本画册采用生态纸印制

重要事项：图示尺寸与实物尺寸可能略有差异，本公司有权修改或取代上述产品，恕不另行通知。

Notes: The dimension of the products maybe a little different from the material, please confirm with us when you place the order.

LEYSDEN TECHNOLOGY LIMITED 外资独资

莱斯顿(上海)电气有限公司[北亚] | 莱斯顿(上海)代表处

Add:上海市高技路655号 No. 655 Gaoji Road, Shanghai, China

Tel: +86 021 57700070 Fax: +86 021 57700170

E-mail: lsd@leysden.com Web: www.leysden.com

中国大陆24h服务热线(24h hotline) 400-7161-961

LEYSDEN

LEYSDEN

Technology Limited

有源滤波器 | 静止无功发生器 | 电容器 | 电抗器

Active Power Filter | Static Var Generator

Capacitor | Reactor

产品选型手册

Product selection guide

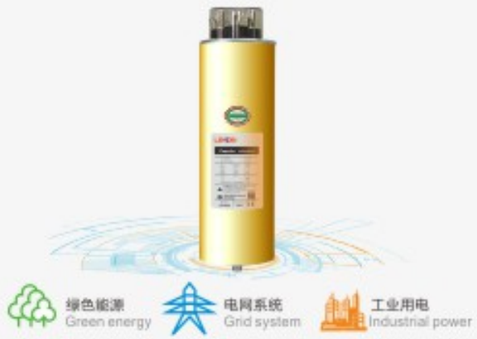
LEYSDEN

INTERNATIONAL

CUTTING-EDGE TECHNOLOGY

莱斯顿-国际前沿技术

更多详情请关注公众号
Please pay attention to the public account



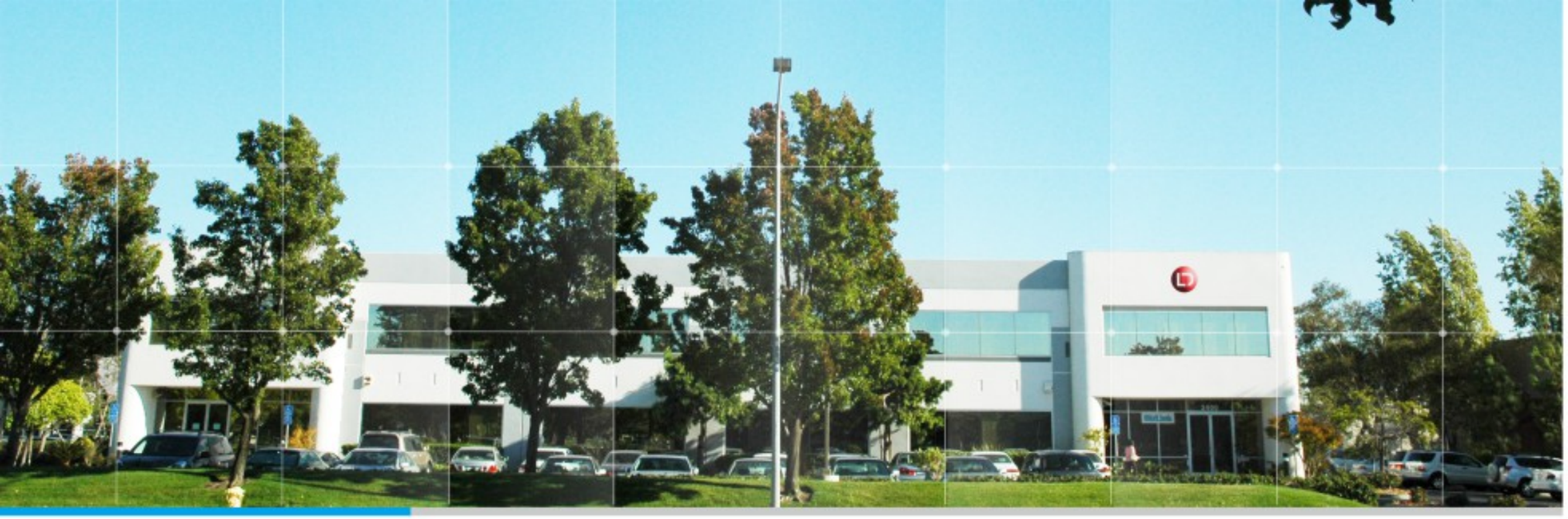
MUNICH | LEYSDEN

让智慧点亮世界
Let wisdom light the world

CONTENTS

目录

LEYSDEN 莱斯顿
LEYSDEN TECHNOLOGY LIMITED 外资独资



莱斯顿在中国
eysden in china

▶ 机构简介 Institutional profile

受益于北亚高速发展的经济和日新月异的基础建设施设，LEYSDEN来到中国成立莱斯顿（上海）电气有限公司，作为LEYSDEN北亚总部，负责统筹大中华区以及北亚区域业务，同时回应莱斯顿在中国大陆蓬勃的业务发展，在中国上海授权成立专门代表机构，专业负责为中国大陆客户量身定做的产品系统集成和维保服务，提供精准的电能污染解决方案。

Benefit from the north high speed development of economy and the rapid set of infrastructure construction, Leysden came to China to set up Leysden (Shanghai) electric co., LTD., as Leysden north Asia headquarters, responsible for the business in greater China and north Asia area as a whole, at the same time in Leysden thriving business development in China, authorized establish a representative office in Shanghai, China, professional responsible for mainland China customers tailored products system integration and maintenance services, to provide accurate pollution solution of electric power.

▶ 莱斯顿品牌 Leysden brand introduction

莱斯顿致力于电力输配电系统及各行业用户的调谐滤波补偿技术，1935年在德国格拉芬(GRAFING)，以矿物油浸渍的棉纤维纸做介质，铝箔做电极的早期真正意义上的电容器开始在电力系统上应用，作为以专业技术导向型品牌，依托新型全膜介质真空灌注充气式电容器和调谐滤波补偿技术在西欧市场的广泛应用，莱斯顿逐渐重点关注全球新兴经济体的发展对电力质量要求的提高，印度的大规模电力基础设施改造，巴西及墨西哥等国家再发展计划，尤其重视中国对电力污染的治理和清洁能源的大力推进，莱斯顿可为中国用户依据电力系统的现状提供标准元件以及特殊应用解决方案。

莱斯顿调谐滤波补偿技术数年来在大中华区快速发展，为更好地服务于用户的技术需要，LEYSDEN入驻中国并在上海成立独资机构致力于滤波补偿技术的服务；在高低压配电系统中，莱斯顿立足于干式技术，安全防爆，设计寿命超过210000小时的过硬质量为中国用户提供高品质，可信赖的谐波治理及实时动态补偿的关键元器件和电能质量整体解决方案，并基于已有的数据库，为中国以及全球的用户提供技术和卓越的服务。

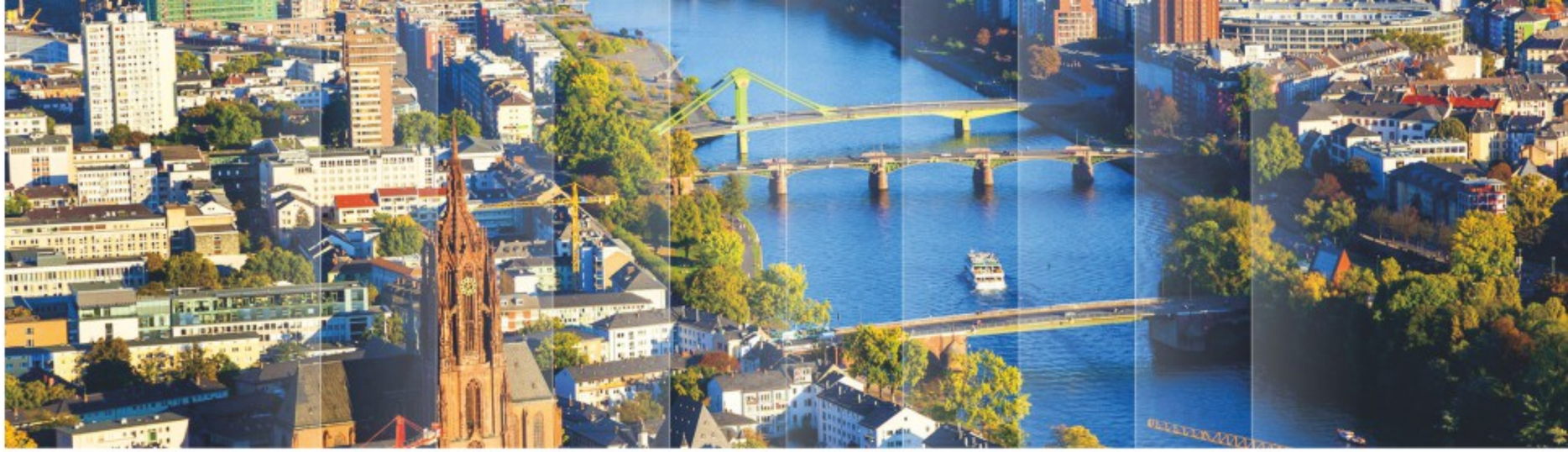
Leysden is committed to the power transmission and distribution system and the user's tuning filter compensation technology, in 1935 in Germany Grafing (Grafing), mineral oil impregnated cotton fiber paper made of medium, aluminum foil electrode to do the early real sense of the beginning of the capacitor Used in power systems. As a professional-oriented brand, relying on the new full-film media vacuum filling inflatable capacitor and tuning filter compensation technology in the Western European market is widely used, Leysden gradually focus on the development of emerging economies in the world to improve the power quality requirements, India's large Scale power infrastructure, Brazil and Mexico and other countries to develop plans, with particular emphasis on China's power pollution control and clean energy to promote, Leysden for the Chinese users based on the status of power systems to provide standard components and special application solutions.

Leysden tuned filter compensation technology has been developing rapidly in Greater China for several years, in order to better serve the technical needs of users, [Leysden Technology] settled in China and set up specialized agencies in Shanghai is committed to filter compensation technology services; in high and low voltage distribution System, Leysden based on dry technology, safe explosion-proof, design life of more than 210,000 hours of excellent quality for Chinese users to provide high-quality, reliable harmonic control and real-time dynamic compensation of key components and power quality of the overall solution, and Based on existing databases, to provide technical and superior service to users in China and around the world.

LEYSDEN

历史演变

Historical evolution



荷兰莱顿大学物理学教授马森布罗克(Musschenbrock，1692—1761)与德国科学家冯·克莱斯特(Von Kleist，1700—1748)分别于1745年和1746年发现了一种具有蓄电功能的"Condenser"电容器，法国神父、博物学家、电学家诺莱特(Nollet1700—1770)将这种能储存电的瓶子称为"莱顿瓶"。很多著名的电学实验都是利用它才得以进行的，例如著名的富兰克林(B.Franklin 1706—1770)利用莱顿瓶发现了正和负电以及电荷守恒定律。1752年7月，富兰克林从放电实验中得到启发，做了当时震动世界的费城用风筝引雷电实验，实现了天电和地电的统一。其后，人们用锡箔或铝箔从内外两面把莱顿瓶包起来，使其储存电荷的效果更明显，由此开始了人类使用电容器的历史。

Leiden University professor of physics Mason Brock (Musschenbrock 1692-1761 and German scientists Feng Kleist (von Kleist, 1700-1748), respectively, in 1745 and 1746 found a of capacitor with storage function, French priest and naturalist, electrical experts Nolet Nollet1700-1770 will this energy storage electric bottle called "Leyden jar. Many famous electrical experiments are using it can be carried out, such as the famous Franklin (B.Franklin 1705-1770) using the Leyden jar found positive and negative and the law of conservation of charge, 1752 July, Franklin from discharging experiment get inspired, the Philadelphia was shaking the World Kite cited lightning experiment, realize the unification of static and geoelectric. Later, people in foil or aluminum foil from both the inside and outside to wrap up the Leyden jar, the stored charge effect is more obvious, which began with the human use of the history of capacitor.

传承历史 开创未来

Inheriting history creating the future

■ 电容器的始祖——莱顿瓶(1745年)
玻璃瓶做介质，玻璃瓶内外用锡箔做电极

Leyden jar - the origin of the capacitor bottle(1745)
Glass bottles as a medium, inside and outside the glass bottle made of tin foil electrode

■ 早期的电报电话系统用电容器（20世纪初期）
棉纤维纸浸渍石蜡做介质，锡箔做电极

Early Telegraph and telephone systems with low voltage capacitors (early twentieth Century)
Paraffin impregnated paper cotton fiber as the medium, the electrode made of tin foil

■ 电力电容器在电力系统的早期应用（1920—1950）
矿物油浸渍棉纤维纸做介质，铝箔做电极

Early application of power capacitor in power system (1920-1950)
Mineral oil impregnated cotton fiber paper to make the medium, aluminum foil to make the electrode

■ 氯化联苯浸渍的电容器（1951—1975）
氯化联苯浸渍木质纤维纸或聚丙烯薄膜与纸复合介质

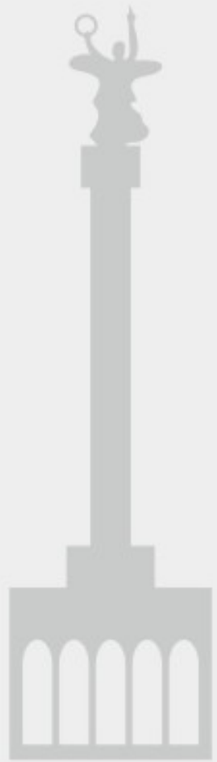
Capacitor impregnated with chlorination(1951-1975)
Chlorinated or impregnated wood fiber paper, or polypropylene film and paper composite medium

■ 无毒新浸渍剂的开发应用（1975—1990）
代替氯化联苯的新浸渍剂IPB，BNC，PXE，C101等固体介质为膜纸复合或全膜介质

Development and application of the new non toxic new impregnation agent(1975-1990)
PXE, BNC, C101, IPB and other new impregnation agents for the replacement of chlorinated chlorinated.Solid medium is a composite of membrane paper or the whole film medium

■ 现代新型电力电容器（1990—现在）
LEYSDEN采用全膜介质真空灌注充气式电容器，其金属化薄膜采用锌铝复合技术，制造采用波纹及平滑切割技术，在真空环境下灌注电解质材料并注入惰性气体，工艺先进，技术先进，

Modern power capacitor (1990-)
LEYSDEN uses the full film dielectric vacuum filling type capacitor, the metal thin film uses the zinc aluminum composite technology, the manufacture uses the corrugated and smooth cutting technology, in the vacuum environment, the electrolyte material and the injection of inert gas, advanced technology, advanced technology.



工程应用
The engineering application

▶ 全面应用 Full application

LEYSDEN向全球通信、数据中心、医疗中心、商业综合体、工业用户提供滤波补偿设备，产品包括有源滤波补偿系统、无源滤波补偿系统，以及有源滤波装置、静止无功发生装置、电容器功率因数调整控制器等滤波补偿专用元器件。

LEYSDEN provides filtering compensation equipment to global communications, data centers, medical centers, commercial complexes, and industrial users. The products include active filtering compensation systems, passive filtering compensation systems, and active filtering devices, static reactive power generating devices, and capacitor power Dedicated components for filter compensation such as factor adjustment controller.

▶ 智能化服务 Intelligent service

信息传递 Information transfer
信息反馈 information feedback
联合管理 Joint management
数据对比 Data comparison
沟通反馈 Communication feedback
绩效考核 Performance appraisal

▶ 主要应用行业 Main application industries

数据中心 Data Center
金属冶炼 Metal Smelting
石油化工 Petrochemical
城市综合体 City Complex
综合医疗 General Medical
市政场馆 Municipal Complex
高科技 High-Tech
烟草 Tobacco
汽车行业 Automotive industry
化工行业 chemical industry
军民机场 civilian airport
太阳能光伏 solar photovoltaic
轨道交通 rail transportation
压延铸造 calender casting
电子业 electronics industry
矿业 mining

▶ 在中国的应用 Application in China


通信·河南联通


石化·中国石油辽阳石化


化工·龙蟒佰利集团钛白基地


数据中心·交通银行


高科技·郑州手机产业园


金属加工·上海宝钢


精密加工·延康汽车


新能源汽车·宜宾汽车园


冶炼·建龙钢铁


城市综合体·重庆涉外商务区


医疗·临朐人民医院

LDCR电容器
LDCR type capacitor

SHOW LEYSDEN

LDCR PRODUCT FEATURES

· Corrugated cutting
· Metallized film
· Frosted gold sprayed cylindrical tank
· Dry self-healing
· Extremely long design life

LDCR型低压滤波电容器专门用于低压去谐滤波系统，其金属化薄膜采用锌铝复合技术,采用先进的安全保护技术,具有优良的过电流及过电压能力,制造方面采用波纹及平滑切割技术,有效改善热响应和封装的密度,抑制高浪涌电流,有效解决由于烧铝薄膜边缘收缩效应引起的边缘接触问题,在真空环境下灌注电解质材料并注入惰性气体,以提高产品的安全可靠性，采用铝壳圆柱型封装便于安装和维护.

LDCR type low-voltage filter capacitor is specially used in low-voltage detuning filter system. Its metallized film adopts zinc-aluminum composite technology, adopts advanced safety protection technology, has excellent over-current and over-voltage capabilities, and uses ripple and smooth cutting technology in manufacturing. Effectively improve the thermal response and the density of the package, suppress the high inrush current, and effectively solve the problem of edge contact caused by the shrinkage effect of the edge of the winding film. Fill the electrolyte material and inert gas in a vacuum environment to improve the safety and reliability of the product. Cylindrical aluminum housing is easy to install and maintain.

波纹切割 | 金属化薄膜 | 磨砂喷金圆柱罐体 | 干式自愈式 | 超长设计寿命

技术参数 Technical Parameters

- 电压范围:230—1300V
- 额定频率：50/60Hz
- 额定容量：5—40kvar
- 容值偏差：-5%—+5%
- 设计寿命：>210000h
- 损耗：0.25W/kvar(可定制0.2W/kvar)
- 测试电压：2.15×Un(AC),10s,端子间
- 过压:1.1Un(8h/24h),1.15Un(30min/24h)
- 绝缘水平：3KV/8KV
- 过流:≤2.0In(可定制≤4.0In)
- 浪涌电流:500In
- 放电特性:放电60s—180s残留电压降至50V
- 温度范围：-40℃—+55℃
- 最高允许湿度：95%
- 海拔高度：≤4000m
- 防护等级：IP20
- 类型：F型H型L型 户内垂直安装
- 标准：IEC60831-1(1996/2002)IEC60831-2(1995)

- Voltage range: 230-1300V
- Rated frequency: 50 / 60Hz
- Rated capacity: 5 — 40kvar
- Capacitance deviation: -5% — + 5%
- Design life:> 210000h
- Loss: 0.25W /kvar (customizable 0.2W / kvar)
- Test voltage: 2.15 × Un (AC), 10s, between terminals
- Overpressure: 1.1Un (8h / 24h), 1.15Un (30min / 24h)
- Insulation level: 3KV / 8KV
- Overcurrent: ≤2.0In (can be customized ≤4.0In)
- Inrush current: 500In
- Discharge characteristics: Residual voltage drops to 50V after 60s — 180s discharge
- Temperature range: -40 ℃ — + 55 ℃
- Maximum allowable humidity: 95%
- Altitude: ≤4000m
- Protection level: Ip20
- Type: F type H type L type Indoor vertical installation
- Standard: IEC60831-1 (1996/2002) IEC60831-2 (1995)

性能特点 Performance characteristics

- 具有更高的过流能力，过流指标的高低直接关系到电容器耐受冲击电流的能力，影响电容器的使用寿命；
- 容值偏差小，精度更高，能够保证滤波补偿回路的谐振频率稳定，滤波效果好；
- 功耗更小，功耗的大小影响电容器的发热，功耗越大电容器的温度越高，寿命越短；
- 具有压敏断路技术，这种技术被用于电容器的每一相，在这只电容不能使用时，能安全地从电路中切除，同时保持良好的电绝缘性能；
- 采用先进生产工艺，高频喷金磨砂罐体，美观耐腐蚀，在设备管理层面避免破窗效应。

- It has a higher over-current capability. The level of the over-current index is directly related to the ability of the capacitor to withstand the inrush current and affect the service life of the capacitor;
- The capacitance deviation is small and the accuracy is higher, which can ensure the resonance frequency of the filter compensation circuit to be stable and the filtering effect is good;
- The power consumption is smaller, the power consumption affects the heating of the capacitor, the larger the power consumption, the higher the temperature of the capacitor, and the shorter the life;
- With pressure-sensitive disconnection technology, this technology is used for each phase of the capacitor. When this capacitor cannot be used, it can be safely cut off from the circuit while maintaining good electrical insulation performance;
- Adopt advanced production technology, high-frequency gold-blasted frosted tank, beautiful and corrosion-resistant, and avoid window breaking effect at the equipment management level.

