LSTC TEK GmbH

POWER QUALITY SOLUTIONS




LSTC TEK GmbH
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COMPANY INTRODUCTION

The headquarters of Germany's LSTC Electric is located in Frankfurt am Main. For many years, the company has specialized in the sale of power quality optimization systems, power transmission and distribution equipment, energy and automation control systems, as well as electrical components. LSTC Electric has established a joint venture for component manufacturing in China, where its products are widely used across various sectors, including energy and power, oil, petrochemicals, natural gas, chemicals, metallurgy, finance, construction, and life sciences. Additionally, its products are exported to markets in Southeast Asia and Africa.

With extensive experience and technological advantages in the field of electrical component manufacturing, LSTC Electric maintains strategic partnerships with Electronicon and Frako, aligning with global trends in energy saving and emissions reduction. The company provides world-class power quality solutions to users worldwide, addressing the pollution of power quality in diverse electrical environments. These solutions include harmonic filtering, load balancing, and reactive power compensation, effectively mitigating the impact of reactive power on the power grid, resolving issues related to harmonics and reactive power, suppressing voltage fluctuations and flickers, comprehensively enhancing grid quality, conserving energy, and contributing to a greener, cleaner global power environment.







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Berliner Str. 14, 65824 Schwalbach am Taunus, Germany

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COMPENSATION/FILTER CAPACITOR

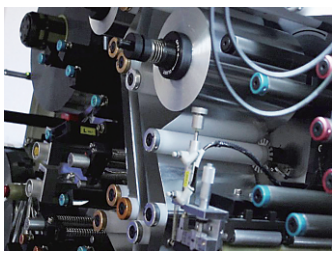
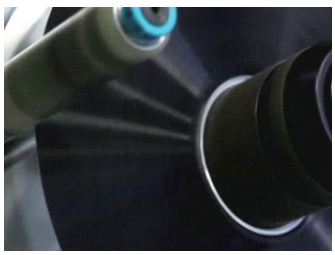
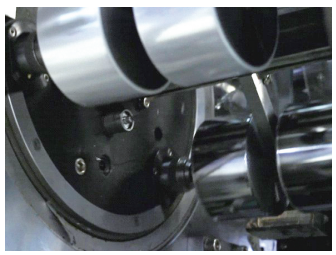


MAIN FEATURES

- Standards: IEC 60831-1/-2:2014, EN60831, EIA-456-A
- Structure: Cylindrical aluminum alloy casing with anodized surface treatment
- Distinctive Features: Excellent heat dissipation, low impedance, low loss, lightweight, and compact size
- Filling Material: Special mineral filler
- Internal Material: High-quality, high-temperature-resistant film
- Protection Method: Overpressure disconnect protection, rupture protection
- Service Life: Operational for 180,000 hours with a capacitor failure rate of <6%

TECHNICAL DATA

- Operating Voltage: 100–1000 VAC
- Unit Capacity: 1–50 Kvar
- Permissible Overvoltage: ≤1.3 Ue
- Permissible Overcurrent: ≤2 Ie
- Voltage Peak Including Harmonic Components: ≤1.22 Ue
- Continuous Overcurrent: ≥1.8 × Ie
- Surge Current Resistance: ≥300 × Ie
- Capacitance Tolerance: 0 to +5%
- Dielectric Loss: ≤0.2 W/kvar
- Test Voltage: 2.15 times Ue between terminals for 5 seconds; 3.8 kV AC between terminals and casing for 2 seconds
- Residual Voltage: Discharges to below 50V within 1 minute after power off
- Temperature Class: -40℃ to +70℃
- Altitude: ≤4000m

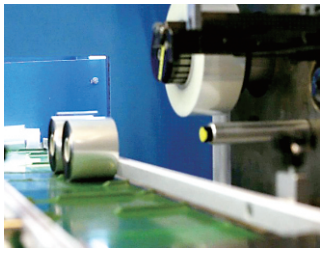





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MODEL ILLUSTRATION

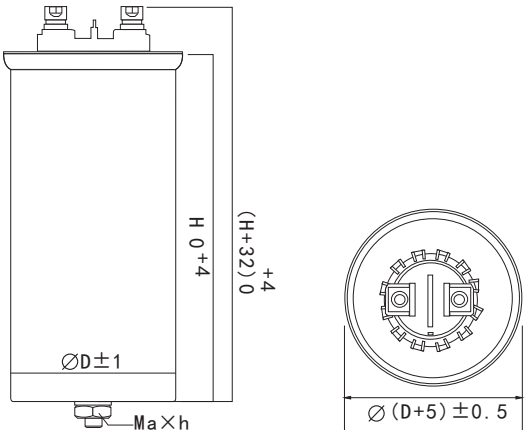
LSTC 480-31-3

LST	:	Manufacturer Code
C	:	Capacitor
480	:	Rated Voltage (VAC)–Common Compensation (Line--Voltage); Individual Compensation (Phase Voltage)
31	:	Rated Capacity or Capacitance
3	:	1–Single-phase Capacitor; 3–Three-phase Capacitor

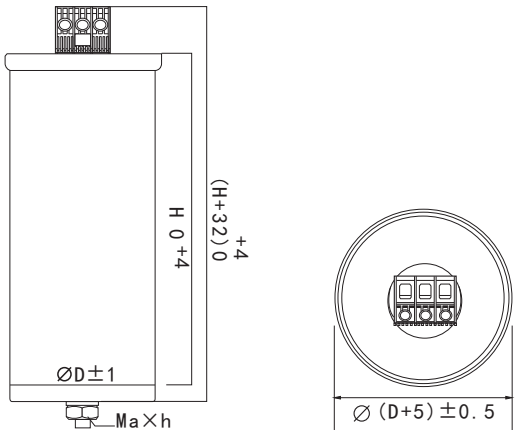




Outline Diagram of Single-phase Capacitor



Outline Diagram of Three-phase Capacitor



SELECTION TABLE

Single-phase Capacitor

Voltage Rating (V)	Model Specifications	Capacity (kvar)	Dimensions (mm) ΦD	H	M. D. (mm) Ma*h
280	LSTC280-10-1	10	86	240	M12×16
	LSTC280-13.3-1	13.3	96	240	M16×25
	LSTC280-15-1	15	96	240	M16×25
	LSTC280-16.7-1	16.7	106	240	M16×25
	LSTC280-20-1	20	116	240	M16×25
303	LSTC303-10-1	10	86	240	M12×16
	LSTC303-13.3-1	13.3	96	240	M16×25
	LSTC303-15-1	15	106	240	M16×25
	LSTC303-16.7-1	16.7	106	240	M16×25
	LSTC303-20-1	20	116	240	M16×25

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SELECTION TABLE

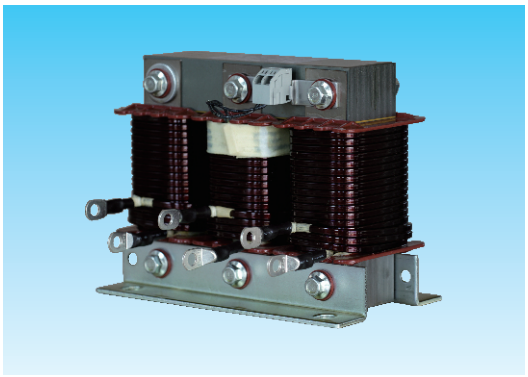
Three-phase Capacitor

Voltage Rating (V)	Model Specifications	Capacity (kvar)	Dimensions (mm) ΦD	H	M. D. (mm) Ma*h
440	LSTC440-5-3	5	76	175	M12×16
	LSTC440-10-3	10	76	245	M12×16
	LSTC440-15-3	15	86	245	M12×16
	LSTC440-20-3	20	96	245	M16×25
	LSTC440-25-3	25	106	245	M16×25
	LSTC440-30-3	30	106	290	M16×25
	LSTC440-35-3	35	106	290	M16×25
	LSTC440-40-3	40	116	290	M16×25
	LSTC440-45-3	45	126	290	M16×25
	LSTC440-50-3	50	136	290	M16×25
480	LSTC480-15-3	15	86	230	M12×16
	LSTC480-20-3	20	106	230	M16×25
	LSTC480-25-3	25	116	230	M16×25
	LSTC480-31-3	31	116	230	M16×25
	LSTC480-33.3-3	33.3	116	245	M16×25
	LSTC480-40-3	40	116	280	M16×25
	LSTC480-50-3	50	136	295	M16×25
525	LSTC525-15-3	15	95	245	M16×25
	LSTC525-20-3	20	95	245	M16×25
	LSTC525-25-3	25	95	245	M16×25
	LSTC525-30-3	30	116	285	M16×25
	LSTC525-37.3-3	37.3	136	240	M16×25
	LSTC525-40-3	40	136	285	M16×25
	LSTC525-45-3	45	136	285	M16×25
	LSTC525-50-3	50	136	285	M16×25

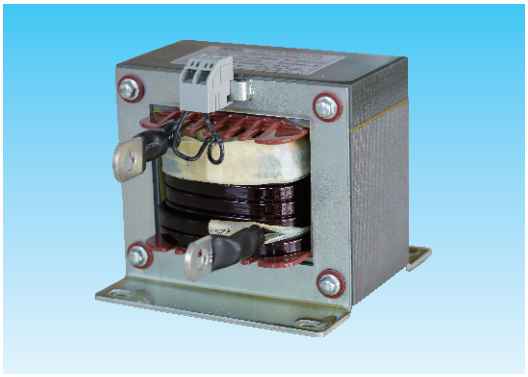


SERIES (FILTERING) REACTOR

In modern power systems, both industrial and residential, the increasing presence of harmonic sources is exacerbating pollution within the power grid. Resonance and voltage distortion can lead to abnormal operation or even failures in many other electrical devices. Series reactors can alter and prevent these issues. The LSTR series reactors are manufactured using high-quality silicon steel sheets and pure copper wire. They effectively reduce harmonic amplification, suppress inrush currents when capacitors are connected, and protect capacitors and other components. They feature high linearity, anti-magnetic leakage design, low noise, low loss, and a long service life.



TECHNICAL DATA



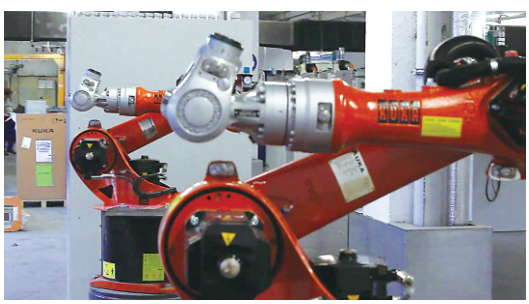
◎ Operating Voltage: 100V–1000V power systems
◎ Voltage Withstand Level: ≥3 kV between coils
◎ Insulation Class: Class H materials, T40/B
◎ Overcurrent Capacity (Imax): 1.8 In (can be designed higher if needed)

◎ Linearity (L): ⩾0.95 at 1.8 In (can be designed higher if needed)
◎ Temperature Rise: 75K between cores, 65K between coils, natural cooling
◎ Environmental Conditions: -25℃ to +50℃, altitude ≤4000m
◎ Temperature Protection: +120℃ thermal cutoff (normally closed type)
◎ Inductance Deviation: -3% Ln to +3% Ln
◎ Typical Reactance Rate: 5.67%, 6%, 7%, 12%, 13%, 14%, etc.
◎ Protection Level: IP00, indoor installation
◎ Filtering Effectiveness: Optimal matching can achieve 30%–60%
◎ Technical Standards: IEC 60076-6

THE CHOICE OF REACTANCE RATE

◎ The main harmonics in the power grid are the 3rd, 5th, and 7th harmonics. Therefore, harmonic treatment primarily focuses on the 3rd, 5th, and 7th harmonics.
◎ 5.67% reactance rate, resonant frequency 210 Hz, primarily targets the 5th and 7th harmonics.
◎ 7% reactance rate, resonant frequency 189 Hz, primarily tunes the 5th and 7th harmonics.
◎ 12% reactance rate, resonant frequency 144.3 Hz, primarily targets the 3rd harmonic.
◎ 14% reactance rate, resonant frequency 134 Hz, primarily tunes the 3rd harmonic.



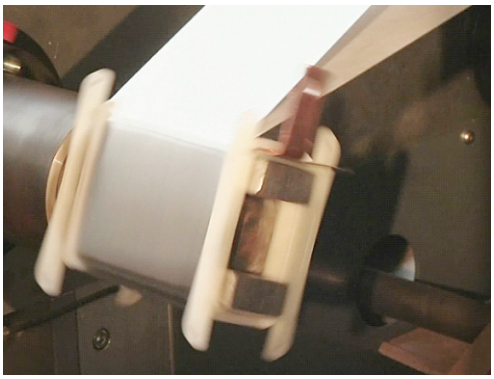


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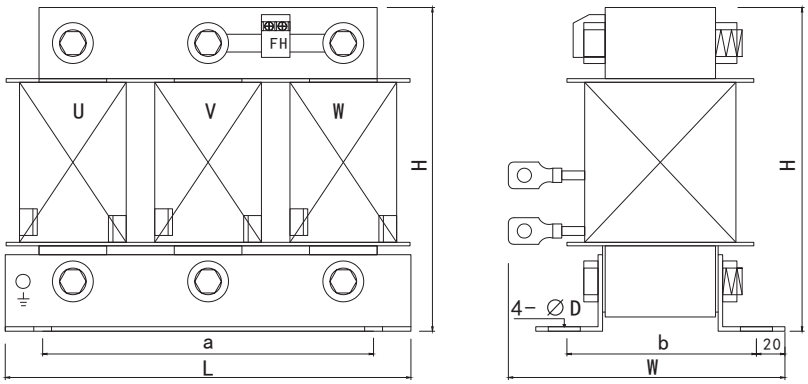
MODEL ILLUSTRATION

LSTR 480-31/7.0/3

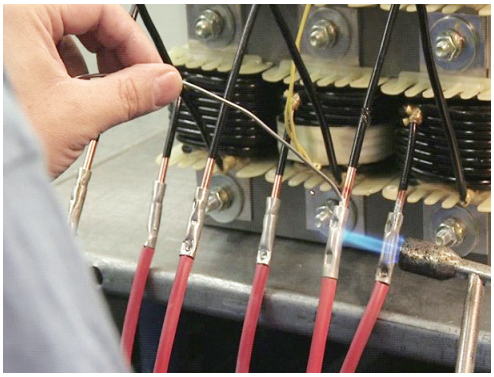
LST	: Manufacturer Code
R	: Filter Reactor
480	: Capacitor Rated Voltage (VAC)
31	: Matching Capacitor Capacity or Rated Capacity
7.0	: Reactance Rate (%)
3	: 1 - Single-phase 3 - Three-phase



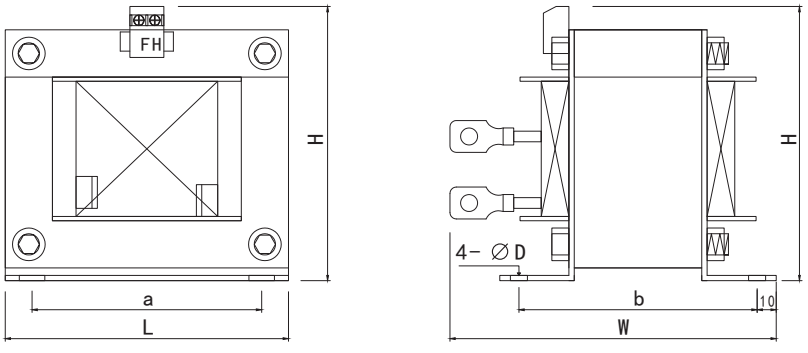
Three-phase Reactor Dimension Diagram

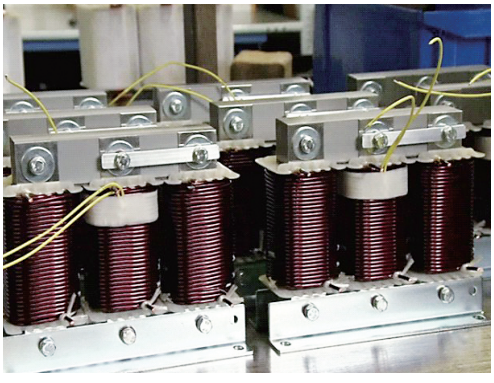






Single-phase Reactor Dimension Diagram





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SELECTION TABLE

Single-phase Reactor

Series Reactor	Dimensions (mm)			M. D. (mm)		Mounting Holes
	Length (L)	Width (W)	Height (H)	Length (a)	Width (b)	D/mm
LSTR280-10/7.0/1	135	175	135	108	112	Φ8×12
LSTR280-13.3/7.0/1	135	185	135	133	120	Φ8×12
LSTR280-15/7.0/1	165	185	135	133	105	Φ8×12
LSTR280-16.7/7.0/1	165	185	155	133	105	Φ8×12
LSTR280-20/7.0/1	165	190	155	133	115	Φ8×12
LSTR303-10/14.0/1	165	185	135	133	105	Φ8×12
LSTR 303-13.3/14.0/1	165	190	155	133	115	Φ8×12
LSTR 303-15/14.0/1	165	215	155	133	131	Φ8×12
LSTR 303-16.7/14.0/1	165	215	155	133	131	Φ8×12
LSTR 303-20/14.0/1	195	190	185	150	120	Φ8×12

