





公司简介 Corporate Overview

山东哈大电气有限公司成立于1999年6月，位于美丽的海滨城市烟台，专业生产阻波器及各类空心电抗器、铁心电抗器。

作为国内最早的电气设备研发制造企业之一，长期以来一直致力于高端电气设备的研发。产品覆盖高压、超高压领域，技术达到国内领先水平。

哈大电气产品已广泛应用于输配电、冶金、电气化铁路、市政工程、海上风电、太阳能、蓄水等新能源行业。同时，哈大电气已成为韩国、马来西亚、墨西哥、菲律宾、埃及等国家电网的主要供应商，产品已服务全球70多个国家。

哈大电气厂房占地26000平方米，配备高精度自动绕线机及检测设备，目前年生产能力达4000万美元。能对阻波器及各种空心、铁心电抗器进行出厂试验。我们的产品符合中国国家标准和IEC标准，并可按美国国家标准或其他国家标准设计和制造产品。

未来，哈大电气将一如既往地致力于电能质量的提升和人类资源的保护，为社会的可持续发展做出贡献。

Shandong Hada Electric Co., Ltd. founded on June, 9.1999, located in Yantai, China, a beautiful coastal city, specialized in producing line trap and all kinds of air-core reactor and iron-core reactor.

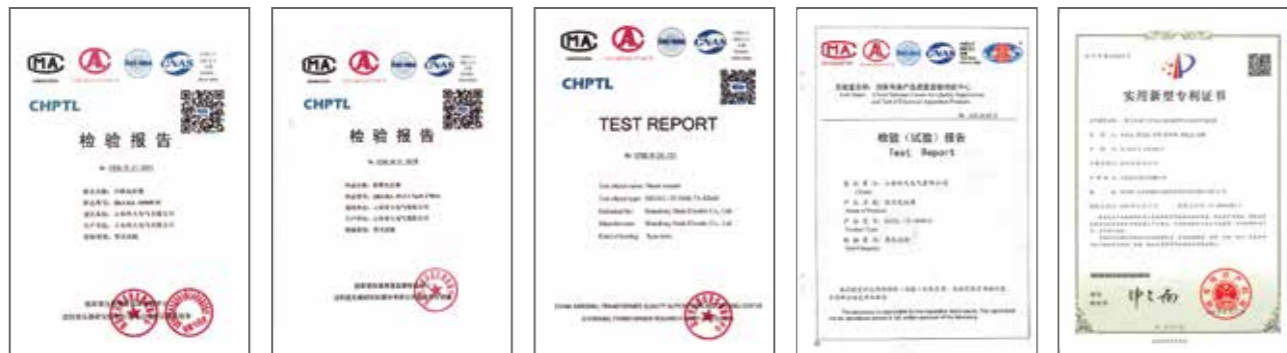
As one of the first electric equipment R & D and manufacturing enterprises in China, it has been committed to the development and research of high-end electric equipment for a long time. Its products cover the fields of high voltage and ultra-high voltage, and its technology has reached the leading level in China.

Hada Electric products have been widely used in power transmission and distribution, metallurgy, electrified railway, municipal engineering, offshore wind power, solar, water storage and other new energy industries. At the same time, Hada Electric has become a major supplier of national power grid in South Korea, Malaysia, Mexico, the Philippines, Egypt and other countries, and the products have been serviced in more than 70 countries worldwide.

Hada Electric workshop covers 26000 square meters which is equipped with high precision auto winding machines and inspection equipment, currently annual capacity reaches to 40million USD. Able to do routine test for line trap and all kinds of air-core and iron-core reactor. Our products comply with the national standard of China and IEC standard, besides, we can design and manufacture the products according to the ANSI standard or the standards of other countries.

In future, Hada Electric will always devote to power quality improving and human resources protecting, make a contribution to social sustainable development.


资质证书 Qualification Certificate



开放式阻波器XZK-4000-0.5/63-H6
在荷兰KEMA试验站完成全部型式试验，
并取得试验证书。

Open type line trap XZK-4000-0.5/63-H6 passed
all the type tests in KEMA lab Netherlands and the
test certificate has been obtained.





