动补气装置
Device for air make-up



流量开关
Flow switch



温度传感器
Temperature transducer



差压变送器
Differential pressure transmitter



电磁空气阀
Solenoid air valve



电动蝶阀
Motor driven butterfly valve



电动球阀
Motor driven ball valve



比例阀
Proportional valve



伺服比例阀
Servo proportional valve

SC2100中小型水电站计算机监控系统

SC2100 computer-based supervision and control system for mid-small hydropower stations

性能特点

- 分层、分布式结构，系统扩展性强；
- 处理能力强：网络的分布式处理，32位及32位以上的工作站；
- 实时性强：现场总线网、IEEE802.3以太网、X.25广域网构成当地、中央、远方三级通信枢纽；
- 可靠性高：系统中重要部件采用双冗余配置，具有在线自检、自诊断和恢复能力；
- 面向对象的工业组态软件，可通过组态界面方便地完成各种组态功能；
- 系统功能齐全，技术先进，操作简便，维护量小；
- 可选用各种工作站，高档微机，不同PLC、DCS设备。

Performance & characters

- Hierarchical and distributed structure, and high system extension ability;
- High processing ability: network distributing processing, and ≥ 32 -bit working stations;
- High real time ability: field bus network, IEEE802.3 Ethernet, and X.25 wide area network make up of local, central and remote communication hinges;
- High reliability: main components in the system adopt redundant configurations which can online self-check, self-diagnose and self-recover;
- The object-oriented industrial configurable software can realize different configuration functions via its configurable interface;
- The system is with complete functions, advanced technology, convenient operation and less maintenance;
- Various working stations, top-grade computers and different PLC, DCS devices can be applied.

主要功能

- 数据采集、处理功能；
- 高效、直观的可视化顺控流程；
- 电厂设备运行管理及指导；
- 人机对话功能，具有丰富多彩的图形界面；
- 各种数据、事件的统计记录，各种操作票的开票、显示、编辑、打印；
- 控制与调节：具有五种机组运行方式
 - ① 命令运行方式 ② 自动发电控制 (AGC) ③ 自动电压控制或机组无功功率联合控制 (AVC)
 - ④ 经济运行方式 (EDC) ⑤ 自动调频运行 (AFC)
- 运行监视和事件报警：

越限和状态变化事件报警，事件顺序记录，事故处理提示和自动处理，声光、语音、电话、图象报警；
- 可与各级调度通信实现四遥功能，与外部计算机系统或装置按各种通信规约进行通信；
- 远程诊断。



Main functions

- Data acquisition and processing functions;
- High efficient and intuitionistic video sequential control flow chart;
- Equipment operation management and guidance in the plant;
- Human-machine dialog function with many graphic interfaces;
- Various data and events statistics record functions, as well as tickets making, displaying, editing and printing of operating tickets;
- Control and regulation: there are five operating modes:
 - ① Command operating mode
 - ② Automatic generation control (AGC)
 - ③ Automatic voltage control or reactive power control (AVC)
 - ④ Economical dispatching mode (EDC)
 - ⑤ Automatic frequency control mode (AFC)
- Operating monitoring and events alarm; Alarms of over-limit and state changes, sequential record of events, failure processing clues and automatic processing; acoustic and light, sound, telephone and image alarms;
- It can realize four remote control functions with different ranked dispatching communication, and communicate with outside computer-based systems or devices in the light of various communication protocols;
- Remote diagnosis.

UK2100水电站辅机控制系统

UK2100 auxiliary device control system of hydropower station

为了满足水电站"无人值班, 少人值守"的要求, 我公司开发了UK2100系列水电站辅机控制系统, 适用于各类水电站公用及机组辅助设备的控制。

To meet the requirement of "Unattended, fewer people on duty", the Corporation has developed UK2100 series auxiliary device control system of hydropower station, which is suitable for the control of public device and auxiliary device in different hydropower stations.

主要配置

- 采用世界知名品牌的PLC, 包括法国施耐德, 德国西门子, 美国GE, 日本三菱等公司生产的PLC;
- 软启动器采用西门子、施耐德、AB、ABB等公司知名品牌;
- 配有空气开关、断路器、接触器、热继电器等动力回路元件。

Main configurations

- World famous brand PLC manufactured by companies such as Schneider, Siemens, GE, and Mitsubishi are used;
- Soft starter are from noted brands such as Schneider, Siemens, AB, and ABB;
- Configured power circuit components such as air switch, circuit breaker, contactor and thermorelay.