Three-phase Reactor

LSTR480-15/7.0/3	210	165	165	180	98	Φ10×18
LSTR480-20/7.0/3	210	165	165	180	98	Φ10×18
LSTR480-25/7.0/3	230	180	185	185	105	Φ10×18
LSTR480-31/7.0/3	230	185	185	185	108	Φ10×18
LSTR480-33.3/7.0/3	230	200	185	185	113	Φ10×18
LSTR480-35/7.0/3	230	200	185	185	113	Φ10×18
LSTR480-40/7.0/3	230	210	185	185	123	Φ10×18
LSTR480-50/7.0/3	270	210	200	205	120	Φ10×18
LSTR480-62/7.0/3	270	210	200	205	120	Φ10×18
LSTR480-66.6/7.0/3	285	220	220	220	130	Φ10×18
LSTR480-80/7.0/3	285	220	220	220	130	Φ10×18
LSTR525-15/14.0/3	230	200	185	185	113	Φ10×18
LSTR525-25/14.0/3	230	210	185	185	123	Φ10×18
LSTR525-30/14.0/3	270	210	200	205	120	Φ10×18
LSTR525-37.3/14.0/3	285	220	220	205	130	Φ10×18
LSTR525-45/14.0/3	285	220	220	220	130	Φ10×18
LSTR525-50/14.0/3	285	220	220	220	130	Φ10×18
LSTR525-60/14.0/3	300	230	270	220	145	Φ10×18
LSTR525-74.5/14.0/3	300	240	270	220	158	Φ10×18
LSTR830-25/7.0/3	215	155	185	180	95	Φ10×18
LSTR830-30/7.0/3	215	155	185	180	95	Φ10×18
LSTR830-40/7.0/3	235	170	215	200	103	Φ10×18
LSTR830-50/7.0/3	275	185	225	200	115	Φ10×18
LSTR830-60/7.0/3	275	185	255	200	115	Φ10×18

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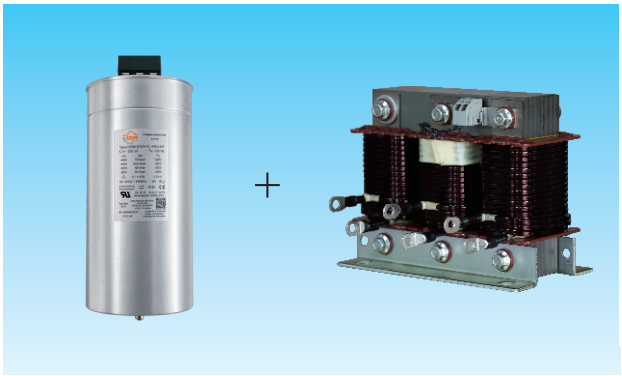
PASSIVE FILTER COMPONENTS

Passive filter components are switching units with relatively independent compensation and filtering functions, formed by configuring and combining capacitors and reactors according to load requirements.

MODEL ILLUSTRATION

LSTCR 480-67/7.0

LSTCR	: Component Model
480	: Common Compensation – Line Voltage (VAC)
	Individual Compensation – Phase Voltage $\sqrt{3}$ (VAC)
67	: Component Configured Capacitor Capacity (kvar)
7.0	: Component Configured Reactance Rate (%)



SELECTION TABLE

Reactive Power Compensation Module for 5th and 7th Harmonic Suppression

Component Model	400V Fundamental Wave Output Capacity (kvar)	Capacitor		Reactor	
		Model	Quantity	Model	Quantity
LSTCR480-20/7.0	15.0	LSTC480-20-3	1	LSTR480-20/7.0/3	1
LSTCR480-25/7.0	18.8	LSTC480-25-3	1	LSTR480-25/7.0/3	1
LSTCR480-31/7.0	23.3	LSTC480-31-3	1	LSTR480-31/7.0/3	1
LSTCR480-33.3/7.0	25.0	LSTC480-33.3-3	1	LSTR480-33.3/7.0/3	1
LSTCR480-40/7.0	30.0	LSTC480-40-3	1	LSTR480-40/7.0/3	1
LSTCR480-50/7.0	37.4	LSTC480-50-3	1	LSTR480-50/7.0/3	1
LSTCR480-62/7.0	46.5	LSTC480-31-3	2	LSTR480-62/7.0/3	1
LSTCR480-66.6/7.0	50.0	LSTC480-33.3-3	2	LSTR480-66.6/7.0/3	1
LSTCR480-80/7.0	60.0	LSTC480-40-3	2	LSTR480-80/7.0/3	1
LSTCR830-25/7.0	18.6	LSTC830-25-3	1	LSTR830-25/7.0/3	1
LSTCR830-30/7.0	22.3	LSTC830-30-3	1	LSTR830-30/7.0/3	1
LSTCR830-40/7.0	29.7	LSTC830-20-3	2	LSTR830-40/7.0/3	1
LSTCR830-50/7.0	37.2	LSTC830-25-3	2	LSTR830-50/7.0/3	1
LSTCR830-60/7.0	44.6	LSTC830-30-3	2	LSTR830-60/7.0/3	1
LSTCR280√3-30/7.0	22.5	LSTC280-10-1	3	LSTR280-10/7.0/1	3
LSTCR280√3-40/7.0	31.0	LSTC280-13.3-1	3	LSTR280-13.3/7.0/1	3
LSTCR280√3-45/7.0	33.8	LSTC280-15-1	3	LSTR280-15/7.0/1	3
LSTCR280√3-50/7.0	37.5	LSTC280-16.7-1	3	LSTR280-16.7/7.0/1	3
LSTCR280√3-60/7.0	45.0	LSTC280-20-1	3	LSTR280-20/7.0/1	3







SELECTION TABLE

Reactive Power Compensation Module for 3rd Harmonic Suppression

Component Model	400V Fundamental Wave Output Capacity (kvar)	Capacitor		Reactor	
		Model	Quantity	Model	Quantity
LSTCR525-25/14.0	16.7	LSTC525-25-3	1	LSTR525-25/14.0/3	1
LSTCR525-30/14.0	20.1	LSTC525-30-3	1	LSTR525-30/14.0/3	1
LSTCR525-37.3/14.0	25	LSTC525-37.3-3	1	LSTR525-37.3/14.0/3	1
LSTCR525-40/14.0	26.8	LSTC525-20-3	2	LSTR525-40/14.0/3	1
LSTCR525-40/14.0	26.8	LSTC525-40-3	1	LSTR525-40/14.0/3	1
LSTCR525-44.8/14.0	30	LSTC525-22.4-3	2	LSTR525-44.8/14.0/3	1
LSTCR525-44.8/14.0	30	LSTC525-44.8-3	1	LSTR525-44.8/14.0/3	1
LSTCR525-50/14.0	33.6	LSTC525-25-3	2	LSTR525-50/14.0/3	1
LSTCR525-50/14.0	33.6	LSTC525-50-3	1	LSTR525-50/14.0/3	1
LSTCR525-60/14.0	40.3	LSTC525-30-3	2	LSTR525-60/14.0/3	1
LSTCR525-67/14.0	45	LSTC525-33.5-3	2	LSTR525-67/14.0/3	1
LSTCR525-74.5/14.0	50	LSTC525-37.3-3	2	LSTR525-74.5/14.0/3	1
LSTCR303√3-30/14.0	20	LSTC303-10-1	3	LSTR303-10/14.0/1	3
LSTCR303√3-40/14.0	26.7	LSTC303-13.3-1	3	LSTR303-13.3/14.0/1	3
LSTCR303√3-45/14.0	30	LSTC303-15-1	3	LSTR303-15/14.0/1	3
LSTCR303√3-50/14.0	33.3	LSTC303-16.7-1	3	LSTR303-16.7/14.0/1	3
LSTCR303√3-60/14.0	40	LSTC303-20-1	3	LSTR303-20/14.0/1	3

REACTIVE COMPENSATION CONTROLLER

- Utilizes a DSP core chip to meet more precise and rapid compensation requirements
- Ultra-thin design for compact installation
- Equipped with a custom LCD screen, offering extensive parameters and flexible operation
- Wide voltage power supply, suitable for various environments
- Features an RS-485 communication interface, supporting the MODBUS protocol
- Single-phase and three-phase compensation with output switching trigger signal <20ms
- Allows custom setting of each capacitor's physical capacitance value
- Supports two switching schemes: cyclic/rotating sequence control and linear (first in, first out)
- Adjustable compensation speed options: dynamic and static
- Temperature sensing and control output function to protect the compensation unit from high-temperature operation
- Offers both manual and automatic control modes



TECHNICAL DATA

- Operating Environment

  Altitude: ≤2500 meters Ambient Temperature: -20℃ to +70℃

  Relative Humidity: 20% to 90% at 40℃ Atmospheric Pressure: 79.5 KPa to 106 KPa

- Environmental Conditions

  Surrounding media should be free from explosive hazards, gases that could damage insulation or corrode metal, conductive dust; the installation site should not be subject to significant vibration and should be protected from wind and snow.

- Basic Parameters

  Power Supply Voltage: AC220V ±20%, 50Hz Sampling Voltage: AC380V, 220V

  Sampling Current: 0 to 5A Power Consumption: ≤12W

- Measurement Accuracy

  Voltage: ±0.5%

  Current: ±0.5%

  Power Factor: ±1.0%

  Reactive Power: ±1.0%

- Control Parameters

  Number of Capacitor Circuits: 1 to 12/18/24 circuits (temperature control and alarm output optional)

  Current Transformation Ratio: 1 to 1000 (e.g., set to 100 for 500/5 CT)

  Overvoltage Setting: 400V to 480V / 230V to 280V, step 1V

  Undervoltage Setting: 300V to 360V / 180V to 210V, step 1V

  Harmonic Voltage Setting: 0 to 25% Harmonic Current Setting: 0 to 100%

  Target Power Factor: 0.85 to 1.0 Switching Threshold: 0.5 to 1.2, step 0.1

  Switching Delay: 0.02s to 600s Discharge Delay: 0s to 300s

  Switching Mode: 0 (cyclic), 1 (linear)

  Capacitor Capacitance Value: 0 to 200 kvar, step 1

  Sensitivity: ≤100mA

  Output Contact: Each circuit DC12V/30mA or AC250V/5A



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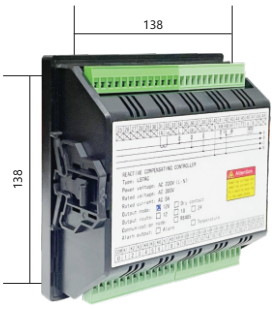
MODEL ILLUSTRATION

LSTRC-PDH-24TC

LSTRC	: Product Serial Number
P	: Sample Physical Quantity: Reactive Power
D	: Switching Function: Encoded
H	: Harmonic Detection and Protection Functior
24	: Control Output Circuits
T	: T: Thyristor Switching
	C: Contactor Switching
C	: Communication Function



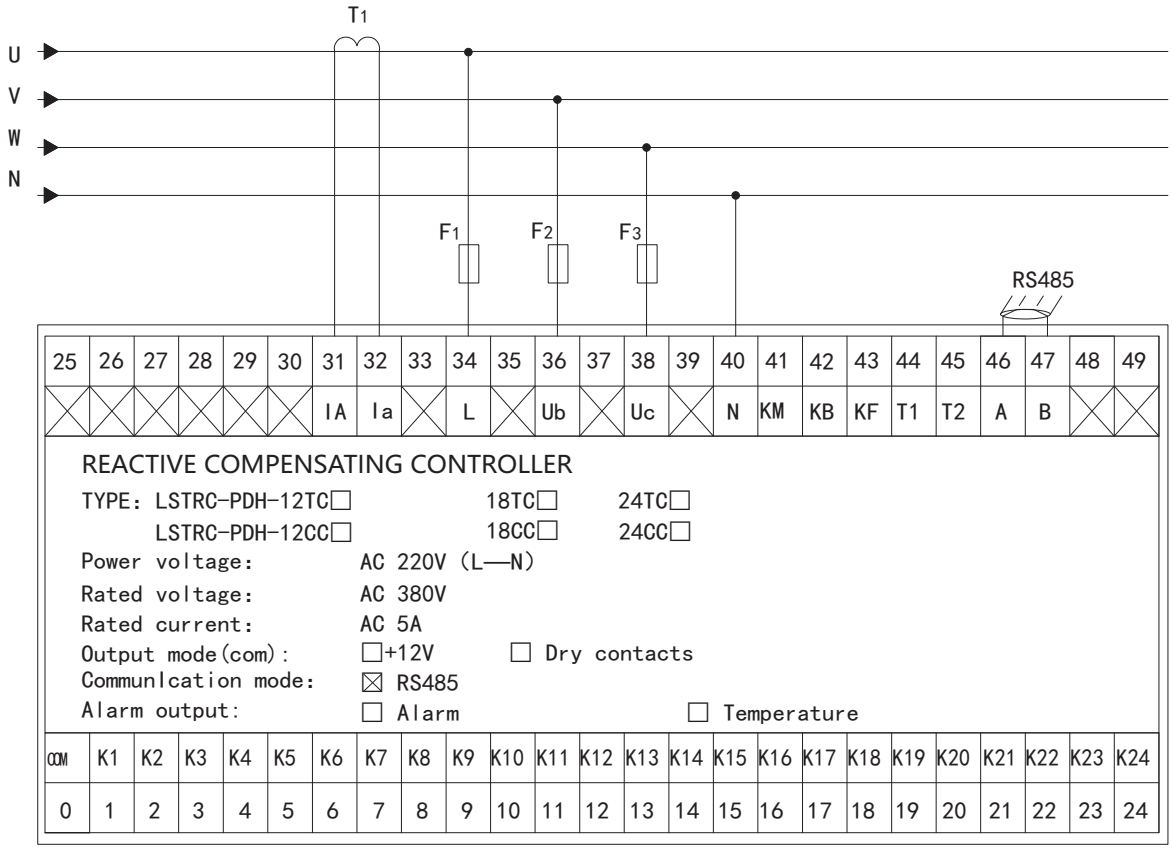
Mounting Dimensions



Panel Cutout Dimensions

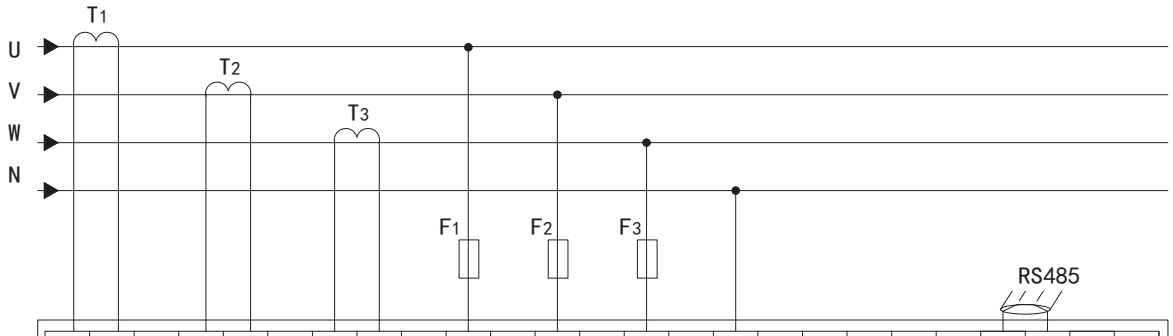
WIRING DIAGRAM

Common Compensation Wiring Diagram



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Hybrid Compensation Wiring Diagram



25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
IA	Ia	X	IB	Ib	X	IC	Ic	X	Ua	X	Ub	X	Uc	X	Un	KM	KB	KF	T1	T2	A	B	X	X

REACTIVE COMPENSATING CONTROLLER

TYPE: LSTRC-PDH-12TC☐ 18TC☐ 24TC☐
LSTRC-PDH-12CC☐ 18CC☐ 24CC☐

Power voltage: AC 220V (Ua-Un)
Rated voltage: AC 220V
Rated current: AC 5A
Output mode (com): ☐+12V ☐ Dry contacts
Communication mode: ☒ RS485
Alarm output: ☐ Alarm ☐ Temperature

COM	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	K11	K12	K13	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

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SCR REGULATING SWITCH

The thyristor-controlled switch is a high-power electronic device capable of rapid, frequent switching of compensation capacitors without inrush current. It primarily consists of a high-power thyristor module and an optoelectronic isolation trigger circuit. Zero-crossing switching minimizes inrush current and switching transients. The semiconductor switch has no mechanical contacts or arcing. It is especially suitable for low-voltage dynamic reactive power compensation applications that require fast and frequent switching.