专业的安全技术 Professional safety technology

联动保护装置 Linkage protection device
特殊气体 Special gas
干式结构 Dry structure
防火防爆 Fire proof
自愈合能力 Self-healing ability
放电电阻 Discharge resistance
特殊气体灌注 Special gas perfusion
真空灌注 Vacuum infusion

耐高温金属化薄膜 High temperature resistant metallized film

- 采用北欧高温粒子制造的聚丙烯薄膜，提高电容器的耐温特性和耐压强度；
- 高结晶度：更长的分子链和更少的支链，等规度高，最高可承受120℃的高温；
- 杂质更低：灰份检测时残留物更少，最低击穿电压比普通高20%左右，所以场强更高。

- The use of polypropylene film made of high-temperature Nordic particles improves the temperature resistance and compressive strength of capacitors;
- High crystallinity: longer molecular chains and fewer branches, high isotacticity, and can withstand a high temperature of 120 ° C;
- Lower impurities: less residue during ash detection, the lowest breakdown voltage is about 20% higher than normal, so the field strength is higher.

先进的介质技术 Advanced Media Technology

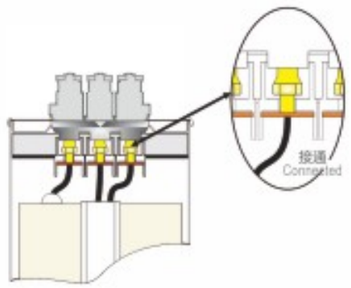
- 填充材料采用欧洲先进材料技术处理的高温环保树脂，散热性能最好，防爆防燃；
- 填充料与薄膜有较好的相容性，其产品在正常使用2年后容量变化率不超过1.5%；
- 采用真空密检工艺，填充料及工艺确保产品一致性；
- 不同温度下的收缩率极低，在-40℃至85℃时均为软态，体积无明显的变化。
- 即使海拔高度达到4000m时，仍保持优良的散热性能和绝缘性能。

- The filling material uses high-temperature environmentally friendly resin processed by European advanced material technology, which has the best heat dissipation performance, explosion-proof and flame-proof;
- The filler has good compatibility with the film, and its capacity change rate does not exceed 1.5% after 2 years of normal use;
- Adopt vacuum tight inspection process, filling material and process to ensure product consistency;
- Very low shrinkage at different temperatures, all in soft state from -40 ° C to 85 ° C, with no significant change in volume.
- Even when the altitude reaches 4000m, it still maintains excellent heat dissipation performance and insulation performance.

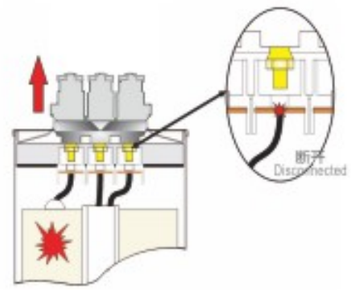
单元保护装置 Unit protection

电容器元件由于聚丙烯电容器不具有无限使用寿命，自愈式电容器依然，很少产生预知的短路，所以仅靠电流熔断器和断路器不能提供充分的保护。本系列电容器均配有独立的过压安全保护装置，当电容器由于过热，过压，过载或临近使用寿命期限而发生大量气体击穿时，电容壳内的气压迅速上升，由于顶盖弯曲或脚胜凹边拉伸引起了电容器长度改变。当膨胀超过限度时，内部连接线会快速分离，故障元件彻底分离，防止故障进一步扩大。

Capacitor elements Because polypropylene capacitors do not have an infinite service life, self-healing capacitors still rarely generate predictable short circuits, so current fuses and circuit breakers alone cannot provide adequate protection. This series of capacitors are equipped with independent over-voltage safety protection devices. When a large amount of gas breakdown occurs due to overheating, overvoltage, overload, or the end of the service life of the capacitor, the air pressure in the capacitor case rises rapidly, due to the top cover bending or expanding. The stretch of the concave edge causes a change in the length of the capacitor. When the expansion exceeds the limit, the internal connection lines will be quickly separated, and the faulty components will be completely separated to prevent the fault from further expanding.



正常的电容器
Normal capacitor



损坏后的电容器
Damaged capacitor

放电电阻 Discharge resistance

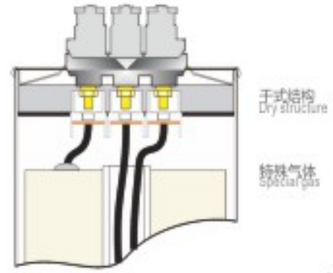
每台电容器内部都已安装放电电阻，电容器在断开电源三分钟后，端子上的电压通过内部放电电阻放电，电压下降到50V以下，以保护操作人员安全，特殊要求下，技术可以达到1分钟放电，但电容器的损耗会因放电电阻的增大而增大。

A discharge resistor is installed inside each capacitor. After the capacitor is disconnected from the power supply for three minutes, the voltage on the terminal is discharged through the internal discharge resistor, and the voltage drops below 50V to protect the operator's safety. Under special requirements, the technology can reach 1 minute Discharge, but the loss of the capacitor will increase due to the increase in discharge resistance.

干式结构 Dry structure

电容器采用铝外壳，内部全干式结构，不含任何油类，内部注入特殊气体后，再填充干式树脂，保证产品不会出现爆炸、燃烧、漏油现象。

The capacitor adopts an aluminum casing, and the internal dry structure does not contain any oil. After the special gas is injected into the capacitor, it is filled with dry resin to ensure that the product will not explode, burn or leak.



注：

1、安装电容器时，顶部要留有30mm以上的空间，连接引线应足够长，保证有弹性空间；
2、电容器的短路电流应不大于10000A；
3、电容器连接端子的电流最大值为50A，如要多台电容器并联使用，每台电容器要单独连接引线。

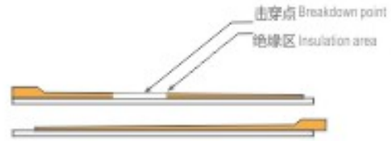
Note:

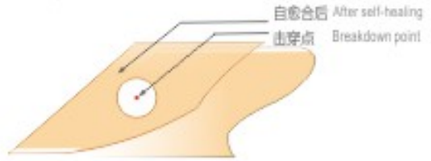
1. When installing the capacitor, leave more than 30mm space at the top, and the connecting leads should be long enough to ensure a flexible space;
2. The short-circuit current of the capacitor should not be greater than 10000A;
3. The maximum current of the capacitor connection terminal is 50A. If multiple capacitors are used in parallel, each capacitor must be individually connected to the lead.

自愈合能力 Self-healing ability

电容器金属化薄膜的电极采用锌铝复合技术，电极的厚度非常薄，当电容器内部由于电气过载或者温度过高，出现电气击穿现象，击穿点周围的电极产生电离，击穿点使电极介质层气化分开，产生绝缘区，电容器恢复正常工作能力。

The capacitor metallized film electrode uses zinc-aluminum composite technology. The thickness of the electrode is very thin. When the capacitor is electrically overloaded or the temperature is too high, electrical breakdown occurs. The electrodes around the breakdown point are ionized. The layers are gasified and separated, creating an insulation zone and the capacitors return to normal operation.





气体保护 Gas protection

电容器采用高真空热定型处理后注入特殊气体，再在高真空下注入树脂，从而提高电容器的电气性能。

Capacitors are injected with special gas after high-vacuum heat setting treatment, and then resin is injected under high vacuum, thereby improving the electrical performance of the capacitor.

真空灌注技术 Vacuum perfusion technique

绕组单元被加热,然后在规定的时间内干燥，而灌注则在真空条件下完成，用这种方法，空气和湿气从电容器内部排出，从而避免了电极的氧化和局部放电，之后电容器被密闭在金属容器中，这一复杂过程保证了电容器具有极好的电容稳定性和长久使用寿命。

采用真空密检工艺，可准确快速判定其产品密封性能，解决了传统高温密检存在的由于烘箱温度，时间控制的关系导致的均匀性差，产品质量判定不准确的现象。

The winding unit is heated and then dried within a specified time, while the pouring is completed under vacuum. In this way, air and moisture are discharged from the inside of the capacitor, thereby avoiding electrode oxidation and partial discharge, and the capacitor is then sealed. In a metal container, this complex process guarantees excellent capacitor stability and long service life.

The vacuum tight inspection process can be used to accurately and quickly determine the sealing performance of the product, which solves the problems of poor uniformity and inaccurate product quality due to the relationship between the temperature and time control of the traditional high temperature dense inspection.

超长设计寿命 Extremely long design life

• 影响电容器使用寿命的因素
Factors affecting the service life of capacitors

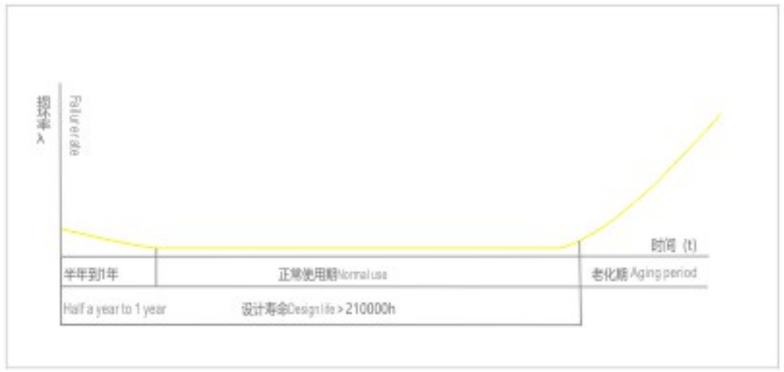
- ☐ 电应力：电压升高10%，寿命减少约一半
- ☐ 热应力：温度提高10℃，寿命减少约一半
- ☐ 机械力：生产挤压，冲撞等使薄膜及其接触部位受损伤
- ☐ 物理作用：喷金焊接过程的热胀冷缩因素
- ☐ 化学作用：酸碱、有机溶剂、水分等对电容器的损害

- ☐ Electrical stress: a 10% increase in voltage reduces the life by about half
- ☐ Thermal stress: the temperature is increased by 10℃, and the life is reduced by about half
- ☐ Mechanical force: The film and its contact parts are damaged due to extrusion, impact, etc.
- ☐ Physical action: thermal expansion and contraction factors during gold spray welding
- ☐ Chemical action: damage to capacitors from acids, alkalis, organic solvents, moisture, etc.

• 超长设计寿命对应采取的措施
Measures taken for long design life

- ☐ 电流能力：采用具有国际先进水平的金属化薄膜及生产流水线，聚丙烯金属化膜制造工艺精良，喷涂面积均匀，增加过电流能力，电容的寿命更长；
- ☐ 局部放电能力：越是尺寸大,局部放电越不好处理，LDCR采用小型圆柱体结构，承受的高频脉冲能力更强，从而寿命更强；
- ☐ 散热能力：散热能力往往是由电容的介质决定的，LDCR采用欧洲先进材料技术处理的高温环保树脂，散热性能最好，防爆防燃，使用寿命更长。

- ☐ Current capacity: Adopting internationally advanced metallized film and metallized film capacitor production lines, polypropylene metallized film has excellent manufacturing process, uniform spray area, increased overcurrent capability, and longer capacitor life;
- ☐ Partial discharge capacity: The larger the size, the more difficult it is to handle partial discharge. LDCR adopts a small cylindrical structure, which has a higher ability to withstand high-frequency pulses and thus a longer life.
- ☐ Heat dissipation capacity: The heat dissipation capacity is often determined by the medium of the capacitor. LDCR uses high-temperature environmentally friendly resin processed by European advanced material technology.



专业的制造技术 Professional manufacturing technology

- ☐ 对每台电容器的金属化薄膜材料进行微观分析检验，确保每台电容器所用材料都能达到最佳性能
- ☐ 采用专门开发的随变张力卷制系统，使薄膜层与层间的张力更加均匀，金属喷层能更好的接触镀层，从而提高电容器的耐浪涌电流能力
- ☐ 采用波纹分切及边缘加厚技术，高频喷金处理端面，使电容器具有良好的过流能力
- ☐ 采用渐变式锌铝复合技术，使电容器具有良好的自愈合能力
- ☐ 电容器采用高真空热定型处理后注入特殊气体，再在高真空下注入树脂，从而提高电容器的电气性能
- ☐ 电容器在出厂前都会进行冲击电流试验，确保电容器质量的稳定性

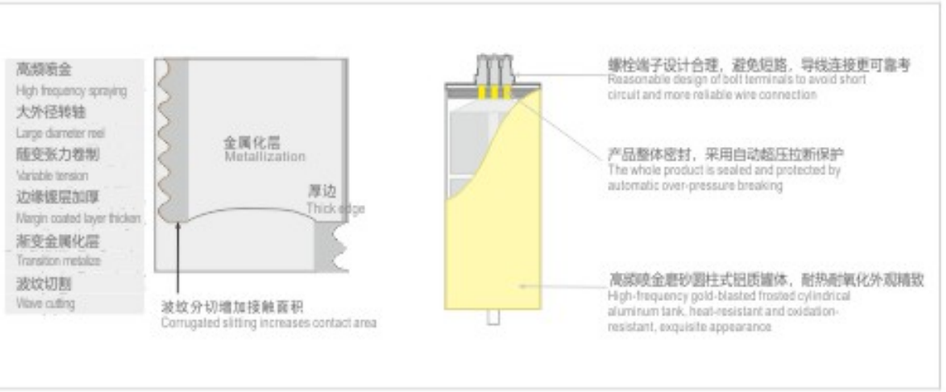
- ☐ Microscopic analysis and inspection of the metallized film material of each capacitor to ensure that the material used for each capacitor can achieve the best performance
- ☐ Specially developed variable tension rolling system is used to make the tension between the film layer and the layer more uniform, and the metal spray layer can better contact the plating layer, thereby improving the surge current resistance of the capacitor
- ☐ Using ripple slitting and edge thickening technology, high-frequency gold spray treatment of the end surface, so that the capacitor has good over-current capability
- ☐ Adopting gradual zinc-aluminum composite technology to make capacitors have good self-healing ability
- ☐ Capacitors are injected with a special gas after high-vacuum heat setting treatment, and then resin is injected under high vacuum to improve the electrical performance of the capacitors
- ☐ Capacitors are tested for inrush current before leaving the factory to ensure the stability of capacitor quality

过电流验证 Over current verification
高频喷金 High frequency injection
波纹切割 Corrugated cutting
防500In浪涌 Anti surge 500
边缘镀层加厚 Edge coating thickness
随变张力卷制 Variable tension roll
渐变金属化层 Graded metal layer
大外径卷轴 Large diameter reel

先进工艺 Advanced technology

金属化薄膜材料采用波纹分切及边缘加厚技术，专门开发的随变张力卷制系统，及高频喷金处理端面，使薄膜层与层间的张力更加均匀，金属喷层更好的接触镀层，从而大大提高电容器的耐浪涌电流能力。

The metallized film material adopts corrugated slitting and edge thickening technology, a specially developed variable tension rolling system, and high-frequency gold spraying treatment of the end surface, so that the tension between the film layer and the layer is more uniform, and the metal sprayed layer has better contact Plating layer, thus greatly improving the surge current capability of the capacitor.



随变张力 Variable tension

有随变张力
Variable tension

有随变张力系统卷制的元件，薄膜层与层间的张力更加平均，金属层喷层能更好的接触镀层
There are components rolled with the variable tension system, the tension between the film layer and the layer is more even, and the metal spray layer can better contact the plating

没有随变张力
No changing tension

没有随变张力系统卷制的元件，薄膜层与层间的张力不平均，金属层喷层不能更好的接触镀层
There is no component rolled with a variable tension system, the tension between the film layer and the layer is uneven, and the metal spray layer cannot better contact the plating

冲击电流及500In浪涌试验 Inrush current and 500In surge test

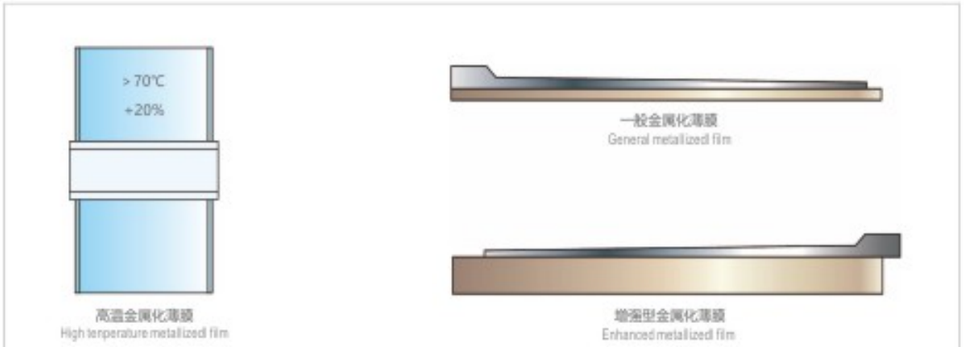
- 电容器在出厂前都会进行冲击电流试验，确保电容器质量的稳定性
- 电容器最高能达到500倍的耐浪涌电流能力

- Capacitors are tested for inrush current before leaving the factory to ensure the stability of capacitor quality
- Capacitors can withstand up to 500 times the surge current capability

矿井专用系列电容器 Mine special series capacitor

该系列电容器采用冲压铝罐外壳，选用定制的高温绝缘材料，专门用于矿井下的调谐滤波补偿系统或集中自动补偿系统，适合于矿井下的封闭防爆箱体内安装，电容器的工作温度最高可达70，电容器内置安全压力保护装置，干式结构。

This series of capacitors are made of stamped aluminum cans and are made of customized high-temperature insulation materials. They are specially used for tuning and compensation systems or centralized automatic compensation systems under the mine. They are suitable for installation in closed explosion-proof cabinets under the mine. 70. The capacitor has a built-in safety pressure protection device and a dry structure.



户外柱上系列电容器 Outdoor Post Capacitors

该系列电容器采用双层端子防护冲压铝罐外壳，具有失效指示，可远距离监视电容器的运行情况，防水端子与铝壳间加入防水密封圈，防止吸入灰尘或水汽，端子盖、密封接头以及接线电缆具有耐候性，抗紫外线辐射和抗老化性，可达到IP65的防护等级，专为室外使用，或者安装在灰尘大、湿度大的工业及民用调谐滤波补偿而设计，具有高可靠性、安装简便等优点。

This series of capacitors adopt a double-layer terminal protection stamped aluminum can housing with failure indication, which can monitor the operation of the capacitor from a long distance. A waterproof sealing ring is added between the waterproof terminal and the aluminum shell to prevent inhalation of dust or water vapor. The cable has weather resistance, anti-ultraviolet radiation and anti-aging, and can reach the protection level of IP65. It is designed for outdoor use, or installed in dusty and humid industrial and civil tuning filter compensation. It has high reliability and easy installation. Etc.