主要功能及特点

- 具有自动、切除和手动三种工作方式:
 - 具有现地和远方控制方式, 相互闭锁;
- 自动主用/备用切换控制, 并具有隔离检修措施:
 - 可采用交直流同时供电, 互为主/备用;
- 实时显示、记录及查询系统运行参数、故障、设备操作事件等信息;
- 具有完整的短路、过载、缺相、相序、三相电压不平衡等电动机保护功能;



- 故障诊断报警: 可对模块、测量回路、系统越限、泄漏等故障进行实时监测报警;
- 电机可采用软启动器控制, 避免对厂用电的冲击:
 - 软件滤波功能;
- 容错控制: 接触器触点粘连时跳空气开关等:
 - 支持Modbus、MB+、Profibus、Can、EtherNet等多种现场总线通讯协议。

Main functions and characters

- There are three operating modes, namely, automatic, cut-off and manual operations;
- There are local and remote control modes with interlock;
- Automatic master/standby switchover control, and isolation measures for maintenance;
- DC and AC can be simultaneously supplied, and they are master/standby for each other;
- Real-time display, record and inquire information such as the system operation parameters, faults, device operation events;
- Complete motor protection functions such as short circuit, over load, absent phase, phase sequence and the unbalance of triphase;
- Fault diagnoses alarm: real-time monitoring and alarm on faults of modules, measurement circuits, system over-limit and leakage;
- Soft starter to avoid impacting on power supply in the plant can control the motor;
- Software filtering function;
- Fault tolerance control: e.g. the air switch is off when contacts of the contactor are adhesive;
- Support various field bus communication protocols such as Modbus, MB+, Profibus, CAN and EtherNet.

UK2100主要包括以下控制单元

- 油压装置控制柜: 用于压力油源系统的控制;
- 漏油泵控制柜: 用于漏油箱油位的控制;
- 空压机控制柜: 用于高、低压气系统的控制;
- 渗漏排水控制柜: 用于渗漏集水井水位的控制;
- 顶盖排水控制柜: 用于机组顶盖水位的控制;
- 检修排水控制柜: 用于检修排水的水位控制;
- 消防供水控制柜: 用于消防水池中的水位及供水管压力的控制;
- 技术供水控制柜: 用于技术供水蓄水池的水位控制;
- 润滑油控制柜: 用于机组润滑油系统的控制;
- 高压油顶起控制柜: 用于机组顶起控制, 使机组在运行时保持可靠的顶起;
- 冷却风机控制柜: 用于机组冷却风机的运行控制;
- 排污控制柜: 用于厂废粪池排污泵控制。

UK2100 mainly includes the following control modules

- Control cabinet of Oil pressure device: for the control of pressure oil source system;
- Control cabinet of leakage pump: for the control of oil level of the oil leakage tank;
- Control cabinet of air-compressor: for the control of high and low pressure air system;
- Control cabinet of leakage drainage: for the control of water level in leakage well;
- Control cabinet of turbine upper cover drainage: for the control of water level on the turbine upper cover;
- Control cabinet of maintenance drainage: for the water level control of maintenance drainage;
- Control cabinet of fire-fighting water supply: for the control of water level in fire-fighting pond and pressure in tubes;
- Control cabinet of technical water supply: for water level control of technical water supply pond;
- Control cabinet of lube: for the control of units' lubricating system;
- Control cabinet of high oil pressure jack: for units' jack control to keep reliable jack when operating;
- Control cabinet of cooling blower fan: for control of units' cooling blower fan;
- Control cabinet of sewage: for the control of sewage pump in the plant.