MODEL ILLUSTRATION

LSTT-CT-400/60	
LSTT-C	: Serial Number
T	: T: Three-phase Common Compensation
	S: Single-phase Individual Compensation
400	: Rating (VAC)
60	: Capacity (kvar)

MAIN FEATURES

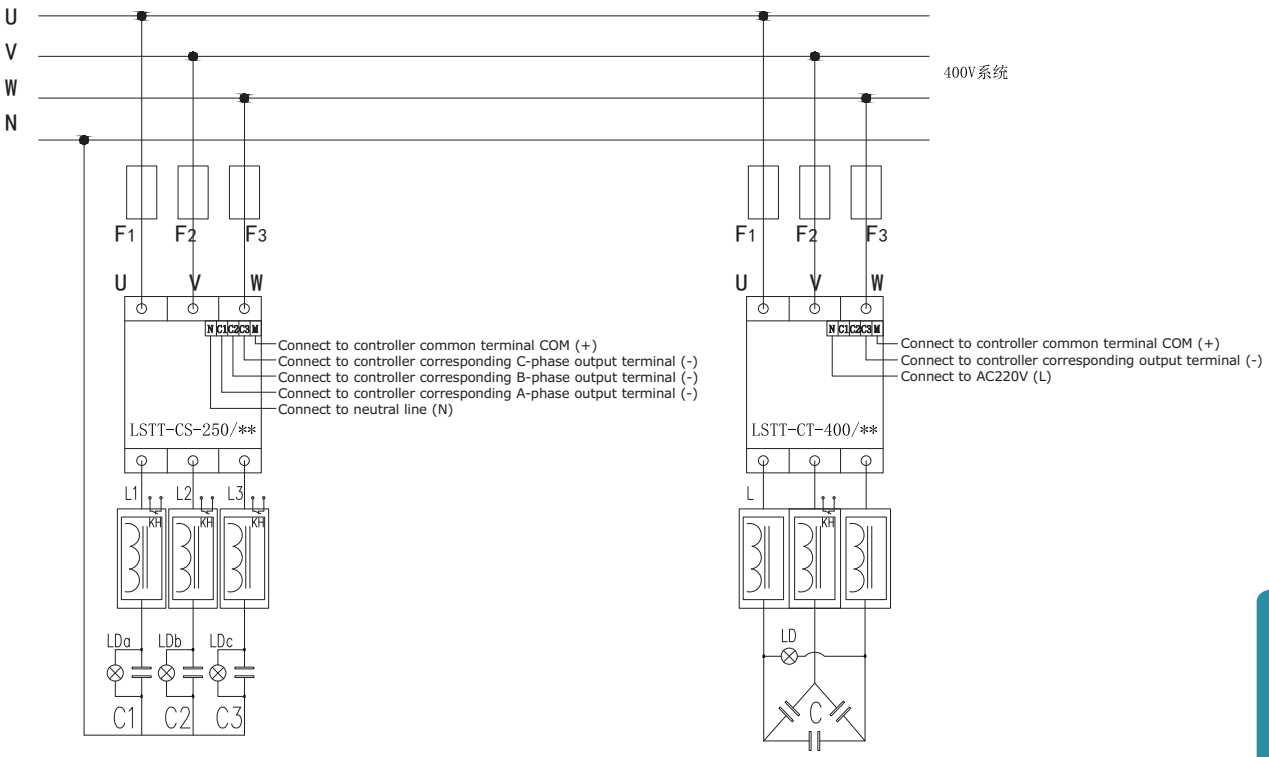
- Excellent dynamic tracking and rapid compensation characteristics
- Enables capacitor conduction at zero voltage and disconnection at zero current
- Uses current rise rate limiting technology to enhance the switch’s harmonic resistance
- Prevents impact on the power system’s current and voltage
- Anti-interference circuit design improves the switch's resistance to interference, effectively preventing false triggering
- Extends the service life of switching equipment

TECHNICAL DATA

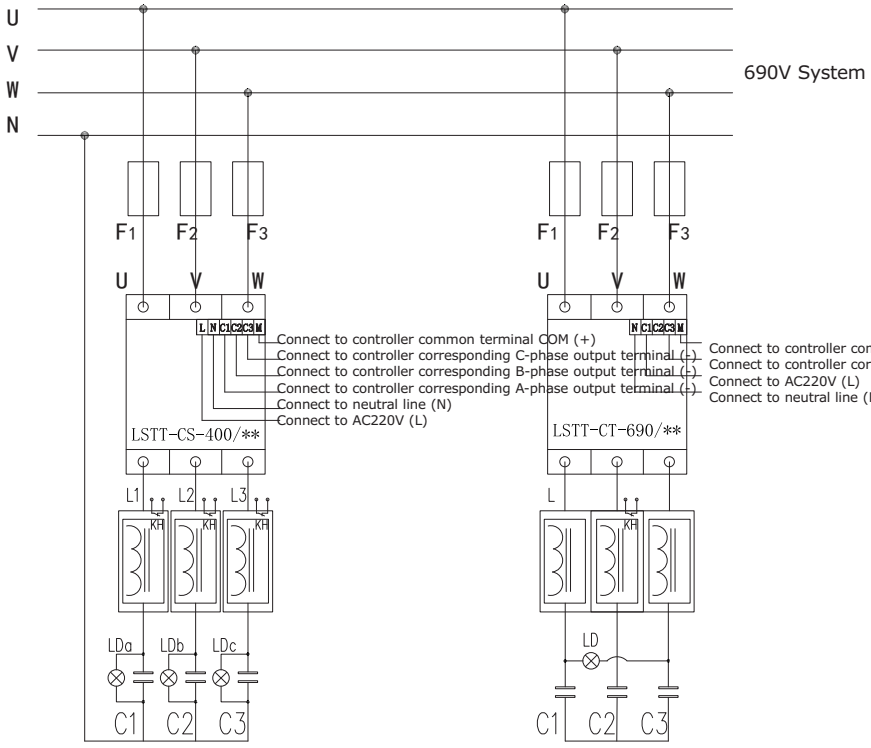
- Rated Voltage: 400V/690V
- Control Capacitor: ≤60 Kvar (LSTT-CT), ≤60 Kvar (LSTT-CS, 20 Kvar per phase)
- Ambient Temperature: -25℃ to +55℃
- Switching Time: ≤20 ms
- Control Terminal Voltage: DC12V, Current 25 mA per channel

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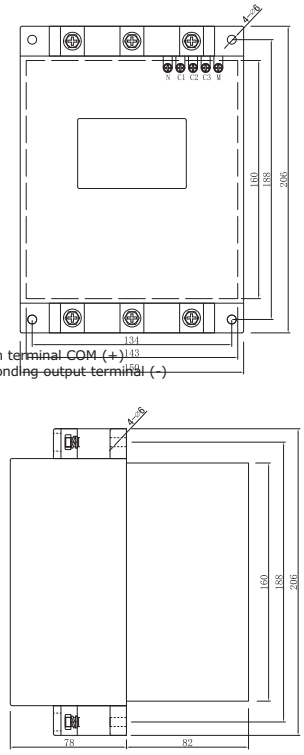
400V System Wiring Diagram



690V System Wiring Diagram



INSTALLATION DIMENSIONS



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INTELLIGENT COMPENSATION MODULE

The LSZC(F) and LSZH series intelligent compensation modules (intelligent capacitors) are DSP-based devices consisting of a thyristor composite switch (or synchronous switch), a miniature circuit breaker, and either two (Δ-type) or one (Y-type) low-voltage self-healing power capacitor. These products can replace conventional automatic reactive power compensation devices. This new product integrates functions such as data acquisition, reactive power compensation, power grid parameter analysis, and intelligent monitoring. It is suitable for monitoring and reactive power compensation control in 0.4kV, 50Hz low-voltage AC distribution systems.

MODEL ILLUSTRATION

LSZH-480/30S-R7

R7	: Reactance Rate: 7%
	Standard Type: None
S	: Compensation Mode: S for three-phase common compensation
	F for three-phase individual compensation
30	: Total Three-phase Compensation Capacity (kvar)
480	: Voltage Rating (V):
	Common compensation for line voltage
	Individual compensation for phase voltage
ZH	: Compensation Type: ZH for harmonic suppression type
	ZC for three-phase common compensation (standard type)
	ZF for three-phase individual compensation (standard type)
LS	: LSTC



FUNCTIONAL CHARACTERISTICS

◎ Real-time display of power factor, voltage, current, reactive power, active power, frequency, total voltage harmonics, total current harmonics, and capacitor switching status

◎ Supports both manual and automatic switching modes

◎ Logic-based switching method, with freely configurable number of capacitor circuits per phase and capacity per group

◎ Equipped with self-check and auto-reset functions

◎ Includes under-voltage, over-voltage, over-temperature, and harmonic overload protection functions

◎ Zero-voltage switching for connection and zero-current switching for disconnection

◎ Uses a specially designed circuit breaker that disconnects within 10ms at 5 times the rated current, providing fast-cut protection for the main circuit current to avoid tripping upstream switches and serving as the main power input switch

◎ Features cascaded electrical isolation and optically isolated RS485 communication. Capacitors are arranged in a master-slave star network configuration, where the master unit directly controls the switching status of each slave unit based on factors such as power factor, allowing independent operation.

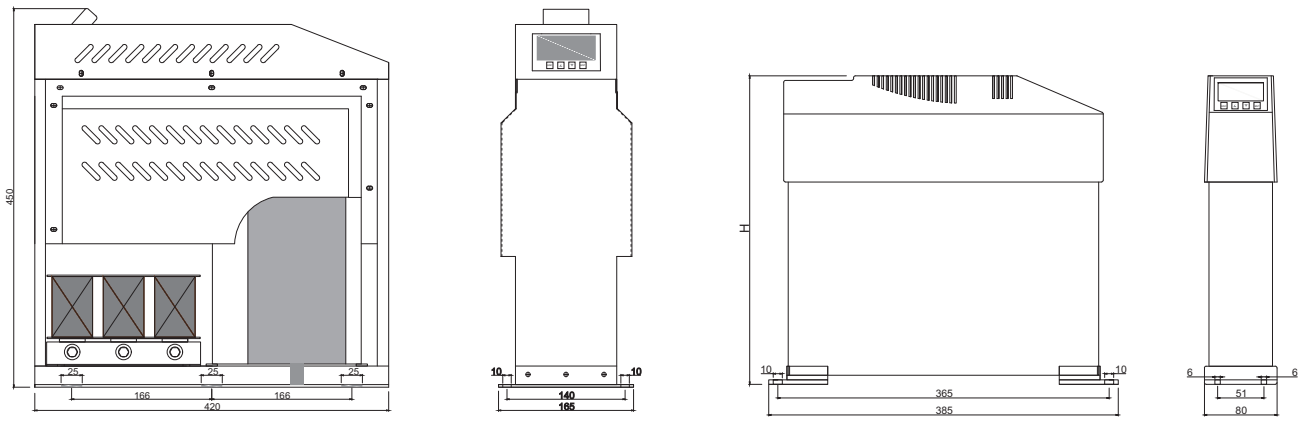
APPLICABLE OCCASIONS

In situations without harmonics, with slowly changing loads, or with low power consumption, decentralized compensation is more suitable.



EXTERNAL DIMENSIONS DIAGRAM

(Unit: mm)



Harmonic Suppression Type

Standard Type

TECHNICAL PARAMETER

(It is recommended to use a semiconductor -specific fast fuse for protection)

Technical Parameters		Specification Parameters	
Basic Parameters	Power Supply Voltage	AC 220V ±20%	
	Sampling Voltage	AC 220V/380 ±20%	
	Sampling Current	0 ~ 5A	
	Measurement Frequency	50Hz ±5%	
Control Parameters	Current Transformation Ratio	1 ~ 1000	Step size 1
	Overvoltage Setting	230 ~ 280V/400 ~ 460V	Step size 1V
	Undervoltage Setting	180 ~ 210V/300 ~ 360V	Step size 1V
	Voltage Harmonics	0.0% ~ 25.0%	Step size 0.5
	Current Harmonics	0.0% ~ 100.0%	Step size 0.5
	Power Factor	0.85 ~ 1.0	Step size 0.01
	Switching Threshold	0.8 ~ 1.2	Step size 0.1
	Switching Delay	0S ~ 600S	Step size 0.1
	Capacitor Capacity	0 ~ 40 kvar	Step size 1
Operating Conditions	Altitude	≤3000m	
	Ambient Temperature	−20℃ ~ +65℃	
	Atmospheric Pressure	79.5 ~ 106kPa	
	Ambient Conditions	No explosive hazards in surrounding media, no gases that could damage insulation or corrode metal, no conductive dust; the installation site should not be subject to significant vibration and should be protected from rain and snow.	
Communication Mode	RS-485	Communication available	

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INTELLIGENT COMPENSATION MODULE

The LSTRC-ZH reactive power compensation controller is a new type of distribution measurement and control equipment that integrates data acquisition, reactive power compensation, power grid parameter analysis, and other functions. It is suitable for monitoring and reactive power compensation control in 0.4KV, 50Hz low-voltage distribution systems.

The LSTRC-ZH reactive power compensation controller is based on a high-speed digital signal processor and uses AC sampling. The human-machine interface is a 128X64 dot matrix large-screen LCD display. It features power distribution monitoring, reactive power compensation, harmonic analysis, and an adaptive frequency algorithm, with input signals varying between 45Hz and 55Hz. USB and RJ45 communication interfaces facilitate communication with intelligent capacitors.



FUNCTIONAL CHARACTERISTICS

◎ Measurement Functions: A, B, C-phase voltage, current, power factor, active power, reactive power, harmonic content ratio, harmonic distortion rate, frequency measurement, etc.

◎ Control Functions: Automatic fast switching based on reactive power and power factor, control logic switching mode, freely setting the number of capacitor stages per phase and per group capacity. It supports both automatic and manual switching functions.

◎ Setting Functions: Settings for sampling current transformer ratio, switching delay, switching threshold, target power factor, etc. Protection setting values for overvoltage, undervoltage, harmonic limits, etc. Settings for capacitor stages, capacity parameters, etc.

◎ Protection Functions: Overvoltage, undervoltage protection for the distribution system, harmonic limit protection, phase loss protection, and capacitor connection/disconnection status signal display.

TECHNICAL PARAMETERS

◎ Working Power Supply: AC220V±20%, 50Hz

◎ Sampling Voltage: Common Compensation Type: AC380V±20%
Mixed Compensation Type: AC220V±20%

◎ Sampling Current: 0～5A from the secondary output of the line cabinet current transformer

◎ Output Interface: USB/RJ45 communication interface

◎ Control Mode: Common Compensation Type: Three-phase common compensation
Mixed Compensation Type: Single-phase, three-phase mixed compensation

