



**made in Europe since 1934**

**捷希科电容器**  
**ZEZ SILKO, s. r. o.**



ZEZ SILKO is a significant producer of power capacitors, automatic capacitor banks and other products in EU. ZEZ SILKO provides complete service in power factor correction and power system evaluation included harmonics (measurement of the network parameters, preparing specifications, manufacturing equipment and delivery to customers). Components for power factor correction and regulation of electrical energy are also available.

ZEZ SILKO was established in 1994 as a result of transformation of company ZEZ Žamberk. Her history can be traced back to 1934.

The company gives a big emphasis to the technical development, completeness of service and product quality.

Nowadays the firm has up-to-date production technology and quality control system according to standards ISO 9001. ZEZ SILKO can compete with all the world-wide known manufacturers.

Ecology and environmental policy are of a great concern for ZEZ SILKO. Therefore the company has been using only non toxic, ecological insulation materials.

ZEZ SILKO is a reliable business partner for you.

ZEZ SILKO 捷希科是欧洲一家电力电容器、自动电容器成套设备和其他相关产品的著名制造商。ZEZ SILKO 捷希科提供全面的功率因数校正和电力系统谐波治理等服务（谐波参数的测量，分析报告，改善方案和设备制造）。也可提供功率因数校正和电能调节的组件。

ZEZ SILKO 捷希科成立于1994年，其前身是ZEZ Zamberk,她的历史可以追溯到1934年。

公司强调技术研发、完善的服务和产品质量。按照ISO9001标准建立最新的生产技术和质量控制体系。ZEZ SILKO捷希科具有世界一流制造商的竞争力。

ZEZ SILKO 捷希科积极关注生态和环境保护。因此，公司一直以来只使用无毒、环保的材料。

ZEZ SILKO 捷希科是您可靠的合作伙伴。

POWER FACTOR CORRECTION 功率因数校正系统	1
CAPACITORS WITH REACTOR GROUP FOR POWER FILTER 调谐滤波电容器电抗器组合	3
TYPE HEAVY DUTY LV CAPACITORS FOR POWER FILTER 低压重载型滤波电容器	4
DETUNED REACTORS 调谐电抗器	9
MEDIUM VOLTAGE CAPACITORS 中压电容器	12
PFC CONTROLLER PFR6/PFR12 功率因数控制器PFR6/PFR12	17
PFC CONTROLLER PFR plus 功率因数控制器PFR plus	17
CAPACITOR SWITCHING CONTACTORS ZEZ-K3 电容器专用接触器ZEZ-K3	17
THYRISTOR SWITCH ZEZ-TS 可控硅开关ZEZ-TS	19
ACTIVE POWER FILTER ZEZ-APF 有源滤波器ZEZ-APF	20
LV AUTOMATIC CAPACITOR BANKS ZEZ-QR 低压自动补偿装置ZEZ-QR	22
QUALITY CERTIFICATION AND TEST REPORT 质量认证与检验报告	23

Under normal operating conditions an electrical equipment (electric motors, welding machines, fluorescent lamps) consumes not only active energy from the power line, but also reactive energy. From the physical viewpoint, the reactive energy is necessary to secure a correct function of these devices. However, sum of both energies applies load to transmission networks. The effort is to connect correctly designed capacitor to the appliance, which supplies the reactive energy directly to the appliance. It reduces the amount of reactive energy transmitted through the power line.

This solution is designated as the power factor correction. The quality of PF correction is given by the power factor  $\cos \phi$ , which is a ratio of real and apparent power. The ideal goal is to achieve  $\cos \phi = 1$ . Usually customer is penalized for the power factor lower than 0.90 or 0.95.

#### The following types of PF correction are used:

individual, group and central. In case of individual PF correction the capacitor is switched directly with the appliance. Group and central PF correction is suitable for more extensive electrical systems with variable loading. Switching of capacitors is controlled by the microprocessor controller, which ensures achievement of the optimum power factor.

Development of semiconductor technology has adverse impacts on the alternating current network. Sinusoidal waveform is distorted by consumption of the reactive energy with non-sinusoidal pattern of currents. Distortion can be expressed by the content of higher harmonics.

The content of harmonics increases the capacitor current, since its impedance decreases with increasing frequency. This may cause damage of capacitor, satisfactory switching of circuit breakers and incorrect operation of the end equipment. This situation can be resolved by installation of capacitors with reactors (detuned PF correction), which attenuate the resonance circuit and such installation has also a partial filtering effect-it reduces the distortion level in the network. It is recommended in situations, where the share of equipment generating higher harmonics exceeds 20% of the total load. Filtering circuits are used for removal of higher percent share of harmonics from the network.

Capacitor in detuned PF correction is exposed to higher voltage than network voltage. This is caused by serial connection of the reactor and capacitor.

用电设备（如：电动机、焊接设备、荧光灯）在正常工作时，不单单从电网中消耗有功能量，同时还消耗无功能量。从物理学的观点讲，无功能量是这些设备正常工作所必需的。无论是有功能量和无功能量，都是从输电网络中取得的。正确设计使用电容器，它可以直接提供用电设备所需的无功能量，从而减少对电网无功能量的消耗。

这种解决方案就被称为功率因数校正系统。

功率因数校正系统的实质就是校正有功功率和视载功率比，即功率因数 $\cos \phi$ 。理想的目标是 $\cos \phi = 1$ 。在功率因数低于0.90或0.95时，用户会受到处罚。

#### 常用的功率因数校正系统类型：

就地、成组和集中三种类型。就地功率因数校正系统，电容器是和用电设备一起直接开关的。成组和集中式功率因数校正系统一般被广泛应用于有大量负载的电力系统中。电容器的投切是由微处理控制器进行控制的，以保证达到合适的功率因数。

半导体技术的发展，对交流电网产生了不良的影响。具有非正弦波电流的无功功率消耗设备造成正弦波形扭曲。这种扭曲的表现就是高谐波含量。

谐波会造成频率升高，阻抗减小，从而增大电容器电流。这可能会对电容器造成损害。谐波也会造成断路器非正常的跳闸和用电设备故障。当非线性设备超过总负载量的20%时，必须安装带电抗器的电容器（调谐功率因数校正系统），它可以削弱谐振，同时又有一定的滤波效应，可以降低电网中的谐波水平。应用这种滤波电路，消除电网中较高比重的谐波。

由于电容器与电抗器相连，调谐功率因数校正系统中的电容器所承受的电压高于电网电压。

Capacitors are produced in MKP and MKV systems. Both dielectric systems are self-healing. Metal plated layer is evaporated in case of the voltage breakdown. Formed insulating surface is very small and does not effected the functionality of the capacitor. Capacitors windings are inserted into aluminium container. Container is equipped with the overpressure disconnecter.

MKP capacitors are made of one-side metallized PP film. Contacting of the winding is performed by zinc spraying. This configuration is dry without impregnant.

As for MKV capacitor, electrodes are of metallized paper on both sides and PP foil serves as a dielectric. The system is impregnated by mineral oil.

MKV capacitors are suitable for higher power loading and higher ambient temperature.

In the meantime the capacitors are produced mainly in MKP system, MKV capacitors are produced only exceptionally, for special projects.

#### Fuses and cross-section of conductors

PFC correction capacitors should be provided with fuses with a slow breaking characteristic (gG). Cross-section of conductors should be sized to at least 1,6 - 1,8 multiple of capacitor's rated current.

#### Connection of capacitors shall be performed only by Cu conductors based on the following table.

电容器的连接应按以下表格要求，采用铜芯电缆

Power rating at 400 V 400V电压额定容量 [kVar]	Rated current of three-phase capacitor 三相电容器额定电流 [A]	Recommended cross-section of connection Cu conductors 推荐的连接铜导体截面 [mm <sup>2</sup> ]	Fuse rated current 熔断器额定电流 [A]
10	14.4	4	25
12.5	18.1	6	32
15	21.7	6	40
20	28.8	10	50
25	36.1	10	63
30	43.4	16	80
35	50.5	16	100
40	57.7	25	100
50	72.2	25	125
60	86.6	35	160
75	108.3	50	200
80	115.5	70	200
100	144.3	70	250

电容器一般采用MKP和MKV技术生产。这两种技术的电介质都是自愈合型的。当发生电压击穿时，金属镀层将气化，形成非常细小的绝缘气孔，而且不会影响电容器的功能。电容器绕组被固定在一个铝制外壳中，这个外壳具有过压力切断功能。

MKP电容器采用单面金属化的聚丙烯薄膜制造。绕组连接通过喷锌处理，这是一种干式无油技术。

而MKV电容器，电极是两面的金属化纸，聚丙烯膜作为电介质，这种技术需要注入矿物油。

MKV电容器适合于大容量和高环境温度。

通常，电容器都是采用MKP技术生产，MKV电容器为特殊项目定制。

#### 熔断器和电缆截面

PFC电容器需要配备gG特性熔断器。连接电缆载流量应不低于电容器额定电流的1.6-1.8倍。

### Application

Tunable filter capacitor reactor combination  $X_L=7\%X_C$ ,  
 $X_L=14\%X_C$   
ZEZ detuned reactor and capacitor group is a perfect power factor correction solutions in the environment of high harmonics.  
For the convenience of your selection, we have developed the following commonly used type of the capacitors with reactor group in 400V/50Hz power network.