KEMA TYPE TEST CERTIFICATE OF COMPLETE TYPE TESTS

Object	A single-phase air-cooled line trap	2268-21	
Type	XZK-4000-0.5/63-H6	Serial No. 210530001	
Rated inductance	0.5 mH	Rated voltage	420 kV
Rated continuous current	4000 A	Rated short-time withstand current	63 kA
Rated power frequency	50 Hz		

Manufacturer Shandong Hada Electric Co., Ltd.,
No. 16, Wuhan Str, YEDA, Yantai, Shandong, China *)
Client Shandong Hada Electric Co., Ltd.,
No. 16, Wuhan Str, YEDA, Yantai, Shandong, China
Tested by KEMA B.V.,
Klingelbeekseweg 195, Arnhem, The Netherlands
Date of tests 21 to 30 July 2021

The object, constructed in accordance with the description, drawings and photographs incorporated in this Certificate, has been subjected to the series of proving tests in accordance with the complete type test requirements of

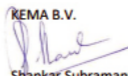
IEC 60353:1989

This Certificate has been issued by KEMA Labs following exclusively the STL Guides and Procedures.

The results are shown in the record of proving tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above standard and to justify the ratings assigned by the manufacturer as listed on page 6.

This Certificate applies only to the object tested. The responsibility for conformity of any object having the same type references as that tested rests with the Manufacturer.
*) as declared by the manufacturer

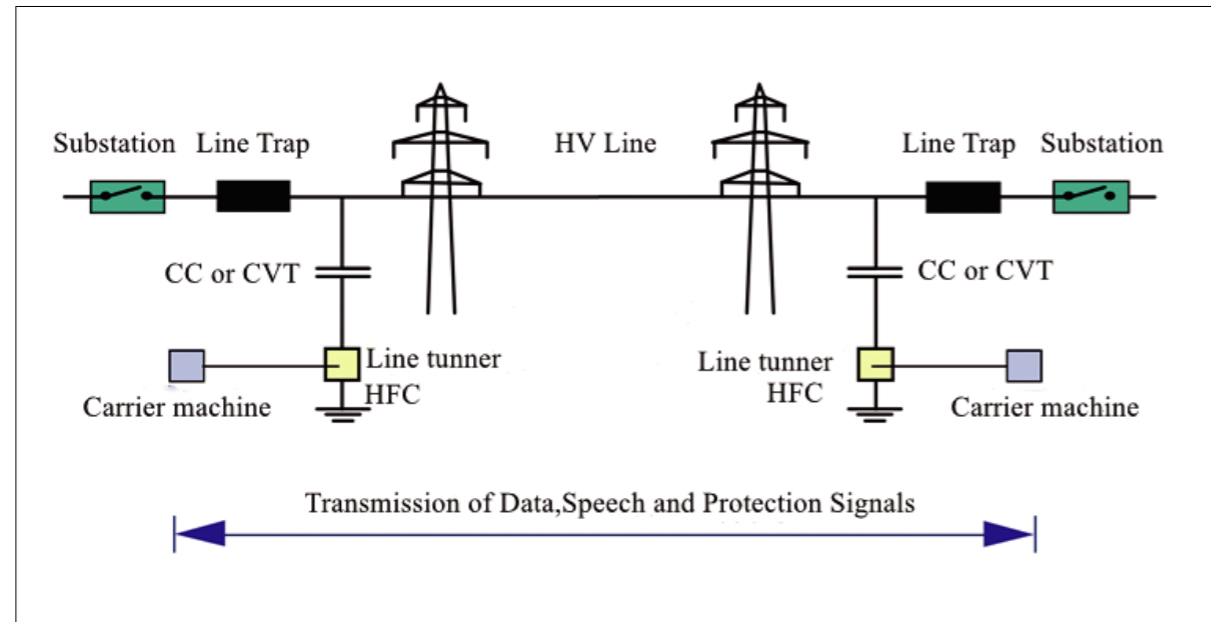
This Certificate consists of 66 pages in total.


KEMA B.V.
 Shankar Subramany
 Director, High-Power
 Laboratory
 Arnhem, 8 September 2021

Copyright: Only integral reproduction of this Certificate is permitted without written permission from KEMA Labs, a CESI brand. Electronic copies as PDF or scan of this Certificate may be available and have the status "for information only". The sealed and bound version of the Certificate is the only valid version.

电力线载波通信系统主要由电力线载波机、电力线路和耦合装置构成。其中耦合装置包括线路阻波器、耦合电容器、结合滤波器（又称结合设备）和高频电缆，与电力线路一起组成电力线高频通道。

The power line carrier communication system is mainly composed of power line carrier machines, power lines and coupling device. The coupling device includes line trap, coupling capacitor, Line tuner(also known as combined equipment) and high-frequency cable, which together with power lines form a power line high-frequency channel.