INSTALLATION DIMENSIONS

◎ Dimensions: 144×144×110

◎ Cut-out Dimensions: 138×138

◎ Embedding Depth: 95

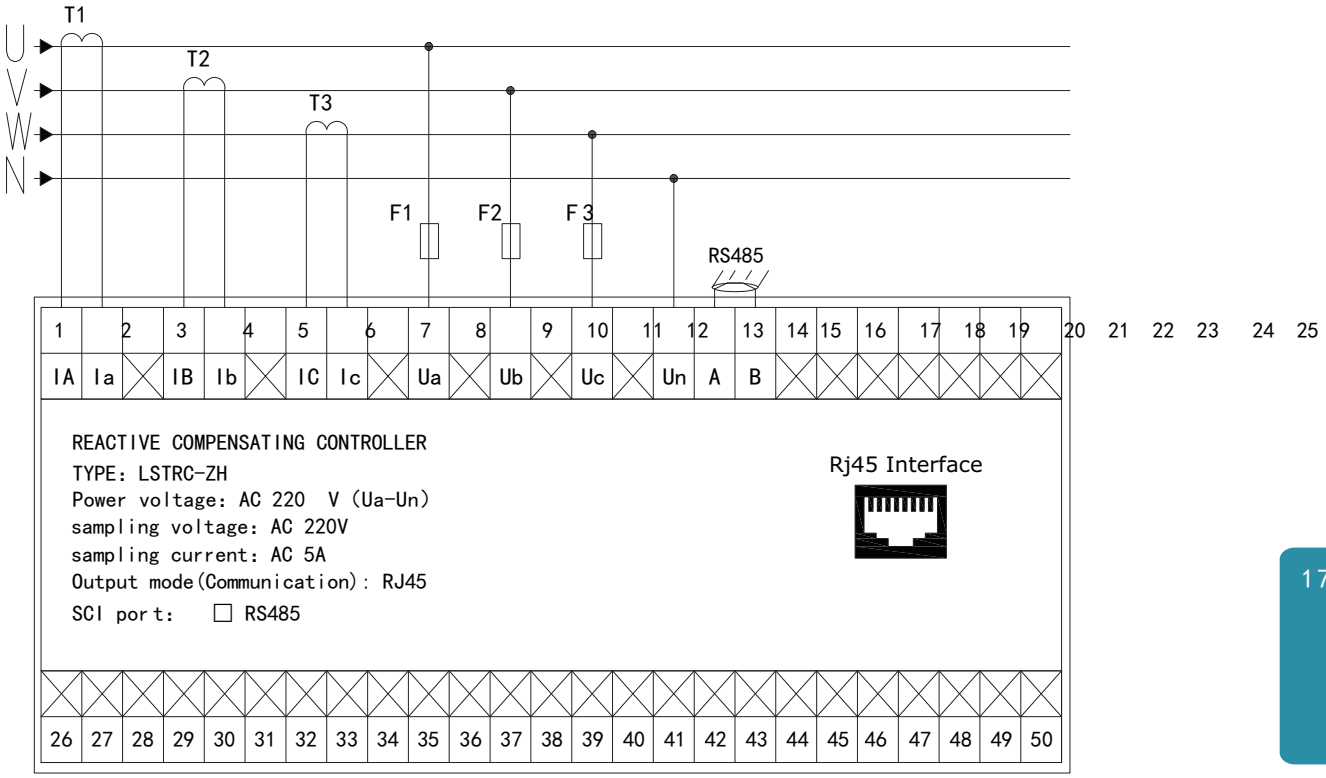


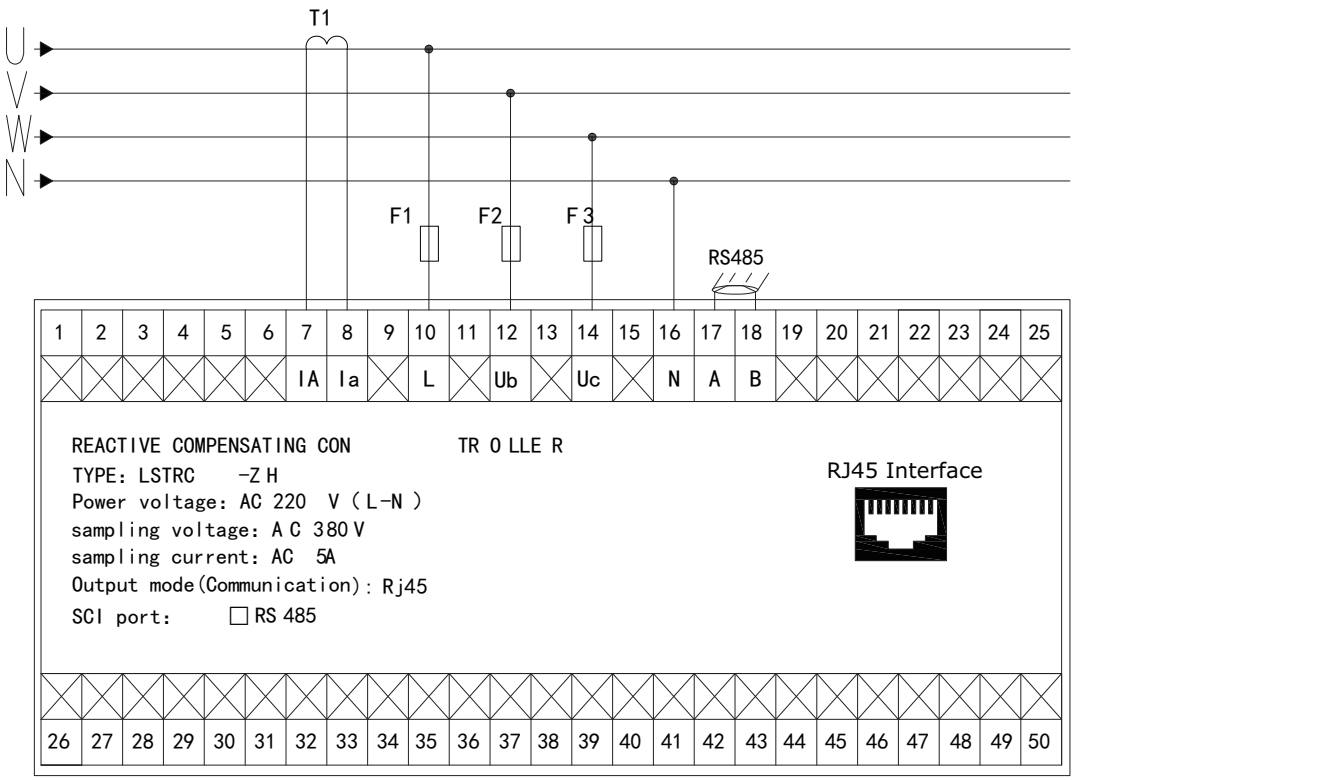




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WIRING DIAGRAM





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HIGH VOLTAGE POWER CAPACITOR

The LSTHSC series high-voltage capacitors are primarily used in 50Hz or 60Hz AC systems with voltages of 1kV and above. Their purpose is to improve power factor, reduce line losses, enhance power grid quality, fully utilize the economic efficiency of power generation and supply equipment, and minimize electrical losses. The product uses a all-film dielectric with chlorine-free insulating fluid/oil and environmentally friendly, chlorine-free, high-safety insulating oil. Each capacitor component is equipped with a built-in fuse and a built-in discharge resistor. It is an essential accessory for reactive power compensation in power systems, effectively improving the voltage waveform and stabilizing the grid voltage.



BASIC PARAMETERS

◎Input Parameters:

Rated Voltage (kV): The RMS value of the AC voltage specified during the design of the capacitor, calculated based on the system voltage of the product connection, connection method, and design safety margin.

Rated Capacity (kvar): The reactive power specified during the design of the capacitor, determined by system compensation capacity requirements, connection method, and protection measurement requirements.

Rated Frequency (Hz): The frequency specified during the design of the capacitor. Capacitors used in China's and Europe's power system are typically 50Hz, while 60 Hz is used in North America and some other regions.

Rated Capacitance (μF): The capacitance value calculated from the rated capacity, rated voltage, and rated frequency, or calculated based on filtering requirements.

Insulation Level BIL (kV): The capacitor's insulation rating to the ground, determined by the installation method. It is typically expressed as the rated withstand voltage or impulse voltage to ground. For example, a capacitor used in a 10kV system may have an insulation rating of 42/75kV.

Installation Dimensions: The dimensions of the capacitor determined by the installation method that the capacitor must meet.

Additionally, to ensure the safe operation of the capacitor, the design should also take into account environmental factors, including the altitude of the installation site, extreme and average temperatures, rainfall and snowfall amounts, pollution conditions at the operating site, power supply quality, and load categories and variations.

◎Output Parameters:

These refer to other characteristics of the capacitor determined under the conditions mentioned above and within the capacity of the production equipment. These include specifications of raw materials, design field strength, component sizes, internal structure of the capacitor (such as series and parallel configurations), and external dimensions.

◎**Quality Performance Parameters**

These refer to the performance metrics that reflect the final product performance differences caused by variations in product design, raw materials, and process control quality. For instance, these include capacitor losses, capacitance deviation, partial discharge, overcurrent resistance, etc. The key aspects are as follows:

Capacitor Losses: Refers to the proportion of active power consumed by the capacitor compared to the apparent power it can provide. For a capacitor unit, losses include those caused by the dielectric, internal fuses, internal discharge devices, and other factors. The dielectric loss is the only controllable part of this loss, directly related to the quality of raw materials and process control. For example, poor vacuum impregnation processes or improper cleanliness control during core processing can directly affect the final product's loss measurement results.

Capacitance Deviation Control: This is a direct evaluation factor of the production technology level of the capacitor. The smaller the deviation in the raw materials used, i.e., the more uniform the thickness of the film and aluminum foil, and the more stable the quality, the smaller the capacitance deviation will be. Another influencing factor is the control precision of the winding machine.

Partial Discharge (PD) Amount: This is another important parameter for assessing the production process level of capacitors because the amount of partial discharge directly affects the capacitor's service life. Therefore, it is often specified in product technical specifications as a quality performance parameter. Partial discharge shall be measured at the test voltage and under the procedure specified by the applicable standard. Some standards also use the partial discharge inception voltage and extinction voltage as the benchmark.

Overcurrent and Overvoltage Resistance: These are performance indicators that reflect the safety margin of the capacitor. Relevant standards explicitly specify these parameters, but sometimes users may require capacitors to have higher overcurrent or overvoltage resistance based on their specific usage conditions.

STRUCTURE

◎The power capacitor consists of a housing, core components, and wiring porcelain posts. The housing is made of stainless steel plates welded together and is sealed to prevent environmental influences. High-strength crimp-type wiring porcelain posts are welded onto the housing, and mounting components are welded on both sides of the housing, which also serve as grounding terminals and can be used for transportation.

◎The core component is composed of several layers of aluminum foil, polypropylene film winding dielectric, and insulating parts. The elements of the core are connected in series to meet different voltage and capacity requirements.

◎Each element inside the power capacitor is equipped with a series fuse. If any element is damaged (e.g., breakdown), the parallel-connected elements discharge the faulty one, causing the fuse to blow (in milliseconds), which isolates the faulty element, allowing the power capacitor to continue operating normally.

USING CONDITIONS

◎Altitude: Not exceeding 1000 meters

◎Operating Temperature: -25℃ to +55℃

◎Surrounding Environment: No harmful gases or flammable/explosive materials

◎Relative Humidity: Not exceeding 90%

◎Special Operating Conditions: Can be designed separately

◎Surrounding Environment: Should have good ventilation conditions







TECHNICAL PERFORMANCE

◎The power capacitor can withstand a long-term operation at 1.1Un voltage, with a voltage fluctuation of 1.15Un for 30 minutes within a 24-hour period.

◎The power capacitor can withstand operation at 1.2Un voltage for 5 minutes and at 1.3Un voltage for 1 minute.

◎The power capacitor can withstand the first peak value of ≯2.2Un transient overvoltage, with a duration of half a cycle.

◎The power capacitor can endure stable overcurrent operation of 1.3In caused by voltage rise or higher harmonics, and for capacitors with maximum positive deviation, it can withstand overcurrent operation at 1.37In.

◎The capacitance deviation of the power capacitor is within -5% to +5%.

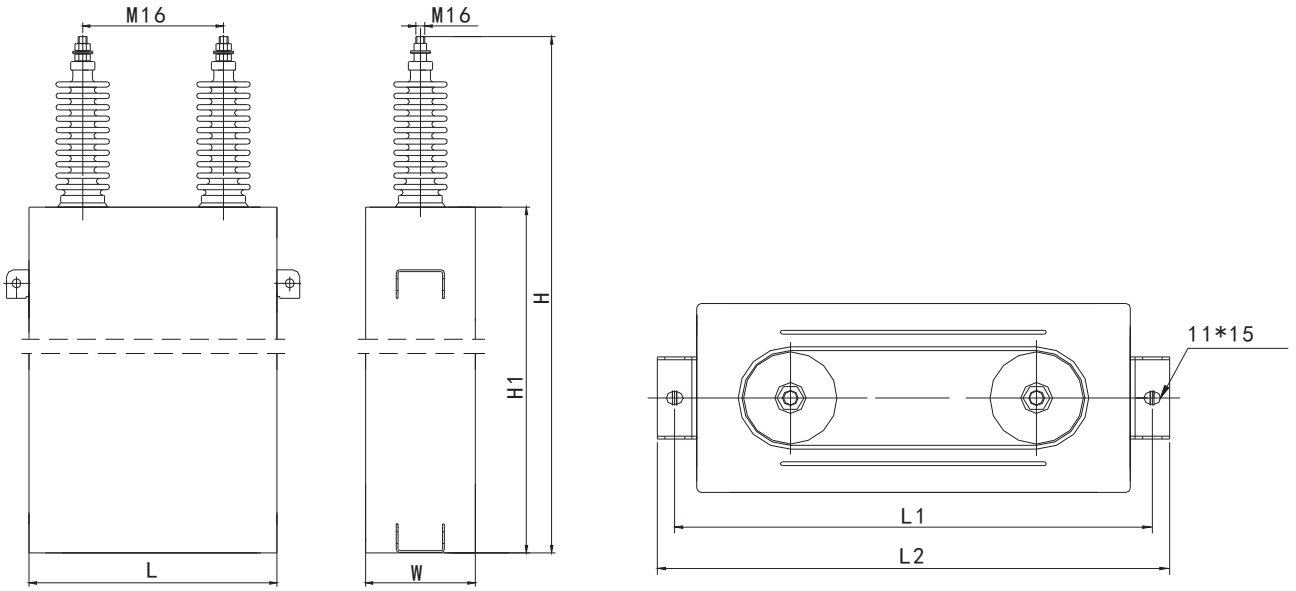
◎After disconnecting the power supply, the residual voltage of the power capacitor will decrease from √2Un to below 50V within 5 minutes.

◎When operating at an ambient temperature of 20℃ and at Un/50Hz voltage, the power capacitor's loss tangent tgδ ≤ 0.0003.

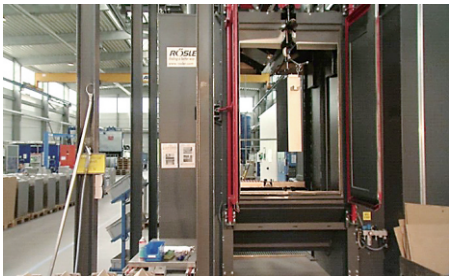
◎Manufacturing standard: IEC60871 or others as needed.

EXTERNAL DIMENSIONS DIAGRAM

（单位：mm）









SELECTION TABLE

11kV Power Capacitor Parameters Table (Adapted for Reactance Rate 6%)			6.6kV Power Capacitor Parameters Table (Adapted for Reactance Rate 6%)		
Capacitor Terminal to Ground Insulation Level (50Hz Voltage 42kV for min)			Capacitor Terminal to Ground Insulation Level (50Hz Voltage 30kV for min)		
Capacitor Inter-electrode Insulation Test Voltage (50Hz Voltage 2.15Un for 10s or DC Voltage 4.3Un for 10s)					
Model	Q (kvar)	C (μF)	Model	Q (kvar)	C (μF)
LSTHSC11/√3-050-1	50	3.95	LSTHSC6.6/√3-050-1	50	10.96
LSTHSC11/√3-100-1	100	7.89	LSTHSC6.6/√3-100-1	100	21.95
LSTHSC11/√3-150-1	150	11.85	LSTHSC6.6/√3-150-1	150	32.92
LSTHSC11/√3-167-1	167	13.19	LSTHSC6.6/√3-167-1	167	36.63
LSTHSC11/√3-200-1	200	15.80	LSTHSC6.6/√3-200-1	200	43.86
LSTHSC11/√3-250-1	250	19.75	LSTHSC6.6/√3-250-1	250	54.84
LSTHSC11/√3-267-1	267	21.11	LSTHSC6.6/√3-267-1	267	58.57
LSTHSC11/√3-300-1	300	23.67	LSTHSC6.6/√3-300-1	300	65.81
LSTHSC11/√3-334-1	334	26.38	LSTHSC6.6/√3-334-1	334	73.28
LSTHSC11/√3-400-1	400	31.57	LSTHSC6.6/√3-400-1	400	87.73
LSTHSC11/√3-500-1	500	39.50			







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HIGH VOLTAGE SERIES REACTOR

The LSTHR series dry-type iron core series reactors are important auxiliary equipment for power system reactive power compensation devices. When connected in series with power capacitors, the dry-type iron core reactors effectively suppress high-order harmonics in the power grid, limit inrush current and operation overvoltage, improve the voltage waveform of the system. This plays a significant role in ensuring the safe operation of power capacitors and other electrical equipment.



STRUCTURE

◎The core of the dry-type iron core series reactor is made of high-quality silicon steel sheets, with the core column divided into uniform small sections by multiple air gaps. The air gaps are insulated using epoxy cloth boards to ensure that they remain unchanged during long-term operation of the reactor.

◎The end faces of the core are bonded with high-quality silicon steel sheet end face glue, securely combining the silicon steel sheets, which greatly reduces operational noise and provides excellent moisture and dust resistance.

◎The coils are made of pure copper and designed for dry-type H-class insulation. The coils are impregnated with H-class solvent-free varnish under vacuum pressure and then further coated with external insulating varnish. This process ensures excellent insulation properties, high mechanical strength, and the ability to withstand large current impacts and thermal cycling without cracking.

◎The external insulating varnish has strong hydrophobic properties and low partial discharge, allowing the reactor to operate safely in harsh environmental conditions.

USING CONDITIONS

◎The altitude should not exceed 2000 meters.

◎The operating ambient temperature range is from -25°C to +45°C, and the relative humidity should not exceed 90%.

◎The surrounding environment should be free of harmful gases and flammable or explosive materials.

◎There should be good ventilation in the surrounding environment.

◎Special operating conditions can be designed upon request.

TECHNICAL DATA

◎The dry-type reactor is smaller, lighter, more compact, and simpler in structure compared to oil-immersed reactors, hollow reactors, and epoxy cast reactors. It is also easier to install.

◎Class H insulation system, with a thermal class of 180°C; maximum temperature rise: 90 K under specified ambient conditions.

◎The dry-type reactor can operate continuously at 1.35 times the rated current.

◎The noise level of the dry-type reactor does not exceed the national standards of China.

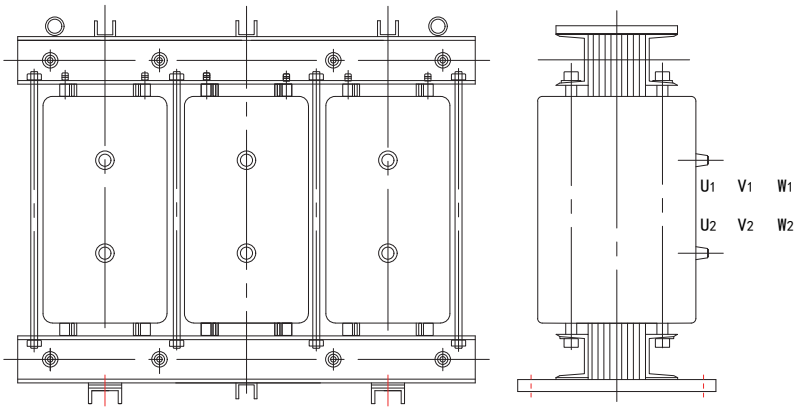
◎Manufacturing standard: IEC60289/VDE0532 or other standards as required.