耐候性材料
Durable materials

双层防水端子
Double terminal protection


失效指示
Remote monitoring


远距离监视
Double terminal protection

型号定义 Model definition

LDCR□/□-□□-□

- 应用场所[可省略] — Application place [may be omitted]
- 单相：1，三相：3 — Single-phase: 1, three-phase: 3
- 端子类型：F、H — Terminal type: F, H
- 额定电压（V）：230-1300 — Rated voltage (V): 230-1300
- 安装容量（kvar）：5-40 — Installation capacity (Kvar): 5-40

三相LDCR电容器标准件 Three-phase LDCR capacitor standard

容量（kvar） Capacity	型号 Type	电压（V） Voltage	电流（A） Current	电容（μF） Capacitance
450V电容器（三相三角型）--适用于0.4KV电力补偿系统 450V capacitor (three-phase triangle type)-suitable for 0.4KV power compensation system				
10	LDCR10/450F3	450	12,83	157,27
15	LDCR15/450F3	450	19,25	235,90
20	LDCR20/450F3	450	25,66	314,54
25	LDCR25/450F3	450	32,08	393,17
30	LDCR30/450F3	450	38,49	471,81
35	LDCR35/450F3	450	44,91	550,44
40	LDCR40/450F3	450	51,32	629,08
480V电容器（三相三角型）--适用于0.4KV 7%去谐滤波补偿系统 480V capacitor (three-phase triangle type)-suitable for 0.4KV 7% detuning filter compensation system				
10	LDCR10/480F3	480	12,03	138,23
15	LDCR15/480F3	480	18,04	207,34
20	LDCR20/480F3	480	24,06	276,45
25	LDCR25/480F3	480	30,07	345,56
30	LDCR30/480F3	480	36,09	414,68
35	LDCR35/480F3	480	42,10	483,79
40	LDCR40/480F3	480	48,11	552,90
525V电容器（三相三角型）--适用于0.4KV 14%去谐滤波补偿系统 525V capacitor (three-phase triangle type)-suitable for 0.4KV 14% detuning filter compensation system				
10	LDCR10/525F3	525	11,00	115,55
15	LDCR15/525F3	525	16,50	173,32
20	LDCR20/525F3	525	21,99	231,09
25	LDCR25/525F3	525	27,49	288,86

三相LDCR电容器标准件 Three-phase LDCR capacitor standard

容量（kvar） Capacity	型号 Type	电压（V） Voltage	电流（A） Current	电容（μF） Capacitance
525V电容器（三相三角型）--适用于0.4KV 14%去谐滤波补偿系统 525V capacitor (three-phase triangle type)-suitable for 0.4KV 14% detuning filter compensation system				
30	LDCR30/525F3	525	32,99	346,64
35	LDCR35/525F3	525	38,49	404,41
40	LDCR40/525F3	525	43,99	462,18
800V电容器（三相三角型）--适用于0.69KV 7%去谐滤波补偿系统 800V capacitor (three-phase triangle type)-suitable for 0.69KV 7% detuned filter compensation system				
10	LDCR10/800F3	800	7,22	49,76
15	LDCR15/800F3	800	10,83	74,64
20	LDCR20/800F3	800	14,43	99,52
25	LDCR25/800F3	800	18,04	124,40
30	LDCR30/800F3	800	21,65	149,28
35	LDCR35/800F3	800	25,26	174,16
40	LDCR40/800F3	800	28,87	199,04

单相LDCR电容器标准件 Single-phase LDCR capacitor standard

容量（kvar） Capacity	型号 Type	电压（V） Voltage	电流（A） Current	电容（μF） Capacitance
250V电容器（单相）--适用于0.4KV电力补偿系统 250V capacitor (single phase)-suitable for 0.4KV power compensation system				
5	LDCR5/250F1	250	20,00	254,65
10	LDCR10/250F1	250	40,00	509,30
15	LDCR15/250F1	250	60,00	763,94
280V电容器（单相）--适用于0.4KV 7%%单相及分相去谐滤波补偿系统 280V capacitor (single-phase)-suitable for 0.4KV 7 %% single-phase and split-phase detuning filter compensation system				
5	LDCR5/280F1	280	17,86	203,00
10	LDCR10/280F1	280	35,71	406,01
15	LDCR15/280F1	280	53,57	609,01
300V电容器（单相）--适用于0.4KV 14%单相及分相去谐滤波补偿系统 300V capacitor (single-phase)-suitable for 0.4KV 14% single-phase and split-phase detuning filter compensation system				
5	LDCR5/300F1	300	16,67	176,84
10	LDCR10/300F1	300	33,33	353,68
15	LDCR15/300F1	300	50,00	530,52

无源滤波及无功补偿技术
Passive filtering and reactive power compensation technology

SHOW LEYSDEN

LDTSC PRODUCT FEATURES

- Reactive power compensation
- Harmonic Reduction Technology
- Exact match
- Real-time compensation
- Quick response

TSC MSC TBB

电网中作为无功功率的磁场电场交换能量，这一过程每秒重复50次，一个简单的解决方案是暂时的将磁场反向能量储存在电容器中并将该无功功率注入到电网中去。因此，通常对功率因数进行校正需把自动无功功率补偿系统安装在较大的负载中，如工厂。这些系统包括一组电容器单元，根据功率因数控制器所测得的功率因数来控制电容回路，自动进行投切。

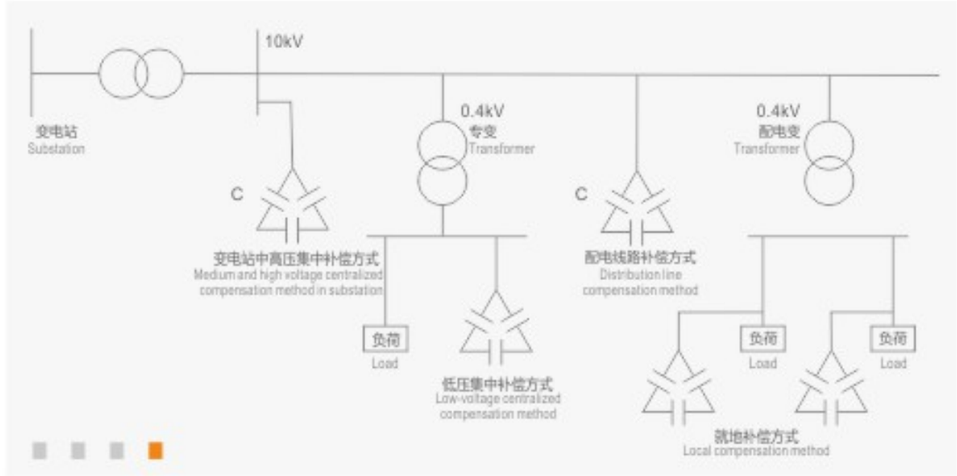
The magnetic field electric field in the power grid exchanges energy as reactive power. This process is repeated 50 times per second. A simple solution is to temporarily store the magnetic field reverse energy in a capacitor and inject the reactive power into the grid. Therefore, the correction of the power factor usually requires the automatic reactive power compensation system to be installed in a larger load, such as a factory. These systems include a set of capacitor units that control the capacitor loop based on the power factor measured by the power factor controller and automatically switch on and off.

无功补偿兼具减谐技术 | 精确匹配 | 实时补偿 | 快速响应

无功补偿系统 Reactive power compensation system

- 高压集中补偿：该补偿是将高压并联电容器组集中安装在变配电所6—10kv母线上，该方式的初期投资较少，电容器利用率高，提高总功率因数，便于集中运行维护；
- 低压集中补偿：该补偿是将低压并联电容器组安装在变压器的二次母线上，能够补偿安装部位前所有高、低压线路和电力变压器的无功功率，可使变压器的出力增加和二次侧电压升高，特别适用于负荷平稳、长期运转而容量又大的设备，如大型感应电动机、高频电热炉等，也适用于容量虽小但数量多且是长期稳定运行的设备如荧光灯等"；
- 低压就地无功补偿：该补偿是根据具体用电设备无功的产生量将电容器组与用电设备并连，通常和用电设备合用一套开关与其同时投入运行或断开，随机吸收电感性设备的无功能量，转换成有功能量反送回电感设备，其补偿范围最大，补偿效果也最好，能就地平衡无功电流。

- High-voltage centralized compensation: This compensation is to install the high-voltage shunt capacitor bank on the 6 – 10kv bus of the transformer substation in a concentrated way. The initial investment in this method is less, the capacitor utilization is high, the total power factor is improved, and centralized operation and maintenance are convenient;
- Low-voltage centralized compensation: This compensation is to install the low-voltage shunt capacitor bank on the secondary bus of the transformer, which can compensate the reactive power of all high- and low-voltage lines and power transformers in front of the installation site, which can increase the output of the transformer and the secondary side. The voltage rises. It is especially suitable for equipment with stable load, long-term operation and large capacity, such as large induction motors, high-frequency electric heating furnaces, etc., but also for equipment with small capacity but large quantities and long-term stable operation such as fluorescent lamps; "
- Low-voltage on-site reactive power compensation: This compensation is based on the amount of reactive power generated by specific electrical equipment. The capacitor bank and the electrical equipment are connected in parallel. Usually, a set of switches is used with the electrical equipment to run or disconnect at the same time. Randomly absorb the non-functional amount of the inductive device, convert it into a functional amount and send it back to the inductive device. Its compensation range is the largest and the compensation effect is the best. It can balance the reactive current on the spot..



无功补偿的经济意义 Economic significance of reactive power compensation

- 提高输变电设备的利用率
- 降低电压损失，提高末端电压水平
- 降低线路损耗
- 减少基本电费支出
- 减少功率因数调整电费支出

- Improve the utilization rate of transmission and transformation equipment;
- Reduce voltage loss and increase terminal voltage level;
- Reduce line loss;
- Reduce basic electricity expenses;
- Reduce power factor and adjust electricity expenses.

各种无源无功补偿装置比较 Comparison of various passive reactive power compensation devices

名称 Name	工作原理 Working principle	技术指标 Technical index	应用场合 Application	优点 Advantage	缺点 Disadvantage
机械投切电容器/MSC	用断路器/接触器分级投切电容 Capacitor switching capacitors with circuit breakers / contactors	投切时间10—30S Switching time 10-30S	适用无功量比较稳定，不需频繁投切电容补偿的用户 It is suitable for users who have relatively stable reactive power and do not need to switch capacitor compensation frequently.	控制器简单，市场普遍供货，价格低，投资成本少，无漏电流 Simple controller, universal market supply, low price, low investment cost, no leakage current	不能快速跟踪Q的变化，而且投切会引起较严重的冲击涌流和操作过电压，不但易造成接触点烧掉，而且使补偿电容器内部击穿，所受的应力大，寿修量大 Can not quickly track the change of Q, and the switching will cause more severe inrush current and operating overvoltage, which will not only cause the contact point to burn out, but also cause internal breakdown of the compensation capacitor.
机械投切电抗器/MSR	并联在线路末端或中间，吸收线路上的充电功率 Paralleled at the end or middle of the line to absorb the charging power on the line	其补偿度60%—85% Its compensation degree is 60%-85%	超高压系统（330KV及以上）的线路上 EHV system (330KV and above) on the line	防止长线路在空载充电或轻载时末端电压升高 Prevents long lines from increasing in terminal voltage during no-load charging or light load	不能跟踪补偿，为固定补偿 Cannot track compensation, it is fixed compensation
自饱和电抗器/SSR	依靠自饱和电抗器自身固有的能力来稳定电压，它利用铁芯的饱和特性来控制发出或吸收无功功率的大小 Relying on the inherent ability of the self-saturated reactor to stabilize the voltage, it uses the saturation characteristics of the iron core to control the amount of reactive power that is sent or absorbed	调整时间长，补偿速度慢 Long adjustment time and slow compensation speed	超高压输电线路 EHV transmission line	动态补偿 Dynamic compensation	噪声大，震动大，补偿不对称电路负荷自身产生较多谐波电流，不具备平衡有功负荷的能力，制造复杂，造价高 Large noise and vibration, compensating asymmetrical circuit load itself generates more harmonic current, does not have the ability to balance active load, complex manufacturing and high cost
晶闸管投切电容器/TSC	分级用可控硅在电压过零时投入电容，在380V低压配电系统中应用较多 The thyristor for classification is put into the capacitor when the voltage crosses zero.	10—20MS	需快速频繁投切电容补偿的用户 Users who need fast and frequent switching capacitor compensation	无涌流，无触点，投切速度快，级数分得细化，可以实现无级调节 No inrush current, no contact, fast switching speed, detailed series, stepless adjustment can be realized	晶闸管结构复杂，需散热，损耗大，遇到电压突变情况下易误导通而被涌流损坏，有漏电流 The thyristor has a complicated structure, which requires heat dissipation and large losses. It is easy to be misconducted and damaged by inrush current when there is a sudden change in voltage.
复合开关投切电容器/TSC+MSC	分级先由可控硅在电压过零时投入电容，再由磁保持交流接触器触点并联闭合，可控硅退出，电容器在磁保持交流接触器触点闭合下运行 In the classification, the thyristor puts the capacitor when the voltage crosses zero, and then the magnetically held AC contactor contacts are closed in parallel.	0.5S左右 Around 0.5S	一般工厂/小区和普通设备，无功量变化大于30S General plant / community and common equipment, reactive power change Daewoo 30S	无涌流，不发热，节能 No inrush current, no heat, energy saving	使用寿命短，故障较多，有漏电流 Short service life, more failures, and leakage current
晶闸管控制电容器/TCC	采用同时选择截止角β和导通角α的方式控制电容器电流，实现补偿电流无级，快速跟踪 The capacitor current is controlled by selecting the cut-off angle β and the conduction angle α at the same time to achieve stepless and fast tracking of the compensation current	20MS	低压小容量，非常适合广大终端低压用户 Low voltage and small capacity, ideal for low voltage users	价格低廉，效果非常高 Low price and very high effect	产生谐波 Generate harmonics
晶闸管阀控制高阻抗变压器/TCT	通过调整触发角的大小就可以改变高阻抗变压器所吸收的无功分量，达到调整无功功率的效果 By adjusting the trigger angle, the reactive power absorbed by the high-impedance transformer can be changed to achieve the effect of adjusting reactive power.	阻抗最大做到85% Impedance up to 85%	容量在30Mvar以上是价格较贵，而不能得到广泛应用 Capacities above 30Mvar are more expensive and cannot be widely used	和TCR型差不多 Similar to TCR type	高阻抗变压器制造复杂，谐波分量包略大一些，价格较贵，而不能得到广泛应用 The manufacturing of high-impedance transformers is complicated, and the harmonic component is slightly larger, which is more expensive and cannot be widely used.
晶闸管投切电抗器/TSR+FC	分级用可控硅作为无触点的静止可控开关投切电抗器 Graded thyristor as non-contact static controllable switching switch reactor	功率因数0.95 cosφ 0.95	与TSC配合使用在牵引变电所 Used in conjunction with TSC in traction substations	不会产生谐波和冲击电流，而且响应速度快， It does not generate harmonics and inrush current, and has fast response speed.	分级多成本高，制造复杂，维护繁琐 Multi-classification, high cost, complicated manufacturing, and tedious maintenance
晶闸管控制空心电抗器/TCR	通过调整触发角的大小就可以改变电抗器所吸收的无功分量，达到调整无功功率的效果 By adjusting the trigger angle, the reactive component absorbed by the reactor can be changed to achieve the effect of adjusting the reactive power.	40MS	35KV及以下系统，与FC/MSC/TSC配合 35KV and below systems, cooperate with FC / MSC / TSC	可以实现较快，连续的无功功率调节，具有及应时间快，运行可靠，无级补偿，可分相调节，能平衡有功，适用范围广 Can achieve fast and continuous reactive power adjustment, with fast response time, reliable operation, stepless compensation, phase-separated adjustment, balance active power, wide application range	结构复杂，损耗大，任何一支SCR击穿，都会使晶闸管整体损坏；对冷却要求严格，设备造价，建设施工及运行维护费用很高，对维护人员要专门培训以提高维护水平；占地面积大，产生谐波等 traininThe structure is complicated and the loss is large. Any SCR breakdown will cause the thyristor to be damaged as a whole; strict cooling requirements, high equipment cost, construction and operation and maintenance costs, and special g for maintenance personnel to improve the maintenance level; Large, generating harmonics, etc.
磁控可调电抗器/MCR	采用直流励磁原理，利用附加直流励磁磁化铁芯，改变铁芯磁导率，实现电抗值的连续可调，改变电抗器感抗电流，以投入电抗器感性无功容量变化来补偿系统容性无功 Adopt the principle of DC excitation, use additional DC excitation to magnetize the iron core, change the core magnetic permeability, realize the continuous adjustment of the reactance value, change the reactor inductive reactance current, and compensate the system capacitance with the input reactor's inductive reactive capacity change	300MS	冲击性负荷，牵引变电站，电弧炉，轧钢机，造船厂 Impact load, traction substation, electric arc furnace, rolling mill, shipyard	功率因数达到0.90—0.99的要求，无功补偿容量自动无级调节，不产生谐波，可靠性高，维护简单，使用寿命长，应用电压等级广泛 Power factor meets the requirements of 0.90-0.99, automatic stepless adjustment of reactive power compensation capacity, no harmonic generation, high reliability, simple maintenance, long service life, and wide application voltage level	相对于TCR型SVC，其谐波水平，有功损耗，占地面积都小，但调节时间长，成本高，温升和噪音是需要控制的 Compared with TCR SVC, its harmonic level, active power loss, and floor area are small, but the adjustment time is long, the cost is high, and the temperature rise and noise need to be controlled

无源LC复式滤波系统 Passive LC complex filtering

无源滤波器，又称LC滤波器，是利用电感、电容和电阻的组合设计构成的滤波电路，可滤除某一次或多次谐波，最普通易于采用的无源滤波器结构是将电感与电容串联，可对主要次谐波（3、5、7）构成低阻抗旁路，单调谐滤波器，双调谐滤波器、高通滤波器都属于无源滤波器。

Passive filters, also known as LC filters, are filter circuits constructed using a combination of inductors, capacitors, and resistors to filter out one or more harmonics. The most common and easy-to-use passive filter structure is the inductor In series with the capacitor, it can form a low-impedance bypass for the main harmonics (3, 5, 7). Single-tuned filters, double-tuned filters, and high-pass filters are all passive filters.

高压无功补偿成套装置 High-voltage reactive power compensation device

TBB系列高压电容补偿柜主要用于6kV～10kV电力系统中，是一种改善功率因数、调整电压、降低网络损耗的容性无功功率补偿装置。适用于冶金、矿山、建材、石化、机械等大功率高压电动机就地补偿和配电系统集中补偿。

TBB series high voltage capacitor compensation cabinet is mainly used in 6kV～10kV power system. It is a capacitive reactive power compensation device for improving power factor, adjusting voltage and reducing network loss. Local compensation for high-power high-voltage motors and centralized compensation for power distribution systems.

型号定义 Model definition

LDTBB□□-□(□)-□

接线及保护方式	Wiring and protection	接线及保护方式 Wiring and protection AK－单星形，开口三角电压保护 AK-Y, open delta voltage protection BL－双星形接线不平衡电流保护 BL-Y + Y, unbalanced current protection AC－单星形接线电压差动保护 AC-Y, voltage differential protection BC－双星形接线电压差动保护 BC-Y + Y, voltage differential protection AQ－单星形接线桥式不平衡电流保护 AQ-Y, bridge type unbalanced current protection
分组情况	Grouping situation	
补偿容量（kvar）	Compensation capacity (kvar)	
额定电压（kV）：6、10	Rated voltage (kV): 6, 10	
投切方式：Z表示自动，K表示固定	Switching mode: Z means automatic, K means fixed	

低压无功补偿成套装置 Low-voltage reactive power compensation device

低压无功补偿装置可以根据负载变化自动跟踪，实时补偿，使系统的功率因数始终保持在最佳点，性价比非常高，配电网规模巨大，负荷情况复杂，使用环境条件差，合理选择无功补偿方案和补偿技术意义重大。合理选择无功补偿方案和补偿容量，能有效提高系统的电压稳定性，保证电网的电能质量，提高输电设备的利用率，降低有功网损和减少力率电费。

◇ 具有高度的可靠性，可实现无人值守；
◇ 先进的动态调节功能，无功补偿精度高；
◇ 极大的改善电压的跌落和闪变；

The low-voltage reactive power compensation device can automatically track according to load changes and compensate in real time, so that the power factor of the system is always maintained at the optimal point, and the cost performance is very high. The size of the distribution network is huge, the load situation is complex, and the use environment is poor. It is of great significance to choose a reactive power compensation scheme and compensation technology reasonably. Reasonable selection of the reactive power compensation scheme and compensation capacity can effectively improve the system's voltage stability, ensure the power quality of the power grid, increase the utilization rate of transmission equipment, reduce active network losses and reduce power rate electricity costs.