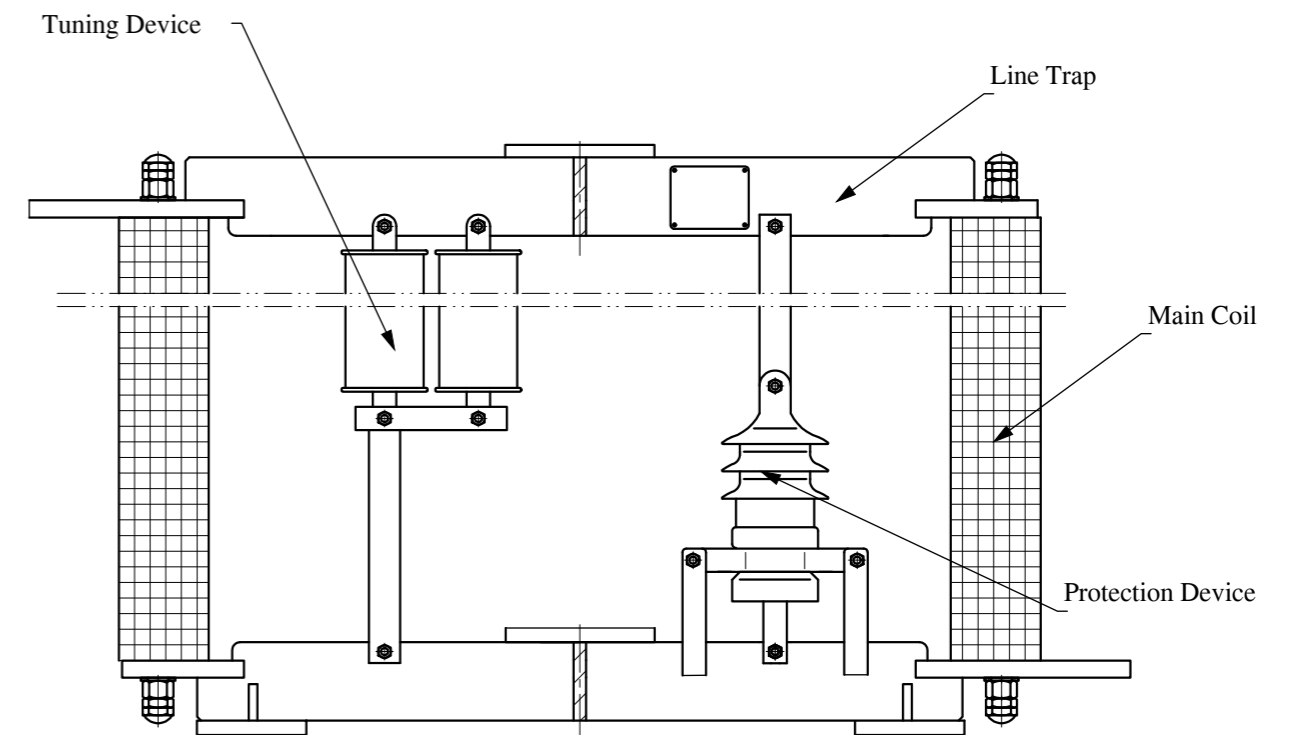


XZK-H型阻波器 XZK-H Type Line Trap

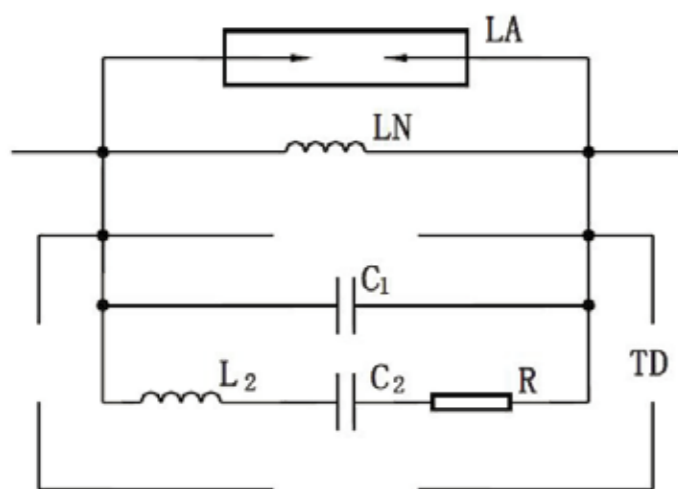
阻波器一般由电感形式的主线圈、调谐装置以及保护元件组成（当用于超高压电力系统时还应配备均压屏蔽环）。串接在高压或超高压输电线中载波信号连接点与相邻的电力系统元件（如母线、变压器等）之间。跨接于主线圈的调谐装置，经适当调谐，可使阻波器在一个、多个载波频率点或连续的载波频带内呈现较高的阻抗。用以防止频率一般在30kHz-500kHz范围内的载波信号在电力系统各种条件下发生过度损耗，并使来自邻近载波的干扰降至最小。