SELECTION TABLE

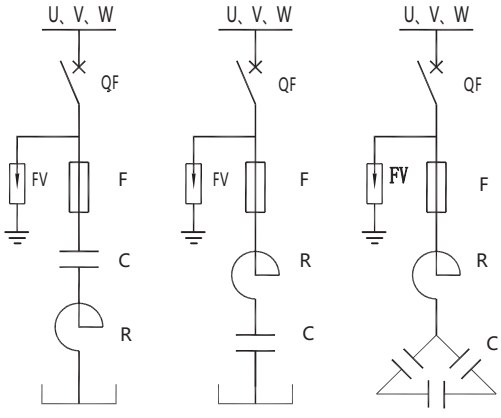
10kV Core-type Series Reactor Parameter Table (Reactance Rate 6%) Rated Short-time Withstand Voltage (50Hz): 35kV				6kV Core-type Series Reactor Parameter Table (Reactance Rate 6%) Rated Short-time Withstand Voltage (50Hz): 25kV			
Model	Q (kvar)	Un (kV)	X (Ω)	Model	Q (kvar)	Un (kV)	X (Ω)
LSTHR11-9/6/3	9	11	44.09	LSTHR6.6-9/6/3	9	6.6	15.87
LSTHR11-12/6/3	12	11	33.07	LSTHR6.6-12/6/3	12	6.6	11.97
LSTHR11-18/6/3	18	11	22.05	LSTHR6.6-18/6/3	18	6.6	7.94
LSTHR11-24/6/3	24	11	16.54	LSTHR6.6-24/6/3	24	6.6	5.95
LSTHR11-30/6/3	30	11	13.23	LSTHR6.6-30/6/3	30	6.6	4.76
LSTHR11-36/6/3	36	11	11.03	LSTHR6.6-36/6/3	36	6.6	3.97
LSTHR11-54/6/3	54	11	7.35	LSTHR6.6-54/6/3	54	6.6	2.64
LSTHR11-60/6/3	60	11	6.61	LSTHR6.6-60/6/3	60	6.6	2.38
LSTHR11-72/6/3	72	11	5.51	LSTHR6.6-72/6/3	72	6.6	1.98
LSTHR11-90/6/3	90	11	4.41	LSTHR6.6-90/6/3	90	6.6	1.59
LSTHR11-108/6/3	108	11	3.68	LSTHR6.6-108/6/3	108	6.6	1.32

EXTERNAL DIMENSIONS DIAGRAM

(Unit: mm)



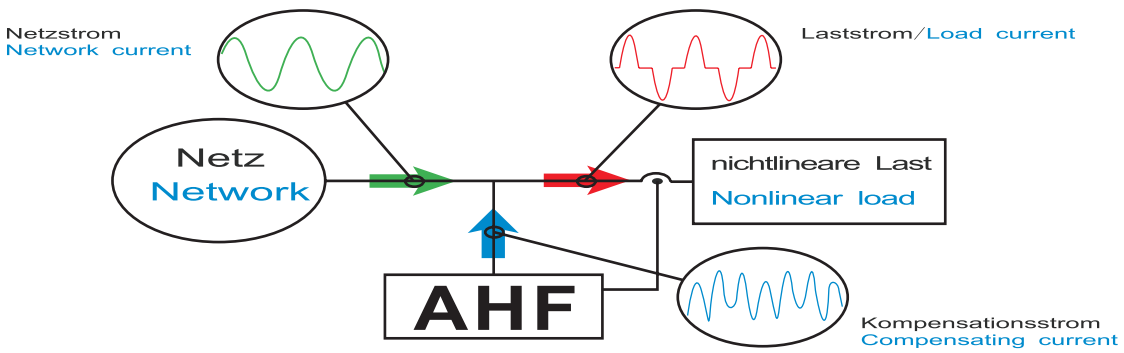
THE MAIN CONNECTION MODE



ACTIVE HARMONIC FILTER

With the rapid development of new distribution and electrical equipment, while bringing efficient work and convenient living to people, it has also led to harmonic pollution in the power grid. The pollution in the power grid gradually worsens our electrical environment, greatly affecting electrical safety and efficiency. The LSTAY(L) series active harmonic filter is the ideal equipment for addressing grid pollution, improving power quality and efficiency, and ensuring the safety of both the grid and electrical equipment. It adopts the most advanced active harmonic compensation technology to dynamically eliminate harmonic distortions in the grid. It detects the current waveforms generated by nonlinear loads in real time, separates the harmonic components, and then uses an IGBT inverter circuit to output a compensating current of equal magnitude but opposite direction to the harmonic current component. This current is injected back into the power system to counteract the load's harmonics, ensuring that the current drawn from the grid is a pure sine wave, thereby filtering out harmonics and suppressing resonance. Additionally, the active harmonic filter can also provide leading or lagging reactive current to improve the power factor of the grid and achieve dynamic reactive power compensation.





MAIN FEATURES

◎Dynamic Active Filtering, Comprehensive Improvement of Power Quality

◎Intelligent control circuit with DSP full smart monitoring.

◎Compensation modes can be selected for harmonic compensation, reactive power compensation, or simultaneous harmonic and reactive power compensation.

◎Depending on the distribution structure, local compensation, partial compensation, or total compensation can be selected. CT (current transformer) can be positioned on the power side or load side.

◎Capable of compensating for phase imbalance.

◎High reliability and efficiency, with full-load loss less than 2.5%.

◎Standard modular design with parallel expansion capability.

◎Reduces line losses, eliminates transformer and motor overheating, and achieves significant energy savings for the system.

◎Protection functions: Overcurrent protection, overheat protection, over/under voltage protection for the grid, phase loss or incorrect phase protection for the grid, over/under voltage protection for the DC bus, and overload automatic current-limiting protection.

◎Easy to expand and designed for redundancy, allowing up to ten units to operate in parallel. Different capacity devices can be connected in parallel, and it features "intelligent redundancy."

ACTIVE HARMONIC FILTER

TECHNICAL DATA

◎Rated Compensation Capacity: 30–200A

◎Maximum Parallel Capacity: 800A
◎Operating Voltage: 400VAC (-10% ~ +10%)
◎Operating Frequency: 45–63Hz
◎Harmonic Compensation Rate: >95%
◎ Filtering Capability: THDi (Total Harmonic Distortion, current distortion rate) <5%
◎Filtering Range: 2nd to 50th Harmonics
◎Fast Response Time: <300μs
◎Full Response Time: <4ms
◎IGBT Switching Frequency: 20kHz

◎Communication Interfaces: RS485/RS232/Ethernet

Communication Function/USB2.0/GPRS

◎Communication Protocol: Modbus Protocol
◎Operation Display: LCD Monitoring Panel, Running Parameter Settings, Touch Button Operation, Multi-parameter Display
◎Self-diagnosis and Protection Functions: Yes
◎Operating Temperature: -20℃ ~ +50℃
◎ Protection Level: IP20 (Customizable to higher protection levels)
◎Noise Level: ≤55dB
◎Relative Humidity: ≤90%
◎Cooling Method: Intelligent Air Cooling

FUNCTION

◎Reactive Power Compensation

The device can provide both inductive and capacitive reactive power for any fundamental harmonic from the grid connection point to the grid. It supplies power to each phase separately, which also helps to balance the three-phase current.

◎Harmonic Suppression

Harmonic currents are measured by current transformers and analyzed by the controller. The active filter separates the harmonic components from the signal, then injects a compensating current with opposite phase to the harmonic current. This process suppresses the harmonics, leaving the grid current to contain only the pure fundamental wave. The active filter reduces selected harmonic components and reactive current to specified limits under rated operating conditions.

◎Neutral Line Compensation

In the specific model of a four-wire system, the device consists of four power circuits. This is essential for compensating the third-order harmonics and their harmonics that superimpose on the neutral line. Neutral rating up to 3x phase rating.

◎Transient Compensation

When the load increases rapidly, the active filter temporarily feeds the power stored in the DC link capacitor back into the grid. When the load decreases, the active filter pulls the power back from the grid into the DC link. This principle smooths out the load fluctuations on the grid side, reducing flicker severity to within the applicable limit, typically Pst ≤ 1 where applicable.. To achieve transient compensation, the device must be used in conjunction with a large-capacity DC link.

HARMONIC AND HARMONIC SOURCES

◎When a sinusoidal voltage is applied to a nonlinear load, the current becomes non-sinusoidal.

Non-sinusoidal current generates a voltage drop across the impedance of the grid, causing the grid voltage waveform to also become non-sinusoidal. The non-sinusoidal waveform can be decomposed using Fourier series. The component with the same frequency as the fundamental frequency is called the fundamental wave (typically 50 Hz). Components with frequencies that are integer multiples of the fundamental frequency are called harmonics.

◎Most of the loads used today are nonlinear, and nonlinear loads generate significant harmonic currents that are injected into the grid, causing distortion in the grid voltage. Typical sources of harmonics include:

Rectifiers (electroplating, electrolysis, etc.)

Frequency converters, DC speed controllers

DC power supplies, chargers

Arc furnaces, induction heating equipment

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Welding equipment
Electrified railways, ship electric drives
Air conditioners
Energy-saving lamps (fluorescent lamps)
Uninterruptible power supplies (UPS)
Computers and peripheral devices, etc.
The LSTAY(L) series active harmonic filters can be successfully applied in the above scenarios to address harmonic pollution issues.

SELECTION TABLE

System Voltage	Rated Compensation Current	Type	Rack-Mounted IGBT Module Dimensions L×W×H (mm)	Wall-Mounted IGBT Module Dimensions L×W×H (mm)	Wall-Mounted Discrete IGBT Dimensions L×W×H (mm)
400VAC	030A	LSTAY(L)-030/400	450×580×88	450×580×118	380×400×88
400VAC	050A	LSTAY(L)-050/400	450×580×88	450×580×118	380×400×88
400VAC	075A	LSTAY(L)-075/400	450×580×110	450×580×140	440×510×88
400VAC	100A	LSTAY(L)-100/400	450×580×160	450×580×190	500×550×100
400VAC	150A	LSTAY(L)-150/400	450×580×192	450×580×222	500×550×100
400VAC	200A	LSTAY(L)-200/400	680×580×192	--	--
690VAC	100A	LSTAY(L)-100/690	680×580×200	--	--



Selection Instructions

Y Series products are suitable for three-phase, four-wire systems with a neutral line. They can simultaneously filter out harmonics flowing through both the phase line and the neutral line.

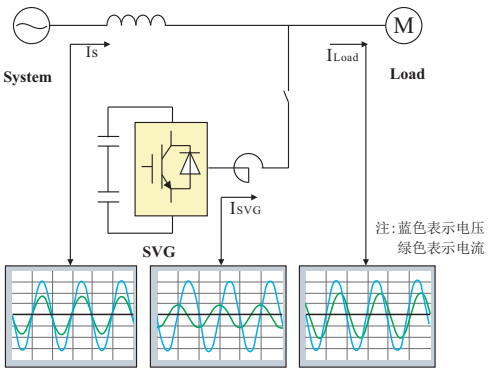
L Series products are suitable for three-phase, three-wire systems with or without a neutral line. They can filter out non-zero sequence harmonics and compensate reactive power.

The basic modules are available in 30A, 50A, 75A, 100A, 150A, and 200A options. Different filtering products with various compensation currents can be customized according to user needs.

Considering that most active harmonic filter cabinets need to be integrated with low-voltage switchgear, their dimensions can be customized according to drawings or user requirements.

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STATIC VAR GENERATOR





Working Principle of Static Var Generator (SVG)

The Static Var Generator (SVG) works by paralleling a self-commutated bridge circuit with an inductor directly to the power grid. It adjusts the aand amplitude of the voltage output on the AC side of the bridge circuit or directly controls the AC side current, thereby achieving dynamic reactive power compensation. The LSTSVG series products can effectively resolve issues such as large reactive power impacts, low power factor, and significant current harmonics.

The Advanced Static Var Generator (ASVG) uses external current transformers to monitor the load current in real time. After the DSP chip computes and analyzes the reactive power components and harmonics of the load current, the system drives IGBTs with PWM signals to generate the required reactive power and low-order harmonic currents. This improves the power factor and mitigates harmonics. The LSTASVG series products not only provide reactive power compensation but also eliminate 3rd to 25th-order harmonics in the system.

MAIN FEATURES

◎Faster Response Speed:

Response Time: ≤5ms

The system can complete the conversion between rated capacitive reactive power and rated inductive reactive power in an extremely short time. This unparalleled response speed makes it highly effective in compensating for loads with high shock or transient characteristics.

◎Flexible Application Conditions:

Using a diode-clamped three-level inverter topology, it can handle unbalanced three-phase conditions, solving issues such as neutral line current, zero-sequence reactive power, and harmonic compensation.

◎Diverse Compensation Functions:

The same device can implement various compensation functions:

Reactive power compensation for the load.

Harmonic compensation for the load.Compensation for load imbalance.

Simultaneous compensation for load reactive power, harmonics, and imbalance.

◎Extremely Low Harmonic Content:

Utilizing PWM technology and multilevel technology, the system has very low harmonic content. Compared to TCR-type SVC, the harmonic content is minimal, preventing secondary pollution to the power grid.

◎Multiple Protection Functions:

Overvoltage/undervoltage protection.

Phase failure protection.

Overcurrent protection for the device.

DC bus overvoltage/undervoltage protection.

Overload automatic current-limiting protection.

◎Voltage Regulation:

The device can emit capacitive or inductive current to adjust the grid voltage, preventing damage to equipment caused by excessively high or low voltages.

SELECTION TABLE

System Voltage	Rated Compensation Capacity	Type	Rack-Mounted IGBT Module Dimensions L×W×H (mm)	Wall-Mounted IGBT Module Dimensions L×W×H (mm)	Wall-Mounted Discrete IGBT Dimensions L×W×H (mm)
400VAC	030kvar	LST(A)SVG-030/400	450×580×88	450×580×118	380×400×88
400VAC	050kvar	LST(A)SVG-050/400	450×580×110	450×580×118	380×510×88
400VAC	075kvar	LST(A)SVG-075/400	450×580×160	450×580×140	500×550×100
400VAC	100kvar	LST(A)SVG-100/400	450×580×192	450×580×190	500×550×100
400VAC	150kvar	LST(A)SVG-150/400	680×580×192	450×580×222	--
690VAC	100kvar	LST(A)SVG-100/400	680×580×200	--	--
690VAC	120kvar	LST(A)SVG-120/690	680×580×200	--	--

TECHNICAL PARAMETER

◎ Module Unit Capacity: 35, 50, 75, 100kvar, 150kvar
◎ System Operating Voltage: 400VAC, 690VAC
◎ Rated Frequency: 45~63Hz
◎ Wiring Method: Three-phase three-wire / Three-phase four-wire
◎ Harmonic Compensation Rate: ≥97% within rated capacity (Load distortion rate ≥20%)
◎ Compensation Function: Capable of harmonic, reactive power, and three-phase imbalance compensation, among other functions
◎ Compensation Mode: Primarily reactive power compensation, with harmonic compensation as an optional feature
◎ Electronic Topology: Three-level
◎ Response Time: Reactive power compensation <5ms, full compensation <10ms
◎ Active Power Loss: <2% of rated power module
◎ Operating Temperature: -20℃ ~ 50℃
◎ Storage Temperature: -20℃ ~ 65℃
◎ Relative Humidity: <90% (at 25℃)
◎ Noise: <55dB
◎ Communication Interface: RS485/RS232/Ethernet communication functionality/USB2.0/GPRS
◎ Communication Protocol: Modbus Protocol
◎ Operation Display: LCD monitoring panel, operating parameter settings, touch button operation, multi-parameter display
◎ Cooling Method: Intelligent air cooling

AHF/SVG CENTRALIZED CONTROL PANEL

LSTC Electric AHF Centralized Control Panel LSCCS-A and SVG Centralized Control Panel LSCCS-S adopt an 800*480 resolution, 7-inch widescreen, and 65,535-color digital true-color LED LCD display. The interface is clear, with a fully Chinese menu and intuitive information.

DESCRIPTION OF OPERATION POINTS

◎The centralized control panel operates on a 24VDC power supply. After powering on, the display screen shows a "Starting up" progress bar, during which no action is required. Once complete, the system enters the equipment monitoring interface, displaying key information such as system voltage, current, power factor, current distortion rate, device current, and fault indicators (which only appear when a fault occurs).

Before entering parameter settings, user login is required (default password: 123456).

◎CT Ratio Settings:

Click "Parameter Settings" to enter the interface, and set the CT ratio based on the current transformer's ratio (e.g., a 2000/5 transformer should be set to 400).