ZM2100 闸门计算机控制系统

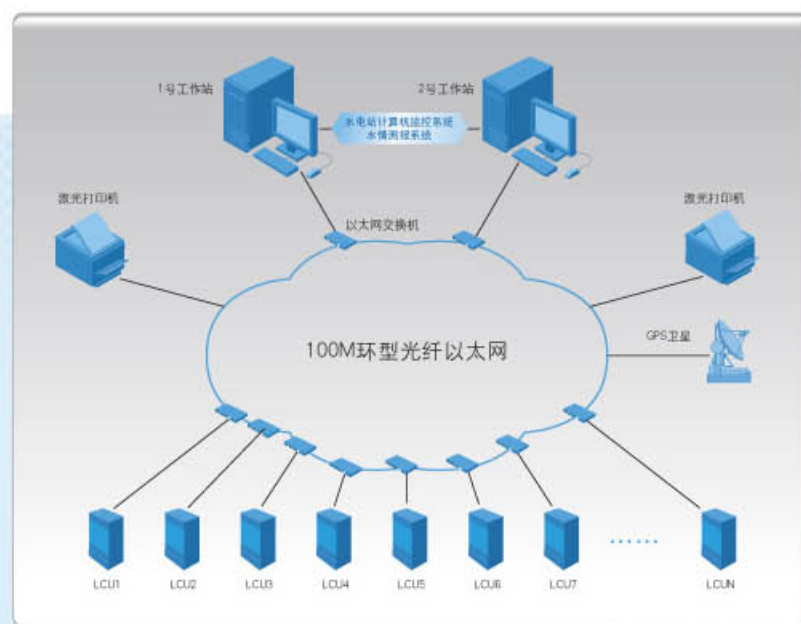
ZM2100 Gate Computer-based Control System

闸门计算机控制系统主要针对水电站、泵站、闸站的闸门控制要求而设计的，整个系统可由计算机集控单元、现地控制单元、视频监控系统三部分组成。适用于液压启闭机和卷扬机各种不同类型的闸门控制与远方调度，包括快速闸门、泄洪闸门、冲沙洞闸门，以及水利、航运、供排水系统的节制闸等。

Gate computer-based control system aims at meeting gate control requirements in hydropower station, pumping station, and gate station. The system, consisting of computer-based centralized control unit, local control unit and video monitoring system, is suitable for hydraulic hoist and hoist's different gate control and remote dispatching, including intake emergency gate, flood discharging gate, sand sluicing gate, as well as check gate for water conservancy, navigation, and water supply and drain system.

ZM2100 闸门控制系统采用环型光纤以太网或者星型光纤以太网结构。

ZM2100 gate control system adopts ring or star optic-fibre Ethernet structure.



环型光纤以太网系统架构图
Ring optic-fibre Ethernet network diagram

计算机集控单元

Computer-based centralized control unit

工业控制计算机为整个集控单元的控制核心，通过通讯控制现地控制单元，显示现地控制单元采集到的各种状态、数据及参数等。可与水调、水情测报自动化系统实现数据通信，完成对整个资源的共享。

As the control core of the whole centralized control unit, industrial controlled computer can control the local control unit via communication, and display different states, data and parameters collected by local control unit. It also can realize data communication with automatic system of reservoir operation and water regime monitoring and report, and accomplish total resource sharing.

主要功能及特点

- 软件可选用InTouch、(i)FIX、组态王、WinCC等先进、高效、可靠的工业组态软件；
- 全分布、开放式系统，易于扩充和升级，充分保护用户投资；
- 模块化、结构化的软件设计；
- 强大的通讯功能，与全厂计算机监控系统、水调、水情测报自动化系统实现数据通信，与现地控制单元可实现光纤双环网通讯；
- 根据泄洪特点量身定做的洪水调度应用软件；
- 显示、记录、打印功能：显示、记录、打印各种状态、数据，同时生成报表和曲线显示；
- 报警提示：语音报警提示发生何种故障，记录报警的时间和内容；
- 权限设定管理，对用户实行分级管理；
- 视频联动功能。

Main functions and characters:

- Advanced, efficient and reliable industrial configurable software such as InTouch, (i)FIX, Kingview, WinCC etc. can be adopted;
- Full distributing and open system, which can be easy for extension and upgrading and clients' investment protection;
- Modular and structural software design;
- Powerful communication function can realize data communication with computer-based supervision and control system in the plant, automatic system of reservoir operation and water regime monitoring and report, optic-fibre double ring networks communication with local control unit;
- Specially designed application software for flood control in the light of characters of flood discharging;
- Displaying, recording and printing functions: various states and data can be displayed, recorded and printed, and they also can be displayed via reports and curves at the same time;
- Alarm clue: it can clue any kind of faults via sound alarm, and record alarm time and contents;
- Purview set management can hierarchically manage clients;
- Video interconnection function.