The line trap consists of the main coil in the form of inductor, the tuning device and protective device (with corona rings equipped for ultra-high voltage power systems). And it is inserted into a high or ultra-high voltage power transmission line between the point of connection of carrier-frequency signals and adjacent power system elements (such as busbar, transformer, etc.). The tuning device connected across the main coil, with proper adjustment, ensures that the line trap presents a relatively high impedance at one or more carrier-frequencies of within the carrier-frequency bands.

Prevent undue loss of carrier signal power, typically in the range 30 kHz to 500 kHz, under all power system conditions and to minimize interference from carrier signalling systems on adjacent transmission lines.



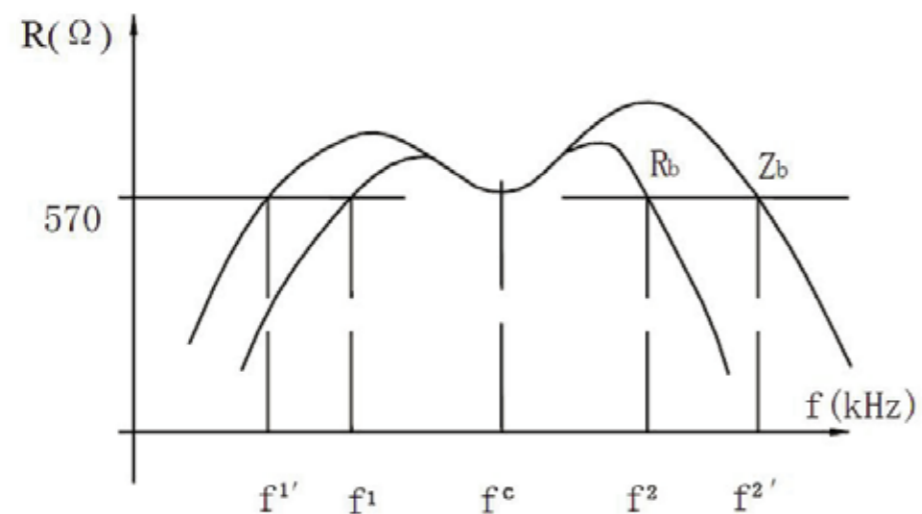
阻波器等效电路 Equivalent Circuit of Line Trap



LA : 保护装置 Protection Device
 LN : 主线圈 Main Coil
 TD : 调谐装置 Tuning Device
 C1、C2 : 电容器 Capacitor
 L2 : 副线圈 Secondary coil
 R : 电阻 Resistance