### 应用方案

调谐滤波电容器电抗器组合  $X_L=7\%X_C$   $X_L=14\%X_C$   
ZEZ调谐式电抗器和..电容器组合是高谐波环境下完美的功率因数校正解决方案。  
为方便您选型，我们制定了以下400V/50Hz系统电压时常用电容器和电抗器组合型号。

## ZEZ Reactor and capacitor group type selection ZEZ电容器电抗器组选型

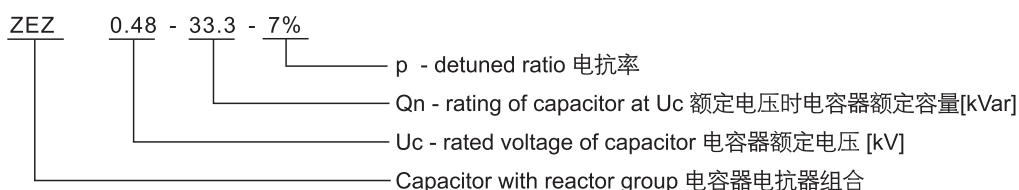
Type 型号	Power of Capacitor 电容器容量 [kVar]	Type of Capacitor 电容器型号	Type of Reactor 电抗器型号
<b>400V, 3P, 50Hz, p=7%, fr=189 Hz</b>			
ZEZ 0.44-25-7%	25	CSADG1-0.44/25	TKA1-25-189/400/440
ZEZ 0.44-28.1-7%1)	28.1	CSADG1-0.44/28.1	TKA1-28.1-189/400/440
ZEZ 0.44-50-7%	50	CSADG1-0.44/25 *2pcs	TKA1-50-189/400/440
ZEZ 0.44-56.2-7%1)	56.2	CSADG1-0.44/28.1 *2pcs	TKA1-56.2-189/400/440
ZEZ 0.48-30-7%	30	CSADG3-0.48/30	TKA1-25-189/400/440
ZEZ 0.48-33.3-7%1)	33.3	CSADG3-0.48/33.3	TKA1-28.1-189/400/440
ZEZ 0.48-60-7%	60	CSADG3-0.48/30 *2pcs	TKA1-50-189/400/440
ZEZ 0.48-66.6-7%1)	66.6	CSADG3-0.48/33.3 *2pcs	TKA1-56.2-189/400/440
<b>400V, 3P, 50Hz, p=14%, fr=134 Hz</b>			
ZEZ 0.525-25-14%	25	CSADG1-0.525/25	TKA1-25-134/400/525
ZEZ 0.525-37.5-14%	37.5	CSADG3-0.525/37.5	TKA1-37.5-134/400/525
ZEZ 0.525-50-14%	50	CSADG1-0.525/25 *2pcs	TKA1-50-134/400/525
ZEZ 0.525-75-14%	75	CSADG3-0.525/37.5*2pcs	TKA1-75-134/400/525
<b>230V, 1P, 50Hz, p=7%, fr=189 Hz</b>			
ZEZ 0.28-14Y3-7%	3 X 14	CVADG1-0.28/6.9*6pcs	TKA1-14Y3-189/230/280
ZEZ 0.28-21Y3-7%1)	3 X 21	CVADG1-0.28/6.9 *9pcs	TKA1-21Y3-189/230/280
<b>230V, 1P, 50Hz, p=14%, fr=134 Hz</b>			
ZEZ 0.28-14Y3-14%	3 X 14	CVADG1-0.28/6.9*6pcs	TKA1-14Y3-134/230/280
ZEZ 0.28-21Y3-14%1)	3 X 21	CVADG1-0.28/6.9 *9pcs	TKA1-21Y3-134/230/280

<sup>1)</sup>Stock product 库存产品

Other power, voltage and frequency on request.  
其它容量、电压和频率产品请咨询我公司。

### Type description of capacitors with reactor group

#### 电容器和电抗器组型号描述



### Application

The capacitors are intended for individual, group or central power factor correction in low-voltage networks.

### Construction

The capacitors are produced by the MKP system, which consists of metallised polypropylene foil with extremely low dielectric losses. The dielectric system is self-healing, in the dry variant.

The capacitors are filled:

- by solid compact substance of vegetal origin, which is non-toxic and ecologically harmless. It is regarding capacitors type CSADP, CSAKP (3-phase) or CVADP, CVAKP (single-phase).
- by inert, ecologically harmless gas. It is regarding capacitors type CSADG (3-phase) or CVADG (single-phase).

Therefore, there is no risk of contamination of the environment, e.g. by leakage of impregnating liquid.

The case of the capacitor is protected against breaking by the overpressure disconnecter, which ensures safe disconnection of the capacitor from the network in the event of overloading and at the end of its operational life.

The capacitors are equipped with discharge resistors.

### Installation instructions

The capacitors can be installed in any position. Clamps for mounting of capacitors are delivered by the producer according to the catalogue. Capacitors may be installed close side by side.

Each capacitor has a protective clamping bolt (M12) on the bottom of the case (tightened by max. torque of 5 Nm).

If bolt M12 on the bottom of the case is not used as a protective clamp, it is possible to use it for fixation of the capacitor.

On request (e.g. when using a cover with IP54), it is possible to place the protective clamp M5 (tightened by max. torque of 2 Nm) on the cap of the capacitor.

The supply conductors are terminated in the clamp terminal of the lead-in insulator with bolt M5 (cross head)-tightening torque max. 2 Nm. The connecting conductors and mounting of the capacitor must permit dilatation of the cap by 20 mm-this condition is necessary for correct function of the overpressure disconnecter.

With respect to the current loading of the terminal block, during the mounting of a group of capacitors do not connect higher power than 30kvar/3P or 15kvar/1P capacitor to the terminal box (with keeping of all connecting conditions). For the protection of capacitors, it is recommended to use power fuses with gG characteristics with the nominal current a 1.6 to 1.8 multiple of the current of the capacitor. For all types of capacitors in a cylindrical Al case with  $\varnothing$  85 and  $\varnothing$  110 it is possible to deliver a plastic cover with the protection degree of IP54 with a suitable outlet.

### 应用

电容器可用于低压电网中的就地、成组或集中式功率因数校正系统中。

### 构造

我们的电容器采用MKP技术，它是由具有极低介电损耗的金属化聚丙烯薄膜制造。电介质系统是干式自愈合的。

电容器的填充物:

- CSADP, CSAKP (三相) 或 CVADP, CVAKP (单相) 电容器填充物是无毒、无害的环保树脂。
- CSADG (三相) 或 CVADG (单相) 电容器填充物是环保无害的惰性气体。

因此，电容器不会对环境造成污染，例如：浸渍液泄漏。

电容器具有过压断开保护，在电容器过载和其使用寿命结束时保证其安全的从电网中断开。

电容器内置放电电阻。



### 安装说明

电容器可任意位置安装。电容器安装螺栓如样本中所示已经提供。

电容器之间可以紧靠安装。

每颗电容器外壳底部都有一个M12的保护接地紧固螺栓（紧固最大扭矩5Nm）。

如果外壳底部的M12螺栓不被用于保护接地，他就只用于电容器固定。

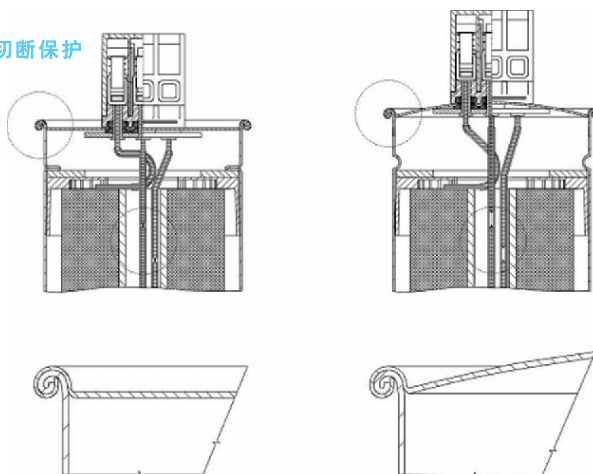
对于定制的产品（如：带IP54外壳），可提供一个M5的螺栓（紧固最大扭矩2Nm），位于电容器的顶部。