现地控制单元

Local control unit

现地控制单元采用PLC作为控制核心，完成对闸门的各种控制，以及与闸门计算机集控单元的数据交换。

With PLC as the control core, the local control unit can accomplish different gate controls and exchange data with gates' computer-based centralized control unit.

主要功能及特点

- 具有现地和远方控制方式，自动和手动工作方式；
- 实时采集、显示闸门的开度、水位或荷重；
- 具有闸门的上升、下降、停止与自动定位功能；
- 通讯冗余功能：可与远方计算机系统组成双环光纤网，实现通讯冗余；
- 电机软起动功能；
- 采用友好的人机界面，具有各种显示、设置、记录、查询、操作及帮助等功能；
- 故障保护功能：电机过流、缺相保护，闸门越限保护，卷扬机的抱闸保护、紧急停机；
- 故障自动诊断功能：诊断PLC、各种传感器、电机及控制回路、电源、液压启闭机的非同步、卷扬机的不平衡及其他各执行机构的故障；
- 软件、硬件的多种闭锁和保护，准确实现闸门的升降和停止。



Main functions and characters

- Local and remote control modes, automatic and manual operations;
- Real-time collect and display gates' opening, water level and charge;
- There are following functions: ascending, descending, stopping and automatic positioning for gates;
- Communication redundancy function: it can combine remote computer system with double-rings optic-fibre network to realize communication redundancy;
- Motors soft start-up function;
- The adopted friendly human-machine interface can realize display, set, record, inquiry, operation and assistance functions;
- Fault protection function: motor's over-current protection, absent phase protection, gate's over-limit protection, brake shutdown protection and emergent stop of the hoister's gate;
- Fault automatic diagnosis function: diagnosing PLC, various sensors/transducers, motor and control circuits, power supply, hydraulic hoist's non-synchronization, unbalance of the hoister and other actuators' faults;
- Various locks and protections of software and hardware, and correctly realize gate ascending or descending.

视频监控系统

Video monitoring system

闸门计算机控制系统可以根据需要配置视频监控系统，视频监控系统是由摄像头、解码器、视频光端机、操作键盘、视频主机和显示器等部分组成。系统主要完成对闸门现场运行状况的监视。

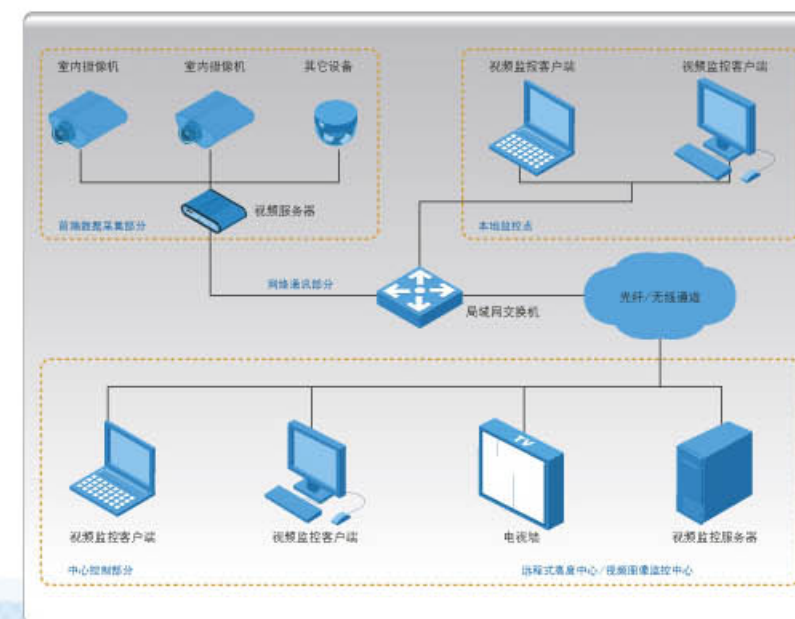
Gate computer-based control system can configure needed video monitoring system, which consists of camera head, encoder, optical transmission equipment, keyboard, video mainframe and display etc. The system is mainly used to monitoring the gate's local operation.