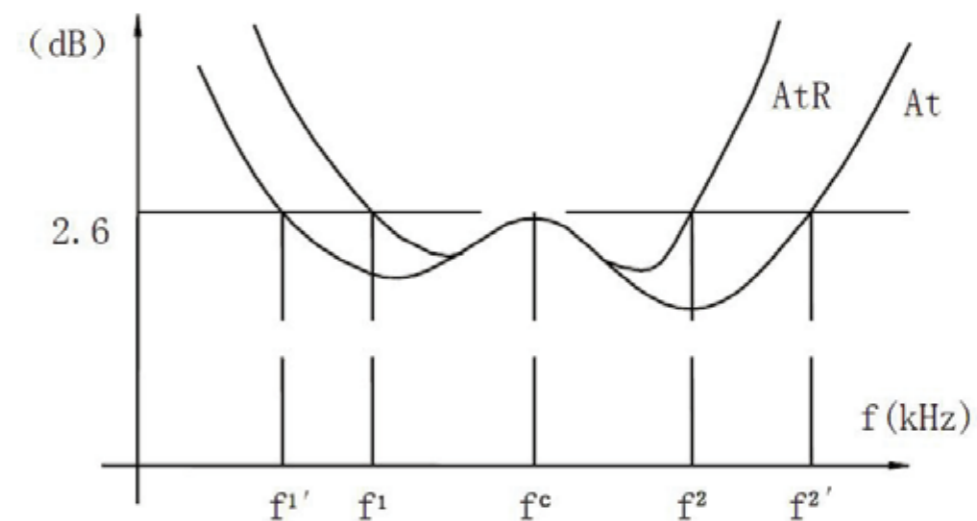
频带调谐阻波器阻塞特性曲线

Characteristic Curves of The Wide-band Tuned Line Traps



以阻塞电阻和阻塞阻抗为基准的分流损耗特性曲线

Characteristic Curves of Resistance and Impedance Tapping Loss



工作条件 Service Conditions

- 正常工作条件 Regular service conditions
 - 使用地点: 户外 Service site: Outdoors
 - 海拔高度: 不大于 3000m Altitude: up to 3000m above sea level
 - 环境温度: -40°C — $+40^{\circ}\text{C}$ Environment Temperature: -40°C to $+40^{\circ}\text{C}$
 - 工作频率: 50Hz/60Hz Power frequency: 50Hz/60Hz
 - 污秽等级: 无破坏性气体或过量的粉尘。 Pollution level: non-harmful gas or excess dust
- 特殊条件: 凡超出以上正常工作条件范围的异常工作条件,均可由顾客与我厂协商确定。
 Special conditions: For unusual service conditions, special agreement should be made between the manufacturer and purchaser.

产品型号说明 Product Model and Meanings

XZK-4000-0.5 / 63-H 6

- 设计序号 design serial number
- 厂家代号 H : manufacturer code
- 额定短时电流(kA) short-circuit current(kA)
- 额定电感(mH) rated inductance (mH)
- 额定电流(A) rated current(A)
- 开放式阻波器 open type line trap

供货范围 Supply Scope

- 采用标准: IEC60353:1989 Executive standard; IEC60353:1989
 - 标准供货范围 Standard supply scope
 - 悬挂式产品: 阻波器、吊环、均压屏蔽环
For suspension: Line trap, Lifting rings, Corona ring
 - 座式产品: 阻波器、吊环、支座、均压屏蔽环
For pedestal: Line trap, Lifting rings, Pedestals, Corona ring
 - 选择供货范围 Optional
 - 防鸟栅、阻波器专用棒式支柱绝缘子
Bird barriers, The special post insulator for line trap
- 一般,当电压等级为 330kV 及以上阻波器才需配备均压屏蔽环
Generally, the corona ring are equipped when the line voltage is above 330kV inclusive

结构特征 Structure Features

- 多层式结构体积小、重量轻。增加了阻波器相间安装安全距离。
Its multi-layer structure is small size and light weight, which increases the safe distance between line traps.
- 独特的框架式结构,机械强度高,承受电动力能力强。载波特性稳定。
Its special framed structure has high mechanical strength and strong electric force endurance with stable carrier frequency characteristics.
- 绝缘可靠,散热性能好,彻底解决了因局部温升带来的绝缘破坏问题。
Its insulation is reliable with good heat dissipation performance so as to completely solve the problem of insulation breakdown caused by partial heating.
- 杂散电容低,品质因数高,阻波器具有互换性。
The line trap is characterized by interchange ability, low stray capacitance, and high Q-factor.
- 接线端子机械强度高。
High mechanical strength of terminals.
- 无线电干扰电压小。
Low radio influence voltage.
- 避雷器保护性能好,工作可靠。
Great protection ability of arrester.
- 均压屏蔽环在强磁场中工作可靠。
Reliable performance of corona ring in strong magnetic field.
- 工频损耗小。
Low power frequency losses.