用户电缆接于绝缘的M5螺钉端子，紧固最大扭矩2Nm。连接导体和电容器安装必须容许顶盖扩张20mm，这对过压断开功能是必需的条件。

为保证端子载流量，建议电容器组不要连接超过三相30kVar或单相15kVar的电容器。电容器的采用gG特性熔断器保护，电流通常是1.6-1.8倍电容器额定电流。

所有 $\varnothing$  85和 $\varnothing$  110圆柱形铝壳的电容器，可以提供防护等级IP54塑料盖和相应的接口。

Overpressure disconnecter 过压力切断保护



Technical data and limit values 技术参数和极限值

Rated voltage 额定电压	Un	230 ... 800 V
Rated frequency 额定频率	fn	50/60 Hz
Standards 标准	IEC 60831-1+2 EN 60831-1+2 UL No. 810 GOST 1282-8 VDE 0560 46+47	
Overvoltage 过电压	Umax	Un +10 % up to 8 h daily Un +15 % up to 30 min daily Un +20 % up to 5 min Un +30 % up to 1 min
		Un +10 % 最多8小时/天 Un +15 % 最多30分钟/天 Un +20 % 最多5分钟 Un +30 % 最多1分钟
Overcurrent 过电流	Imax	1.5-2.0 * In ( Possible short time over current /可能的短时过电流)
Capacitance tolerance 电容量公差		-5 / +10 %
Test voltage terminal 极间测试电压	Utt	2,15 x Un AC, 2 s
Test voltage terminal/case 极壳测试电压	Utc	Un ≤ 500 V: 3000 V AC, 10 s Un > 500 V: 2 x Un + 2000 V AC, 10 s
Inrush current 浪涌电流	Is	max. 400 x In
Losses 损耗		cca 0.2 W/kVar
Statistical life expectancy 平均寿命		> 150000-200000 h (Standard conditions 标准条件下)
Protection degree 防护等级		IP00, IP 20, on request IP 54, indoor mounting
Ambient temperature 环境温度		-40°C - max.temp. = 65 °C - max.over 24 h = 45 °C - max. over 1 year = 35 °C - lowest temperature = -40 °C
Cooling 冷却方式		natural or forced 自然或强制冷却
Permissible relative humidity 允许相对湿度		IP00 - max. 95 %, IP20 - max. 95 %, IP54 - max. 95 %
Altitude 允许海拔高度		max. 4000 m above sea level 海平面上4000米
Mounting position 安装位置		Any 任意位置
Mounting 安装		M12 stud at the bottom of the case (max. torque 5 Nm) 外壳底部M12螺栓 ( 最大扭矩 5Nm )
Safety features 安全装置		overpressure disconnecter 过压力切断装置
Case 外壳		cylindrical, aluminium can 圆柱形铝罐
Dielectric system 电介质系统		MKP - metallised polypropylene film 金属化聚丙烯薄膜
Impregnation 注入材料		dry type 干式, N <sub>2</sub> 氮气
Terminals		1/ double, three-way (connected to terminal by bolt M5 by max. torque of 2 Nm) 2/ Terminals M10, max. torque of 8 Nm
Discharge resistors 放电电阻		built-in 内置 - 50 V, 1 minute (0,5 - 30 kVar) built-in 内置 - 75 V, 3 minutes (33 - 50 kVar)



**Three-phase Capacitors 400VAC,50Hz,IP20,MKP dry 三相电容器400VAC,50Hz,IP20,MKP干式**  
**Delta Connection 三角形接法**

Type 型号	Output 额定容量 Qn[kVar]	Current 额定电流 In[A]	Capacitance 电容量 Cn[uF]	Dimensions 尺寸 DxH[mm]	Dimensional Drawings 尺寸图	Weight 重量 [kg]
CSADG1-0.4/5	5	7.2	3x33.2	Φ85x175/226	1	0.9
CSADG1-0.4/10	10	14.4	3x66.3	Φ85x245/296	1	1.1
CSADG1-0.4/12.5	12.5	18.0	3x82.9	Φ85x245/296	1	1.2
CSADG1-0.4/15	15	21.7	3x99.5	Φ110x245/296	1	1.6
CSADG1-0.4/20	20	28.9	3x132.6	Φ110x245/296	1	1.9
CSADG1-0.4/25	25	36.1	3x165.8	Φ110x245/296	1	2.1
CSADG3-0.4/30	30	43.3	3x198.9	Φ136x220/271	1	3.3
CSADG3-0.4/33.3	33.3	48.1	3x220.8	Φ136x261/324	2	4.0
CSADG1-0.4/37.5	37.5	54.1	3x248.7	Φ136x261/324	2	4.0
CSADG3-0.4/40	40	57.7	3x265.3	Φ136x261/324	2	4.0

**Three-phase Capacitors 440VAC,50Hz,IP20,MKP dry 三相电容器440VAC,50Hz,IP20,MKP干式**  
**Delta Connection 三角形接法**

型号	Output 额定容量 Qn[kVar]	Current 额定电流 In[A]	Capacitance 电容量 Cn[uF]	Dimensions 尺寸 DxH[mm]	Dimensional Drawings 尺寸图	Weight 重量 [kg]
CSADG1-0.44/5	5	6.6	3x27.4	Φ85x175/226	1	0.8
CSADG1-0.44/10	10	13.1	3x54.8	Φ85x245/296	1	1.0
CSADG1-0.44/12.5	12.5	16.4	3x68.5	Φ85x245/296	1	1.2
CSADG1-0.44/15	15	19.7	3x82.2	Φ85x245/296	1	1.3
CSADG1-0.44/20	20	26.2	3x109.6	Φ110x245/296	1	1.9
CSADG1-0.44/25	25	32.8	3x137.0	Φ110x245/296	1	2.1
CSADG1-0.44/28.1	28.1	36.9	3x154.0	Φ110x245/296	1	2.1
CSADG3-0.44/30	30	39.3	3x164.4	Φ136x220/271	1	3.3
CSADG3-0.44/33.3	33.3	43.7	3x182.5	Φ136x261/324	2	3.8
CSADG1-0.44/37.5	37.5	49.2	3x205.5	Φ136x261/324	2	4.0
CSADG3-0.44/40	40	52.5	3x219.2	Φ136x261/324	2	4.0

**Three-phase Capacitors 480VAC,50Hz,IP20,MKP dry 三相电容器480VAC,50Hz,IP20,MKP干式**  
**Delta Connection 三角形接法**

Type 型号	Out put 额定容量 Qn[kVar]	Current 额定电流 In[A]	Capacitance 电容量 Cn[uF]	Dimensions 尺寸 DxH[mm]	Dimensional Drawings 尺寸图	Weight 重量 [kg]
CSADG1-0.48/5	5	6.0	3x23.0	Φ85x175/226	1	0.9
CSADG1-0.48/10	10	12.0	3x46.1	Φ85x245/296	1	1.2
CSADG1-0.48/15	15	18.1	3x69.1	Φ85x245/296	1	1.7
CSADG1-0.48/16.7	16.7	20.1	3x76.9	Φ110x245/296	1	1.8
CSADG1-0.48/20	20	24.1	3x92.1	Φ110x245/296	1	2.0
CSADG1-0.48/25	25	30.1	3x115.2	Φ110x245/296	1	2.2
CSADG3-0.48/30	30	36.1	3x138.0	Φ136x220/271	1	3.0
CSADG3-0.48/33.3	33.3	40.3	3x154.0	Φ136x261/324	2	3.8
CSADG3-0.48/40	40	48.2	3x184.2	Φ136x261/324	2	4.2

**Three-phase Capacitors 525VAC,50Hz,IP20,MKP dry 三相电容器 525VAC,50Hz,IP20,MKP干式**  
**Delta Connection三角形接法**

Type 型号	Output 额定容量 Qn[kVar]	Current 额定电流 In[A]	Capacitance 电容量 Cn[uF]	Dimensions 尺寸 DxH[mm]	Dimensional Drawings 尺寸图	重量 [kg]
CSADG1-0.525/10	10	11.3	3x38.5	Φ85x245/296	1	1.0
CSADG1-0.525/15	15	16.5	3x57.7	Φ85x245/296	1	1.3
CSADG1-0.525/18.5	18.5	20.4	3x71.2	Φ85x245/296	1	1.8
CSADG1-0.525/20	20	22.0	3x77.0	Φ110x245/296	1	1.9
CSADG1-0.525/25	25	27.5	3x96.2	Φ110x245/296	1	2.1
CSADG3-0.525/30	30	33.0	3x115.5	Φ136x220/271	1	3.3
CSADG3-0.525/33.3	33.3	36.6	3x128.2	Φ136x261/324	2	3.8
CSADG3-0.525/37.5	37.5	41.2	3x144.4	Φ136x261/324	2	4.0
CSADG3-0.525/40	40	44.0	3x154.0	Φ136x261/324	2	4.0

**Three-phase Capacitors 690VAC,50Hz,IP20,MKP dry 三相电容器690VAC,50Hz,IP20,MKP干式**  
**Delta Connection三角形接法**

Type 型号	Output 额定容量 Qn[kVar]	Current 额定电流 In[A]	Capacitance 电容量 Cn[uF]	Dimensions 尺寸 DxH[mm]	Dimensional Drawings 尺寸图	Weight 重量 [kg]
CSADG1-0.69/10	10	8.4	3x22.3	Φ85x245/296	1	1.0
CSADG1-0.69/12.5	12.5	10.5	3x27.9	Φ85x245/296	1	1.2
CSADG1-0.69/15	15	12.6	3x33.4	Φ85x245/296	1	1.3
CSADG1-0.69/20	20	16.7	3x44.6	Φ110x245/296	1	1.9
CSADG1-0.69/25	25	20.9	3x55.7	Φ110x245/296	1	2.1
CSADG3-0.69/30	30	25.1	3x66.9	Φ136x220/271	1	3.3
CSADG3-0.69/40	40	33.4	3x89.2	Φ136x261/324	2	4.0