主要功能及特点

- 在闸门现场布置摄像头，具有闸门视频联动功能；
- 采用室外使用的摄像头和解码器，防潮、防雨、防雷电；
- 远程遥控；
- Web功能：可通过局域网或Internet网对闸门进行视频监视、浏览；
- 完善的图像监视、录像、检索和回放功能。

Main functions and characters

- Camera head configured on the gates' site has gate video interlocking function;
- Outside used camera head and encoder which is damp-proof, waterproof and against thunder;
- Remote control;
- Web function: it can monitor and browse the gate via LAN or internet;
- Perfect photo monitoring, kinescoping, searching and reviving functions.

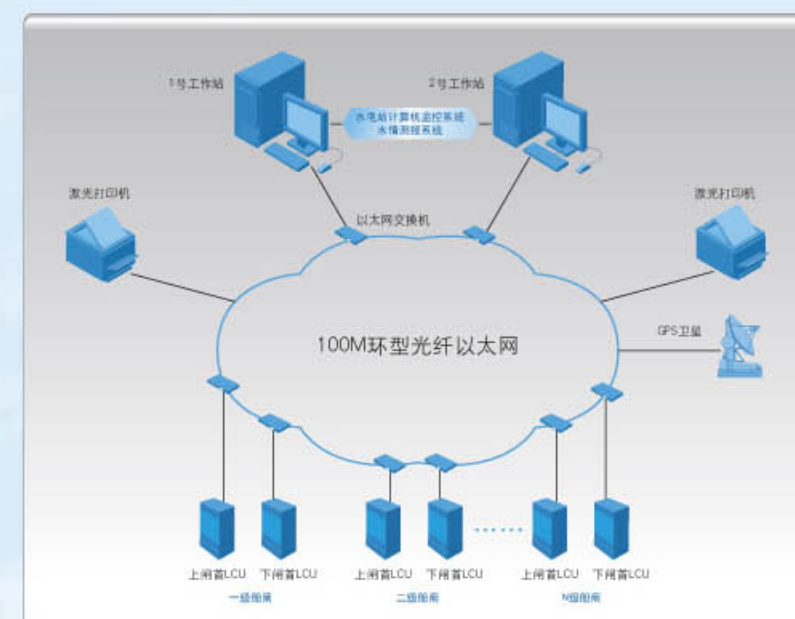


CZ2100船闸计算机控制系统

CZ2100 tail gate computer control system

船闸计算机控制系统主要针对船闸的闸门控制要求而设计的，整个系统通常由计算机集控单元、现地控制单元、广播系统、视频监控系统四部分组成。适用于各种不同类型的船闸自动控制与远方调度。

Aiming at meeting requirements for shiplock control, the computer-based control system for shiplock is suitable for different automatic and remote controls. The system consists of computer-based centralized control unit, local control unit, broadcasting system and video monitoring system.



计算机集控单元

Computer central control unit

主要功能及特点

- 软件可选用InTouch、(i)FIX、组态王、WinCC等先进、高效、可靠的工业组态软件；
- 全分布、开放式系统，易于扩充和升级，充分保护用户投资；
- 模块化、结构化的软件设计，保证系统功能的可扩展性；
- 软件、硬件的多种闭锁和保护，准确实现上下游船只的下行和上行；
- 计算机管理船只过闸收费工作；
- 控制功能：集中控制各个现地控制单元，管理整个船闸控制系统；
- 显示、记录、打印功能：显示、记录各种状态、数据，同时生成报表和曲线显示，并可打印；
- 报警提示：语音报警提示发生何种故障，记录报警的时间和内容；
- 权限设定管理，对用户实行分级管理；
- 视频联动功能。

Main functions and characters

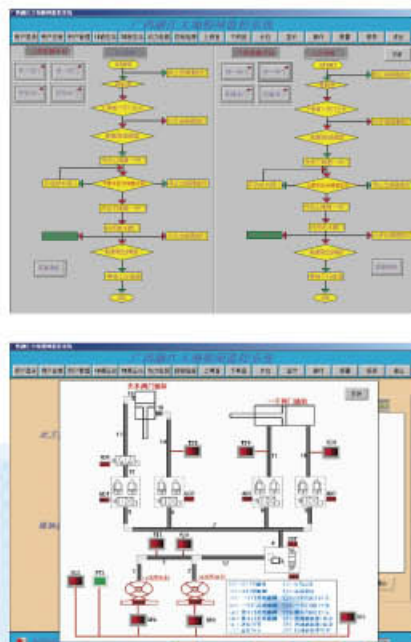
- Advanced, efficient and reliable industrial configurable software such as InTouch, (i)FIX, Kingview, WinCC etc., can be applied;
- Full distributing and open system, easy for extension and upgrading, and clients' investment protection;
- Modular and structural software design to guarantee the extension of system functions;
- Various lock and protection for software and hardware, and correctly realize the navigation of boats from upstream or downstream;
- Computer can manage charging fees that boats pass the shiplock;
- Control functions: centralized control of different local control units, management of the whole shiplock control system;
- Displaying, recording and printing functions: various states and data can be displayed, recorded and printed, and they can be displayed via reports and curves at the same time, and also can be printed;
- Alarm clue: it can clue any kind of faults via sound alarm, and record alarm time and contents;
- Purview set management can hierarchically manage clients;
- Video interconnecting function.