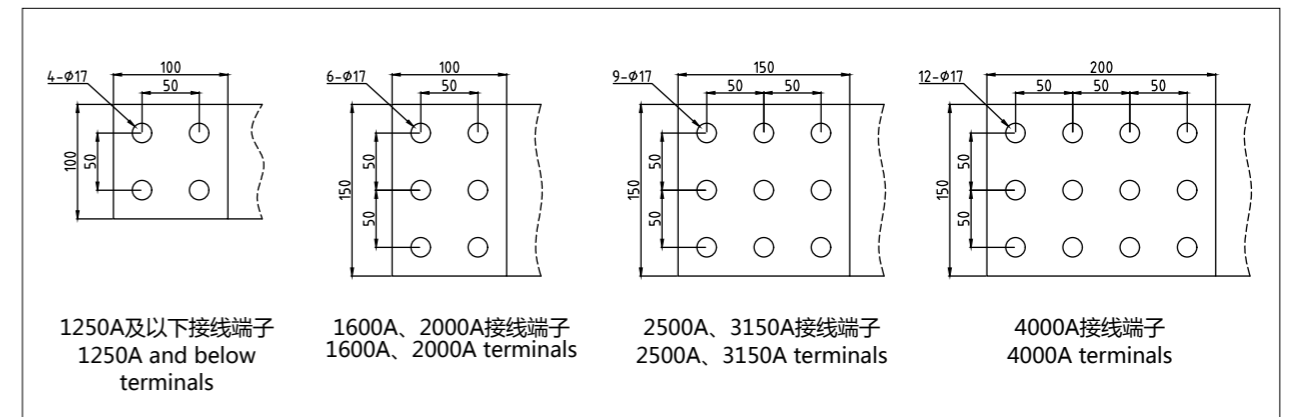
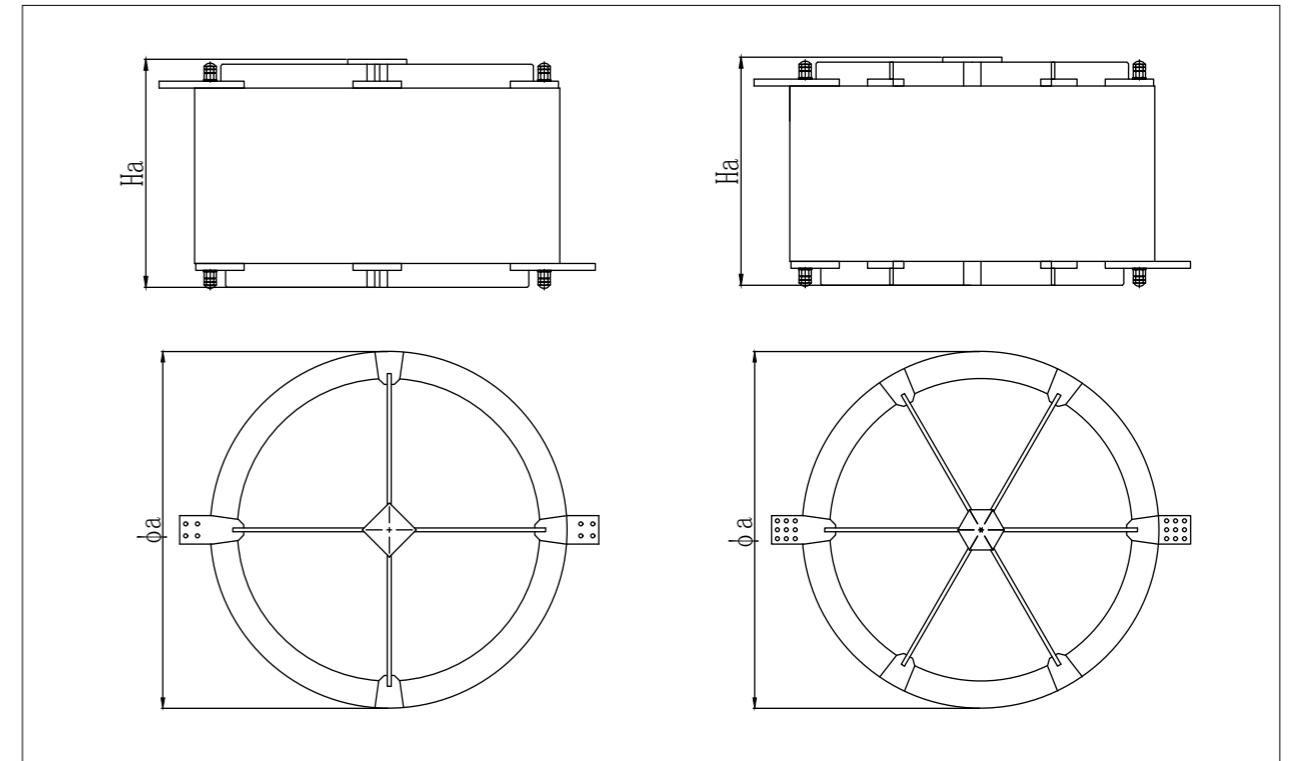
开放式阻波器参数表 Open Type Line Trap Technical Parameters