**Single-phase Capacitors 250/280VAC,50Hz,IP20,MKP dry 单相电容器250/280VAC,50Hz,IP20,MKP干式**  
**I connecton I 接法**

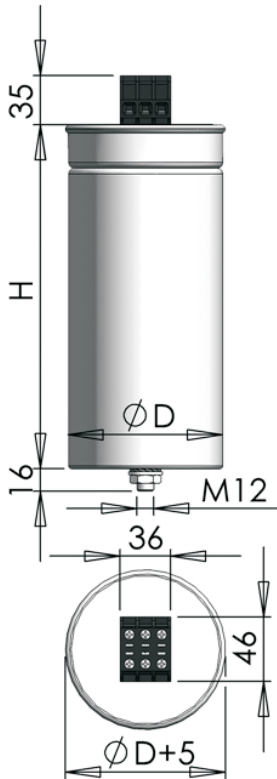
Type 型号	Output 额定容量 Qn[kVar]	Current 额定电流 In[A]	Capacitance 电容量 Cn[uF]	Dimensions 尺寸 DxH[mm]	Dimensional Drawings 尺寸图	Weight 重量 [kg]
CVADG1-0.25/5	5	20	255	Φ85x245/296	1	1.3
CVADG1-0.25/10	10	40	510	Φ110x245/296	1	1.9
CVADG1-0.28/6.9	6.9	24.6	280	Φ85x245/296	1	1.3
CVADG1-0.28/13.8	13.8	49.3	561	Φ110x245/296	1	1.9

Other voltage, power and frequency are available on request.

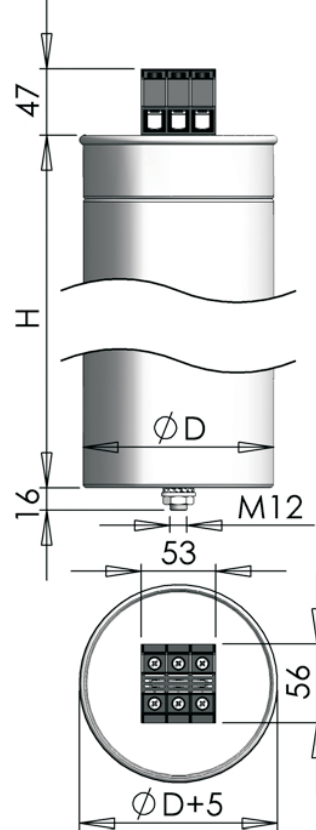
可提供其它电压、容量和频率产品，请咨询我公司。

Dimensional drawings 尺寸图

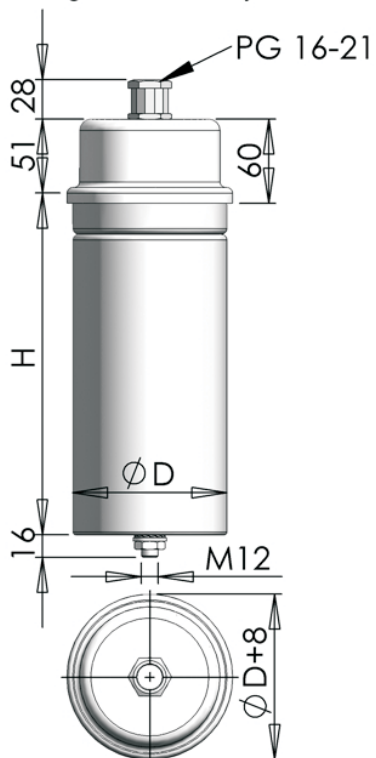
Drawing No./Rozměr. výkres 1



Drawing No./Rozměr. výkres 2



Drawing No./Rozměr. výkres 3a



Drawing No./Rozměr. výkres 3b



### Application:

Very frequent use of electronic devices with non-linear waves leads to a distortion of sinusoidal voltage and current now. These include: switching power supply, welding machines, drives, arc furnaces, inverters and rectifiers. Distortion of sinusoidal harmonic waves has resulted in current increase of power capacitors and other parts of the system as well as the possibility of capacitor resonance with other inductive loads (transformer). As a result of these phenomena it can lead to the destruction of all components used in power factor correction devices. The solution is the use of detuned (protection) reactors forming a series resonant circuit with capacitors (typically 189 Hz). Reactors connected with capacitors prevents unnecessary resonance and also acts as a broadband filter. Mostly it is appropriate to use the reactors when the voltage distortion THDu is more than 3%.



### Construction

Reactors ZEZ SILKO are manufactured from high grade transformer sheets, aluminum bands and copper wires. Thanks to this feature, the reactors have a high linearity and low losses. Vacuum impregnation by a special resin provides high voltage stress, minimum noise and long lifetime. Reactors are equipped with thermal protection to prevent overheating. Winding outlets are terminals (Cu wire) or flat busbars (Al band). Cu reactors can be supplied with a cable length of 1 m .

### Installation instructions

When installing detuned reactors it must be carefully considered all aspects of the power factor devices, preferably to do an analysis of network parameters. Then decide on the reactor power (inductance) and detuned frequency (134, 189, 210 Hz). Since the resonant circuit capacitor - reactor generates heat, it is necessary to ensure an appropriately dimensioned cooling of PFC device. Reactors in the above mentioned circuits cause increase of voltage on capacitors. For this reason it is necessary to use capacitors at a higher voltage than the network rated voltage (e.g. 440V or 480V capacitors for 400 V network at a frequency of 189 Hz ,  $p = 7\%$ ). Recommended torques of Al reactors with busbars :

- M6: 7-9 Nm
- M8: 8-10 Nm
- M10: 11-14 Nm
- M12: 15-20 Nm

### 应用

非线性电子设备的频繁使用会导致正弦波电压和电流的失真。这些设备包括：开关电源，电焊机，驱动器，电弧炉，逆变器和整流器。正弦谐波失真将导致电力电容器和系统的其它部件的电流增大，以及可能造成电容器和其他感性负载（变压器）谐振。这些现象的结果可导致功率因数校正装置中使用的所有组件的破坏。该解决方案是使用失谐（保护）电抗器和电容器形成串联谐振电路（典型值为189HZ）。与电容器连接的电抗器可防止不必要谐振，并且也是一个宽带滤波器。大多电压畸变THD超过3%时，应使用电抗器。

### 构造

ZEZ SILKO电抗器采用高等级变压器硅钢片、铝箔和铜线制造。正因如此，我们的电抗器具有高线性度和低损耗特点。真空浸渍特殊绝缘漆，保证产品的高耐压、低噪音和长寿命。电抗器都配备了热保护触点，防止过热。线圈出线可以是端子（铜线）或母排（铝箔）。铜线的电抗器也可以提供1米长的电缆出线。

### 安装说明

安装调谐电抗器，必须慎重考虑的功率因数设备的所有方面，最好是对系统参数进行分析。然后决定电抗器功率（电感量）和调谐频率（134，189，210赫兹）。由于电容器和电抗器的共振电路会产生热量，确保PFC装置适当的冷却是必须的。上述电路中的电抗器会引起电容器电压上升。由于这个原因，必需采用比系统电压更高的额定电压的电容器（例如，在调谐频率189Hz、电抗器率7%的400V系统中，采用440V或480V电容器）带母排出线铝电抗器的推荐扭矩：

- M6: 7-9 Nm
- M8: 8-10 Nm
- M10: 11-14 Nm
- M12: 15-20 Nm

Technical data 技术参数

Type 型号	Power of Capacitor- Reactor 有效输出容量 Qn[kVar]	Power of Capacitor at Uc 电容器额定容量 Qc[kVar]	Capacitance of Capacitor 电容器电容量 Cn[μF]	Inductance of Reactor 电抗器电感量 [mH]	Rated Current 额定电流 In [A]	Losses 损耗 [W]
<b>400V,50Hz,p=7%,fr=189Hz for 440/480V Capacitors</b>						
TKA1-25-189/400/440	22.2	25/30	3x137.0	1.73	32.1	114
TKA1-28.1-189/400/440	25	28.1/33.3	3x154.0	1.53	36.0	144
TKA1-50-189/400/440	44.4	50/60	3x274.0	0.86	64.1	145
TKA1-56.2-189/400/440	50	56.2/66.6	3x308.0	0.77	72.1	175
<b>400V,50Hz,p=14%,fr=134Hz for 525V Capacitors</b>						
TKA1-25-134/400/525	16.8	25	3x96.2	4.88	24.3	145
TKA1-37.5-134/400/525	25	37.5	3x144.4	3.27	36.5	150
TKA1-50-134/400/525	33.6	50	3x192.5	2.46	48.7	205
TKA1-75-134/400/525	50	75	3x288.7	1.64	73.1	250

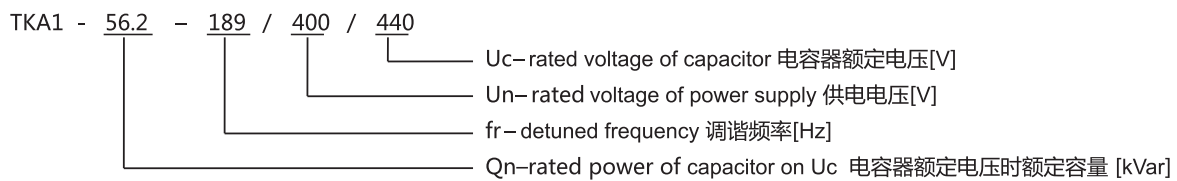
Other voltage, power and frequency are available on request.