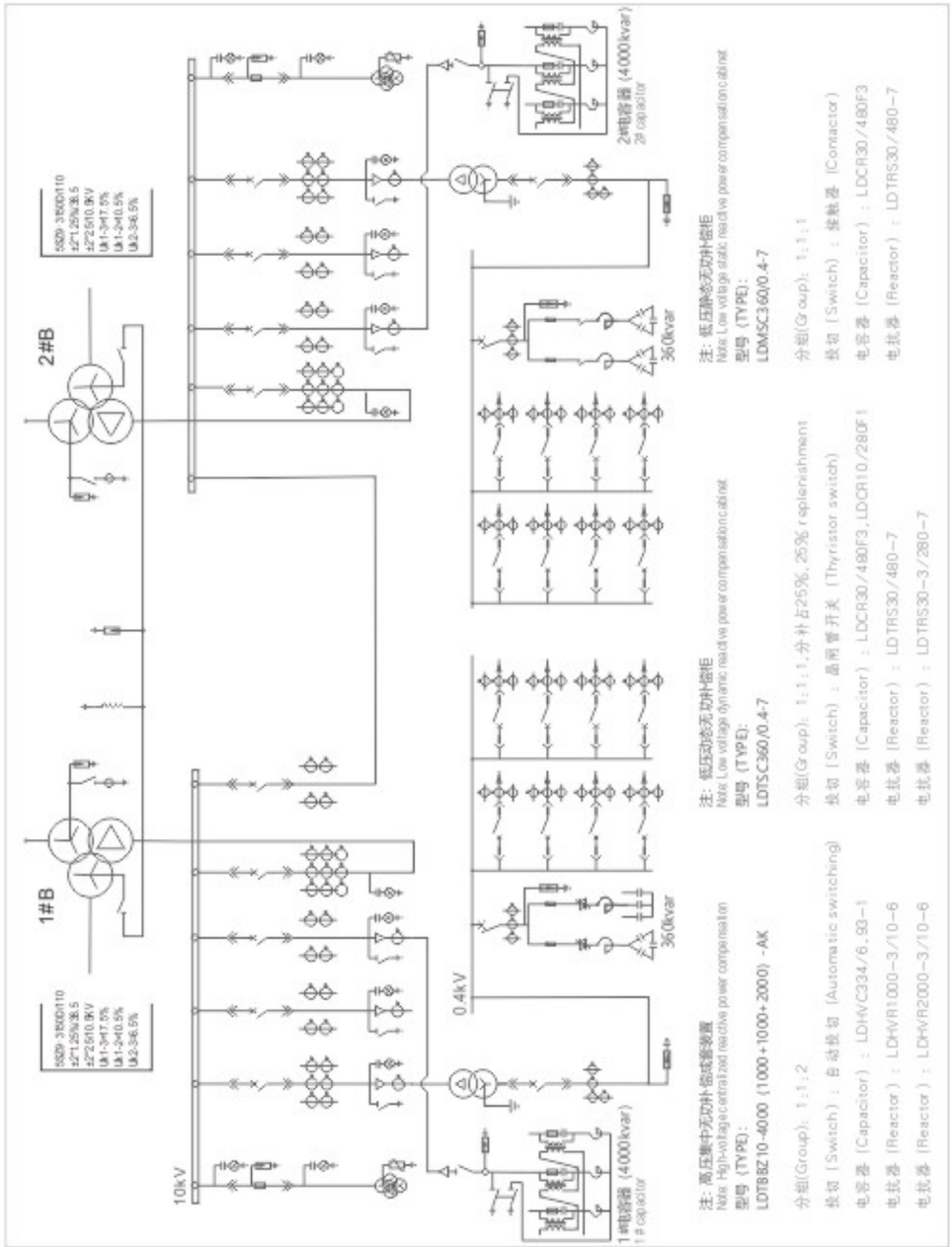
◇ It has high reliability and can be unattended;
◇ Advanced dynamic adjustment function, high precision of reactive power compensation;
◇ Greatly improve voltage drop and flicker;

型号定义 Model definition

LD□SC□/□-□-□

分组路数（可省略）：1－18	Number of packets (can be omitted): 1～18
电抗率（%）：5－14	Reactance rate (%): 5～14
系统电压（kV）：0.2－1	System voltage (kV): 0.2～1
补偿容量（kvar）：50－600	Compensation capacity (kvar): 50 ～ 600
投切方式：T表示晶闸管投切，M表示接触器投切	Switching mode: T means thyristor switching, M means contactor switching

图纸设计 Drawing design



低压滤波补偿组件
Low-voltage filter compensation components

SHOW LEYSDEN

LSDFC PRODUCT FEATURES

- Exact match
- Universal installation
- High linearity
- Dry structure
- Fire and explosion protection
- Low noise operation

LSDFC型低压滤波补偿组件是根据负载而将电容器、电抗器按需求配置组合形成的有相对独立补偿和滤波功能的投切单元，将一定电抗系数的滤波电抗器和一定容量的滤波电容器进行适当比例的配置，组成滤波补偿回路，从而达到滤波补偿的目的。由干式自愈电容器、低压电抗器等组成。

The LSDFC type low voltage filter compensation component is a switching unit with relatively independent compensation and filtering function formed by combining capacitors and reactors according to the requirements according to the load. The filter reactor with a certain reactance coefficient and the filter capacitor with a certain capacity are appropriately proportioned Configuration to form a filter compensation loop to achieve the purpose of filter compensation. It consists of dry-type self-healing capacitor and low-voltage reactor.

精确匹配 | 通用安装 | 高线性度 | 干式结构 | 防火防爆 | 低噪音运行

技术参数 Technical Parameters

- 额定电压：230—1300V，50/60Hz
- 电抗率：7%、14%
- 温湿度要求：—25℃—+50℃，最大湿度95%
- 安装条件：室内安装，最高海拔不超过4000米

- Rated voltage: 230-1300V, 50 / 60Hz
- Reactance rate: 7%, 14%
- Temperature and humidity requirements: -25 ℃-+ 50 ℃, maximum humidity 95%
- Installation conditions: indoor installation, the highest altitude does not exceed 4000 meters

性能特点 Performance characteristics

精确匹配 Exact matching

通用安装 General installation

低噪音运行 Low noise operation

高线性度L > 0.97 High linearity >0. 97

特殊气体灌注 Special gas perfusion

干式结构 Dry structure

自愈合能力 Self-healing ability

防火防爆 Fire proof

型号定义 Model definition

LSDFC□-□/□-□

- 电抗率（%）：7、14 — Reactance rate (%): 7, 14
- 额定电压（V）：230-1300 — Rated voltage (V): 230-1300
- 补偿类型：省略[共补，三相电抗器]，3[分补，三个单相电抗器结构一体] — Compensation type: omitted [complementary, three-phase reactor], 3 [Sub-compensation, three single-phase reactor structures integrated]
- 匹配电容器总容量（Kvar）：5-90 — Matching capacitor total capacity (Kvar): 5-90

LSDFC滤波补偿组件标准件 Economic significance of reactive power compensation

容量(kvar) Capacity	型 号 Type	工作电压(V) Voltage	电抗率 Reactance rate	配 置 Configuration	备 注 Remark
20KVar	LSDFC20/480-7	480V	7%	1×LDCR20/480F3，1×LDTRS20/480-7	三相共补 系统电压400V 电抗率7% Three-phase complement System voltage 400V Reactance rate 7%
25KVar	LSDFC25/480-7	480V	7%	1×LDCR25/480F3，1×LDTRS25/480-7	
30KVar	LSDFC30/480-7	480V	7%	1×LDCR30/480F3，1×LDTRS30/480-7	
40KVar	LSDFC40/480-7	480V	7%	1×LDCR40/480F3，1×LDTRS40/480-7	
50KVar	LSDFC50/480-7	480V	7%	2×LDCR25/480F3，1×LDTRS50/480-7	
60KVar	LSDFC60/480-7	480V	7%	2×LDCR30/480F3，1×LDTRS60/480-7	
15KVar	LSDFC15-3/280-7	280V	7%	3×LDCR5/280F1，1×LDTRS15-3/280-7	分相补偿 系统电压400V 电抗率7% Single-phase compensation System voltage 400V Reactance rate 7%
30KVar	LSDFC30-3/280-7	280V	7%	3×LDCR10/280F1，1×LDTRS30-3/280-7	
45KVar	LSDFC45-3/280-7	280V	7%	3×LDCR15/280F1，1×LDTRS45-3/280-7	

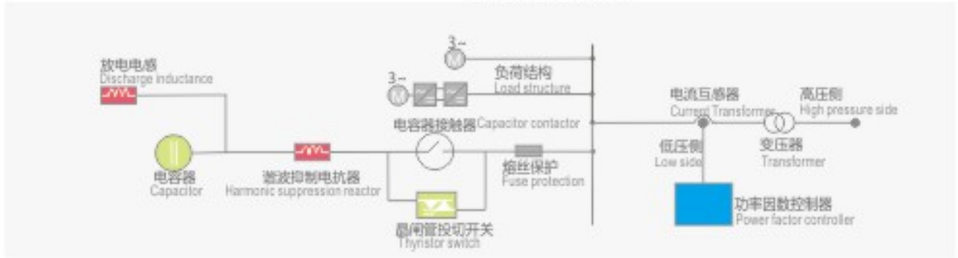
滤波补偿结构选择 Filter compensation structure selection

为了提高功率因数，提高变压器的利用率，提高系统的用电效率，降低无功电流带来的损耗是用户的最基本目的。在谐波的环境下，当用户使用LC回路的目的是既可以对基波频率（50Hz）下的系统补偿容性的无功电流，又可以避免用纯电容补偿时容易发生的谐振现象，滤除部分谐波时，建议采用安全补偿的方式，即非调谐式滤波补偿设备，背景谐波为5次以上时，电抗率选择7%或5.5%。

当用户的用电负荷比较集中，为单一大容量非线性负载，负荷变化率不高但要求变压器使用效率高逾80%以上时，此时系统谐波含量大，谐波电压超出限值，特征谐波电流发生值较恒定，变压器负荷率高，建议采用调谐式滤波器，避免罚款。另外降低变压器发热，滤波效果好。例如造纸、中频炉、橡胶行业的密炼机等。

In order to improve the power factor, increase the utilization rate of the transformer, improve the power efficiency of the system, and reduce the loss caused by reactive current, it is the most basic purpose of the user. In the environment of harmonics, when the user uses the LC circuit, the purpose is to not only compensate the capacitive reactive current for the system at the fundamental frequency (50Hz), but also to avoid the resonance phenomenon that easily occurs when using pure capacitor compensation. When removing some harmonics, it is recommended to use a safe compensation method, that is, non-tunable filter compensation equipment. When the background harmonic is more than 5 times, the reactance rate is selected to be 7% or 5.5%.

When the user's power load is relatively concentrated, it is a single large-capacity non-linear load, and the load change rate is not high but the transformer use efficiency is required to be more than 80%. At this time, the system harmonic content is large, and the harmonic voltage exceeds the limit. Features The harmonic current generation value is relatively constant and the transformer load rate is high. It is recommended to use a tuned filter to avoid fines. In addition, the transformer's heating is reduced, and the filtering effect is good. For example, papermaking, intermediate frequency furnaces, mixers in the rubber industry, etc.



元件选择 Component selection

名称 Name	描述 Description
静态补偿组件 Static compensation component	采用接触器投切的补偿回路为静态补偿 The compensation circuit using contactor switching is static compensation
动态补偿组件 Dynamic compensation component	采用晶闸管开关投切的补偿回路为动态补偿 Compensation circuit using thyristor switch for dynamic compensation
电容器 Capacitor	电抗率7%时，三相电容器端电压480V，单相电容器端电压280V； 电抗率14%时，三相电容器端电压525V，单相电容器端电压300V When the reactance rate is 7%, the terminal voltage of the three-phase capacitor is 480V, and the terminal voltage of the single-phase capacitor is 280V; when the reactance rate is 14%, the terminal voltage of the three-phase capacitor is 525V, and the terminal voltage of the single-phase capacitor is 300V
电抗器 Reactor	用于抑制5次及以上谐波时，电抗器可按7%配置； 用于抑制3次以上谐波时，电抗器可按14%配置 When used to suppress the harmonics for more than 5 times, the reactor can be configured as 7% When used to suppress the 3rd harmonic or more, the reactor can be configured as 14%
投切开关 Switching switch	针对快速瞬变负荷应采用晶闸管投切开关进行投切； 对于变化较小的一般负荷宜采用接触器投切 For fast transient loads, thyristor switching switches should be used for switching; For general loads with small changes, contactor switching should be used

常规配置方案快速选型 Quick selection of common configuration schemes

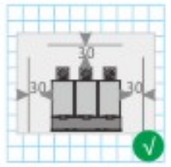
变压器容量 Transformer capacity	补偿容量 Capacity	路数 Quantity	调谐滤波补偿组件型号及数量 Model and number of tuning filter compensation components	柜体尺寸W*D*H Cabinet size
系统电压400V/50Hz,调谐频率7%,调谐滤波补偿组件 System voltage 400V / 50Hz, tuning frequency 7%, tuning filter compensation component				
630KVA	225KVar	5	1×LSDFC25/480-7+4×LSDFC50/480-7	800*800*2200
800KVA	275KVar	6	1×LSDFC25/480-7+5×LSDFC50/480-7	1000*800*2200
1000KVA	350KVar	8	2×LSDFC25/480-7+6×LSDFC50/480-7	1200*1000*2200
1250KVA	450KVar	9	9×LSDFC50/480-7	1200*1000*2200
1600KVA	550KVar	11	11×LSDFC50/480-7	800*800*2200*2柜
2000KVA	700KVar	14	14×LSDFC50/480-7	800*800*2200*2柜
系统电压400V/50Hz,调谐频率14%,调谐滤波补偿组件 System voltage 400V / 50Hz, tuning frequency 14%, tuning filter compensation component				
630KVA	225KVar	5	1×LSDFC25/525-14+4×LSDFC50/525-14	800*800*2200
800KVA	275KVar	6	1×LSDFC25/525-14+5×LSDFC50/525-14	1000*800*2200
1000KVA	350KVar	8	2×LSDFC25/525-14+6×LSDFC50/525-14	1200*1000*2200
1250KVA	450KVar	9	9×LSDFC50/525-14	1200*1000*2200
1600KVA	550KVar	11	11×LSDFC50/525-14	800*800*2200*2柜
2000KVA	700KVar	14	14×LSDFC50/525-14	800*800*2200*2柜

滤波补偿组件安装方式 Filter compensation component installation method

▶ 电容器之间及柜体和其他元件之间最小的距离25mm
25mm minimum distance between capacitor and other components

▶ 需要垂直安装，电容器必须安装 在U型架上，利于通风
Capacitors must be mounted on a U-frame to facilitate ventilation

▶ 电抗器应垂直向上安装在通风板上，有利于散热
The reactor should be installed vertically on the ventilation board to facilitate heat dissipation



▶ 电抗器和其他元件的最小的距离30mm
The minimum distance is 30mm

▶ 禁止将电容器安装在无孔的金属板上，不利于通风
Do not install on non-perforated metal plates, which is not conducive to ventilation

▶ 禁止将电容器垂直反向安装
Do not install capacitors vertically

▶ 电容器禁止安装在电抗器的上方
Capacitors must not be installed above the reactor

▶ 禁止将电抗器倾斜倒置安装
It is forbidden to install the reactor upside down

滤波补偿组件通风设计 Filter compensation component ventilation design

- 补偿柜内气流从下向上流动
- 气流必须经过所有的元件，并且严禁受阻
- 排气扇到元件的最小间距为100mm
- 风扇通风量的选择：实际计算发热量的1，67倍
- 自然冷却：顶部通风口至少为底部的1，1倍
- 强迫冷却：根据无功功率安装通风设施
- 带调谐电抗器的必须强制通风，
  最小通风量F = 0，3 x Ps，（Ps：电抗器的热损耗功率）
- The airflow in the compensation cabinet flows from the bottom up
- Air flow must pass through all components
- The minimum distance from the exhaust fan to the component is 100mm
- Selection of fan ventilation: 1.67 times the actual calorific value
- Natural cooling: the top vent is at least 1.1 times the bottom
- Forced cooling: install ventilation facilities based on reactive power
- Forced ventilation with tuned reactor is required, minimum ventilation F = 0.3 x Ps, (Ps: heat loss power of tuned reactor)

补偿容量（400V 50Hz） Capacity	通风方式 Ventilation method	进风孔面积 Air inlet area	最小排风量（立方米/小时） Minimum exhaust volume(m3/h)
IP≤IP3X			
容量Capacity ≤100kvar	自然风冷Natural air cooling	200 cm2	
容量Capacity 100kvar—200kvar	自然风冷Natural air cooling	400 cm2	
容量Capacity >200kvar	强制风冷Forced air cooling		≤0，75倍的Kvar容量 ≤0.75 times Kvar capacity
IP≤IP3X			
所有容量 All capacity	强制风冷Forced air cooling		≤0，75倍的Kvar容量 ≤0.75 times Kvar capacity

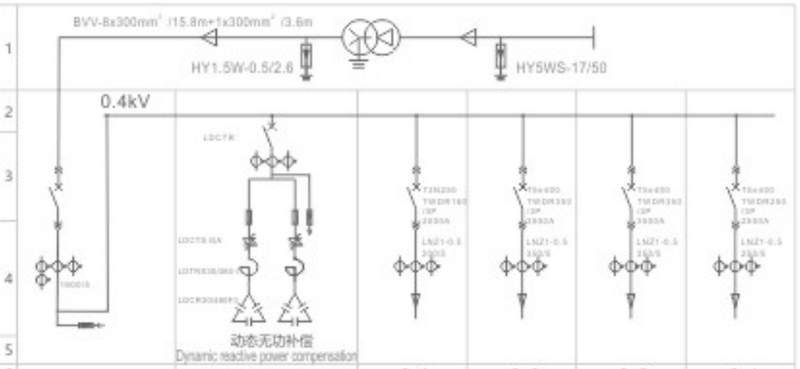
合理使用延长使用寿命 Proper use extends service life

- 电容器联接线应采用软导线，接线应对称一致，整齐美观，线端应加线鼻子，并压接牢固可靠
- 电容器组用母线联接时，不要使电容器套管（接线端子）受机械应力，压接应严密可靠，母线排列整齐
- 严格控制运行电压，电压越高，老化越快，寿命越短
- 控制运行温度，要求并联电容器外壳最热点的温度不得大于60℃
- 装设熔断器保护，应对每个单台电容器设置熔断器保护，要求熔丝的额定电流不得大于被保护cbb电容器额定电流的1，3倍
- The capacitor connecting wire should be a flexible wire, the wiring should be symmetrical and consistent, neat and beautiful, the wire end should be added with a wire nose, and the crimping should be firm and reliable.
- When the capacitor bank is connected with bus bars, do not subject the capacitor bushings (terminals) to mechanical stress. The crimping should be tight and reliable. The bus bars are arranged neatly and painted well.
- Strictly control the operating voltage, the higher the voltage, the faster the aging, and the shorter the life
- To control the operating temperature, the hottest temperature of the shell of the shunt capacitor must not exceed 60 ℃
- Install fuse protection, fuse protection should be provided for each single capacitor, and the rated current of the fuse must not be greater than 1.3 times of the rated current of the protected cbb capacitor


电容器安装配线

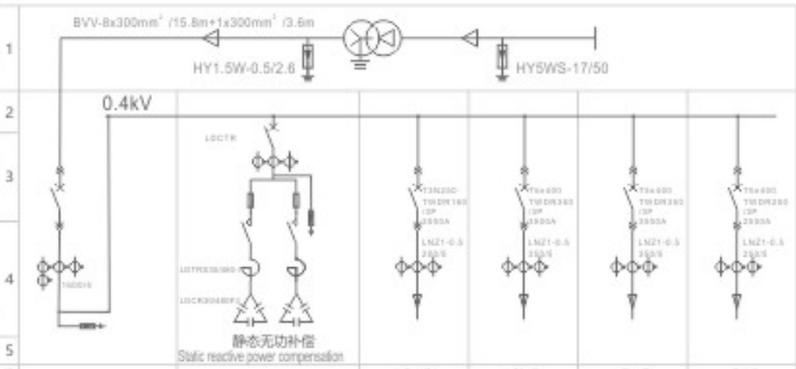

电抗器安装配线

动态无功补偿图纸设计 Design drawing of dynamic reactive power compensation



一次接线图 Wiring diagram							
S11-M.RL-800kVA/10kV/0.4kV	1						
自动开关 Automatic switch	2						
编号No. 标准型号Specification 额定值Rating value(A)	3						
变比Ratio 电流互感器 Current Transformer	4						
	5						
线路编号Line NO.	6			3w1	3w2	3w3	3w4
回路用途Use	7	进线Incoming line	电容器补偿柜Capacitor cabinet	出线1Out line 1	出线2Out line 2	出线3Out line 3	出线4Out line 4
安装容量Installed capacity	8	1060	240kvar	96	207	205	132
计算容量Computing capacity	9	763.2		76.8	155.25	143.50	105.6
计算电流(A)Current	10	1445.5	288	137.3	277.5	256.5	188.76
电气元件 电缆型号及规格	11			4X95+1X50	4X240+1X120	4X240+1X120	4X150+1X70
电气元件 多功能仪表	12	IMI900	INI900	IMI900	IMI900	IMI900	IMI900
电气元件 浪涌保护器	13						
电气元件 滤波补偿组件	14		8×LSDFC30/480-7				
屏宽（mm）	15		800	800	800	800	800

静态无功补偿图纸设计 Static reactive power compensation design



一次接线图 Wiring diagram							
S11-M.RL-800kVA/10kV/0.4kV	1						
自动开关 Automatic switch	2						
编号No. 标准型号Specification 额定值Rating value(A)	3						
变比Ratio 电流互感器 Current Transformer	4						
	5						
线路编号Line NO.	6			3w1	3w2	3w3	3w4
回路用途Use	7	进线Incoming line	电容器补偿柜Capacitor cabinet	出线1Out line 1	出线2Out line 2	出线3Out line 3	出线4Out line 4
安装容量Installed capacity	8	1060	240kvar	96	207	205	132
计算容量Computing capacity	9	763.2		76.8	155.25	143.50	105.6
计算电流(A)Current	10	1445.5	288	137.3	277.5	256.5	188.76
电气元件 电缆型号及规格	11			4X95+1X50	4X240+1X120	4X240+1X120	4X150+1X70
电气元件 多功能仪表	12	IMI900	INI900	IMI900	IMI900	IMI900	IMI900
电气元件 浪涌保护器	13						
电气元件 滤波补偿组件	14		8×LSDFC30/480-7				
屏宽（mm）	15		800	800	800	800	800

模块化滤波补偿组件Modular filter compensation components

LSDMC型低压模块化组件积木式安装，分组进行自动投切，自动适应系统无功需求，适当投切各支路以达到滤波补偿效果，模块可对系统共补或分补，所有元器件选型均经过精密计算、设计、生产、试验，主要优点有：容量更大，易于扩展、安装方便，结构紧凑、布局简洁美观；单元间采用母线连接，改善电能质量，延长电器设备使用寿命。

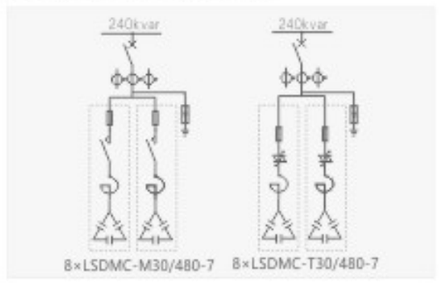
LSDMC type low-voltage modular components are installed in a building block type, and are automatically switched in groups to automatically adapt to the reactive power requirements of the system. Each branch is appropriately switched to achieve the filtering compensation effect. All have undergone precise calculation, design, production and testing. The main advantages are: larger capacity, easy expansion, convenient installation, compact structure, simple and beautiful layout; the use of busbar connection between units to improve power quality and extend the service life of electrical equipment.