规格型号 Specification model	额定电流 In A	额定电感 Ltn mH	短时电流 Ikn kA	时间 T s	峰值电流 Ikm kA	线圈外径 φa mm	线圈高度 Ha mm	质量 Weight kg
XZK-800-1.0/31.5-H6	800	1.0	31.5	1	80.5	780	1118	185
XZK-800-2.0/31.5-H6		2.0				983	1338	296
XZK-1000-0.2/25-H6	1000	0.2	25	3	64	760	560	100
XZK-1000-0.3/25-H6		0.315				776	662	122
XZK-1000-0.5/25-H6		0.5				810	749	150
XZK-1000-1.0/25-H6		1				918	1018	228
XZK-1000-1.5/25-H6		1.5				894	1312	279
XZK-1000-2.0/25-H6		2				1122	1330	320
XZK-1000-0.2/31.5-H6	1000	0.2	31.5	2	80.5	760	560	100
XZK-1000-0.3/31.5-H6		0.315				776	662	122
XZK-1000-0.5/31.5-H6		0.5				908	690	150
XZK-1000-1.0/31.5-H6		1				916	1089	249
XZK-1000-1.5/31.5-H6		1.5				928	1308	325
XZK-1000-2.0/31.5-H6		2				1146	1302	375
XZK-1250-0.2/31.5-H6	1250	0.2	31.5	3	80.5	822	570	105
XZK-1250-0.3/31.5-H6		0.315				800	821	165
XZK-1250-0.5/31.5-H6		0.5				912	1035	226
XZK-1250-1.0/31.5-H6		1				928	1243	295
XZK-1250-1.5/31.5-H6		1.5				1180	1072	355
XZK-1250-2.0/31.5-H6		2				1180	1572	550
XZK-1250-0.2/40-H6	1250	0.2	40	2	102	837	707	125
XZK-1250-0.3/40-H6		0.315				856	1033	182
XZK-1250-0.5/40-H6		0.5				914	1035	232
XZK-1250-1.0/40-H6		1				904	1455	333
XZK-1250-1.5/40-H6		1.5				1182	1572	504
XZK-1250-2.0/40-H6		2				1180	1572	563
XZK-1250-0.2/50-H6	1250	0.2	50	1	128	778	713	159
XZK-1250-0.3/50-H6		0.315				928	773	183
XZK-1250-0.5/50-H6		0.5				926	913	253
XZK-1250-1.0/50-H6		1				938	1466	424
XZK-1250-1.5/50-H6		1.5				1314	1690	567
XZK-1250-2.0/50-H6		2				1504	1510	740
XZK-1600-0.2/40-H6	1600	0.2	40	2	102	876	824	165
XZK-1600-0.3/40-H6		0.315				932	810	200
XZK-1600-0.5/40-H6		0.5				888	1484	269
XZK-1600-1.0/40-H6		1				1146	1608	395
XZK-1600-1.5/40-H6		1.5				1108	2088	570
XZK-1600-2.0/40-H6		2				1472	1980	670
XZK-1600-0.2/50-H6	1600	0.2	50	2	128	946	961	198
XZK-1600-0.3/50-H6		0.315				933	818	201
XZK-1600-0.5/50-H6		0.5				1292	1021	290
XZK-1600-1.0/50-H6		1				1141	1932	479
XZK-1600-1.5/50-H6		1.5				1333	1482	574
XZK-1600-2.0/50-H6		2				1346	1685	743
XZK-2000-0.2/40-H6	2000	0.2	50	3	102	918	913	191
XZK-2000-0.3/40-H6		0.315				1152	926	236
XZK-2000-0.5/40-H6		0.5				922	1603	342
XZK-2000-1.0/40-H6		1				1170	1800	520
XZK-2000-2.0/40-H6		2				1482	2049	779