可提供其它电压、容量和频率产品，请咨询我公司。

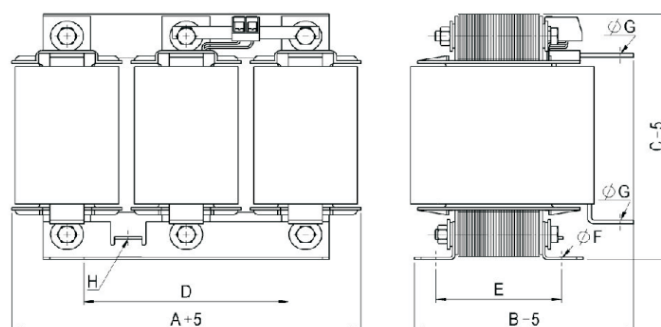
Dimensions 尺寸

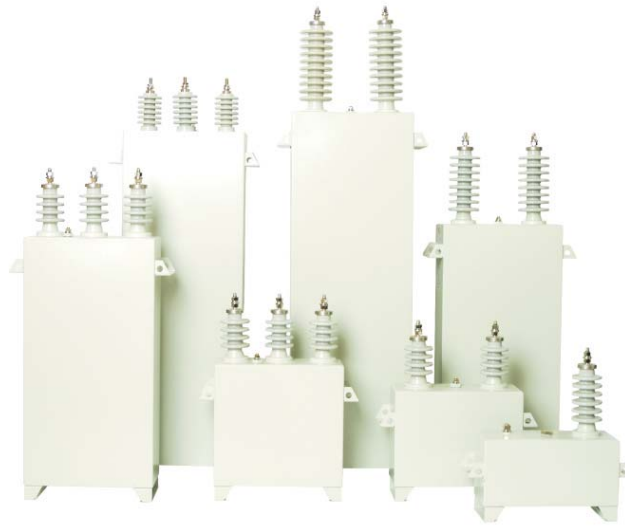
Type 型号	Dimensions 尺寸 [mm]						Weight 重量 [kg]
	A	B	C	D	E	ΦF	
TKA1-25-189/400/440	235	150	160	150	93	7x14	13
TKA1-28.1-189/400/440	235	150	160	150	93	7x14	13
TKA1-50-189/400/440	250	185	215	150	125	9x17	23
TKA1-56.2-189/400/440	250	185	215	150	125	9x17	23

Type description of reactors 电抗器型号描述



Dimensional drawings 尺寸图





### Application

The capacitors are designed for power factor correction and harmonics filtration at medium voltage.

### Construction

The construction of the dielectric is all-film. The dielectric is polypropylene foil impregnated with synthetic liquid known under the trade name JARYLEC, which is harmless to health and environmentally friendly. Electrodes are of aluminium foil. This construction ensures extremely low losses of capacitors. Three-phase units are in star – Y connection, single-phase units are in I connection. The capacitors have internal discharge resistors decreasing voltage to 75 V within 10 minutes. All three-phase and single-phase units are in a dead case, on request it is possible to deliver capacitors with one pole on the case. It is possible to deliver capacitors with pressure sensor 230 V, 50 Hz.

### Installation instructions

- to prevent mechanical stress of the insulators
- max. torque for clamping bolt of insulators M12 –20/25 Nm (as table Bushings)
- max. torque for clamping bolt of grounding clamp M10–15 Nm
- min. distance between capacitor cans –60 mm
- to check all electric connections and visually check the tightness of the capacitors after several days of operation
- device must be discharged before manipulation with capacitor cans or capacitor terminals and the terminals must be short-circuited

### 应用

专为中压功率因数校正和谐波过滤而设计的电容器。

### 构造

采用全薄膜电介质制造。

电介质是聚丙烯薄膜并注入称为JARYLEC的，不会危害健康和环境浸渍液体。

电极是铝箔。这种结构保证了极低的电容损失。三相产品采用星形-Y接法，单相产品采用I接法。电容器内置放电电阻，在10分钟内的电压下降到75V。所有三相和单相电容器都是固定外壳的。可按要求定制一极与外壳相接的电容器。可以提供带有230V/50HZ压力传感器的电容器。

### 安装说明

- 防止绝缘子机械应力;
- 最大绝缘子螺栓夹紧扭矩M12-20/25Nm (如套管);
- 最大接地螺栓夹紧扭矩M10-15Nm;
- 最小电容外壳间距-60mm;
- 检查所有电气连接并在几天运行后肉眼检查电容器是否紧固;
- 在对电容器外壳或电容器端子进行操作前，设备必须被切除，而且端子必须短接。

Technical data and limit values 技术参数和极限值

Rated voltage/ 额定电压	Un	Single phase:1-24kv 25...1000kvar Three phase:1-15kv 25...1000kvar
Rated frequency/ 额定频率	fn	50/60 HZ
Standards/ 标准		IEC60871-1+2 EN60871-1+2 GOST1282-88
Max. overvoltage/ 过电压	Umax	Un+10% up to 8 h daily / 最多8小时/天 Un+15% up to 30 min daily/ 最多30分钟/天 Un+20% up to 5 min / 最多5分钟/天 Un+30% upto 1 min / 最多1分钟/天
Overcurrent/ 过电流	Is	1.8xIn (Possible short time over current /可能的短时过电流)
Capacitance tolerance/ 电容器量公差		-5/ +10%
Test voltage,terminal/terminal/ 极间测试电压	Utt	2.15xUnAC,10s(4.3UnDC,10s)
Test voltage,terminal/case/ 极壳测试电压	Utc	According to the insulating level,for10s/按绝缘等级要求测试10s
Inrush current/ 浪涌电流		max.300xIn
Losses/损耗-dielectric/电介质		0.06W/kVar
- total / 全部		0.2W/kVar
Statistical life expectancy/ 平均寿命		> 150000 hours(Standard conditions/ 标准环境下)
Protection degree/ 防护等级		IP00(Ip54 cover on request,up to 15kv)
Ambient temperature category/ 环境温度		-40/C - max.temp.=50C - max.over24h =40C - max.over1 year=30C -40/D - on request咨询我公司
Cooling/冷却方式		naturally air cooled/自然空气冷却
Humidity/ 湿度		IP00-max.95% ; IP54-max.95%
Altitude/ 海拔		max.4000 m above sea level/海平面上4000m
Mounting position/ 安装位置		vertical and horizontal/垂直和水平
Mounting/ 安装		side brackets,bottom brackets/ 侧面支架, 底部支架
Case/ 外壳		stain less-steel,forindoor/outdoor installation/不锈钢, 室内/户外安装
Dielectric/ 电介质		all film / 全薄膜
Impregnation/填充材料		JARYLEC(environmentally-friendly,non-toxic,non-PCB/环境友好型、无毒、无PCB)
Discharge resistors/放电电阻		built-in/内置-75V , 10minutes

Three-phase capacitors-type CPEFS 23-voltage/power,50Hz,Y connection,IP00

三相电容器-型号CPEFS-电压/容量, 50Hz, Y接法, IP00

Power 容量 [kVar]	Dimensions尺寸 [mm]		Weight 重量 [kg]	DrawingNo <sup>1)</sup> 图号
	Dc	Hc		
50	145	170	17	2/3/4
100	145	260	19	2/3/4
150	145	350	25	2/3/4
200	145	450	31	2/3/4
250	145	550	38	2/3/4
300	145	640	43	2/3/4
350	175	590	48	2/3/4
400	175	670	54	2/3/4
450	175	740	59	2/3/4
500	175	810	64	2/3/4
550	175	890	70	2/3/4
600	175	960	76	2/3/4
650	200	910	80	2/3/4
700	200	970	85	2/3/4
1000	200	1305	114	2/3/4

\*) Drawing 2 for voltage ≤7.2kV; Drawing 3 for voltage >7.2kV; Drawing 4 for voltage >12kV

Single-phase capacitors – type CUEFS 23 – voltage/power, 50Hz, I connection, IP00