技术参数 Technical Parameters

- ◇ 容量范围：15kvar—60kvar
- ◇ 电压范围：280V、300V、480V、525V
- ◇ 电抗率：7%、14%
- ◇ 功耗：电容器≤0.25W/kvar，整机≤1%
- ◇ 结构形式：盒式、机架
- ◇ 温湿度要求：-25℃—+50℃，最大湿度95%
- ◇ 安装条件：室内安装，≤4000米

- ◇ Capacity range: 15kvar-60kvar
- ◇ Voltage range: 280V, 300V, 480V, 525V
- ◇ Reactance rate: 7%, 14%
- ◇ Power consumption: capacitor ≤0.25W / kvar, whole machine ≤1%
- ◇ Structural form: box type, rack
- ◇ Temperature and humidity requirements: -25 ℃-+ 50 ℃, maximum humidity 95%
- ◇ Installation conditions: indoor installation, ≤4000 meters

性能特点 Performance characteristics



设计：标准化设计、模块化、积木式 器件：定制化、优化配置 安装：安装方便，与常规柜型任意组合 散热：结构紧凑，采用横梁安装保证散热 维修：方便维修，易于操作	Design: standardized design, modular, building block Device: customized, optimized configuration Installation: easy installation, any combination with conventional cabinet type Heat dissipation: compact structure, using crossbeam installation to ensure heat dissipation Maintenance: easy maintenance and easy operation
结构紧凑　扩展自如	Compact structure and free expansion
LSDMC模块内部布置合理，安装容量大，结构紧凑；具有方便扩展性，使用户在初次安装补偿装置的同时已经为今后补偿装置的增容打好基础，增容不必改动柜体，不必改动母线，不必长时间停电，只需订购模块单元即可完成增容。	The internal layout of the LSDMC module is reasonable, the installation capacity is large, and the structure is compact; it is easy to expand, allowing users to lay the foundation for the future expansion of the compensation device while installing the compensation device for the first time. There is no need to power off for a long time, just order the module unit to complete the capacity increase.
检修方便　接口简单	Easy maintenance, simple interface
LSDMC模块单元更换、安装方便，无需专用工具，可以在短时间内拆除故障单元并同时安装备用的模块单元，恢复补偿装置的运行对故障单元的修理也是在脱离装置的前提下处理，操作安全，可退厂修理； LSDMC模块各单元对外安装连接接口共2个，既电网接口和控制接口，电网接口采用铜排连接，三相A、B、C，控制接口采用标准导线连接。	The LSDMC module unit is easy to replace and install. No special tools are required. The faulty unit can be removed in a short time and a spare module unit can be installed at the same time. The operation of the compensation unit is restored. The repair of the faulty unit is also handled without the device. Can be returned for repair; Each unit of the LSDMC module is equipped with a total of two connection interfaces. The power interface and the control interface. The power interface is connected by copper bars.

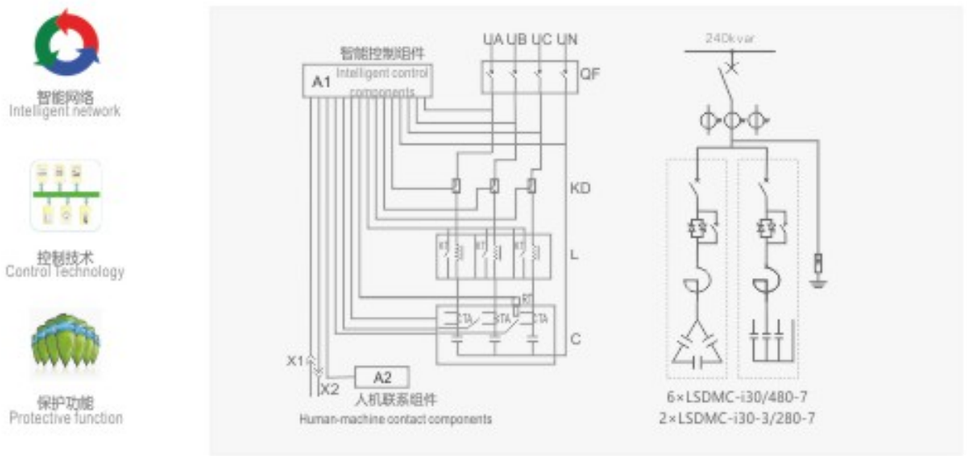
智能抗谐型滤波补偿组件 Intelligent anti-harmonic filter compensation component

智能型抗谐补偿模块是针对电网谐波含量高，常规智能无功补偿电容器不能正常运行而设计的一款新型产品，该产品能够满足无功补偿，改善功率因数，并对谐波无放大作用，在一定程度上有吸收谐波作用。产品由智能测控单元、投切开关、智能保护单位、低压自愈式电力电容器、干式串联电抗器组成一个独立完整的智能补偿单位。

- ◇ 保护功能：具有过电压、欠电压、失压保护、短路保护电容器过温保护等功能
- ◇ 控制技术：采用无功潮流预测和延时多点采样技术，功率因数低于设定值时，根据负荷无功缺额分级差控制投切，确保投切无震荡，重载时，无功得到充分补偿。
- ◇ 智能网络功能：采用智能网络技术，构建485通讯网络，多台电容器并联使用，自动生成一个网络，组成一个新的系统

The intelligent anti-harmonic compensation module is a new product designed for the high harmonic content of the power grid, and the conventional intelligent reactive power compensation capacitors cannot operate normally. To a certain extent, it has the effect of absorbing harmonics. The product consists of an independent and complete intelligent compensation unit consisting of an intelligent measurement and control unit, a switching switch, an intelligent protection unit, a low-voltage self-healing power capacitor, and a dry series reactor.

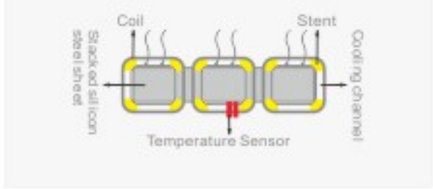
- ◇ Protection function: with over-voltage, under-voltage, voltage loss protection, short-circuit protection, capacitor over-temperature protection, etc.
- ◇ Control technology: Adopt reactive power flow prediction and delayed multi-point sampling technology. When the power factor is lower than the set value, the switching is controlled according to the gradation difference of the load reactive power shortage to ensure that the switching has no vibration. Under heavy load, reactive power is fully compensated.
- ◇ Intelligent network function: Use intelligent network technology to build a 485 communication network. Multiple capacitors are used in parallel to automatically generate a network to form a new system.



模块化组件标准件选型 Standard selection of modular components

容量 Capacity	静态补偿 Static compensation	动态补偿 Dynamic compensation	智能补偿 Smart compensation	电压 Voltage	电抗率 Reactance rate	备注 Note
10kvar	LSDMC-M10/480-7	LSDMC-T10/480-7	LSDMC-i10/480-7	480V	7%	三相共补 Three-phase complement
15kvar	LSDMC-M15/480-7	LSDMC-T15/480-7	LSDMC-i15/480-7	480V	7%	
20kvar	LSDMC-M20/480-7	LSDMC-T20/480-7	LSDMC-i20/480-7	480V	7%	
25kvar	LSDMC-M25/480-7	LSDMC-T25/480-7	LSDMC-i25/480-7	480V	7%	
40kvar	LSDMC-M40/480-7	LSDMC-T40/480-7	LSDMC-i40/480-7	480V	7%	
15kvar	LSDMC-M15-3/280-7	LSDMC-T15-3/280-7	LSDMC-i15-3/280-7	280V	7%	分相补偿 Phase separation compensation
20kvar	LSDMC-M20-3/280-7	LSDMC-T20-3/280-7	LSDMC-i20-3/280-7	280V	7%	
30kvar	LSDMC-M30-3/280-7	LSDMC-T30-3/280-7	LSDMC-i30-3/280-7	280V	7%	

低压电抗器 Low voltage reactor



LDTRS low-voltage reactors have high accuracy and high linearity, and will not be saturated due to harmonic distortion. They are used in low-voltage filter compensation systems. They are connected in series with filter capacitors and tuned to a certain resonant frequency, which can effectively absorb the power grid Harmonics, improve the voltage waveform of the system, and can effectively suppress the inrush current and operating overvoltage, and effectively protect the safe operation of the power system.

技术参数 Technical Parameters

- ◇ 工作电压：230—1300V　50Hz/60Hz
- ◇ 工作电流：3—1600A
- ◇ 过载能力：**1.35In**连续，1.5In持续**60s**
- ◇ 最大电流：1.8In，持续60s
- ◇ 感抗误差：0—+3%
- ◇ 电抗率：7%、14%等，其他可以定制
- ◇ 温升：连续1.35In，温升≤120℃（电阻法）
- ◇ 压降：<4%
- ◇ 线性度：2.0倍额定电流下，L>0.97
- ◇ 绝缘耐压：0.23kV—0.6kVAC4000V/1分钟
- ◇ 温度保护：+125° 过热开断(常闭型)
- ◇ 噪音：不大于35—40dB
- ◇ 抗电强度：铁芯—绕组3KVAC/5mA/10s无飞弧击穿（工厂）
- ◇ 绝缘等级：H、F
- ◇ 温湿度范围：—40℃—+55℃，≤95%
- ◇ 海拔高度：≤4000m
- ◇ 防护等级：**IP20**

- ◇ Working voltage: 230 ~ 1300V 50Hz / 60Hz
- ◇ Working current: 3 ~ 1600A
- ◇ Overload capacity: 1.35In continuous, 1.5In continuous 60s
- ◇ Maximum current: 1.8In for 60s
- ◇ Inductive reactance error: 0 ~ + 3%
- ◇ Reactance rate: 7%, 14%, etc. others can be customized
- ◇ Temperature rise: 1.35In continuously, temperature rise ≤120 ℃ (resistance method)
- ◇ Pressure drop: <4%
- ◇ Linearity: 2.0 times rated current, L> 0.97
- ◇ Insulation withstand voltage: 0.23KV ~ 0.6KVAC4000V / 1 minute
- ◇ Temperature protection: + 125 ° over-temperature break (normally closed)
- ◇ Noise: not more than 35 ~ 40dB
- ◇ Electric strength: iron core-winding 3KVAC / 5mA / 10s without flashover (factory)
- ◇ Insulation class: H、F
- ◇ Temperature and humidity range: -40 ℃ ~ + 55 ℃, ≤95%
- ◇ Altitude: ≤4000m
- ◇ Protection level: Ip20

低压电抗器 Low voltage reactor

主要功能 The main function

- ◇ 降低电容器组的涌流倍数和涌流频率。
- ◇ 与电容器组构成全谐振回路，滤除特征次谐波。
- ◇ 与电容器组构成偏谐振回路，抑制特征次谐波。
- ◇ 提高短路阻抗，减小短路容量，降低短路电流。
- ◇ 减少电容器组向故障电容器组的放电电流，保护电力电容器。
- ◇ 减小操作电容器组引起的过电压幅值，避免电网过电压保护。
- ◇ 减少电容器组的投切涌流，降低涌流暂态过程的幅值，有利于接触器灭弧。

- ◇ Reduce the inrush current multiple and inrush frequency of the capacitor bank.
- ◇ Form a full resonance circuit with the capacitor bank to filter out characteristic sub-harmonics.
- ◇ Form a partial resonance circuit with the capacitor bank to suppress characteristic sub-harmonics.
- ◇ Increase short-circuit resistance, reduce short-circuit capacity, and reduce short-circuit current.
- ◇ Reduce the discharge current from the capacitor bank to the faulty capacitor bank to protect the power capacitor.
- ◇ Reduce the over-voltage amplitude caused by operating the capacitor bank to avoid grid over-voltage protection.
- ◇ Reduce the switching inrush current of the capacitor bank and reduce the amplitude of the transient process of the inrush current, which is beneficial to the contactor's arc extinguishing.

性能特点 Performance characteristics

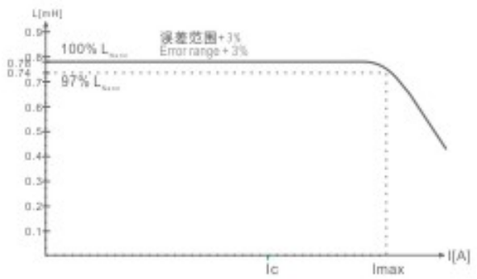
- ◇ 节能环保：干式电抗器运行成本低，损耗低，节能降耗；
- ◇ 性能卓越：具有高线性度、过流强、绝缘高等卓越性能；
- ◇ 稳定安全：具有过温报警接点，保证电抗器安全运行；
- ◇ 先进工艺：电抗器的线圈和铁芯组装成一体后经过预烘→真空浸漆→热烘固化这一工艺流程，采用H级浸渍漆，具有过载能力强、温升低、噪音小等特点。

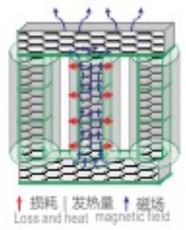
- ◇ Energy saving and environmental protection: dry type reactor has low operating cost, low loss, energy saving and consumption reduction;
- ◇ Excellent performance: It has excellent performance such as high linearity, strong overcurrent and high insulation;
- ◇ Stable and safe: with over-temperature alarm contact to ensure the safe operation of the reactor;
- ◇ Advanced technology: The coil and core of the reactor are assembled into a whole and then pre-baked → vacuum dip paint → heat-bake and cured. This process adopts H-level dip paint with strong overload capacity, low temperature rise, low noise, etc .

高线性度和超低损耗 High linearity and ultra-low loss

电抗器超流运行，在额定电流的1.8倍下，电感值都能保持在0.97%以上，以免铁芯磁饱和,同时电抗器固件采用无磁性金属材料，铁芯采用低损优质材料生产，确保有高的抗谐波能力和低损耗特性。

The reactor runs at overcurrent. At 1.8 times of the rated current, the inductance value can be maintained above 0.97% to avoid magnetic saturation of the iron core. At the same time, the reactor firmware is made of non-magnetic metal material, and the iron core is made of low-loss high-quality materials to ensure Has high anti-harmonic ability and low loss characteristics.





低压电抗器 Low voltage reactor

气隙柱 叠装 冷压接工艺 Air-gap column stacked cold crimping process

电抗器的铁芯采用低损耗冷轧取向硅钢片，有效降低电抗器的温升＼提高电抗器的线性度；柱芯采用多气隙结构，结合耐高温高强度粘结剂粘结，以保证电抗器高达97%的线性度。

The iron core of the reactor uses low-loss cold-rolled oriented silicon steel sheet, which effectively reduces the temperature rise of the reactor and improves the linearity of the reactor. The reactor has a linearity of up to 97%.

每台电抗器的硅钢片采用高精度自动设备加工，尺寸偏差小于0.02mm，硅钢片在叠装时能保证高度的稳定性及一致性。

The silicon steel sheet of each reactor is processed by high-precision automatic equipment, and the dimensional deviation is less than 0.02mm. The silicon steel sheet can ensure high stability and consistency when stacked.

电抗器与线圈的引出端采用冷压接工艺连接，极大地减少了尖角毛刺的产生，减少局部放电，能使场强更加的均匀，连接更可靠。

The reactor and the lead-out end of the coil are connected by a cold crimping process, which greatly reduces the occurrence of sharp corner burrs and reduces partial discharge, which makes the field strength more uniform and the connection more reliable.

电抗器型号定义Reactor model definition

LDTRS□-□/□-□

电抗率（%）：7、14	Reactance rate (%): 7, 14
额定电压（V）：230-1300	Rated voltage (V): 230-1300
补偿类型：省略[共补，三相电抗器]，3[分补，三个单相电抗器结构一体]	Compensation type: omitted [complementary, three-phase reactor], 3 [Sub-compensation, three single-phase reactor structures integrated]
匹配电容器总容量（Kvar）：5-90	Matching capacitor total capacity (Kvar): 5-90

LDTRS电抗器标准件 LDTRS reactor standard parts

型 号 Type	匹配电容器 Matching capacitor	电压（V） Voltage	电抗率 rate	电抗 (mH)	电流 (A)	过温接点 Over temperature	说 明 Description
LDTRS10/480-7	1×LDCR10/480F3	480	7%	5.136	12.03	有	三相电抗器 用于三相共补 Three-phase reactor For three-phase mutual compensation
LDTRS15/480-7	1×LDCR15/480F3	480	7%	3.424	18.04	有	
LDTRS20/480-7	1×LDCR20/480F3	480	7%	2.568	24.06	有	
LDTRS25/480-7	1×LDCR25/480F3	480	7%	2.055	30.07	有	
LDTRS30/480-7	1×LDCR30/480F3	480	7%	1.712	36.09	有	
LDTRS40/480-7	1×LDCR40/480F3	480	7%	1.284	48.11	有	
LDTRS50/480-7	2×LDCR25/480F3	480	7%	1.027	60.14	有	
LDTRS60/480-7	2×LDCR30/480F3	480	7%	0.856	72.17	有	
LDTRS15-3/280-7	3×LDCR5/280F1	280	7%	3.498	17.86	有	单相电抗器 用于分相补偿 Single-phase reactor
LDTRS30-3/280-7	3×LDCR10/280F1	280	7%	1.747	35.71	有	
LDTRS45-3/280-7	3×LDCR15/280F1	280	7%	1.165	53.57	有	

智能控制器 Intelligent controller

LDCTR SERIES

集数据采集、无功补偿、电参数分析等功能于一体的智能装置，以高速数字信号处理器为核心，采用交流取样，人机界面为大屏幕液晶显示器，具有配电监测、滤波补偿控制功能，自适应频率算法，适用于低压调谐滤波补偿系统的控制。

PRTK

Intelligent device integrating functions of data acquisition, reactive power compensation, electrical parameter analysis, etc., with high-speed digital signal processor as the core, adopting AC sampling, human-machine interface is large screen LCD display, with power distribution monitoring, filter compensation control , Adaptive frequency algorithm, suitable for the control of low-voltage tuning filter compensation system.

技术参数 Technical Parameters

- ◇ 工作电压：220V±20% 50Hz/60Hz±5%
- ◇ 取样电压：220V 50Hz/60Hz±5%
- ◇ 取样电流：5A 50Hz/60Hz±5%
- ◇ 过压保护：235—280V；欠压保护：200—180V
- ◇ 电压越上限率：7%—15%
- ◇ 功耗：小于15W
- ◇ 触点容量：250VAC 5A
- ◇ 设计寿命： 3000000次
- ◇ 工作温湿度：—25℃—+55℃；在20℃时，小于95%

- ◇ Working voltage: 220V ± 20% 50Hz / 60Hz ± 5%
- ◇ Sampling voltage: 220V 50Hz / 60Hz ± 5%
- ◇ Sampling current: 5A 50Hz / 60Hz ± 5%
- ◇ Overvoltage protection: 235 — 280V; undervoltage protection: 200 — 180V
- ◇ Voltage over the upper limit: 7% – 15%
- ◇ Power consumption: less than 15W
- ◇ Contact capacity: 250VAC 5A
- ◇ Design life: 3000000 times
- ◇ Operating temperature and humidity: -25℃ — + 55 ℃; less than 95% at 20 %

性能特点 Performance characteristics

- ◇ 采用宽液晶屏，完全菜单引导操作，显示直观，操作灵活
- ◇ 可任意设定每组电容器物理容量
- ◇ 自优化的智能控制模式，可循环，线性（先投后切）投切
- ◇ 可设置动态，静态两种补偿速度
- ◇ 可设置手动，自动两种控制方式
- ◇ 具有通讯接口和报警输出
- ◇ 具有基本的过压、欠压，谐波电压，谐波电流保护

- ◇ Wide LCD screen, fully menu-guided operation, intuitive display and flexible operation
- ◇ The physical capacity of each group of capacitors can be arbitrarily set
- ◇ Self-optimizing intelligent control mode, can be cycled, linear (first cast, then cut) switching
- ◇ Can set dynamic and static compensation speed
- ◇ Two control modes: manual and automatic
- ◇ With communication interface and alarm output
- ◇ With basic overvoltage, undervoltage, harmonic voltage, and harmonic current protection

控制器型号定义 Controller model definition

LDCTR□-□□

投切开关：A[+12V],B[干接点]	Switching switch: A [+ 12V], B [dry contact]
控制类型：G[三相共补]，F[混合补偿]	Control type: G [three-phase common compensation], F [mixed compensation]
控制路数	Control number

投切开关 Switching switch

LDCTS SERIES

用于低压无功补偿电容器的通断控制，由大功率晶闸管模块、隔离电路、触发电路、保护电路及散热装置组成，具有投切时无涌流，无接触噪声以及很高的开关频率，接线简单方便，适用于负载变化较快的场合。

PRTK

It is used for on-off control of low-voltage reactive power compensation capacitors. It is composed of high-power thyristor module, isolation circuit, trigger circuit, protection circuit and heat sink. Convenient, suitable for occasions with fast load changes.