◎CT Position Selection:

A. System side (closed-loop mode), includes filter's own current

B. Load side (open-loop mode), does not include filter's own current, only load current is sampled

◎Parallel Module Quantity and Capacity Settings:

Set the number of parallel modules based on actual installation (≤8), and set the total parallel capacity according to the actual module capacity; the unit is in Amps.

◎Compensation Mode Settings:

A. Harmonic priority (set the harmonic limit percentage in the menu)

B. Reactive power priority (set the power factor, the suggested value is 0.95)

◎Operation Mode Settings:

Can be manually or automatically switched. In automatic mode, after manual forced shutdown, the system will not restart automatically.

◎Harmonic Limiting Settings:

Set the harmonic frequencies to be eliminated in the corresponding menu on the screen. Note that total current and the first fundamental harmonic must be set, with a suggested range of 90%-100%.

◎Communication Status Query:

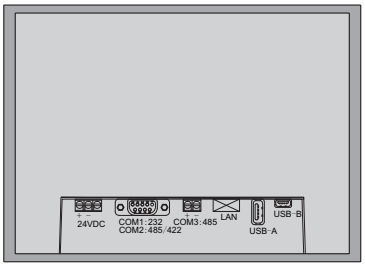
Click the module monitoring interface to view the status of the parallel module. If the status is yellow and communication status is green, communication is normal. Red indicates no communication. Then, click the module control command dropdown to choose start, stop, or reset. Operations for other modules are the same.

◎Real-time Alarm Query:

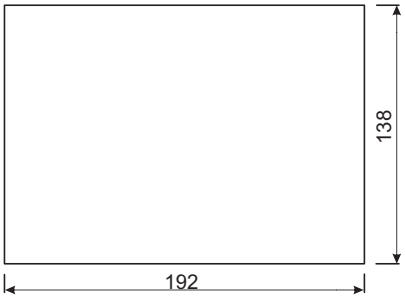
This menu displays module alarm fault information.

EXTERNAL DIMENSIONS DIAGRAM

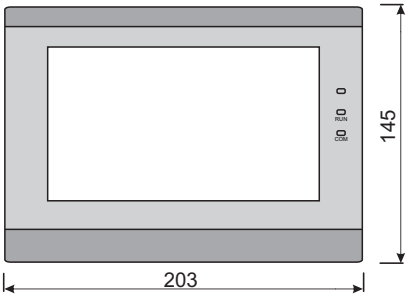
(Unit: mm)

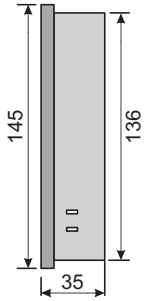


Centralized Control Panel Backplane Terminal Physical Diagram



Hole Opening Dimension Diagram



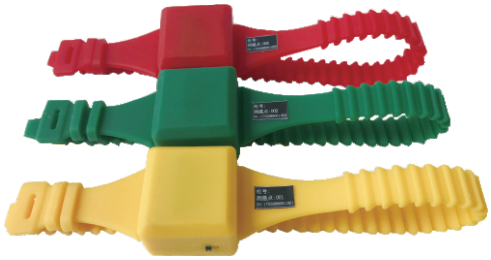


Centralized Control Panel Front Panel Physical Dimensions

SWITCHGEAR INTELLIGENT CONTROL DEVICE

LSTC LSIC60 series switchgear intelligent control device offers powerful functionality. It is integrated into switchgear to simplify panel design, enhance layout aesthetics, and make switchgear more intelligent, networked, and digital. The LSIC60 series includes two models: LSIC60A Active Temperature Measurement Intelligent Control Device and LSIC60P Passive Temperature Measurement Intelligent Control Device.





BASIC FUNCTIONS

- Real-time dynamic display of the primary simulation diagram: breaker energy storage status, switch open/close status, trolley position detection and indication, grounding switch open/close status, etc.
- Intelligent voice anti-misoperation prompts, high-voltage live voice alerts
- High-voltage live display and interlocking, high-voltage detection function
- Infrared human body sensing probe
- RS485 communication interface, MODBUS-RTU protocol
- Two-channel temperature and humidity display and control
- Infrared human body sensing probe
- Open/close operation, remote/local switching, energy storage, lighting control
- Online monitoring of high-voltage electrical contact temperatures, supporting up to 48 wireless temperature sensors

TECHNICAL PARAMETERS

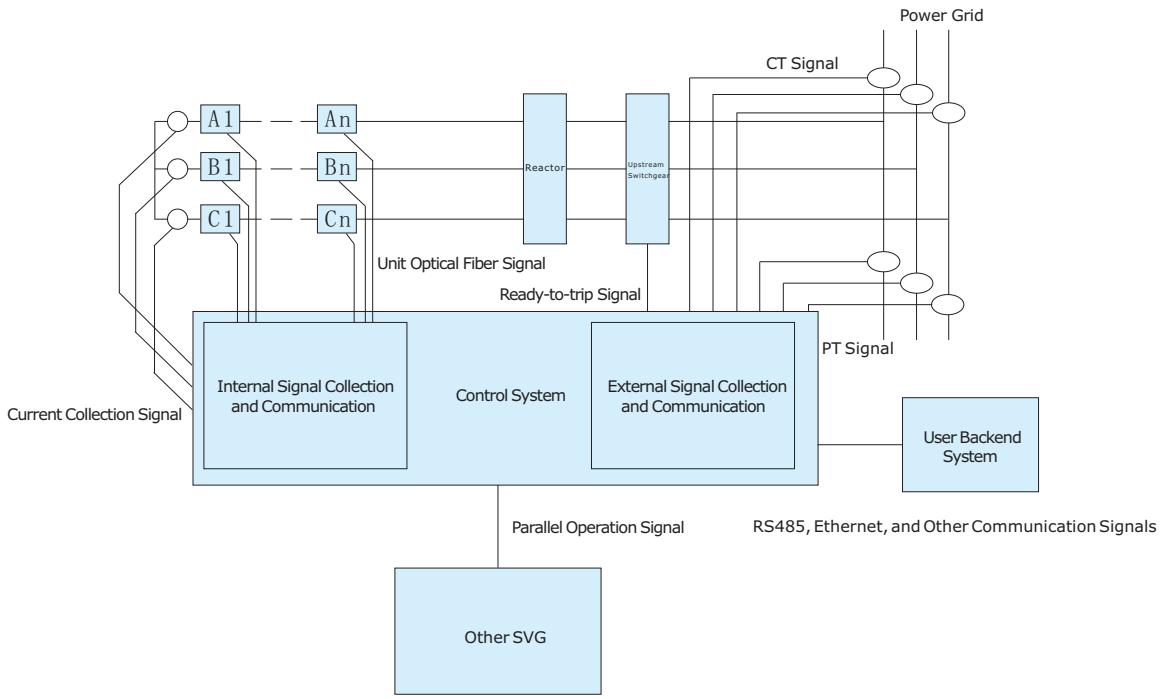
Category	Technical Parameters
Standard Power Supply	AC85265V/DC100375V
Operating Environment	-10℃-50℃，≤95%RH (non-condensing)
Storage Environment	-40℃-80℃，≤95%RH (non-condensing)
Temperature Measurement Range, Accuracy	-40℃60℃, ±1℃
Humidity Measurement Range	0-99%RH, ±3%RH
Wireless Temperature Sensor Power Supply	Lithium battery or online power supply option
Infrared Human Detection	>0.5m
Online Power Extraction Startup Current	Greater than 10A
Wireless Transmission Distance	Less than 10 meters
Passive Sensor Startup Current	5A or more (only for F8IC70P)
Contact Capacity	220VAC/5A
Dielectric Strength	Greater than AC2kV between housing and terminals
Electromagnetic Compatibility	Complies with GB/1726.8-2008
Dimensions	238x185mm
Cutout Dimensions	220x165mm

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HIGH VOLTAGE STATIC VAR GENERATOR

The High Voltage Static Var Generator (SVG) is a dynamic reactive power compensation system with IGBT as the core. It adopts modern technologies such as power electronics, automation, microelectronics, and network communication. By utilizing advanced instantaneous reactive power theory and the power decoupling algorithm based on synchronous coordinate transformation, it operates with the control objectives of preset reactive power properties and magnitude, power factor, and grid voltage. The system dynamically tracks changes in grid power quality, adjusts reactive power output, and provides continuous capacitive or inductive reactive power in real-time. It achieves constant reactive power, constant voltage, and constant power factor control at designated measurement points.

LSTC High Voltage LSHSVG products can be widely applied in various fields, including renewable energy sources such as wind power and photovoltaic, urban distribution networks, rural power supply grids, electrified railways, urban rail transit, as well as industries like petroleum, chemicals, mining, ports, heavy industry, steel, metallurgy, etc. They provide high-quality and highly reliable reactive power compensation solutions for equipment such as wind turbines, inverters, asynchronous motors, transformers, thyristor converters, hoists, cranes, stamping machines, welding machines, rolling mills, electric arc furnaces, induction furnaces, resistance furnaces, quartz melting furnaces, electric locomotives, and more.



LSHSVG Star Connection Structure Diagram

TECHNICAL DATA

- ◎ Rated Operating Voltage: 6kV±10% ~ 35kV±10%
- ◎ Assessment Point Voltage: 6kV±10% ~ 500kV±10%
- ◎ Input Voltage: 0.9 ~ 1.1pu
- ◎ Low Voltage Ride Through: 0pu (150ms), 0.2pu (625ms)
- ◎ High Voltage Ride Through: 1.2 ~ 1.3pu (configurable up to 1s)
- ◎ System Voltage Imbalance Protection: Setting range: 4% ~ 10%
- ◎ System Frequency: 50Hz/60Hz, allowing short-term fluctuations
- ◎ Reactive Power Output Range: Continuously adjustable within the range from inductive rated reactive power to capacitive rated reactive power
- ◎ Rated Operating Voltage: 6kV±10% ~ 35kV±10%

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HIGH VOLTAGE STATIC VAR GENERATOR

- Assessment Point Voltage: 6kV±10% ~ 500kV±10%
- Input Voltage: 0.9 ~ 1.1pu
- Low Voltage Ride Through: 0pu (150ms), 0.2pu (625ms)
- High Voltage Ride Through: 1.2 ~ 1.3pu (configurable up to 1s)
- System Voltage Imbalance Protection: Setting range: 4% ~ 10%
- System Frequency: 50Hz/60Hz, allowing short-term fluctuations
- Reactive Power Output Range: Continuously adjustable from inductive rated reactive power to capacitive rated reactive power
- Output Capacity: ±0.1Mvar ~ ±200Mvar
- Startup Power: ±5kW
- Compensation Current Resolution: 0.5A
- Power Loss: ≤0.8%
- Response Time: Full response time ≤5ms
- Overload Capacity: ≥120% (1 minute)
- Total Harmonic Voltage Distortion (Before Grid Connection): ≤5%
- Total Harmonic Current Distortion (THD) at Rated Power: THDi 3% when output is ⩾ 25% of SN
- Reactive Power Regulation Mode: Smooth, continuous automatic regulation between capacitive and inductive modes
- Power Supply: Dual power supply
- Control Power: 380VAC, 220VAC, or 220VDC
- Communication Interfaces: Ethernet, RS485, CAN, high-speed optical fiber communication interface
- Communication Protocols: MODBUS_RTU, ProfiBUS, CDT91 Power Protocol, IEC60870-5-104
- Operating Modes: Constant device reactive power mode, constant assessment point reactive power mode, constant assessment point power factor mode, constant assessment point voltage mode, with real-time adjustable target values
- Parallel Operation: Multi-machine parallel networking, multi-bus comprehensive compensation, and multi-group FC comprehensive compensation control
- Protection Functions: Bus overvoltage, bus undervoltage, LSHSVG overcurrent, drive failure, power unit overvoltage, overcurrent, unit overheating; protection input and output interfaces, and abnormal system power supply protection functions
- Fault Handling: Redundant design to meet N-1 operational requirements
- Cooling Method: Air cooling / Water cooling
- Protection Level: Indoor type IP30, outdoor type IP42
- Storage Temperature: -30℃ ~ +70℃
- Operating Temperature: Indoor type -10℃ ~ +40℃, outdoor type -25℃ ~ +40℃
- Relative Humidity: Monthly average ≤90% (25℃), no condensation
- Seismic Intensity: ≤8 degrees
- Altitude: <2000m (customization required for altitudes above 2000m)

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MODEL ILLUSTRATION

LSHSVG-D10/2.0/I/T3F

LSHSVG	: LSTC High Voltage SVG
D	: Direct-mounted as D
10	: Voltage Level (kV)
2.0	: Power Level (Mvar)
I	: Indoor type as I, Outdoor type is blank
T	: Delta type as T, Star type as Y
3	: Single-phase as 1, Three-phase as 3
F	: Air cooling as F, Water cooling as W

Explanation; The capacity (Mvar) represents the maximum rated adjustment capacity within the dynamic regulation range from inductive reactive power to capacitive reactive power. For example, D10/2.0 indicates a direct-mounted 10kV device with a capacity of 2Mvar. It can continuously and smoothly regulate reactive power within the range of 2000kvar (inductive) to 2000kvar (capacitive).

Product Specifications and Dimensions

6kV Product Specifications and Dimensions

Voltage Level	Cooling Method	Installation Type	Rated Capacity (Mvar)	Dimensions Width × Depth × Height (mm)	Weight (kg)	Reactor Type
6kV	Air Cooling	Indoor	1.0～2.0	3300×1400×2400	2290～2850	Iron Core Reactor
6kV	Air Cooling	Indoor	3.0	3400×1400×2400	3060	Iron Core Reactor
6kV	Air Cooling	Indoor	4.0～5.0	4800×1400×2400	3750～4260	Iron Core Reactor
6kV	Air Cooling	Indoor	6.0～7.0	3600×1400×2400	2750～3450	Air Core Reactor
6kV	Air Cooling	Indoor	8.0～12.0	5600×1400×2600	4600～5000	Air Core Reactor
6kV	Air Cooling	Outdoor	1.0～6.0	5200×2438×2560	6500	Iron Core Reactor
6kV	Air Cooling	Outdoor	7.0～12.0	6700×2438×2560	6450～7000	Air Core Reactor
6kV	Water Cooling	Indoor	1.0～9.0	5200×1400×2400	2550	Air Core Reactor
6kV	Water Cooling	Indoor	10～15	5800×1400×2400	2750	Air Core Reactor
6kV	Water Cooling	Outdoor	1.0～15.0	5800×2438×2591	7900～8900	Air Core Reactor

10kV Product Specifications and Dimensions

Voltage Level	Cooling Method	Installation Type	Rated Capacity (Mvar)	Dimensions Width × Depth × Height (mm)	Weight (kg)	Reactor Type
10kV	Air Cooling	Indoor	1.0~2.0	4500×1400×2600	2000～3150	Iron Core Reactor
10kV	Air Cooling	Indoor	3.0	4500×1400×2600	2000～3600	Iron Core Reactor
10kV	Air Cooling	Indoor	4.0	4500×1400×2600	2000～4000	Iron Core Reactor
10kV	Air Cooling	Indoor	5.0	4500×1400×2600	4500	Iron Core Reactor
10kV	Air Cooling	Indoor	6.0	3400×1400×2600	2500	Air Core Reactor

10kV Product Specifications and Dimensions

Voltage Level	Cooling Method	Installation Type	Rated Capacity (Mvar)	Dimensions Width × Depth × Height (mm)	Weight (kg)	Reactor Type
10kV	Air Cooling	Indoor	7.0~8.0	6900×1400×2600	6350	Iron Core Reactor
10kV	Air Cooling	Indoor	9.0~10.0	5600×1400×2600	4200	Air Core Reactor
10kV	Air Cooling	Indoor	11.0~12.0	5700×1400×2600	4200	Air Core Reactor
10kV	Air Cooling	Indoor	13.0~21.0	9500×1400×2600	7000~9200	Air Core Reactor
10kV	Air Cooling	Outdoor	0.5~0.9	3200×2350×2591	3000	Iron Core Reactor
10kV	Air Cooling	Outdoor	1.0~4.0	5500×2350×2800	6500~6950	Iron Core Reactor
10kV	Air Cooling	Outdoor	5.0~6.0	5500×2350×2800	6700~6950	Iron Core Reactor
10kV	Air Cooling	Outdoor	7.0~12.0	6700×2438×2560	6700~6950	Air Core Reactor
10kV	Air Cooling	Outdoor	13.0~21.0	9700×2438×2560	9000~9700	Air Core Reactor
10kV	Water Cooling	Indoor	1.0~10.0	5200×1400×2400	2850	Air Core Reactor
10kV	Water Cooling	Indoor	11.0~15.0	5800×1400×2400	3050	Air Core Reactor
10kV	Water Cooling	Indoor	16.0~25.0	8700×1400×2400	3850~4450	Air Core Reactor
10kV	Water Cooling	Outdoor	1.0~15.0	5800×2438×2591	8200~9200	Air Core Reactor
10kV	Water Cooling	Outdoor	16.0~25.0	9300×2438×2591	13000~15000	Air Core Reactor

35kV Product Specifications and Dimensions

Voltage Level	Cooling Method	Installation Type	Rated Capacity (Mvar)	Dimensions Width × Depth × Height (mm)	Weight (kg)	Reactor Type
35kV	Air Cooling	Indoor	8.0~21.0	14500×1800×2100	9550~10200	Air Core Reactor
35kV	Air Cooling	Indoor	22.0~42.0	26200×1800×2100	15580~19200	Air Core Reactor
35kV	Air Cooling	Indoor	43.0~70.0	47800×1800×2100	27000~32000	Air Core Reactor
35kV	Air Cooling	Indoor	71.0~80.0	52400×1800×2100	36000~72000	Air Core Reactor
35kV	Air Cooling	Outdoor	8.0~21.0	12700×2438×2591	11900~14300	Air Core Reactor
35kV	Air Cooling	Outdoor	22.0~42.0	25192×2438×2591	25000~27000	Air Core Reactor
35kV	Air Cooling	Outdoor	43.0~84.0	50384×2438×2591	50000~54000	Air Core Reactor
35kV	Water Cooling	Indoor	5.0~50.0	7400×7900×2600	9000~14000	Air Core Reactor
35kV	Water Cooling	Indoor	51.0~85.0	11500×7900×2600	15800~24000	Air Core Reactor
35kV	Water Cooling	Indoor	86.0~100.0	16000×7400×2600	18000~28000	Air Core Reactor
35kV	Water Cooling	Outdoor	5.0~26.0	14000×2350×2896	19000~23000	Air Core Reactor
35kV	Water Cooling	Outdoor	27.0~50.0	14000×2700×2896	27000~31000	Air Core Reactor
35kV	Water Cooling	Outdoor	51.0~100.0	28000×2700×2896	54000~62000	Air Core Reactor

Note:

1. The height of indoor air-cooled cabinets does not include the height of the fan (approximately 450mm).
2. The capacity (Mvar) represents the rated adjustment capacity within the dynamic regulation range from inductive reactive power to capacitive reactive power.
3. Equipment using air-core reactors without a reactor cabinet requires additional planning for placement space.
4. The above dimensions are for reference only. The company reserves the right to upgrade and improve the product, and any changes in product dimensions will not be notified separately.