开放式阻波器参数表 Open Type Line Trap Technical Parameters

规格型号 Specification model	额定电流 In A	额定电感 Ltn mH	短时电流 lkn kA	时间 T s	峰值电流 lkm kA	线圈外径 φa mm	线圈高度 Ha mm	质量 Weight kg
XZK-2000-0.2/50-H6	2000	0.2	50	3	128	960	1078	265
XZK-2000-0.3/50-H6		0.315				940	1527	382
XZK-2000-0.5/50-H6		0.5				1060	1338	377
XZK-2000-1.0/50-H6		1				1322	1542	552
XZK-2000-1.5/50-H6		1.5				1488	1830	796
XZK-2000-2.0/50-H6		2				1488	2079	975
XZK-2000-0.2/63-H6	2000	0.2	63	2	161	960	1078	265
XZK-2000-0.3/63-H6		0.315				940	1527	382
XZK-2000-0.5/63-H6		0.5				1186	1453	468
XZK-2000-1.0/63-H6		1				1325	1694	642
XZK-2000-2.0/63-H6		2				1750	1802	1011
XZK-2500-0.2/50-H6		2500				0.2	50	3
XZK-2500-0.3/50-H6	0.315		1238	1167	470			
XZK-2500-0.5/50-H6	0.5		1218	1426	490			
XZK-2500-1.0/50-H6	1		1420	1703	769			
XZK-2500-1.5/50-H6	1.5		1594	1834	1054			
XZK-2500-2.0/50-H6	2		1816	2016	1485			
XZK-2500-0.2/63-H6	2500	0.2	63	2	161	994	1086	324
XZK-2500-0.3/63-H6		0.315				1240	1167	473
XZK-2500-0.5/63-H6		0.5				1218	1426	490
XZK-2500-1.0/63-H6		1				1420	1703	769
XZK-2500-1.5/63-H6		1.5				1594	1834	1051
XZK-2500-2.0/63-H6		2				1816	2016	1485
XZK-3150-0.2/50-H6	3150	0.2	50	3	128	1138	1330	547
XZK-3150-0.3/50-H6		0.315				1298	1439	663
XZK-3150-0.5/50-H6		0.5				1495	1436	730
XZK-3150-1.0/50-H6		1				1596	1882	1135
XZK-3150-1.5/50-H6		1.5				1825	1958	1527
XZK-3150-2.0/50-H6		2				1864	1956	1726
XZK-3150-0.2/63-H6	3150	0.2	63	2	161	1138	1330	547
XZK-3150-0.3/63-H6		0.315				1298	1439	663
XZK-3150-0.5/63-H6		0.5				1495	1436	745
XZK-3150-1.0/63-H6		1				1596	1882	1135
XZK-3150-1.5/63-H6		1.5				1825	1958	1527
XZK-3150-2.0/63-H6		2				1864	1956	1726
XZK-4000-0.2/63-H6	4000	0.2	63	3	161	1488	1156	665
XZK-4000-0.3/63-H6		0.315				1452	1481	900
XZK-4000-0.5/63-H6		0.5				1570	1950	1175
XZK-4000-1.0/63-H6		1				1983	1980	1866
XZK-4000-0.2/80-H6	4000	0.2	80	2	204	1488	1156	680
XZK-4000-0.3/80-H6		0.315				1452	1481	915
XZK-4000-0.5/80-H6		0.5				1570	1950	1185
XZK-4000-1.0/80-H6		1				1874	2180	1880

注：参数表产品外形尺寸为参考尺寸。
Note: The product dimensions in the parameter table are reference dimensions.



注：

1. 安装尺寸未包含均压环尺寸。

The installation dimensions do not include the corona ring dimensions.

2. 外形图只为展示现有产品外形,具体产品图纸以订货确认图纸为准。

The outline drawing is only to show the outline of the existing product, and the specific product drawing is subject to the order confirmation drawing.

阻波器、耦合电容器一体化装置

Integrated device by combining line trap with coupling capacitor

简介 General Introduction

阻波器、耦合电容器一体化装置具有节省占地面积、安装方便、整体机械强度高、运行安全可靠等优点。

The integrated device of line trap and coupling capacitor has the advantages of saving floor space, convenient installation, high overall mechanical strength, safe and reliable operation, etc. e.



安装 Installation

先将耦合电容器底座与基础安装。再将阻波器及连接部件与耦合电容器顶端安装。

The base of coupling capacitor is installed onto the foundation, and its top end is tightened to line trap with joint components.

供货范围 Scope of Supply

- 阻波器 Line trap
- 连接部件 Joint components
- 耦合电容器 Coupling capacitor

订货须知 Ordering Instructionse

请注明产品型号及相关技术要求。

如需详细资料，请与我厂市场营销部联系。

Please inform the type of the product and the related technique requirements.

For more information, please contact with Sales Department.

通用型结合滤波器

General line tunner

用途 Application

结合滤波器是连接在耦合电容器或电容式电压互感器的低电压端与连接电力线载波机的高频电缆之间，它与耦合电容器一起，实现传输通道与电力线载波设备的阻抗匹配，在电力线和高频电缆之间传输载波信号。

Line tunner is installed in the space between coupling capacitor and the low voltage end of capacitor voltage transtormer, and high frequency cables connected to power line carrier. Transmission channel is matching with the impedance of power line carrier equipment due to combined action by the filter and coupling capacitor, which allows the carrier signals transmission between power line and high-frequency cables.



采用标准 Executive Standard

IEC60481:1974

工作条件 Service Conditions

- 户外运行，在日光、雨、冰雹、雪和结冰等环境中能正常工作。
It operates normally during outdoor movement, or in the sunlight, rain, hail, snow, and freezing environment.
- 安装地点海拔高度不应超过3000米。
Altitude is no more than 3000m.
- 环境温度应在-40℃至+45℃之间。
Environment temperature for operation ranges from -40℃ to +45℃.

订货注意事项 Order Information

订货时需注明结合滤波器的承受功率、线路侧阻抗及交货期。

Please inform the withstanding power, line side impedance, and delivery date of coupling device.