技术参数 Technical Parameters

- ◇ 额定电压：250—400V AC，690V AC
- ◇ 工作电压：380V ±20%
- ◇ 工作频率：50Hz ±5%
- ◇ 控制端电压：12VDC，10mA
- ◇ 环境温湿度：−25℃ — +65℃， ≤80%
- ◇ 动作响应时间：≤10ms
- ◇ di/dt≥500A/μs dv/dt≥1000V/μs
- ◇ 设计寿命：>300万次
- ◇ 数码显示：具备
- ◇ 海拔高度：≤4000m

- ◇ Rated voltage: 250-400V AC, 690V AC
- ◇ Working voltage: 380V ± 20%
- ◇ Working frequency: 50Hz ± 5%
- ◇ Control terminal voltage: 12VDC, 10mA
- ◇ Environmental temperature and humidity: -25 ℃ ~ + 65 ℃, ≤80%
- ◇ Action response time: ≤10ms
- ◇ di / dt≥500A / μs dv / dt≥1000V / μs
- ◇ Design life: > 3 million times
- ◇ Digital display: available
- ◇ Altitude: ≤4000m

晶闸管投切开关
Thyristor switch

电子式开关（复合开关）
Composite switch

性能特点 Performance characteristics

- ◇ 采用先进的隔离技术，提高抗干扰能力
- ◇ 过零触发，无涌流，无过压，无电弧
- ◇ 快速投切，≤10ms(三相全部投入时间)
- ◇ 具有电流、温度显示
- ◇ 过流、温度、缺相保护，具有击穿警报，触发等功能
- ◇ 功耗低，不需加装散热装置，管压降≤2.0V

- ◇ Adopt advanced isolation technology to improve anti-interference ability
- ◇ Zero-cross trigger, no inrush current, no over-voltage, no arc
- ◇ Fast switching, ≤10ms (all three-phase input time)
- ◇ With current and temperature display
- ◇ Overcurrent, temperature, phase loss protection, with functions such as breakdown alarm and trigger
- ◇ Low power consumption, no need to install heat dissipation device, tube voltage drop ≤2.0V

复合开关 Composite switch

利用单片机技术，使软件和硬件相结合，根据三相电的相序特征，在数个交流周期内按照各相的相位，利用单片机分别对电容器每相进行投切操作，从而实现无涌流和无过压的投切过程。

Using single-chip microcomputer technology, combining software and hardware, according to the phase sequence characteristics of three-phase electricity, in accordance with the phase of each phase in several AC cycles, using a single-chip microcomputer to perform switching operations on each phase of the capacitor, thereby achieving no inrush current and no Over-voltage switching process.

投切开关型号定义 Switching switch model definition

LDCTS-□□-□

- 开断能力[A] — Breaking capacity [A]
- 控制对象：A[≤40Kvar],B[≤60Kvar] D[≤90Kvar]，S[复合开关] — Control object: A [≤40Kvar], B [≤60Kvar] D [≤90Kvar], S [composite switch]
- 补偿类型：G[三相共补]，F[分相补偿] — Compensation type: G [three-phase common compensation] F [phase separation compensation]

谐波监测仪表 Harmonic monitoring instrument

LDCTR900 SERIES

集数据采集、控制、统计功能于一体，具有交流电参量的测量、电能计量、脉冲输入量累计、故障记录、开关量输入监测、继电器输出、脉冲输出、越限告警、2～31次谐波监测的功能等功能。支持RS485接口MODBUS通讯协议，与计算机监控系统连接。

PRTK

Set data acquisition, control, and statistics functions in one, with AC electrical parameter measurement, energy measurement, pulse input accumulation, fault record, switch input monitoring, relay output, pulse output, limit violation alarm, 2 to 31 harmonic monitoring Functions and other functions. Support RS485 interface MODBUS communication protocol, connect with computer monitoring system.

技术参数 Technical Parameters

- ◇ 工作电源：AC186—264V，50/60Hz
- ◇ 电压输入：0—450V
- ◇ 电流输入：5A
- ◇ 开关量输入：4路，隔离电压1500VDC
- ◇ 继电器输出：2路触点容量5A/250VAC
- ◇ 模拟量输出：直流4—20mA，精度为1级
- ◇ 脉冲输出：常数为5000imp
- ◇ 通讯：RS485，MODBUS—RTU
- ◇ 精度：U、I，0.2S
- ◇ 环境：−25℃—+55℃， ≤95%

- ◇ Working power: AC186 ~ 264V, 50 / 60Hz
- ◇ Voltage input: 0-450V
- ◇ Current input: 5A
- ◇ Switch input: 4 channels, isolation voltage 1500VDC
- ◇ Relay output: 2 contact capacity 5A / 250VAC
- ◇ Analog output: DC 4-20mA, accuracy is level 1
- ◇ Pulse output: constant 5000imp
- ◇ Communication: RS485, MODBUS-RTU
- ◇ Accuracy: U, I, 0.2S
- ◇ Environment: -25 ℃ ~ + 55 ℃, ≤95%

谐波检测
Harmonic monitoring

大屏幕液晶触摸屏
Touch screen

性能特点 Performance characteristics

- ◇ 具有强大的数据采集、处理、统计与控制功能
- ◇ 具有先进的触摸屏技术，引领仪表技术的发展方向
- ◇ 有效检测谐波
- ◇ 安全性高，可靠性好，显示直观操作简便
- ◇ 体积小，安装接线方便

- ◇ With powerful data collection, processing, statistics and control functions
- ◇ With advanced touch screen technology, leading the development direction of instrument technology
- ◇ Effective detection of harmonics
- ◇ High safety, good reliability, intuitive display and easy operation
- ◇ Small size, convenient installation and wiring

谐波监测仪表型号定义 Harmonic monitoring instrument model definition

LDCTR90□□-□□-□□-□

- R：通讯 — R: Communication
- 输入输出量数量 — Number of input and output quantities
- O：开关量输出 — O: switch output
- I：开关量输入 — I: digital input
- A：模拟量输入 — A: Analog input
- 尺寸（mm）:72[72*72],96[96*96] — Size (mm): 72 [72 * 72], 96 [96 * 96]
- 显示屏：T[触摸屏],E[数码管]，C[液晶] — Display: T [touch screen], E [digital tube], C [liquid crystal]
- 功能：i[电流],u[电压],f[谐波表],z[组合表] — Function: I [current], u [voltage], f [harmonic table], z [combination table]
- 相数：1[单相]，3[三相],e[多功能] — Number of phases: 1 [single phase], 3 [three phases], e [multifunction]

高压电容器
High voltage capacitor

SHOW LEYSDEN

LDHVC PRODUCT FEATURES

· Long lasting
· Environmental protection without pollution
· Advanced processing technology

LDHVC型高压电容器使用非氟化物、无毒、可生物降解的浸渍剂，具有非常高的化学稳定性，极高的气体吸收能力和局部放电熄灭能力，每个电容器单元都有内熔丝，用于隔离故障单元；采用双面粗化优质聚丙烯薄膜以保证良好的浸渍，使用寿命长，可用于6KV、10KV系统中滤波补偿、系统电压支撑，释放线路及变压器的能力的作用，降低输电线路和变压器的损耗。

LDHVC type high-voltage capacitors use non-fluoride, non-toxic, biodegradable impregnants, have very high chemical stability, extremely high gas absorption capacity and partial discharge extinguishing capacity. Each capacitor unit has an internal fuse. Used to isolate the faulty unit; use double-sided roughened high-quality polypropylene film to ensure good impregnation and long service life. It can be used for filtering compensation, system voltage support in 6KV and 10KV systems, releasing the ability of lines and transformers, and reducing transmission lines. And transformer losses.

使用寿命长 | 环保无污染 | 先进加工工艺

技术参数 Technical Parameters

- 额定电压：3.15—12KV，50/60Hz
- 单体容量：25—900KVar
- 固体介质：全膜介质，聚丙烯膜
- 液体介质：苄基甲苯，二芳基乙烷
- 设计寿命：>250000h
- 放电时间：<75V/10min或<50V/5min
- 电容误差：±5%
- 损耗：<0.2W/KVar
- 过载能力：1.3In，最高至1.43I
- 环境温度：-40℃—+45℃

- Rated voltage: 3.15 — 12KV, 50 / 60Hz
- Unit capacity: 25 — 900KVar
- solid media: full film media, polypropylene film
- Liquid medium: benzyltoluene, diarylethane
- Design life:> 215000h
- Discharge time: <75V / 10min or <50V / 5min
- Capacitance error: ± 5%
- Loss: <0.2W / KVar
- Overload capacity: 1.3In, up to 1.43I
- Ambient temperature: -40 ℃ — +45 ℃

性能特点 Performance characteristics

- 采用全膜电介质，具有较低的介质温升和介质温度
- 损耗极低、重量轻、安全高、寿命长
- 容值偏差小，故障率低
- 内附放电电阻，快速放电至安全范围
- 填充介质无毒无污染，非常环保
- 适用环境温度宽
- 不锈钢草绿环保色，灰色可选
- 空气自然冷却或强排风

- Using full film dielectric, Has low media temperature rise and temperature
- Extremely low loss, light weight, high safety and long life
- Small tolerance deviation and low failure rate
- Built-in discharge resistor, fast discharge to safe range
- Insulating oil is non-toxic and pollution-free, very environmentally friendly
- Wide applicable ambient temperature
- Stainless steel grass green environmental protection color, gray optional
- Natural air cooling or strong exhaust

超长设计寿命 Extremely long design life

高压并联电容器在实际的运行过程中会不断的受到电场和热场作用。电容器的介质在电和热的作用下会不断的发生电老化、热老化和电化学老化，从而使电容器的各项性能逐渐变坏，直至失效。

设计使用寿命，通过变化电场、热场等加速寿命试验的老化方式获得，依据经验公式：

High-voltage shunt capacitors will be continuously exposed to electric and thermal fields during actual operation. Under the action of electricity and heat, the dielectric of a capacitor will continue to undergo electrical aging, thermal aging, and electrochemical aging, which will gradually deteriorate the performance of the capacitor until it fails.

The design service life is obtained by the aging method of accelerated life test such as changing electric field and thermal field. Based on empirical formula:

$$\tau_u=\tau_t(E_t\times\Theta_t/E_u\times\Theta_u)\alpha$$

τ_u-电容器的额定寿命（年）

τ_t-电容器的加速寿命试验时间（年）

E_t-加速寿命试验时加在电容器上的场强

E_u-电容器的额定场强

Θ_t-加速寿命试验时的介质温度

Θ_u-额定运行状态下介质的温度

α-常数

τ_u-rated life of capacitor (year)

τ_t-Accelerated life test time of capacitor (year) Field strength applied to the capacitor during

E_t-Accelerated Life Test

E_u-rated capacitor field strength

Θ_t- Medium temperature during accelerated life test

Θ_u- Humidity of the medium under rated operating conditions

α-constant

在合理设定条件下，在1.4EN、1000h的等值寿命为47.7年，但是电容器在实际运行中，不可避免的会受到各种过电压、过电流、涌流、操作过电压、局部放电、谐波电流的作用，所以其实际设计寿命达不到试验寿命，但设计寿命不低于20—30年。

Under reasonable setting conditions, the equivalent life at 1.4EN and 1000h is 47.7 years, but in actual operation, the capacitor will inevitably be subjected to various overvoltages, overcurrents, inrush currents, operating overvoltages, partial discharges, harmonics, etc. The effect of wave current, so its actual design life can not reach the test life, but the design life is not less than 20 to 30 years.

电气特性 Electrical characteristics

□ 电容器极间介质能承受下列二种试验电压之一，历时10s
a 工频交流电压：Ut（一）=2,15Un
b 直流电压：Ut（-）=4,3Un
□ 电容器端子与外壳的绝缘水平应能承受下表所列的试验电压：

□ The dielectric between the capacitors can withstand one of the following two test voltages, which lasts for 10S.
a Power frequency AC voltage: Ut (一) = 2.15Un
b DC voltage: Ut (-) = 4.3Un
□ The insulation level between the capacitor terminal and the case should be able to withstand the test voltages listed in the table below:

绝缘等级（kv） Insulation class	电容器额定电压（KV） Capacitor rated voltage	绝缘水平（KV） Insulation level		
		工频试验电压，1min Power frequency test voltage		雷电冲击试验电压1.2～1.5 / 50us，峰值 Lightning impulse test voltage 1.2 ～ 1.5 / 50us, peak value
		干式 Dry	湿式 Wet	
3	3,15	25	18	40
6	6,6√3,6,3	30	23	60
10	10,5,11，11√3	42	30	75
20	19,20	65	50	125

□ 电容器具有下表所示的工频稳态电压能力：

□ The capacitor has the power-frequency steady-state voltage capability shown in the following table:

工频过电压 Power frequency over voltage	最大持续时间 Maximum duration	说明 Description
1,1Un	长期 long	最长期工作电压的最高值应不超过1,1Un The maximum value of the long-term working voltage should not exceed 1.1Un
1,15Un	每24小时中30分钟 30 minutes every 24 hours	系统电压调整与波动 System voltage adjustment and fluctuation
1,20Un	5分钟 5 minutes	轻负荷时电压升高 Voltage rise at light load
1,30Un	1分钟 1 minute	同上 Ibid

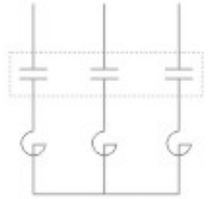
注：表中的1,2Un、1,3Un及其对应的运行时间在电容器的寿命期间总共应不超过200次，为了延长电容器的使用寿命，电容器应经常维持在不超过额定电压下运行。

□ 电容器能承受第一个峰值不超过2,2UN持续1/2周期的过渡够电压。
□ 电容器允许在由于电压升高及高次谐波造成的有效值为1,3In的稳定过电流下运行，对于电容具有最大正偏差的电容器，这个过电流允许达到1,43In。
□ 电容器的实测电容值与额定值之差不超过额定的-5%—+10%，三相电容器中任何两线路端子间测得的最大与最小电容值之比值应不大于1,06。
□ 电容器在工频额定电压下，温度为20℃ 时的损耗正切值[tgδ] 为
膜纸复合介质电容器：tgδ ≤0,0008或0,0005
全膜介质电容器：tgδ ≤0,0005或0,0002
注：内部装有放电电阻或熔丝的电容器，其损耗角正切值允许增加0,0001。
□ 内部装有放电电阻的电容器，与电源断开后，能在10分种内由额定电压的峰值降到75伏以下。若要在5分钟内额定电压的峰值降到50伏以下，需要特别定制。

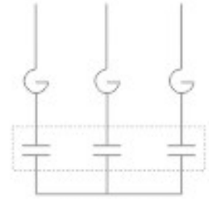
Note: 1.2Un, 1.3Un and their corresponding operating time in the table should not exceed 200 times during the life of the capacitor. In order to extend the life of the capacitor, the capacitor should always be maintained to operate under the rated voltage.

□ Capacitor can withstand the first transition voltage of 2.2UN for 1/2 cycle.
□ Capacitors are allowed to operate under stable overcurrents with an effective value of 1.3In due to voltage rise and higher harmonics. For capacitors with the largest positive deviation in capacitance, this overcurrent is allowed to reach 1.43In.
□ The difference between the measured capacitance value and the rated value of the capacitor should not exceed -5% – + 10% of the rated value. The ratio of the maximum and minimum capacitance values measured between any two line terminals in a three-phase capacitor should not be greater than 1.06.
□ The loss tangent value (tgδ) of the capacitor at the power frequency rated voltage at a temperature of 20 ° C is
Film-paper composite dielectric capacitor: tgδ≤0.0008 or 0.0005
Full film dielectric capacitor: tgδ≤0.0005 or 0.0002
Note: For capacitors with internal discharge resistors or fuses, the loss tangent value can be increased by 0.0001.
□ The capacitor equipped with a discharge resistor can be reduced from the peak value of the rated voltage to less than 75 volts within 10 minutes after disconnecting from the power supply. If the peak value of the rated voltage drops below 50 volts within 5 minutes, special customization is required.

接线方式 Wiring



位置位于中性点侧
Position on the neutral point side
对动，稳定没有特殊要求
No special requirements for movement and stability



位置位于电源侧
Location on the power side
应效验动，稳定电流
Response test, stable current

型号定义 Model definition

LDHVC□/□-□

相数：1|单相，3|三相　Number of phases: 1 [single phase], 3 [three phases]

系统电压（KV）：3.81[6.6√3]　System voltage (KV): 3.81 [6.6√3],
4.16[7.2√3]　4.16 [7.2√3],
6.35[11√3]　6.35 [11√3],
6.93[12√3]　6.93 [12√3],
6.6,7.2,11,12　6.6,7.2,11,12

容量（kvar）：90-600　Capacity (Kvar): 90-600

高压电容器标准件 High-voltage capacitor standard parts

安装容量 Installed capacity	电容器型号 Type	系统电压 System voltage	标称电容 Nominal capacitance	接线方式 Wiring
34kvar	LDHVC34/6,93-1	10KV	2,25μF	星形Y
67kvar	LDHVC67/6,93-1	10KV	4,44μF	星形Y
100kvar	LDHVC100/6,93-1	10KV	6,63μF	星形Y
134kvar	LDHVC134/6,93-1	10KV	8,89μF	星形Y
167kvar	LDHVC167/6,93-1	10KV	11,07μF	星形Y
200kvar	LDHVC200/6,93-1	10KV	13,26μF	星形Y
267kvar	LDHVC267/6,93-1	10KV	17,71μF	星形Y
300kvar	LDHVC300/6,93-1	10KV	19,89μF	星形Y
334kvar	LDHVC334/6,93-1	10KV	22,15μF	星形Y
400kvar	LDHVC400/6,93-1	10KV	26,53μF	星形Y
500kvar	LDHVC500/6,93-1	10KV	33,16μF	星形Y
600kvar	LDHVC600/6,93-1	10KV	39,79μF	星形Y
667kvar	LDHVC667/6,93-1	10KV	44,23μF	星形Y

高压无功补偿组件
High-voltage reactive power compensation components

SHOW LEYSDEN

LSDFH PRODUCT FEATURES

- Exact match
- Universal installation
- Low noise operation
- High linearity
- High overload capacity

LSDFH型高压无功补偿组件由高压电容器和高压抗谐电抗器组成滤除特定谐波的补偿回路，抑制电网电压波形畸变，抑制流过电容器组的谐波分量和限制电容器组的合闸涌流。高压补偿组件已经成为无功补偿装置中必不可少的设备，目前在各行业电网建设中，其作为重要的无功补偿设备得到广泛应用

LSDFH type high-voltage reactive power compensation component is composed of high-voltage capacitors and high-voltage anti-resonant reactors, which eliminates specific harmonics. It suppresses the distortion of the grid voltage waveform, suppresses the harmonic components flowing through the capacitor bank, and limits the inrush current of the capacitor bank. High-voltage compensation components have become essential equipment in reactive power compensation devices. At present, it is widely used as an important reactive power compensation device in the construction of power grids in various industries.