6-10kV Indoor High-Voltage Model



35kV Outdoor Container Model



35kV Indoor Water-Cooled Delta Connection Model



Prefabricated Cabin Model

Product Structure

The product consists of four main parts: the control cabinet, the power cabinet, the reactor cabinet (if air-core reactors are used, this cabinet is omitted), and the cooling system. The power cabinet uses a modular design, facilitating capacity expansion and improving system stability. The main components and their functions within each cabinet are listed in the following table.

System Structure	Main Component Classification	Function
Control Cabinet	Switching Devices	Main circuit switching and disconnection
	Buffer Devices	Bus buffering during module charging
	Data Acquisition Devices	Digital and analog signal acquisition
	Controller Box	Data processing
	Logic Controller	Logical control
	Human-Machine Interface	Parameter setting, display, and waveform recording
	Secondary Power System	Power processing to ensure system stability
Power Cabinet	Power Units	Cascading signals into specific voltage amplitudes and phases
	Forced Air Cooling System/Water Cooling System	Forced cooling for module units

System Structure	Main Component Classification	Function
Reactor Cabinet	Reactor	Integration of reactive voltage source into the grid and current filtering
Water Cooling System	Water Cooling Control Cabinet	Providing power for water cooling circulation and real-time monitoring of the water cooling system operation
	Air-Water Heat Exchanger	Heat transfer medium enters the air-water heat exchanger, where forced air removes heat to achieve the purpose of heat exchange.

PRODUCT CHARACTERISTICS

High Performance

◎ Dynamic response speed is fast, response time ≤5ms

◎ Under rated conditions, output current harmonic distortion (THD) ≤3%

◎ Carefully designed LSHSVG circuit parameters ensure low heat generation, high efficiency, and low operating costs

◎ The main circuit adopts an H-bridge power unit chain-type series structure with IGBT, where each phase consists of multiple identical power units. The entire output is formed by a PWM waveform superimposed into a stepped wave that approaches a sine wave. After output reactor filtering, the sine wave quality is excellent.

◎ Comprehensive protection functions, including overvoltage, undervoltage, overcurrent, unit overheating, uneven voltage distribution, and fault waveform recording for fault identification and maintenance, ensuring high reliability

Ease of Operation

◎ User-friendly human-machine interface. External communication supports RS485, Ethernet, and standard Modbus protocol. It provides real-time digital and analog displays, running history event records, historical curve queries, unit status monitoring, system information inquiries, and historical fault queries. It also supports system self-check after power-on, one-key start/stop, time-based control, oscilloscope function (AD channel forced waveform recording), and fault voltage/current waveform recording.

◎ Multiple operating modes meet user needs, including constant device reactive power mode, constant assessment point reactive power mode, constant assessment point power factor mode, and constant assessment point voltage mode, with real-time target value adjustments.

◎ LSHSVG design includes interfaces for collaboration with FC systems, enabling effective integration of fixed and dynamic compensation, providing users with economical and flexible solutions.

◎ Supports parallel installation for easy capacity expansion. Parallel operation uses optical fiber communication, providing fast communication speed to meet real-time compensation requirements.

Ease of Maintenance

◎ Redundant design ensures high system reliability and ease of maintenance.

◎ Modular design of power circuits simplifies maintenance and provides good interchangeability.

◎ No transient impact or inrush current during switching.

High/Low Voltage Ride Through - Fearless in Extremes

◎ During momentary dips or surges in the main power grid voltage or large load switching in the factory grid, the SVG quickly resumes normal operation within the allowable range of national standards without manual intervention after the grid recovers. This enhances adaptability to different depths of grid voltage dips from U0 (100%-0%).

Voltage Flicker and Fluctuation Suppression

◎ Rapid load changes can cause voltage fluctuations and flicker, such as in arc furnaces, rolling mills, or oxygen plant turbine compressors. SVG can quickly provide changing reactive current according to grid voltage fluctuations to compensate for load-induced voltage fluctuations and flicker.

INTELLIGENT POWER METER

The LSIN series is a self-developed, intelligent multifunctional power meter by our company. It features programmable settings, automated measurement, LCD display, energy accumulation, harmonic measurement, event recording, digital input (remote signaling), digital output (remote control), and digital communication. The product adopts advanced microprocessor and digital signal processing technologies, integrating digitalization, intelligence, and networking into one. It boasts superior performance, high measurement accuracy, attractive design, and strong electromagnetic compatibility, fully replacing traditional analog and digital meters. It also serves as a terminal component in power monitoring systems, enabling remote data acquisition and monitoring. Additionally, the LSIN series offers flexible I/O functionality to meet the application needs of distributed RTUs, integrating remote signaling, remote measurement, remote adjustment, and metering.



Application Fields

· Switchgear · Power distribution systems · Panel control · Energy management systems · Building control systems · Power station monitoring systems · Process control systems · Distribution boxes

Model Description

LSIN–L3SR

LSIN	:	Instrument Series	
		LSIN9 — LSTC LSIN Series Intelligent Power Meter (96×96)	
		LSIN7 — LSTC LSIN Series Intelligent Power Meter (72×72)	
		LSIN4 — LSTC LSIN Series Single-phase Power Meter (48×48)	
L	:	Display Type	
		L — LCD Display	N — Segment Display
3	:	Phase Code	
		3 — Three-phase	1 — Single-phase
S	:	Function Code	
		A — Current	K — Current + Voltage + Active Power + Power Factor
		B — Voltage	M — Active Energy + Reactive Energy
		C — Active Power	N — Current + Active Energy
		D — Frequency	P — Current + Voltage + Active Energy + Reactive Energy
		E — Power Factor	Q — Full Functions
		F — Active Energy	S — Full Functions + Harmonics
		G — Reactive Power	T — Full Functions + Time-sharing
		J — Current + Voltage	W — Full Functions + Harmonics + Time-sharing
R	:	Auxiliary Function	
		/K — Digital Input	/J — Relay Output
		/M — Analog Output	/R — RS485 Communication Function

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Operating Conditions

- Altitude: ⩽2000m
- Operating Temperature Range: -10℃+60℃
- Storage Temperature Range: -40℃+85℃
- Relative Humidity: 5~95%, no condensation
- No harmful gases or flammable/explosive substances in the surrounding environment

Technical Data

Performance			Parameters		
			LSIN-9	LSIN-7	LSIN-4
Input Signal	Voltage	Network	Three-phase four-wire (three-phase three-wire) / Single-phase		
		Rated Value	AC100V, 400V		
		Overload	Long-term overload 1.2 times; short-term overload 2 times (60s)		
		Power Consumption	<1VA (per phase)		
		Impedance	>300kΩ		
		Accuracy	True RMS measurement, accuracy class 0.2		
	Current	Rated Value	AC1A, 5A		
		Overload	Long-term overload 1.2 times; instantaneous overload 10 times (5s)		
		Power Consumption	<0.4VA (per phase)		
		Impedance	>200mΩ		
		Accuracy	True RMS measurement, accuracy class 0.2		
Measurement Display		Frequency	40~55Hz, accuracy 0.05Hz		
		Power	Active, reactive, apparent power, accuracy class 0.5		
		Energy	Four-quadrant metering, active accuracy class 0.5, reactive accuracy class 1.0		
		Display	Segment display (LCD display), content can be switched or displayed in a loop		
Working Power Supply		Working Range	AC 85V~265V / DC 90~300V		
		Power Consumption	⩽5VA		
Extended Functions		Communication Interface	RS485, MODBUS-RTU protocol		
		Switching Signal Interface	DI passive dry contact input, DO output (DO can be set for limit alarm output)		
		Pulse Output	Energy pulse output		
		Transmitter Output	DC 4~20mA, class 0.5		
Safety		Withstand Voltage	Input, output, and power >2kV		
		Insulation	Input, output, and power to the casing >100MΩ		
Installation		Dimensions (H×W)	96×96mm	72×72mm	48×48mm
		Panel Opening Dimensions	91×91mm	67×67mm	45×45mm

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PRODUCT COMPARISON

FUNCTION \ MODEL		LSIN9-L□	LSIN9-N□	LSIN7-L□	LSIN7-N□	LSIN4-N□
MEASUREMENT FUNCTION	Voltage	√	√	√	√	√
	Current	√	√	√	√	√
	Power Factor	√	√	√	√	
	Frequency	√	√	√	√	
	Active Power	√	√	√	√	
	Reactive Power	√	√	√	√	
	Active Energy	√	√	√	√	
	Reactive Energy	√	√	√	√	
	Harmonics	√	√			
EXPANDED FUNCTION	Time Segmentation	√	√			
	Analog Output (AO)	√	√	√	√	√
	Relay Output (DO)	√	√	√	√	
	Digital Input (DI)	√	√	√	√	
	Communication RS485	√	√	√	√	√
INSTALLATION	Display Mode LC	LCD	LED	LCD	LED	LED
	Dimensions 96	96×96	96×96	72×72	72×72	48×48

INSTALLATION METHOD

	LSIN9	LSIN7	LSIN4
Height × Width × Depth	96×96×86mm	72×72×86mm	48×48×86mm
Installation Type	Cabinet Front Installation		
Display Screen Type	Segment Display, LCD Display		Segment Display
Terminal Type	Fixed Measurement Input, Other Pluggable Type		

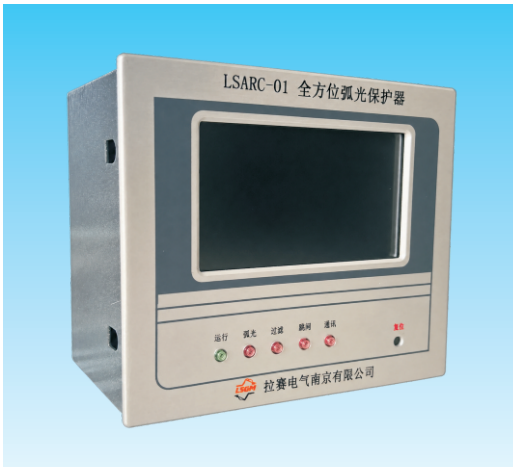
ARC FLASH PROTECTION DEVICE

Causes and Hazards of Arc Flash

Due to various factors such as increased system capacity in medium and low voltage networks, expanded cable applications, system resonance overvoltage, insulation failures, poor current-carrying circuits, and human operational errors, arc flash short-circuit faults in switchgear frequently occur. Arc faults inside switchgear rapidly increase both pressure and temperature, with the core arc temperature reaching approximately 20,000℃, which is 3 to 4 times the surface temperature of the sun. If not promptly eliminated, the arc can ignite components inside the switchgear, leading to fires, extensive damage to power distribution equipment, and even destruction of DC systems, causing severe losses and major casualties.

The severity of arc flash hazards depends on arc current magnitude and clearance time. The energy released by an arc follows an exponential increase with time. If an arc burns for more than 100ms, the released energy escalates rapidly, causing catastrophic effects on switchgear, cables, busbars, and steel components. However, current medium and low-voltage bus protection relies on transformer backup overcurrent protection, with operating times as long as 1.0 to 2.0 seconds. Even with feeder overcurrent protection, typical operating times range from 300ms to 500ms. By the time the circuit breaker trips, the switchgear is often completely destroyed.

According to national standards, Type I and Type II transformers have a dynamic stability time of 0.25s, whereas medium and low-voltage bus fault clearing times typically exceed 0.25s. This prolonged exposure to high short-circuit fault currents can cause mechanical deformation of transformer windings, often requiring winding replacement, leading to significant consequences and losses.



Arc Flash Protection System Solution

To address these technical challenges, LSTC Electric has developed the LSARC Arc Flash Protection System, a fast protection system for medium and low-voltage busbars and switchgear faults. This system utilizes LSTCa's proprietary arc detection probe as the core technology, combined with current detection, forming a dual-criterion detection method based on light and current analysis. By integrating arc detection, high-speed data transmission, fiber optic communication, and large-scale hardware programming, the system precisely detects arc flash signals, achieving a tripping response time of less than 4ms, effectively eliminating faults at an early stage and ensuring rapid protection for medium and low-voltage busbars.

MAIN FEATURES

Rapid Protection: Enables fast protection for medium and low voltage busbars and internal switchgear faults.

Selectivity: The arc protection system integrates arc protection with high-speed communication technology, incorporating features of arc protection, failure protection, and current protection, forming a selective and rapid protection system.

Reliability: Excellent electromagnetic compatibility performance. The arc sensor adopts a passive design, with all units connected via optical fiber. The arc signal is transmitted through optical fiber into the arc acquisition unit, where the photoelectric conversion occurs. The entire system has passed national and IEC highest-level electromagnetic compatibility tests, making it suitable for complex electromagnetic environments.

Dual Criteria: The arc protection system operates based on both arc and current criteria. The system can be set to detect only the arc or both arc and overcurrent simultaneously. The detection intensity and current threshold can be adjusted based on real-time operating conditions, further improving device reliability.

Sensitivity: The LSARC series arc protection system features spectrum recognition capability, accurately identifying the characteristic spectrum of arc light. It effectively distinguishes between sunlight reflections, lighting, maintenance flashlight beams, and other light sources in daily operation, preventing interference with the arc protection system and improving sensitivity.

Fast Response: Users can choose between electromagnetic relays and solid-state relays for outputs. The response time is ⩽8ms for electromagnetic relays and ⩽4ms for solid-state relays, significantly faster than traditional busbar protection.

Data Interface: Supports up to two Ethernet ports or two CAN bus ports, can be integrated with GPS time synchronization via IRIG-B format or pulse mode. Communication protocols support IEC 61850-9-2(SMV) and GOOSE high-speed communication, meeting digital substation requirements and adapting to the future development of smart grids.

SYSTEM SOLUTION

The LSARC series arc protection system adopts a modular design, making it suitable for various applications. It can form a simple system with only one main control unit or a complex system with multiple units for selective arc protection.

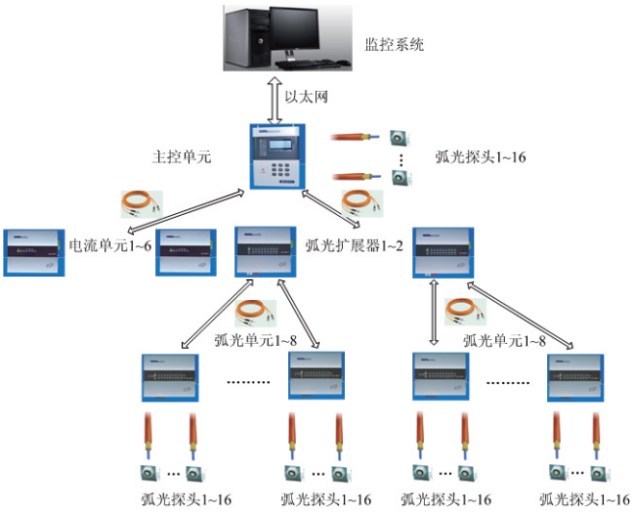
The system network structure uses an optical fiber star connection. Single-mode communication optical fibers connect the main control unit with current units, arc units, arc extenders, and arc detection units. The main control unit and arc sensors, as well as arc units and arc sensors, are connected using dedicated optical fibers.