单相电容器 – 型号CUEFS – 电压/容量, 50Hz, I接法, IP00

Power 容量[kVar]	Dimensions尺寸 [mm]		Weight 重量 [kg]	DrawingNo. *) 图号
	Dc	Hc		
50	145	170	14	1
100	145	250	18	1
150	145	330	23	1
200	145	420	29	1
250	145	520	35	1
300	145	600	40	1
350	175	570	45	1
400	175	640	50	1
450	175	710	55	1
500	175	780	60	1
550	175	850	66	1
600	175	920	71	1
650	200	870	75	1
700	200	930	81	1
750	200	990	86	1
800	200	1030	89	1
1000	200	1250	109	1

Other voltage, power, frequency and insulating levels are available on request.  
可提供其它电压、容量、频率和绝缘等级产品，请咨询我公司。

Bushings–Porcelain bushings for outdoor installation

套管-户外安装用陶瓷套管

Type 类型	Insulating level 绝缘等级 [kV]	Max.operating network voltage 最高运行电压[kV]	Creepage distance 爬电距离 [mm]	Height 高度 [mm]	Terminals 端子	Max.torque 最大扭矩 [Nm]	Weight 重量 [kg]
M1	20/60	7.2	260	160	M12	20	1.00
	28/75	12					
C3	38/95	17.5	317	232	M12	25	1.20
C4	50/125	24	457	274	M12	25	1.80
C5	70/170	36	635	315	M12	25	2.5

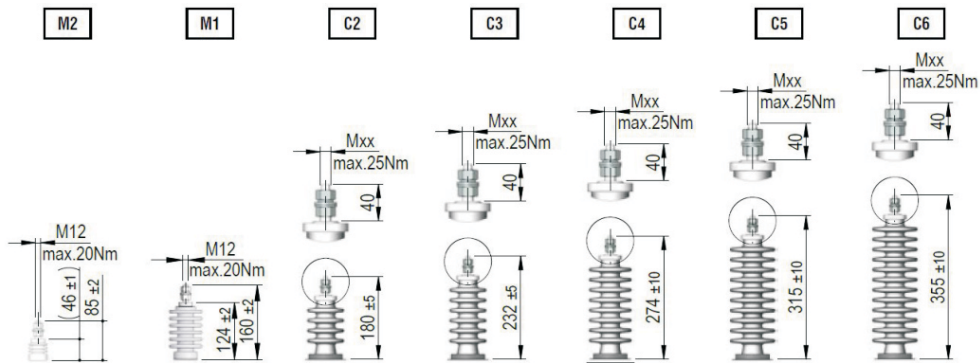
Standard insulation levels for Um<52kV

标准绝缘等级 Um<52kV

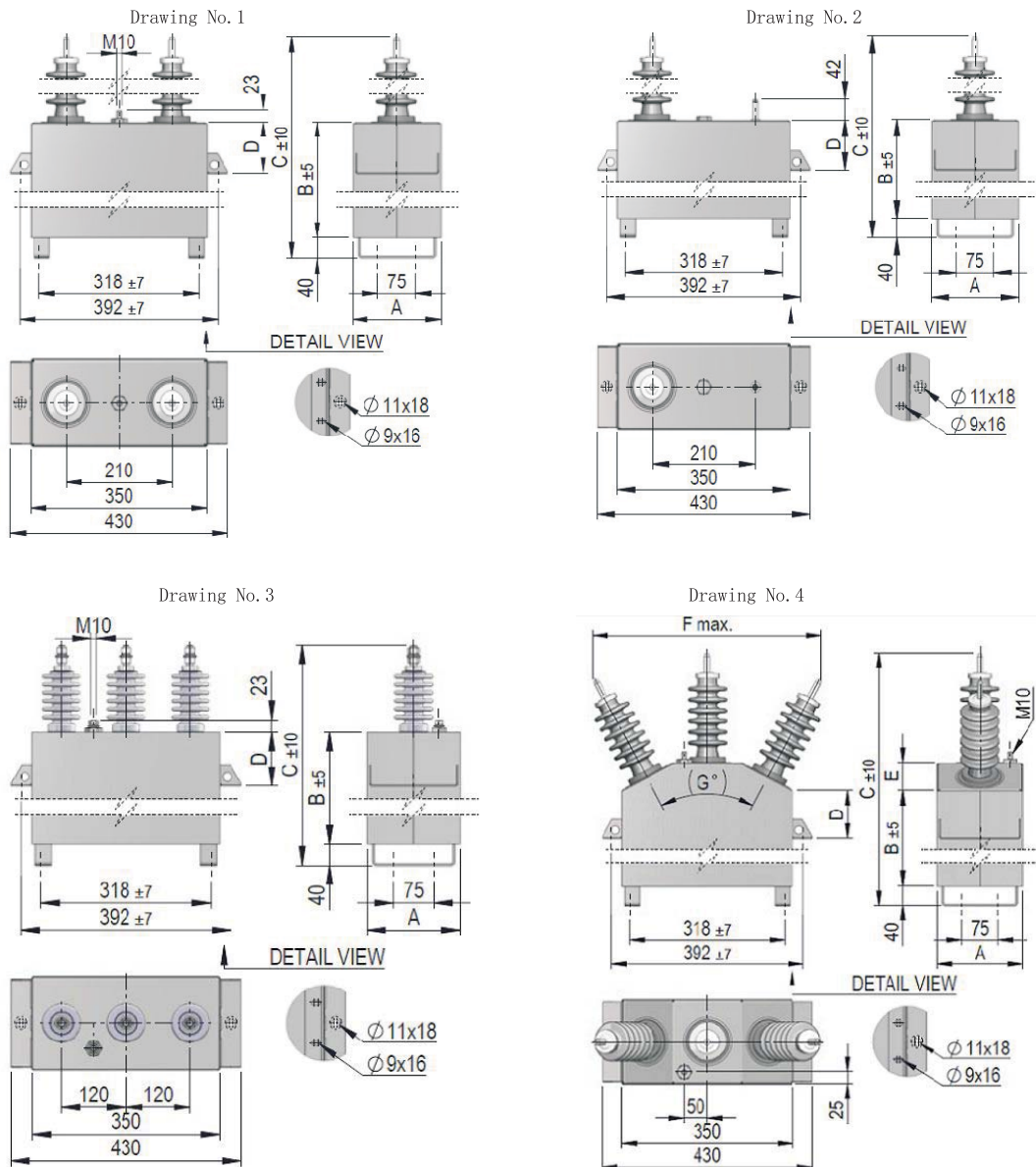
Highest voltage for equipment Um (RMS) 设备最高电压Um (有效值)	[kV]	2.4	3.6	7.2	12	17.5	24	36
Rated power-frequency short duration withstand voltage (RMS) 额定电源频率短时耐受电压 (有效值)	[kV]	8	10	20	28	38	50	70
Rated lightning impulse withstand voltage (peak) 额定雷电冲击电压 (峰值)	[kV]	35	40	60	75	95	125	170



Drawings of bushings 套管尺寸图



Dimensional drawings 尺寸图



PFR6/PFR12 is the new range of power factor regulators using on the highest technology and designed for easy and effective regulation. Regulator monitors the power system status and accurately and quickly takes decisions on the connection or disconnection of compensation stages in order to reach the preset target cos phi. Regulator's microprocessor records system voltage and current consumption of the entire operation via instrument transformer inputs and uses these to calculate the relationship between active power and reactive power in the power system.

Regulator calculates the basic harmonic factor of the active and reactive currents using the FFT algorithm. Thus precise measurement and control are provided even if the current waveform is distorted by higher harmonic components.

- THD measurement
- Alarm output
- FCP System (Fast Computerized Program), minimizes the number of ON/OFF operations
- displays all measurements on one single display
- connected steps display
- features designed for easy and intuitive handling by the user
- parameter setting in RUN-TIME
- totally digital setting and handling
- 4 quadrant PFC

PFR6/PFR12新系列功率因数控制器，运用最高技术，专为方便和有效的功率因数控制而设计。

控制器监测电力系统状态并准确而迅速控制补偿投切，以达到预设功率因数目标。

控制器的微处理器记录系统电压和通过电流互感器输入的整个运行电流消耗，并利用这些数据计算电力系统的有功功率和无功率的关系。

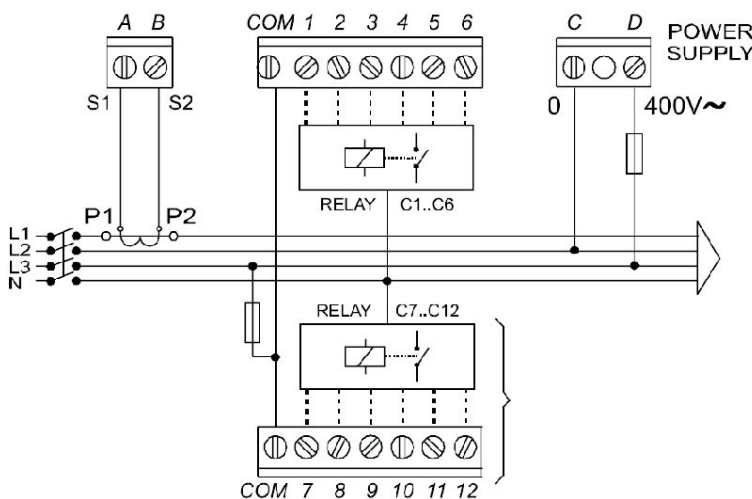
控制器采用FFT傅利叶算法计算有功和无功的基波电流。从而做到精确测量和控制，即使是受高谐波分量污染的电流波形。