精确匹配 | 通用安装 | 低噪音运行 | 高线性度 | 高过载能力

技术参数 Technical Parameters

- 电压范围：3.15–12KV，50/60Hz
- 补偿范围：50–2400KVar
- 电抗率：6%，12%
- 噪声：<65dB
- 设计寿命：>215000h
- 运行温度：–25℃–+45℃
- 储存温度：–40℃–+70℃
- 相对湿度：<95%
- 海拔高度：常规1000m，其他定制
- 使用环境：室内、无污染、无振动
- 执行标准：IEC

- Voltage range: 3.15—12KV, 50 / 60Hz
- Compensation range: 50—2400KVar
- Reactance rate: 6%, 12%
- Noise: <65dB
- Design life:> 215000h
- Operating temperature: -25 ℃ — + 45 ℃
- Storage temperature: -40 ℃ — + 70 ℃
- Relative humidity: <95%
- Altitude: conventional 1000m, other customized
- Operating environment: indoor, no pollution, no vibration
- Executive Standard: IEC

型号定义 Model definition

LSDFH□/□-□

- 电抗率（%）：6,12 — Reactance rate (%): 6,12
- 电容器端电压（KV）：3.81[6.6√3], 4.16[7.2√3], 6.35[11√3], 6.93[12√3] 6.6,7.2,11,12 — Capacitor terminal voltage (KV): 3.81 [6.6√3], 4.16 [7.2√3], 6.35 [11√3], 6.93 [12√3], 6.6,7.2,11,12
- 电容器组容量（kvar）：50-2400 — Capacitor bank capacity(kvar): 50-600

高压无功补偿组件标准件 High-voltage reactive power compensation components

安装容量(kvar) Installed capacity	型 号 Type	匹配电容器 Matching capacitor	匹配电抗器 Matching reactor
100	LSDFH100/6,93–6	3×LDHVC34/6,93–1	LDHVR100–3/10–6
200	LSDFH200/6,93–6	3×LDHVC67/6,93–1	LDHVR200–3/10–6
300	LSDFH300/6,93–6	3×LDHVC100/6,93–1	LDHVR300–3/10–6
400	LSDFH400/6,93–6	3×LDHVC134/6,93–1	LDHVR400–3/10–6
500	LSDFH500/6,93–6	3×LDHVC167/6,93–1	LDHVR500–3/10–6
600	LSDFH600/6,93–6	3×LDHVC200/6,93–1	LDHVR600–3/10–6
750	LSDFH750/6,93–6	3×LDHVC250/6,93–1	LDHVR750–3/10–6
800	LSDFH800/6,93–6	3×LDHVC267/6,93–1	LDHVR800–3/10–6
900	LSDFH900/6,93–6	3×LDHVC300/6,93–1	LDHVR900–3/10–6
1000	LSDFH1000/6,93–6	3×LDHVC334/6,93–1	LDHVR1000–3/10–6
1200	LSDFH1200/6,93–6	3×LDHVC400/6,93–1	LDHVR1200–3/10–6
1500	LSDFH1500/6,93–6	3×LDHVC500/6,93–1	LDHVR1500–3/10–6
1800	LSDFH1800/6,93–6	6×LDHVC300/6,93–1	LDHVR1800–3/10–6
2000	LSDFH2000/6,93–6	6×LDHVC334/6,93–1	LDHVR2000–3/10–6

高压电抗器 High voltage reactor

LDHVR SERIES

LDHVR与电容器组成串联回路，可有效抑制合闸涌流、操作过电压及高次谐波，改善系统电压波形，对电网及无功补偿的安全运行起到十分重要的作用具有高线性度、低噪音、高过载电流能力、低损耗的特点，材料可环保回收。

PRTK

LDHVR forms a series circuit with capacitors, which can effectively suppress closing inrush current, operating overvoltage and higher harmonics, improve the system voltage waveform, and play a very important role in the safe operation of the power grid and reactive power compensation; it has high linearity, Low noise, high overload current capability and low loss. The material can be recycled in an environmentally friendly manner.

技术参数 Technical Parameters

- ◇ 额定电压：6—35KV
- ◇ 额定容量：3—144KVar
- ◇ 配套电容器容量：50—2400KVar
- ◇ 常见电抗率：6%，12%
- ◇ 感抗误差：0—+3%
- ◇ 冷却方式：空气自冷
- ◇ 绝缘等级：F，H级〔可选〕

- ○ Rated voltage: 6～35KV
- ○ Rated capacity: 3～144KVar
- ○ Supporting capacitor capacity: 50-2400KVar
- ○ Common reactance rate: 6%, 12%
- ○ Inductive reactance error: 0 ～ + 3%
- ○ Cooling method: air self-cooling
- ○ Insulation grade: F, H (optional)

低噪音运行
Low noise operation

高线性度
High linearity

性能特点 Performance characteristics

- ◇ 铁芯采用优质低损耗进口冷轧取向硅钢片，经浸渍工艺处理，线圈整体采用环氧浇注成型，关键部位加有减震措施，保证了产品绝缘性好、耐压高、低噪音、长寿命并且具有憎水性
- ◇ 线圈电场分布均匀，温升低，抗短路能力强；铁芯有效截面积大，漏磁小，损耗低
- ◇ 表面处理工艺先进，防潮防燃防龟裂免维护，整体体积小，重量轻，外观美，安装方便

- ◇ The iron core is made of high-quality, low-loss imported cold-rolled oriented silicon steel sheet, which is processed by the dipping process. The entire coil is made of epoxy casting. The key parts are added with shock absorption measures to ensure that the product has good insulation, high voltage resistance, low noise, and long length. Life-span and hydrophobic
- ◇ The electric field of the coil is evenly distributed, the temperature rise is low, and the short-circuit resistance is strong; the effective cross-sectional area of the core is large, the magnetic leakage is small, and the loss is low
- ◇ Advanced surface treatment technology, moisture-proof, flame-proof, crack-free, maintenance-free, small overall size, light weight, beautiful appearance, convenient installation

高压电抗器型号定义 Definition of High Voltage Reactor Model

LDHVR□-3/□-□

电抗率（%）：6,12	Reactance rate (%): 6,12
系统电压（KV）：1.3-35	System voltage (KV): 1.3-35
结构：3[单相，三相一体]	Structure: 3 [single-phase, three-phase one]
匹配电容器容量（kvar）：50-4800	Matching capacitor capacity (kvar): 50-4800

高压无功补偿组件配置原则 Configuration principles of high-voltage reactive power compensation components

安装位置 Installation location

补偿组件应安装于主变压器的主要负荷侧，35—220kV变电所多安装于10kV侧，可降低变压器的损耗，提高母线电压，补偿效果最好。

Compensation components should be installed on the main load side of the main transformer. 35-220kV substations are mostly installed on the 10kV side, which can reduce the loss of the transformer and increase the bus voltage. The compensation effect is the best.

电容器容量选择 Capacitor capacity selection

对于35kV和110kV变电所补偿容量一般可取主变压器容量的15%—20%，63kV变电所一般可取主变压器容量的20%—30%，220kV变电所一般可取主变压器容量的0—30%，装于主变压器第三绕组侧的电容器组，其总容量不超过该绕组的额定容量。

For 35kV and 110kV substations, the compensation capacity can generally take 15% -20% of the main transformer capacity, 63kV substations can generally take 20% -30% of the main transformer capacity, and 220kV substations can generally take 0-30 of the main transformer capacity %, The total capacity of the capacitor bank installed on the third winding side of the main transformer does not exceed the rated capacity of the winding.

电抗器的选择 Choosing a reactor

串联电抗器串接在电容器组的回路中，用于抵制高次谐波和限制合闸涌流。

- ◇ 用于抵制5次用以上谐波时，可按XI/Xc=4，5%—6%配置
- ◇ 用于抵制3次用以上谐波时，可按XI/Xc=12%—13%配置
- ◇ 仅用于限制涌流时，电抗器可按XI/Xc=0，5%—1%配置

Series reactors are connected in series in the capacitor bank to resist higher harmonics and limit closing inrush current.

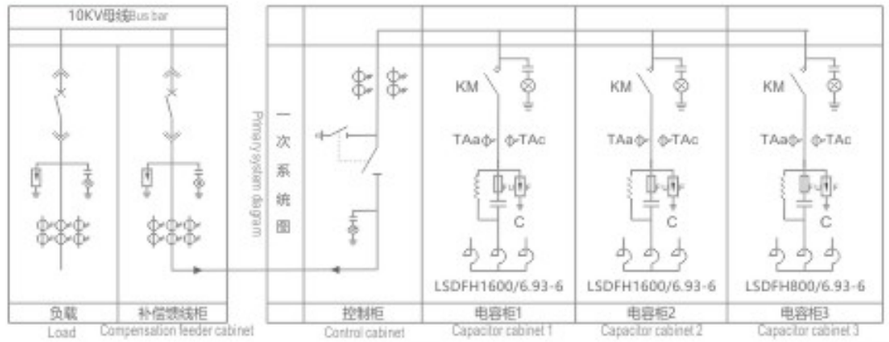
- ◇ When it is used to resist more than 5th order harmonics, it can be configured according to XI / Xc = 4.5% -6%
- ◇ When it is used to resist more than 3 harmonics, it can be configured according to XI / Xc = 12% -13%
- ◇ Only for limiting inrush current, the reactor can be configured as XI / Xc = 0.5% -1%

分组和接线原则 Grouping and wiring principles

- ◇ 在不同负荷条件下，投切电容器引起的母线电压波动值应在允许范围内；
- ◇ 不同容量组合投入时都不应发生谐振，且主变各侧母线的谐波含量不应超限；
- ◇ 分组容量应考虑单台电容器的爆裂容量及熔断器的耐爆能量，并与断路器断路容量相适应；
- ◇ 满足调压、调序要求的条件下，选择较大的单组容量，减少组数，一般不超过4组。
- ◇ 宜采用单星形或双星形的接线方式，在中性点非接地的电网中，中性点不应接地；
- ◇ 组件的每相或每个桥臂由多台电容器串并联时，应先并联后串联的接线方式。

- ◇ Under different load conditions, the bus voltage fluctuation caused by switching capacitors should be within the allowable range;
- ◇ No resonance should occur when different capacity combinations are put in, and the harmonic content of the buses on each side of the main transformer should not exceed the limit;
- ◇ The grouping capacity should consider the burst capacity of a single capacitor and the explosion-resistant energy of the fuse, and be compatible with the circuit breaker's breaking capacity;
- ◇ Under the condition that the pressure and sequence requirements are met, choose a larger single group capacity and reduce the number of groups, generally no more than 4 groups.
- ◇ Single-star or double-star wiring should be used. In a non-grounded power grid, the neutral point should not be grounded;
- ◇ When each phase of the module or each bridge arm is connected in series and parallel by multiple capacitors, the connection mode should be in parallel first and then in series.

高压无功补偿组件图纸设计 Drawing design of high voltage reactive power compensation component



有源滤波及无功补偿技术
Active filtering and reactive power compensation technology

SHOW LEYSDEN

LDTSVG PRODUCT FEATURES

· Reactive power compensation and filtering
· Quick response
· Exact match

TSVG ASVG TAPF

有源补偿装置(APF&SVG)与无功补偿组件并联,充分利用有源补偿装置的谐波虑除功能和高效线性补偿功能,共同承担无功补偿与谐波治理任务。该技术针对波动负载性工业和商建、医院、数据中心等现代建筑具有快速有效的动态双向无功补偿和高效滤波功能。

The active compensation device (APF & SVG) is connected in parallel with the reactive power compensation component, making full use of the harmonic elimination function and efficient linear compensation function of the active compensation device to jointly undertake the tasks of reactive power compensation and harmonic control. This technology has fast and effective dynamic two-way reactive power compensation and efficient filtering functions for modern buildings such as wave-loaded industrial and commercial construction, hospitals, and data centers.

无功补偿兼具滤波 | 快速响应 | 精确匹配

技术原理 Technical principle

有源补偿与晶闸管控制的电容器组搭配，基于柔性交流输电技术，通过电容器组，并由IGBT功率单元按控制指令发出无级平滑可调的从感性到容性无功电流。有源补偿单元与电容器组单元通过统一协调控制，从而实现混合补偿的目的。

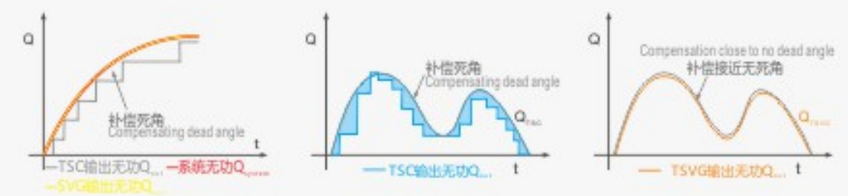
有源补偿单元作为交流单元与电容器组单元协调控制过程中，变流单元作为一个快速可控的无功源，用于对无功需求中的动态部分做出及时反应，并且在稳态情况下保留足够的动态可控无功储备。当系统的无功需求瞬间发生剧烈变化时，首先由变流单元快速改变其输出，以对无功功率进行快速、动态、连续的跟踪补偿，对接入点电压可动态支撑和稳态调整，从而改善系统的动态和稳态性能，抑制电压振荡。当扰动导致系统进入新的稳态工作点后，再投入或切除适当数量的电容器组，以承担由变流单元所卸下的部分无功负荷，如此既相互协调配合，又各自相对独立工作，既能满足不同的无功补偿要求，又能提高灵活性和响应速度。

Active compensation is matched with thyristor-controlled capacitor banks. Based on flexible AC power transmission technology, the capacitor banks and IGBT power units issue stepless smooth adjustable adjustable inductive to capacitive reactive currents according to control instructions. The active compensation unit and the capacitor bank unit achieve unified hybrid compensation through unified and coordinated control.

During the coordinated control of the active compensation unit as the converter unit and the capacitor bank unit, the converter unit serves as a fast and controllable reactive power source, which is used to respond to the dynamic part of the reactive power demand in a timely manner, and in a steady state Keep enough dynamic controllable reactive power reserve. When the reactive power demand of the system changes suddenly and suddenly, the converter unit first changes its output quickly to perform fast, dynamic and continuous tracking compensation for the reactive power. The access point voltage can be dynamically supported and adjusted in a steady state. This improves the dynamic and steady-state performance of the system and suppresses voltage oscillations. When the disturbance causes the system to enter a new steady-state operating point, an appropriate number of capacitor banks are put in or cut off to bear part of the reactive load unloaded by the converter unit. In this way, they not only coordinate and cooperate with each other, but also work relatively independently, which can not only meet different reactive power compensation requirements, but also improve flexibility and response speed.

技术优势 Technical advantages

功能特性 Functional characteristics	TSC动态无功补偿 Dynamic reactive power compensation	动态滤波混合补偿 Dynamic filter hybrid compensation
控制方式 Control method	独立控制器，控制分组投切 Independent controller to control group switching	电容器组+SVG/APF模块+专用控制器，更加稳定、快速 Capacitor bank + SVG / APF module + dedicated controller, more stable and fast
输出无功 Output reactive power	分组输出，有盲区 Group output with dead zone	线性输出，稳定平稳 Linear output, stable and stable
补偿能力 Ability to compensate	分组、分级补偿 Grouping and grading compensation	连续补偿，全程近1 Continuous compensation, nearly 1 throughout
响应时间 Response time	≤20ms	≤10ms，动态性能更好 ≤10ms, better dynamic performance
使用寿命 Service life	过零投切，无冲击，使用寿命长 Zero crossing switching, no impact, long service life	整体使用寿命更长 Longer overall life
三相平衡度 Three-phase balance	一般，需要特殊设计 Generally requires special design	效果明显 The effect is obvious
滤波能力 Filtering ability	特定次谐波 Specific harmonic	滤除2～50次谐波 Filter out 2～ 50th harmonic
应用前景 Application prospects	目前主流产品 Current mainstream products	应用前景广泛 Wide application prospects



技术参数 Technical Parameters

LDTSVG SERIES

装置由LC电容电抗补偿支路、SVG模块组成，其融合了无源补偿和有源滤波补偿技术，共同承担无功补偿与谐波治理任务。该装置针对波动负载性工业和商建、医院、数据中心等现代建筑具有快速有效的动态双向无功补偿和高效滤波功能。

PRTK

The device is composed of LC capacitor reactance compensation branch and SVG module. It integrates passive compensation and active filter compensation technology, and jointly undertakes tasks of reactive power compensation and harmonic control. The device has fast and effective dynamic two-way reactive power compensation and efficient filtering functions for modern buildings such as wave-loading industrial and commercial construction, hospitals, and data centers.

技术特点 Technical characteristics

- □ 连调性：无功容量连续调节，实现无级补偿；
- □ 双向性：可动态双向连续调节无功功率，即补偿感性负荷，又补偿容性负荷；
- □ 模块化：模块化设计，外形美观，维护方便；
- □ 响应快：小于5ms，可抑制电压波动，削弱负荷功率冲击，保护电气设备；
- □ 低噪音：小于50dB；
- □ 低损耗：自身损耗小，低于1%；
- □ 方便维护：模块化设计，可单独检修，相互间无影响；
- □ 保护全：完善的保护系统技术，监视部件的工作状态；
- □ 智能化：数字化控制和参数设置，采用大屏幕液晶屏，具有波形显示，谐波含量显示及事件记录等功能

- □ Continuous tuning: continuous adjustment of reactive power capacity to achieve stepless compensation;
- □ Bidirectional: Reactive power can be continuously and dynamically adjusted in both directions, that is, to compensate the inductive load and the capacitive load.
- □ Modular: Modular design, beautiful appearance and easy maintenance;
- □ Fast response: less than 5ms, can suppress voltage fluctuations, weaken load power impact, and protect electrical equipment;
- □ Low noise: less than 50dB;
- □ Low loss: small loss, less than 1%;
- □ Convenient maintenance: Modular design, which can be inspected separately without affecting each other;
- □ Full protection: complete protection system technology to monitor the working status of components;
- □ Intelligent: digital control and parameter setting, large screen LCD screen, with waveform display, harmonic content display and event recording functions

高速动态控制器 High-speed dynamic controller

- □ 型号：LDCTR-AGi
- □ 用于APF、SVG、TAPF、TSVG的液晶屏操作界面，通过Rs485接口与模块通信，可以进行模块的参数设置和数据查看。

- □ Model: LDCTR-AGi
- □ LCD screen operation interface for APF, SVG, TAPF, TSVG, communicate with the module through RS485 interface, you can set module parameters and view data.

APF与TSC混合补偿控制 APF and TSC mixed compensation control

- □ 控制器采用瞬时无功算法，响应速度10ms
- □ 实时监测系统的电压、电流、功率因数、补偿状态等
- □ 实时跟踪负荷变化，动态周期为(10—40ms)
- □ 可避免电容谐振，TSC可分流20%—35%，APF可滤除98%左右的特征次谐波电流
- □ 对相间负荷具有分相补偿、消谐功能，也可对三相不平衡负荷平衡三相有功

- □ Instantaneous reactive power algorithm, response speed is 10ms
- □ Real-time monitoring of voltage, current and power factor
- □ Real-time tracking of load changes with a dynamic period of (10 – 40ms)
- □ Can avoid capacitor resonance, TSC can shunt 20% – 35%, APF can filter out about 98% of characteristic sub-harmonic current
- □ With phase separation compensation, harmonic elimination function, three-phase unbalance function

APF与TSC混合补偿控制 APF and TSC mixed compensation control

Aiming at the rapidly changing reactive power and harmonic load, a thyristor switching capacitor (TSC) and APF reactive harmonic integrated compensation system are adopted. TSC is used to perform large-capacity stepwise compensation for reactive power. APF achieves fast and continuous two-way compensation of small reactive power and filters out harmonic currents generated by the load. This technology has higher steady-state accuracy and dynamic response speed.At the same time, under conditions where the grid voltage harmonic content is not high, it can effectively reduce the reactance rate of the series reactance in TSC, thereby reducing the economic cost of TSC and reducing the device volume. , Is a kind of excellent performance and cost-effective reactive harmonic compensation scheme

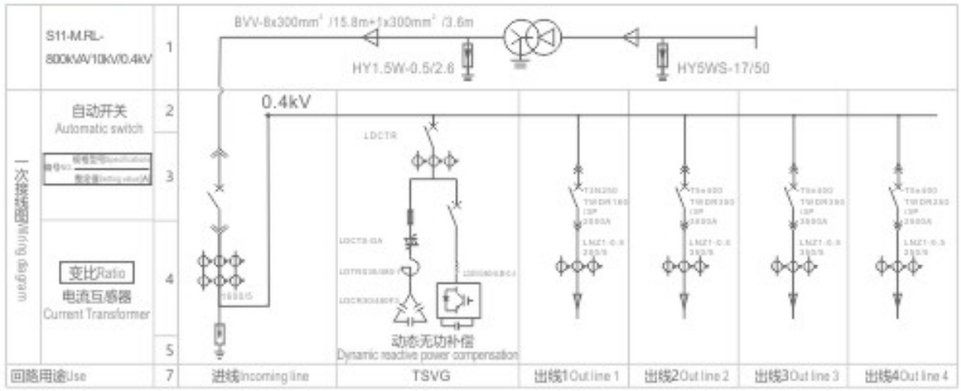
针对快速变化的无功和谐波负载,采用晶闸管投切电容器(TSC)与APF无功谐波综合补偿系统。TSC用来对无功进行大容量有级补偿,APF实现无功的小容量快速连续双向补偿,并滤除负载产生的谐波电流。该技术具有更高的稳态精度和动态响应速度,同时在电网电压谐波含量不高的工况下,可以有效降低TSC中串联电抗的电抗率,从而降低TSC的经济成本,减小装置体积,是一种性能优良且高性价比的无功谐波补偿方案

型号定义 Model definition

LD□□□□-□-□-□

线制	Wire
有源模块容量（kvar、A）	Active module capacity (kvar, A)
系统电压（kV）：0.4	System voltage (kV): 0.4
无功补偿容量（kvar）：0-360	Reactive power compensation capacity (kvar): 0-360
类型：TSVG、TAPF	Type: TSVG, TAPF

LDTSVG动态无功补偿图纸设计 Design drawing of dynamic reactive power compensation



有源滤波器
Active Power Filter

SHOW LEYSDEN

LDAPF PRODUCT FEATURES

- Modular design
- High-precision control
- Adaptable
- High stability
- Low power operation

LDAPF采用模块化设计,各模块单元独立运行,智能分配补偿容量;任意模块故障后自动退运,其余模块自动分配补偿容量;根据N+1冗余理论,设备每冗余一级,可靠性可提高一个数量级;模块化结构尤其适合对可靠性要求更高的负荷场合;同时可以与第三方无源补偿产品配合应用,可在补偿精度、成本上综合考虑,节约投资,实现高性价比的电能质量治理系统。

LDAPF adopts a modular design.Each module unit operates independently and intelligently allocates compensation capacity; any module is automatically returned after failure, and the remaining modules are automatically allocated compensation capacity.According to the N + 1 redundancy theory, each level of redundancy of the equipment can ensure reliability. Improve an order of magnitude; the modular structure is particularly suitable for load occasions with higher reliability requirements; at the same time, it can be used in conjunction with third-party passive compensation products, which can comprehensively consider compensation accuracy and cost, save investment, and achieve cost-effective power quality Governance system.