This system communicates with the in-station monitoring system through the main control unit, enabling seamless integration into automation systems.

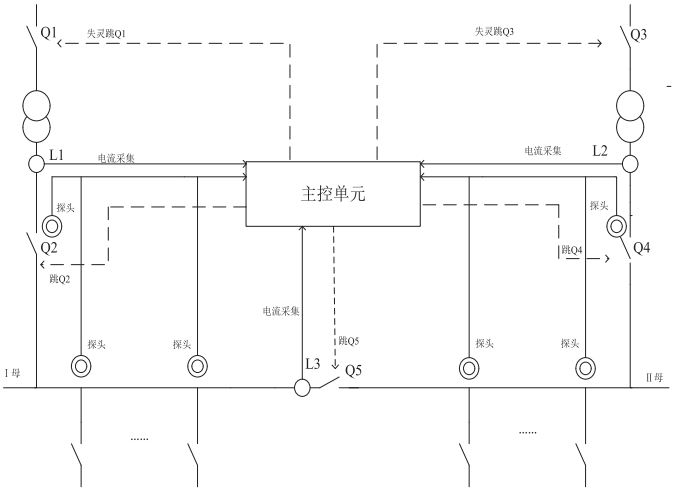
BUSBAR PROTECTION SOLUTION

Arc protection provides fast protection for medium and low-voltage busbar faults.

System Configuration Diagram



Busbar Protection System Configuration Plan



Typical Application Example of Busbar Protection System

SYSTEM PRINCIPLE DESCRIPTION

For low-voltage circuit breakers and feeder switches in busbar chambers, all other compartments on the busbar (PT cabinets, isolation cabinets, etc.) belong to the busbar protection scope. Arc sensors are installed in each compartment and directly or via extenders are connected to the main control unit. The main control unit directly or via current units sends trip signals to the low-voltage sectioning switch. The CT of the main transformer or sectioning switch is connected to the main control unit, either directly or via the current unit.

The system logic divides protection zones based on busbar segments, associating arc sensors with the power inlet and bus-tie switch connected to that segment. When both arc and current detection criteria are met, only the switch at the current sampling point is tripped, ensuring selective busbar fault isolation. The arc sensors on the busbar are directly connected to the main control unit. If an arc is detected, and current criteria are met, the main control unit will immediately trip the main transformer's low-voltage side switch or sectioning switch.

If the arc protection system trips the power source switch but the fault is not cleared within the set time, the arc failure protection is activated, which trips the upstream switch of the power source.

When the system is operating in a split-bus mode, if the arc sensor on the working bus detects an arc and the current detection criteria for Transformer #1 are met, the working bus arc protection will trip Transformer #1's low-voltage side switch to isolate the fault. Similarly, if the arc sensor on the working bus detects an arc and the current criteria for Transformer #2 are met, the arc protection will trip Transformer #2's low-voltage side switch, isolating the fault.

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When the system is operating in a parallel-bus mode, with Transformer #1 supplying both busbar sections, if an arc is detected on Busbar #1 and the current detection criteria for Transformer #1 are met, Busbar #1's arc protection will trip Transformer #1's low-voltage side switch. Because there is no power current flowing through the sectioning switch to the fault point, the sectioning switch arc protection does not activate. If an arc is detected on the working bus, the fault current flows from Transformer #1 through the sectioning switch to the fault point. Since the current detection criteria for both Transformer #1 and the sectioning switch are met, the sectioning switch's arc protection is activated, tripping the sectioning switch and isolating the working bus fault, while Busbar #1 continues operation, ensuring selective fault clearing.

The same logic applies when Transformer #2 supplies both busbar sections.

For operational flexibility, each busbar section can be configured with a separate main control unit. Each unit will manage all arc sensors and power current detection points on its respective busbar segment, creating independent arc protection systems for each busbar section. This configuration simplifies system maintenance and operation.

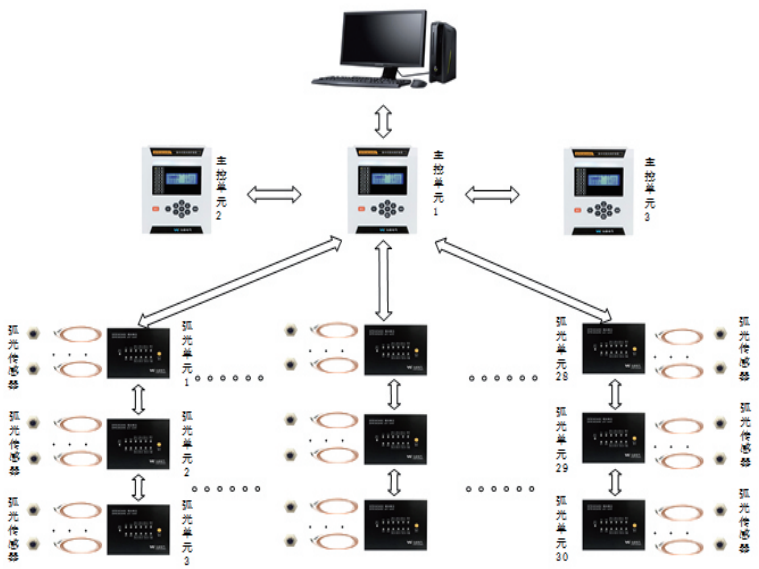
CONFIGURATION AND FUNCTION OF EACH UNIT

Model	Device Name	Function Description
LSARC-01	Digital Arc Protection Device	The system's main control unit is responsible for input acquisition, measurement, calculation, and logical judgment. It implements various protection logic functions, communicates with the station monitoring system, performs self-diagnosis, and handles other auxiliary functions.
LSARC-U1	Arc Unit	If the main control unit's probe interfaces are insufficient, an arc unit can be used. It is installed near the location requiring protection, and only a standard single-mode communication optical cable is needed from the arc unit to the main control unit.
LSARC-U2	Arc Unit	The feeder unit uses an arc relay, capable of collecting current and arc signals and providing outputs to reflect line faults.
LSARC-D1	Arc Probe	LSARC-D1 Arc Probe installed in each compartment of the switchgear. It detects sudden increases in light intensity during arc faults and transmits the optical signal to the arc unit or main control unit via a dedicated optical fiber.

FAST PROTECTION SOLUTION FOR INTERNAL SWITCHGEAR FAULTS

For well-sealed switchgear, arc detection points are installed in the busbar compartment, switch compartment, and cable compartment to locate fault positions and achieve fast protection for internal switchgear faults.

System Configuration Diagram



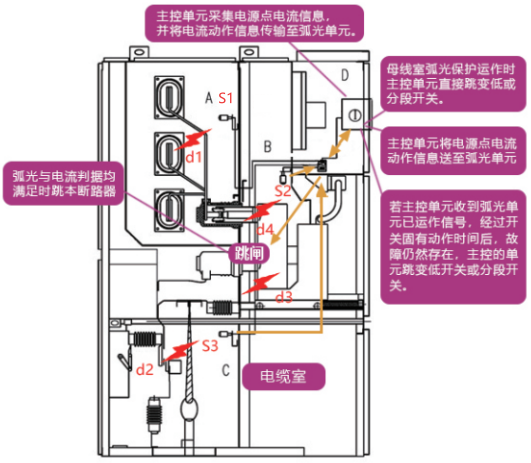
Typical Application Diagram for Fast Protection of Internal Switchgear Faults

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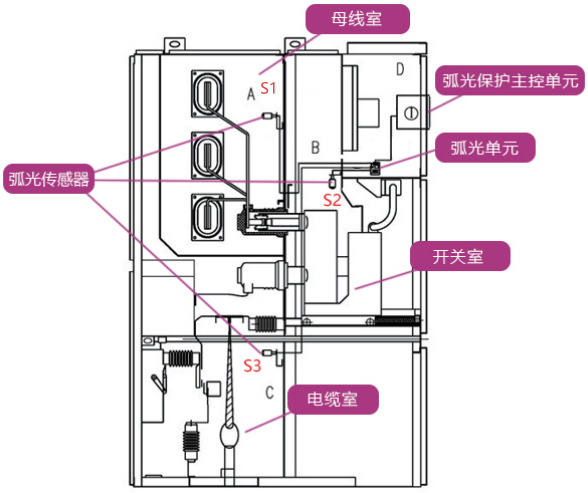
SYSTEM PRINCIPLE DESCRIPTION

The system is designed for enclosed switchgear and enables selective arc protection in bus compartments, switch compartments, and cable compartments. In low-voltage switches and feeder switches, other busbar compartments (such as PT cabinets and isolation cabinets) fall within the scope of bus protection. Each compartment is equipped with an arc sensor, which is connected directly or via an extension module to the main control unit, as shown in Figure 4 for bus compartment S1 arc sensor installation.

Each feeder unit and bus-tie switch switchgear compartment is equipped with an arc unit. The switch compartment and cable compartment are respectively equipped with arc sensors that are connected to the arc unit, as shown in the right diagram for switch compartment S2 and cable compartment S3 arc sensor installation. The main control unit directly trips the transformer low-voltage side switch and sectionalizing switch, while the arc unit directly trips the local unit switch. The transformer low-voltage side and sectionalizing switch CTs are connected directly or via the acquisition unit to the main control unit.



TYPICAL APPLICATION DIAGRAM FOR RAPID SWITCHGEAR INTERNAL FAULT PROTECTION



EXAMPLE OF SWITCHGEAR INTERNAL FAULT PROTECTION LOGIC

Based on the logical division of busbar areas, if a fault occurs at position d1 within the bus protection range, the bus compartment arc sensor S1 detects the arc action, and if the current criteria are met, the main control unit will rapidly trip the transformer low-voltage side switch and the sectionalizing switch according to the preset logic.

The arc unit and the main control unit communicate bidirectionally via fiber optics. Depending on the operating mode, the main control unit sends the transformer low-voltage or bus-tie current action status to the arc unit.

If a fault occurs at position d2 or d3 within the feeder switch protection range, the arc unit will detect arc activity from switch compartment arc sensor S2 and cable compartment arc sensor S3. If the current criteria are met, it will directly trip the corresponding switch. Simultaneously, the arc unit will send a fault signal (failure signal) to the main arc control unit.

If a fault occurs at position d4 at the breaker contact, and the arc unit detects arc action from switch compartment arc sensor S2, it will trip the local switch. If the breaker fails to clear the fault and the main control unit receives the arc unit action signal, after a preset delay of 50–150ms (adjustable), and if the source point phase current, negative-sequence current, or zero-sequence current meets the criteria, the main control unit will trip the transformer low-voltage side switch and the sectionalizing switch to provide failure protection.

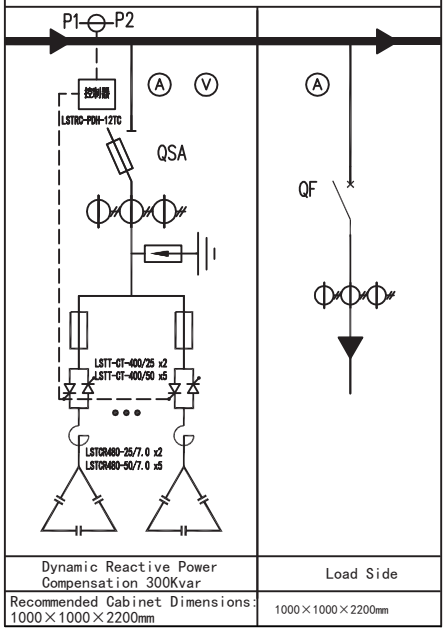
By coordinating the main control unit and arc units, the system designed to provide fast protection for all specified protection zones and enabling selective fault isolation to minimize power outages.

UNIT CONFIGURATION AND FUNCTIONS

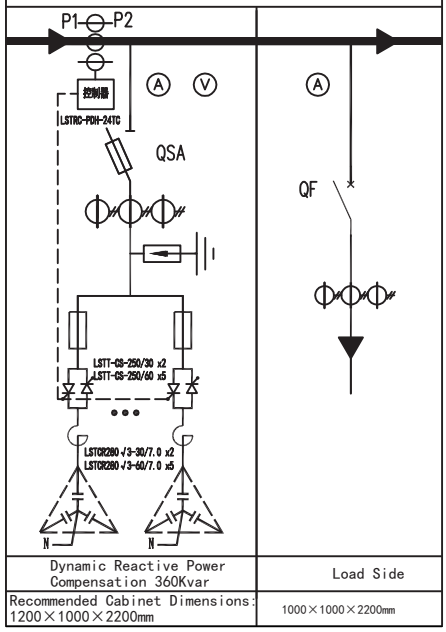
Model	Device Name	Function Description
LSARC-M1	Main Control Unit	If the main control unit lacks sufficient probe interfaces, an arc unit can be used. It is installed near the protected area and connects to the main control unit using a single pair of standard single -mode communication fiber optics.
LSARC-U	Arc Unit	Collects arc information and performs local tripping of circuit breakers. Can be installed in the feeder metering compartment.
LSARC-D1	Arc Sensor	Installed in each compartment of the switchgear, the light-sensitive element detects sudden increases in light intensity when an arc fault occurs and transmits the signal via dedicated optical fiber to the arc unit or main control unit.

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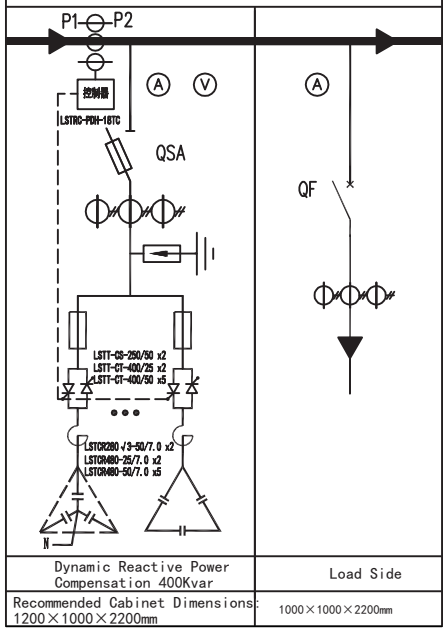
Dynamic Reactive Power Compensation Single-Line Diagram (Common Compensation)



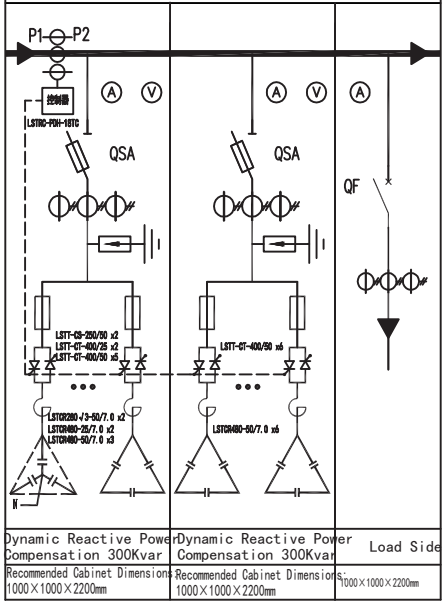
Dynamic Reactive Power Compensation Single-Line Diagram (Phase Compensation)



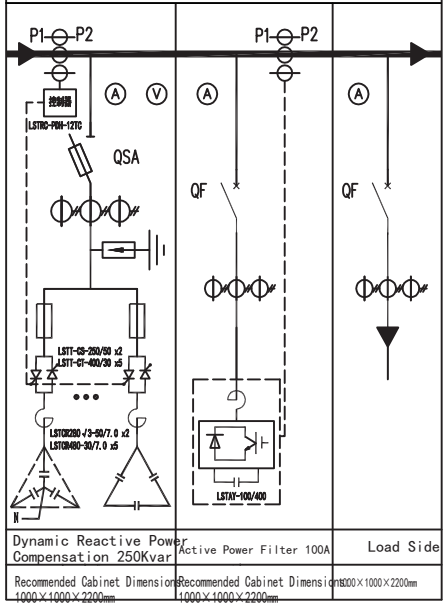
Dynamic Reactive Power Compensation Single-Line Diagram (Hybrid Compensation)



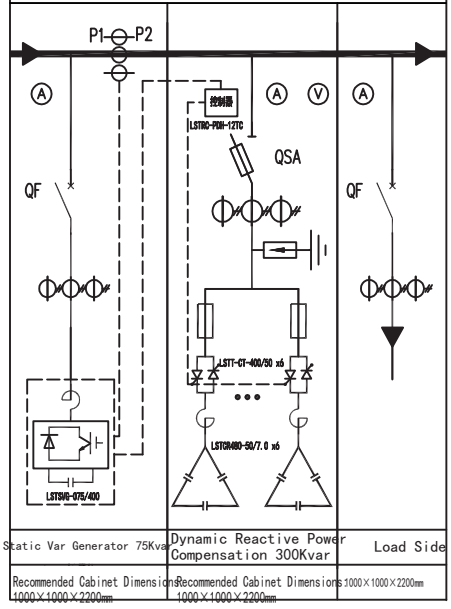
Dynamic Reactive Power Compensation Single-Line Diagram (Main and Auxiliary Cabinets)



Passive Filtering Compensation + Active Power Filter (APF) Single-Line Diagram



Static Var Generator (SVG) + Dynamic Reactive Power Compensation Single-Line Diagram





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