现地控制单元

Local control unit

现地控制单元采用PLC作为现地控制单元核心，完成对船闸的各种控制，以及与船闸计算机集控单元的数据交换。

With PLC as the control core, local control unit can accomplish different controls for shiplock, and exchange data with computer-based centralized control unit of shiplock.



主要功能及特点

- 具有现地和远方控制方式，自动和手动工作方式；
- 实时采集、显示各水位及闸门开度等信号；
- 人字门开门及关门同步；
- 具有防超灌、超泄功能；
- 实现上闸首、下闸首、充水门及通航灯等设备的控制；
- 系统具有多重联锁功能；
- 启闭机房设备状态的实时自动监测；
- 采用友好的人机界面，具有各种显示、设置、记录、查询、操作及帮助等功能；
- 故障保护功能：电机过流、缺相保护，紧急停机；
- 故障自动诊断功能：诊断PLC、各种传感器、电机及控制回路、电源、液压启闭机的非同步、卷扬机的不平衡及其他各执行机构的故障。

Main functions and characters

- Local and remote control modes, automatic and manual operations;
- Real-time collect and display signals such as water level, gate opening etc.;
- Synchronization for opening and closing A-door;
- Protect it from over-output and over-input;
- Realize the control of upper-gate, down-gate, filling gate as well as navigation lamps;
- The system has multi-interlock function;
- Real-time automatic monitoring of equipment states in the hoist room;
- The adopted human-machine interface can realize functions such as display, set, record, inquiry, operation and assistance;
- Fault protection function: motor's over-current and absent phase protection, and emergent shutdown etc.;
- Fault automatic diagnosis function: diagnosing PLC, various sensors/transducers, motor and control circuits, power supply, non-synchronization of hydraulic hoist, unbalance of hoister and other actuators faults.

广播系统

The broadcasting system

该广播系统吸收采用了公交系统语音报站器技术，集成了船闸自身特点的标准提示用语，结合调度收费系统，用于对过闸船民广播服务。

The broadcasting system adopts the technology of voice reporter of public transportation system, integrates standard clues with proper characters of shiplock, and combines with control charging system. The system is used to provide people on the boat with broadcasting services.

主要功能及特点

- 可采用有线或无线播放方式；
- 语音可自动和手动播放，根据运行需要实现分区广播；
- 设备具有良好的防雷措施。

Main functions and characters

- Wire or wireless broadcasting method;
- Realize automatically and manually voice broadcast, and divisional broadcast according to operation needs;
- Satisfactory system against thunder.

视频监控系统

Video monitoring system

船闸计算机控制系统可以根据需要配置视频监控系统，视频监控系统是由摄像头、解码器、视频光端机、操作键盘、视频主机和显示器等部分组成。系统主要完成对船闸上下游及闸室状况的监视。

The computer-based control system for shiplock can configure needed video monitoring system, which consists of camera head, encoder, video modem, keyboard, video mainframe and display etc. The system is mainly used to monitoring the state of shiplock's upstream, downstream and chamber.