- 谐波水平测量；
- 报警输出；
- FCP快速运算程序系统，最大限度地减少投切次数；
- 显示所有测量值在单个显示屏上；
- 投入步数显示
- 功能设计，直观方便用户处理；
- 快速参数设计；
- 完全数字化设置和处理；
- 四象限功率因数控制。

**Technical features 主要技术参数**

Supply and measuring voltage/ 供电与测量电压	400VAC(+15/-10%),45-65HZ
Current measurement circuit/ 电流测量	CT, In/5A
Accuracy of voltage measurement/ 电压测量精度	1%
Accuracy of current measurement/ 电流测量精度	1%
Accuracy of cos phi measurement/ 功率因数测量精度	+/-2%, 1 digit
Output / 输出	Relays, max.250V/10A/AC1
Protection degree/ 防护等级	IP51
Dimensions/ 外形尺寸	144*144*62mm
Installation hole/ 安装孔	138*138mm

**Connection 接线图**



PFC controller type PFR plus are used for auto connection or disconnection the capacitors, and in order to reach the preset target cos phi. There are three phase voltage and three phase current measurement. It can be used for three phase or single phase compensation.

Controller is constituted by basic module, display and operation module and extension module.

Controller used a microprocessor to measure power data. Supply power and measuring voltage are independent. Controller can measure the detail data of power network, include power, THD, frequency and up to 31th harmonic volume, does not need other power measuring apparatus. There are Modbus interface to connect with data bus.

功率因素控制器PFRplus用于自动控制电容器的投入和切除，以达到用户预设的功率因素目标。具备三相电压和三相电流测量，可实现共补和分补。

控制器由基本模块、显示操控模块和扩展模块组成，易于安装调试。

采用微处理器进行电参数测量。辅助电源和电压采样信号分离。可测量电网的详细电参数，包括功率、总谐波畸变率、频率、以及三十一次谐波值，无需外加电力分析表。可以通过Modbus接口实现总线连接。

### General

- modular design
- used for three phase, single phase or hybrid compensation
- handle or automatic data setup and data protect
- colorized LCD display
- state display for capacitors
- up to 31th harmonic measurement
- alarm relay outputs
- extend to 24 outputs
- relay or transistor output
- Modbus interface



### 特点

- 模块化设计
- 可用于共补、分补或混合补偿
- 手动或自动参数设置和保护
- 彩色液晶显示
- 电容器状态显示
- 31次谐波测量
- 报警输出
- 最多可扩展至24点输出
- 继电器输出或晶体管输出
- Modbus通讯接口

### Type selection 选型

Products 产品	Type 型号	Descripton 描述
BasicModule/ 基本模块	PFRplus-BM6 <sup>*)</sup>	6relayout puts/6路继电器输出, 2DI, 2DO
BasicModule/ 基本模块	PFRplus-BM12 <sup>*)</sup>	12relayout puts/12路继电器输出, 2DI, 2DO
BasicModule/ 基本模块	PFRplus-BM6T <sup>*)</sup>	6transistorout puts/6路晶体管输出, 2DI, 2DO
BasicModule/ 基本模块	PFRplus-BM12T <sup>*)</sup>	12transistorout puts/12路晶体管输出, 2DI, 2DO
DisplayandOperatonMo dule/ 显示操控模块	PFRplus-HM	LCDdisplayandoperatonpanel/ 液晶显示和操作控制面板
ExtensionMo dule/ 扩展模块	PFRplus-EM6	6relayout puts/6路继电器输出
ExtensionMo dule/ 扩展模块	PFRplus-EM6T	6transistorout puts/6路晶体管输出

\*) The type of basic module +DM, include Modbus interface.

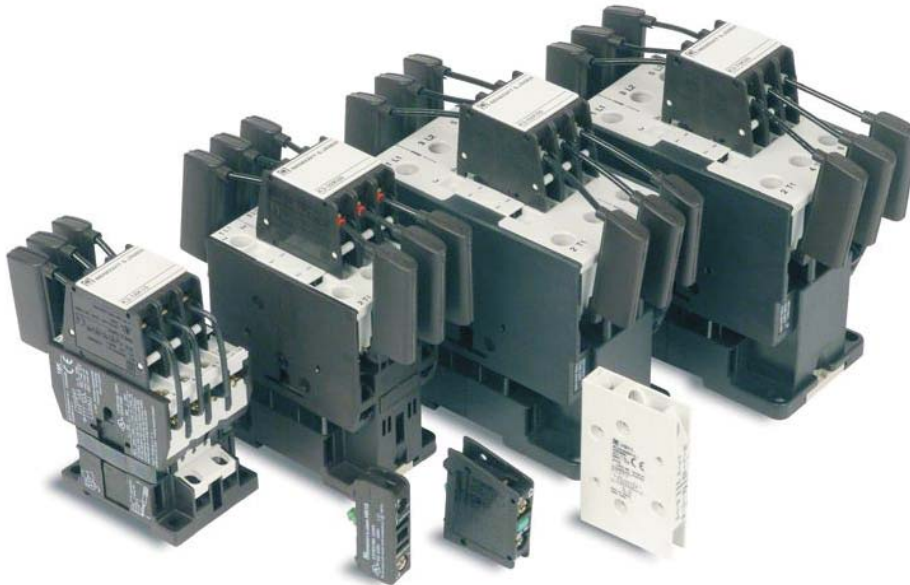
基本模块后缀+DM, 带Modbus通讯接口。

You can description with type PFR plus-6/12/18/24 or PFR plus-6T/12T/18T/24T, when you order product.

你订购产品时, 型号可描述为PFR plus-6/12/18/24或者PFR plus-6T/12T/18T/24T。

e.g.: PFR plus-24T incl. PFR plus-BM12T \*1 unit, PFR plus-HM \*1 unit and PFR plus-EM6T \*2 units.

例如: PFR plus-24T包含PFR plus-BM12T \*1个, PFR plus-HM \*1个和PFR plus-EM6T \*2个。



### Specification

Contactors K3-..K are suitable for switching capacitors in capacitor banks (IEC 70 and 831, VDE 0560) without and with reactors.

Capacitor switching contactors are fitted with early make contacts and damping resistors, to reduce the value of make current < 70 x Ie.

### Operating conditions

Capacitor switching contactors are protected against contact welding for a prospective making current of 200 x Ie. Fuse rating approx. 1.6 to 2.5 x Ie, type gL (gG).

### Technical data 技术参数

acc.toIEC947-4-1,IEC947-5-1,EN60947-4-1,EN60947-5-1,VDE0660

Rated Operational Power at 50/60Hz <sup>1)</sup> 50/60Hz额定容量						Aux.Contacts 辅助触头			Type 型号	Weight 重量
Ambient Temperature 环境温度						Built-in 内置	Add. 外加	Coil Voltage <sup>1)</sup> 线圈电压	Pcs.	kg
50°C			60°C							
380/400V	415/440V	660/690V	380/400V	415/440V	660/690V	NO	NC	AC/50Hz		
kVar	kVar	kVar	kVar	kVar	kVar					
25	27	41	25	27	41	-	-	32)	K3-32K00-230	0.62
50	53	82	50	53	82	-	-	32)	K3-62K00-230	1.0
75	75	120	60	64	100	-	-	32)	K3-74K00-230	1.0

- 1) Other coil voltage on request;
- 2) 2 HB for side mounting, 1 HN or HA snap-on;
- 3) Other rated operational power on request;