模块化设计 | 高精度控制 | 适应性强 | 稳定性高 | 低功耗运行

技术参数 Technical Parameters

额定电压Rated voltage（V）	AC380±20%
工作频率Working frequency（Hz）	50±5
电气连接Electrical connections	三相三线/三相四线Three-phase three-wire / three-phase four-wire
功率拓扑Power topology	三电平Three level
单模块补偿容量Single module compensation capacity	50A 100A 150A
CT要求Claim	150/5—10000/5
谐波补偿Harmonic compensation	支持Stand by
滤波范围Filtering range	2—50次谐波，各次谐波可分别设定补偿2 – 50th harmonic, compensation can be set for each harmonic
滤波能力Filtering ability	>97%
无功补偿Reactive power compensation	支持容感性无功连续补偿Supports capacitive inductive reactive power continuous compensation
不平衡补偿Unbalance compensation	支持Stand by
开始响应时间Response time	<100μs
整机效率Machine efficiency	>97%
多台并联运行Multiple parallel operation	并联运行，单柜最大并机数量6台Parallel operation, maximum 6 parallel units
保护功能Protective function	过欠压保护、短路保护、过温保护、过补偿保护、自检保护等Over and under voltage protection, short circuit protection, over temperature protection, over compensation protection, self-test protection, etc.
开关频率Operating frequency（Hz）	20kHz
控制算法Control algorithm	瞬时无功功率、FFT、对称分量法、直接电流控制等Instantaneous reactive power, FFT, symmetrical component method, direct current control, etc.
控制器Controller	双DSP+FPGA全数字控制器Dual DSP + FPGA full digital controller
通信功能Communication function	采用Modbus通信协议，支持现场及远程电脑同时监控（RS485），可拓展CAN总线、网络通讯接口、WiFi Adopt Modbus communication protocol, support simultaneous monitoring of on-site and remote computers (Rs485), can expand CAN bus, network communication interface, WiFi
安装方式Installation method	机架式/壁挂式Rack-mounted / wall-mounted
防护等级Protection class	IP30或按用户要求定制IP30 or customized according to user requirements
冷却方式Cooling method	强迫风冷Forced air cooling
环境温度Ambient temperature	−15℃~+40℃
相对湿度Relative humidity	最大90%，无凝露90% max，no condensation
海拔高度Altitude	安装海拔小于2000米，2000—4000m 之间，每增加100m，容量降低1%Installation altitude is less than 2000 meters, between 2000 and 4000m, capacity increases by 1% for every 100m increase

主要功能 The main function

- 谐波滤除：滤除谐波，减小电压、电流畸变率
- 全效能补偿：可实现谐波治理、无功补偿、三相不平衡电流调节功能
- 节能降耗：减少线损和变压器损耗，改善设备发热，延长设备使用寿命
- 稳定系统：防止设备误动作，保证电容器等安全投入，提高系统的稳定性

- Harmonic filtering: filtering harmonics and reducing voltage and current distortion rates
- Full-efficiency compensation: Harmonic control, reactive power compensation, and three-phase unbalanced current adjustment functions can be realized
- Energy saving and reduction: reduce line loss and transformer loss, improve equipment heating and extend equipment life
- Stable system: prevent equipment malfunction, ensure the safe input of capacitors, and improve the stability of the system

性能特点 Performance characteristics

模块化设计	模块化设计，提高功率密度，体积小，重量轻，利用安装，在线更换模块不影响其他模块的补偿，电能质量持久续航
Modular design	Modular design, increase power density, small size, light weight, use installation, online replacement module does not affect the compensation of other modules, power quality lasts forever
布局合理，内部设计整洁	发热器件在风道内均匀布置，散热均衡，器件之间的功率连接全部采用铜排硬连接，无导线连接
Reasonable layout and clean interior design	The heating devices are evenly arranged in the air duct, and the heat dissipation is balanced. The power connections between the devices are all hard-wired with copper bars, without wires
品质保证	核心元器件全部采用国际知名的品牌，保证产品的可靠性及稳定性
Quality Assurance	All core components are from internationally renowned brands to ensure product reliability and stability
三电平NPC拓扑设计	采用先进的三电平NPC功率拓扑电路，配置高性能IGBT，使输出波形更接近正弦波，谐波含量少，噪音低，纹波电流小，电流响应速度更快
Three-level NPC topology design	Adopt advanced three-level NPC power topology circuit and configure high-performance IGBT to make output waveform closer to sine wave, less harmonic content, low noise, small ripple current, faster current response speed
智能控制极速响应	智能识别负载环境变化情况，判断所需补偿电流大小及变化趋势，自动调整参数以适应负载环境，并快速响应及出补偿电流，以保证电能质量治理的动态补偿效果
Intelligent control for fast response	Intelligently identify the load environment changes, determine the magnitude and change trend of the required compensation current, automatically adjust parameters to adapt to the load environment, and quickly respond to the compensation current to ensure the dynamic compensation effect of power quality management
全效能补偿	可实现谐波、无功、三相不平衡电流的多功能补偿，并可以根据负载环境及需求配置不同的组合模式，实现电能质量问题的全方位、多角度补偿
Full efficiency compensation	Multi-function compensation for harmonics, reactive power, and three-phase unbalanced current can be realized, and different combination modes can be configured according to the load environment and requirements to achieve comprehensive and multi-angle compensation of power quality problems
人性化交互界面设计	采用大屏幕液晶屏，界面图形化设计，简单、直观的人性化设计，操作简单方便，实时监控治理状态
Humanized interface design	Large-screen LCD screen, graphical interface design, simple and intuitive user-friendly design, simple and convenient operation, real-time monitoring of governance status

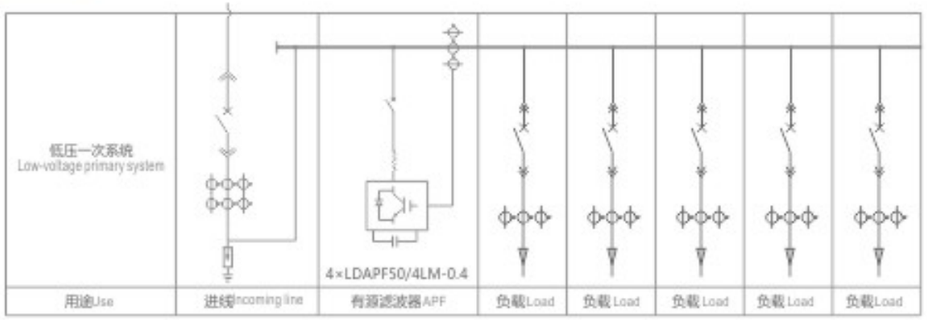
型号定义 Model definition

LDA（I）PF□/□□-□

- 电压（kV）：0.4、0.69　Voltage (KV): 0.4, 0.69
- 类型：M[机架]，H[壁挂],C[组柜]　Type: M[rack], H[wall mount], C[cabinet]
- 线制：4L[三相四线制]，3L[三相三线制]　Wire system: 4L [three-phase four-wire system] 3L [three-phase three-wire system]
- 容量（A）：25-600　Capacity (A): 25-600

注：LDIPF为品牌机柜，含高速动态控制器，组柜需配置LDCTR—AGI高速动态控制器
LDIPF is a brand cabinet with high-speed dynamic controller
Note: The cabinet needs to be configured with LDCTR-AGI high-speed dynamic controller

图纸设计 Drawing design



产品选型 Product model

集中治理速查表 Central governance quick checklist

变压器容量 Transformer capacity	楼宇 Building	楼宇、地铁 Building, subway	医疗、轮胎、冶金 Medical, tire, metallurgy	汽车及制造行业 Automotive and Manufacturing	大型场馆、石油开采 Venues and oil extraction	化工 Chemical industry
谐波电流总畸变率 THDi	10%	15%	20%	25%	30%	35%
200kVA	50	50	50	75	100	100
250kVA	50	50	75	75	100	100
315kVA	50	75	100	100	150	150
400kVA	50	75	100	150	150	150
500kVA	75	100	150	150	200	200
630kVA	100	150	150	200	250	250
800kVA	100	150	200	250	300	350
1000kVA	150	200	250	300	350	400
1250kVA	150	250	300	400	450	500
1600kVA	200	300	400	500	550	650

注：表中的容量均是在变压器负载率80%的情况下计算所得，若变压器的负载率有变化，那么容量的选择按比例变化
Note: The capacities in the table are calculated under the condition that the load rate of the transformer is 80%. If there is a change in the load rate of the transformer, the choice of capacity will change proportionally.

就地治理速查表 Local governance quick checklist

设备容量	中央空调、可控硅调光	可控硅调光、蓝宝石加热及医疗设备	UPS（6脉）	开关电源、变频器、电梯、中频炉	直流传动	充电器化工
Equipment capacity	Central air conditioning, SCR dimming	Triac dimming, sapphire heating and medical equipment	UPS (6 pulses)	Switching power supply, inverter, elevator, intermediate frequency furnace	DC drive	Charger chemical
谐波电流总畸变率 THDi	15%	30%	35%	40%	45%	55%
50kVA	50	50	50	50	50	50
75kVA	50	50	50	75	75	75
100kVA	50	75	75	75	100	100
125kVA	50	75	100	100	100	150
150kVA	50	100	100	150	150	150
175kVA	50	150	150	150	150	200
200kVA	75	150	150	150	200	200
250kVA	100	150	200	200	200	250
300kVA	100	200	200	250	250	300
400kVA	150	250	250	300	350	400
500kVA	150	300	350	400	400	500

静止无功发生器 Static Var Generator

LDSVG SERIES

Static Var Generator是指自由换相的电力半导体桥式变流器来进行发生和吸收无功功率的无功功率动态补偿装置是一款具有响应速度快，补偿性能优良的无功补偿设备相比传统无功补偿设备具有高可靠性、感性容性无功双向补偿、高性价比等优势。

PRTK

Static Var Generator refers to a free-commuting power semiconductor bridge converter to generate and absorb reactive power, a reactive power dynamic compensation device. It is a reactive power compensation device with fast response and excellent compensation performance. Traditional reactive power compensation equipment has the advantages of high reliability, inductive capacitive reactive power two-way compensation, and high cost performance.

技术参数 Technical Parameters

额定电压（V） Rated voltage	Ac380±20%，50±5Hz
电气连接 Electrical connections	三相三线/三相四线；CT要求150/5—10000/5 Three-phase three-wire / three-phase four-wire; CT requirements 150 / 5–10000 / 5
功率拓扑 Power topology	三电平 Three level
补偿功能 Compensation function	容感性无功连续补偿，可设置目标功率因数（-1—1）；谐波补偿；不平衡补偿 Capacitive and inductive reactive power continuous compensation, can set the target power factor(-1~1); harmonic compensation; unbalance compensation
开始响应时间及效率 Time and efficiency	<5ms；>97%
多台并联运行 Multiple parallel operation	并联运行，最大并机数量10台 Parallel operation, maximum 10 parallel units
保护功能 Protective function	过欠压保护、短路保护、过温保护、过补偿保护、自检保护等 Over and under voltage protection, short circuit protection, over temperature protection, over compensation protection, self-test protection, etc.
开关频率（Hz） Operating frequency	20kHz
控制算法 Control algorithm	瞬时无功功率、FFT、对称分量法、直接电流控制等 Instantaneous reactive power, FFT, symmetrical component method, direct current control, etc.
控制器 Controller	双DSP+FPGA全数字控制器 Dual DSP + FPGA full digital controller
通信功能 Communication function	采用Modbus通信协议，支持现场及远程电脑同时监控（RS485），可拓展CAN总线，网络通讯接口、WiFi Adopt Modbus communication protocol, support simultaneous monitoring of on-site and remote computers (Rs485), can expand CAN bus, network communication interface, WiFi
防护等级 Protection class	ip20或按用户要求定制 Ip20 or customized according to user requirements
环境要求 Surroundings	强迫风冷；-15℃—+40℃；最大90%，无凝露；海拔小于2000米，2000—4000m 之间，每增加100m，容量降低1% Forced air cooling; -15 ℃~+40 ℃; maximum 90%, non-condensing; altitude less than 2000 meters, between 2000 ~4000m, each increase of 100m, capacity decreases by 1%

型号定义 Model definition

LDSVG□/□□-□

- 电压（kV）：0.4、0.69　Voltage (KV): 0.4, 0.69
- 类型：M[机架]，H[壁挂],C[机柜],A[加强型]　Type: M [rack], H [wall mount], C [cabinet], A [Enhanced]
- 线制：4L[三相四线制]，3L[三相三线制]　Wire system: 4L [three-phase four-wire system] 3L [three-phase three-wire system]
- 容量（kvar）：25-600　Capacity (kvar): 25-600

注：柜柜需配置LDCTR-AGi高速动态控制器 Note: The cabinet needs to be configured with LDCTR-AGi high-speed dynamic controller

电能污染治理 Treatment of electric energy pollution

Power quality is an index system that measures whether consumers use electricity to cause pollution to the power grid. It directly affects the safety, reliability, and economics of both power suppliers and consumers. The main factors affecting power quality are harmonics, reactive power, three-phase imbalance, voltage fluctuations, and flicker. Power filtering technology and power factor correction technology have created conditions for improving power quality, saving user investment and ensuring rapid return on investment.

For ordinary loads, the anti-resonant reactive power compensation management of contactor switching is adopted. For the fast and convenient loads, the anti-harmonic reactive power compensation management of thyristor switching is adopted. For the loads with harmonics and fast transients, TSVG or TAPF

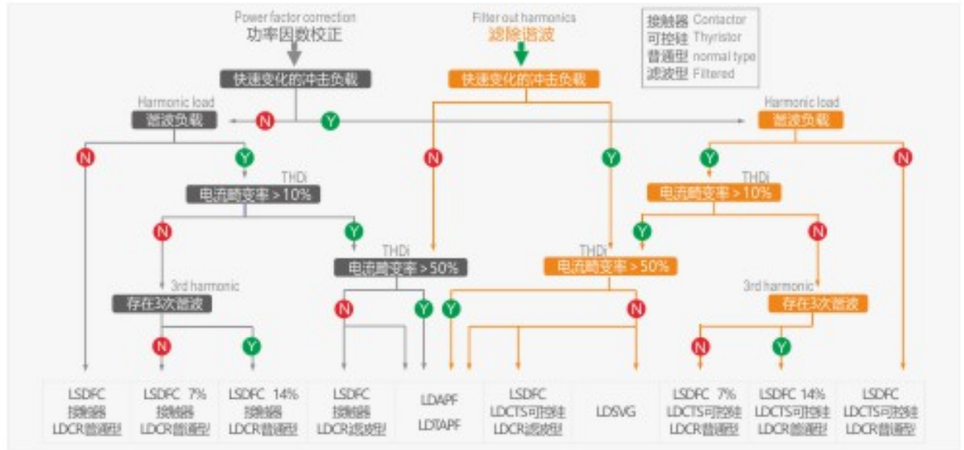
电能质量是衡量用电客户对供电电网是否造成污染的指标体系，它直接影响着供用电双方的安全性、可靠性和经济性。影响电能质量的主要因素有谐波、无功功率、三相不平衡、电压波动和闪变。电力滤波技术和功率因数校正技术为提高电能质量创造了条件，并节约用户投资并确保投资快速收回。

对于普通负荷，采用接触器投切的抗谐无功补偿治理，对于快速频便负荷，采用可控硅开关投切的抗谐无功补偿治理，对于快速瞬变含有谐波的负荷采用TSVG或者TAPF来治理。

谐波的危害 Harm of Harmonics

电缆 cable	损耗增加、温升、绝缘下降 Increased loss, temperature rise, and decreased insulation	重要设备 Important equipment	精度误差增大，故障率提高，影响寿命和稳定性 Increased accuracy error, increased failure rate, impacted life and stability
变压器 transformer	损耗增加、温升、噪声增加 Increased loss, increased temperature, and increased noise	其他 other	计算机异常，整流设备故障，控制器故障，保护误动作误触发 Computer system abnormality, rectification equipment failure, controller failure, protection malfunction, and false trigger
系统 Power Systems	引起系统谐振，电容器发生谐振 Cause system resonance, capacitor resonance		

电能污染治理措施 Electricity pollution control measures



电能污染治理 Treatment of electric energy pollution

电能质量综合治理装置 Comprehensive power quality management device

GLFQCC电能质量综合治理装置装置融合了动态无源滤波技术和有源谐波补偿技术，实时检测电网中的各次谐波和无功功率，能够对电容、APF和SVG实时控制，具有滤波容量大、滤波范围广、滤波效率高、适时跟踪和响应的特点，可高效滤除负载谐波，抑制系统振荡，提高电网的稳定性。同时取得明显的节能降耗和供电设备增容的效果，具有较强的工程实用性和很高的产品性价比。

The GLFQCC power quality comprehensive treatment device integrates dynamic passive filtering technology and active harmonic compensation technology. It detects real-time harmonics and reactive power in the power grid and can control capacitors, APF and SVG in real time. It has the characteristics of large filtering capacity, wide filtering range, high filtering efficiency, and timely tracking and response, which can efficiently filter load harmonics, suppress system oscillation, and improve the stability of the power grid. Effect, with strong engineering practicability and high cost performance.

GLFQCC包含动态滤波补偿模块与综合电能质量调控装置二部分，共同承担无功补偿与谐波治理的任务。包括多组单调谐支路及高通支路，主要吸收特征低频次的负载谐波电流，绝大部分的负载谐波电流得以滤除。达到双向连续单相的高效无功补偿，有效改善系统的三相不平衡。

GLFQCC includes a dynamic filter compensation module and a comprehensive power quality control device, which jointly undertake the tasks of reactive power compensation and harmonic control. It includes multiple groups of single-tuned branches and high-pass branches, which mainly absorb characteristic low-frequency load harmonic currents, and most of the load harmonic currents are filtered. It achieves two-way continuous single-phase efficient reactive power compensation and effectively improves the three-phase imbalance of the system.

◇ 型号定义 Model definition

GLFQCC□/□-□

- GLFQC：kvar/A
- 容量（kvar）：LC容量 — Capacity (kvar): LC capacity
- 电压（kV）：0.4 — Voltage (kV): 0.4

注：GLFQC综合电能质量调控装置综合调控动态补偿和谐波电流 GLFQC comprehensive power quality control device comprehensively controls dynamic compensation and harmonic current

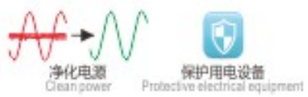
谐波保护器 Harmonic protector

LDHR型谐波保护器对于各种频率及各种负载的谐波干扰都有较强的消除能力，应用频段宽，以及在抗浪涌，瞬时脉冲中显示出很高的响应速度和瞬间消除高频噪声及瞬时干扰这些特性，适用于各类高科技设备、流水线自控系统、大型计算机网络系统、数字信号处理和交换和控制系统等非线性负载场合。

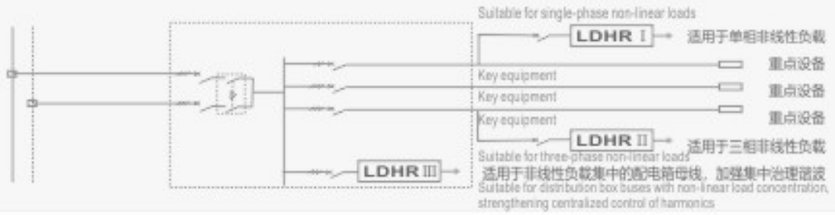
LDHR type harmonic protector has a strong ability to eliminate the harmonic interference of various frequencies and various loads. It has a wide application frequency band and shows high response speed and instantaneous elimination in anti-surge and instant pulse These characteristics of frequency noise and instantaneous interference are suitable for non-linear load occasions such as various high-tech equipment, pipeline automatic control systems, large-scale computer network systems, digital signal processing and switching and control systems.

净化电源 | 保护用电设备 | 消除高次谐波 | 消除脉冲尖峰 | 消除电涌 | 消除高频噪声

PURIFY POWER | PROTECT ELECTRICAL EQUIPMENT | ELIMINATE HIGH HARMONICS
ELIMINATE PULSE SPIKES | ELIMINATE SURGES | ELIMINATE HIGH-FREQUENCY NOISE



◇ 谐波保护器安装位置图 Harmonic protector installation location diagram



给您一个 安全 可靠用电

Give you a safe and reliable electricity

帮助万千用户获得
高效率、低投资、无污染的用电工况

Help thousands of users to obtain high-efficiency, low-investment, pollution-free electrical conditions