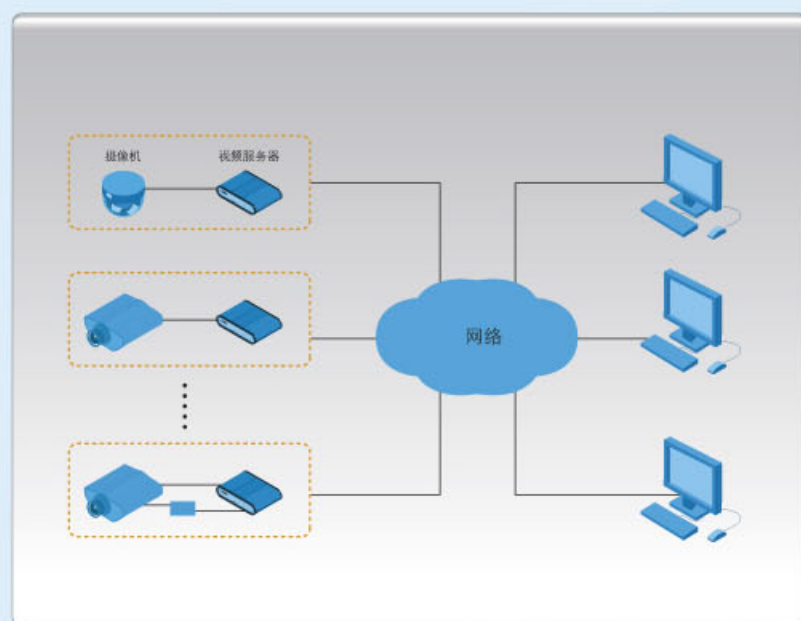


SP2100数字工业电视监控系统

SP2100 digital and industrial video monitoring system

SP2100数字工业电视监控系统是我公司开发的一种全数字网络视频监控系统，技术先进，结构简洁，可在企业各领导办公室的计算机上或调度室的大屏幕投影电视墙上控制、显示工业视频图像，实现企业多媒体安全生产综合信息全局联网。

SP2100 digital and industrial video monitoring system is a self-developed digital network monitoring system with advanced technology and simple structure. Industrial video photos can be controlled and displayed on the large projection screen in the control room, and/or on the computers of leaders' office to finally realize comprehensive multi-media-based information network for safe production in enterprises.



适用范围

适用于水利、电力、生产线厂房、工地等电视监控系统、联动防盗监视系统。

Applications

The system can be applied to video monitoring system and interconnected monitoring system for guard against theft in water conservancy, electric power, and product line plants.

主要功能及特点

- 光纤传输工业电视图像，距离远，抗干扰能力强；
- MPEG-4视音频压缩标准，数据量小，存储时间长；
- 通过Ethernet网络平台，实现真正的数字网络视频监控；
- 数字网络视频服务器集图像实时显示、云台编码控制、存储、回放、字符叠加、矩阵切换、权限管理、网络通信为一体，功能强大，操作方便；
- 在计算机屏幕上可同时显示一个、四个、九个、十六个摄像机的图像，画面格式可选，并可对其进行图像冻结、放大、缩小等操作；
- 在各联网计算机上均可直接控制前端云台、镜头、风扇、雨刷、加热等；
- Web功能：可通过局域网或Internet网对闸门进行视频监视、浏览；
- 用多种先进的硬盘录像方式：连续录像、动态录像、手动录像、报警录像；
- 监控系统有安全密码，没有权限的人员不能对监控系统进行查询、设置系统、删除文件等操作；
- 监控中心站和网络终端可同时显示不同的视频图像监控画面；
- 系统预留有报警接口，可以连接主动探测器或被动式紧急按钮，增加对突发事件的报警录像功能。

Main functions and characters

- Industrial video photos can be transmitted by optic-fibres in long distance and the system also has powerful disturbing resistance;
- The system adopts MPEG-4 video and audio compressed standard, which has less data and long time of storage;
- The system realizes digital network video monitoring via Ethernet network platform;
- Integrating real-time photos display, mini pan encoding control, storage, reviving, characters' overlap, matrix switchover, purview management and network communication, the digital network video server is powerful in functions and convenient for operation;
- The computer display can simultaneously display 1, 4, 9 or 16 camera photos (the format of photos is optional) which can be frozen, zoomed, shrunk and so on;
- Front mini pan, lens, fan, rain-brush, heating etc can be directly controlled by computers connected on the network;
- Web function: it can monitor and browse the gate via LAN or Internet;
- Various advanced hard disk recording methods: continuous recording, dynamic recording, manual recording, and alarm recording;
- Security password has been set in the monitoring system so that people without purview cannot inquire and system set, and deletes files in the monitoring system;
- The monitoring center and the network terminal can simultaneously display different video photos monitoring interfaces;
- The system pre-remained alarm interface can connect active probe or passive emergent button so that alarm recording function of emergent events is added.