### 说明

K3-..K系列接触器用于投切电容器柜中带或不带电抗器的电容器 ( IEC 70和831 , VDE 0560 ) 。

该电容器专用接触器包含提前动作触点和阻尼电阻，从而限制投入涌流小于70倍额定电流。

### 运行条件

电容器专用接触器需要后备保护，以防止预期的投入电流达到200倍额定电流时触点被熔焊。采用gL (gG)型熔断器，规格大约为1.6-2.5倍额定电流。

- 1) 其它线圈电压规格请咨询我公司；
- 2) 侧面安装2个HB，上部安装1个HN或HA；
- 3) 其它额定容量请咨询我公司。

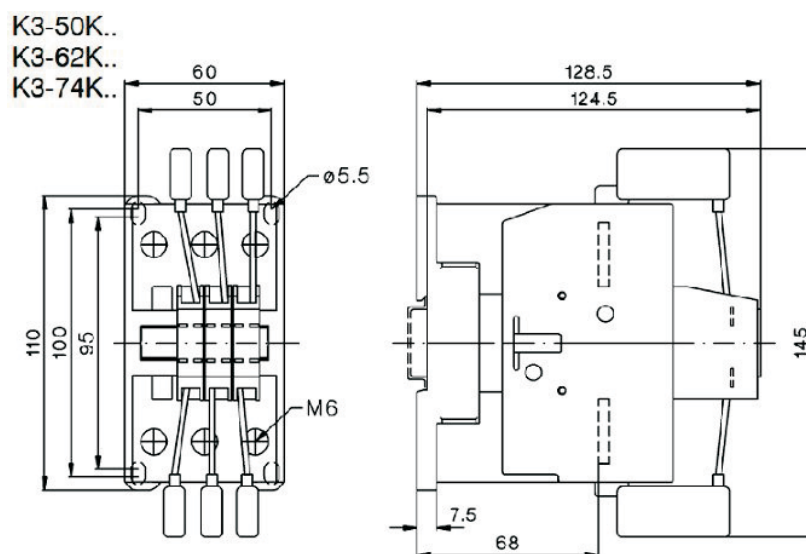
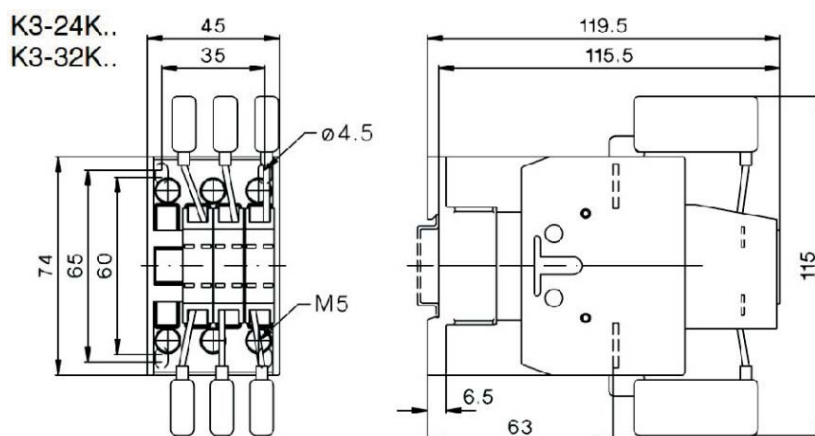
### Auxiliary contact blocks

#### 辅助触头

Rated operational current 额定电流 [A]			For contactor 用于接触器	Contacts 触头		Type
AC15/230V	AC15/400V	AC1/690V		NO	NC	
3	2	10	K3-10..toK3-115	1	-	HN10
3	2	10	K3-10..toK3-115	-	1	HN01
3	2	10	K3-24..toK3-115	1	1	HB11
6	4	25	K3-10..toK3-115	1	-	HA10
6	4	25	K3-10..toK3-115	-	1	HA01

### Dimensional drawings

#### 尺寸图



### Application

ZEZ-TS thyristor switch is used for fast switching capacitors in the low voltage system. It compared with other switching devices, there are No inrush current during, smooth cutting, fast switching, which is suitable for electrical welding machine and other rapid load changes.

### General

- Zero crossing switching, no inrush current, no impact, not voltage flicker;
- photoelectric isolation, strong anti-interference ability, fast response speed (50ms);
- small volume, convenient installation;
- LED lights display switching state;
- built-in cooling fan, automatically control the fan start and stop;
- built-in over temperature (80°C) protection;
- no noise, no mechanical wear, prolonging the service life greatly;
- special terminal design, easy connection.

### 应用

ZEZ-TS可控硅开关用于快速投切低压系统中的电容器。和其它投切装置相比较，具有导通过程无涌流、平滑切断、快速投切等优点。适用于如电焊机  
等负载快速变化的场合。

### 特点

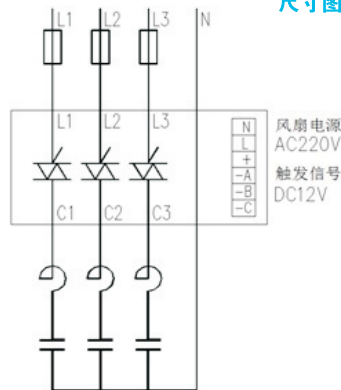
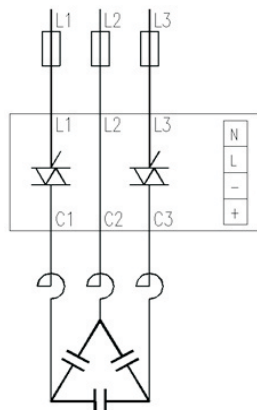
- 过零投切、无涌流、无冲击，不会造成电网电压闪变；
- 光电隔离，抗干扰能力强，响应速度快（50ms）；
- 体积小，方便安装；
- LED信号灯显示投切状态；
- 内置冷却风扇，自动控制风扇启停；
- 内置过温（80°C）保护；
- 无噪音、无机械磨损，大大延长使用寿命；
- 特殊端子设计，方便客户接线。

### Technical data 技术参数

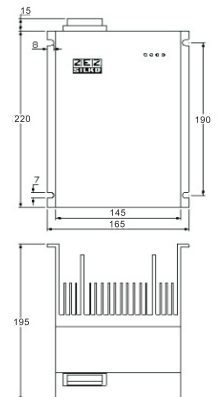
Type 型号	Rated Voltage 电压 [V]	Rated Power 额定容量 [kVar]	Rated Current 额定电流 [A]	Max. Current 最大电流 [A]
ZEZ-TS25H2	400	25	40	63
ZEZ-TS50H2	400	50	75	115
ZEZ-TS30H3	230	3x10	50	75
ZEZ-TS45H3	230	3x15	75	115
RD-100/10	Discharge resistor for ZEZ-TS25H2 and ZEZ-TS50H2 / 放电电阻，用于 ZEZ-TS25H2 和 ZEZ-TS50H2			

Other voltage and power are available on request.  
可提供其它电压和容量产品，请咨询我公司。

### Connection drawings 接线图



### Dimensional drawings 尺寸图



### Application

ZEZ-APF active power filter consists of a control module and the power modules. The quantity and capacity of the modules are depend on the required filter harmonic currents. They be widely used in construction, medical, communication and other industrial applications.

### General

- 2-50th harmonic filter;
- response time <300us, the full response time <10ms;
- specific harmonic compensation;
- harmonics, reactive energy and three phase unbalanced, three compensation modes;
- >97% work efficiency, small energy loss;
- totally digital control;
- modular design, easy installation.



### 应用

ZEZ-APF有源滤波器由控制模块和功率模块等组成，模块的数量和容量取决于所需滤除谐波电流的大小。可广泛用于建筑、医疗、通讯和其它各类工业场合。

### 特点

- 2-50次滤波；
- 响应时间<300us，全响应时间<10ms；
- 可选特定次数谐波补偿；
- 谐波、无功和不平衡三种补偿方式；
- >97%工作效率，损耗小；
- 全数字控制；
- 模块化设计，安装方便。

### Technical data 技术参数

Type 型号	Voltage 电压 [V]	Rated Current 额定电流 [A]	Rated Current of N Phase 中性线额定电流 [A]
ZEZ-APF50-3P	230-450	50	/
ZEZ-APF100-3P	230-450	100	/
ZEZ-APF150-3P	230-450	150	/
ZEZ-APF200-3P	230-450	200	/
ZEZ-APF300-3P	230-450	300	/
ZEZ-APF50-3P/N	230-450	50	150
ZEZ-APF100-3P/N	230-450	100	300
ZEZ-APF150-3P/N	230-450	150	450
ZEZ-APF200-3P/N	230-450	200	600
ZEZ-APF300-3P/N	230-450	300	900

Other voltage, power and frequency are available on request.  
可提供其它电压、容量、频率产品，请咨询我公司。

### Application

Automatic capacitor banks type ZEZ-QR are used for the powerfactor correction of inductive character loads in low voltage power networks. They be widely used in industrial and construction applications.

### Construction

Capacitor banks are constructed in steel-plate cabinets. The banks are equipped with automatic PFC regulator, switching contactors, cylindrical capacitors ZEZ SILKO (MKP capacitors, dry type), reactor and fuses. Main switch can be installed in all banks (three-phase circuit breaker or fuse switch).



### 应用

ZEZ-QR自动补偿装置用于低压电力系统中感性负载的功率因素控制。可广泛用于各类工业和建筑场合。

### 结构

补偿装置采用钢结构柜体，装备功率因素控制器、投切开关、ZEZ SILKO圆柱形电容器（干式MKP电容器）、电抗器和熔断器。所有补偿装置可以安装主开关（三相断路器或熔断器开关）。

### Technical Data 技术参数

Type 型号	额定容量[kVar]	Power of Each Step 单步容量[kVar]	Voltage of Capacitor 电容器额定电压[V]
400V, 3P, 50Hz, p=7%, fr=189Hz, Contactor Switching 接触器投切			
ZEZ-QRF7-200/4(or/5)	200	50(25+ 25)+ 50+ 50+ 50	440/480
ZEZ-QRF7-250/5(or/6)	250	50(25+ 25)+ 50+ 50+ 50+ 50	440/480
ZEZ-QRF7-300/6(or/7)	300	50(25+ 25)+ 50+ 50+ 50+ 50+ 50	440/480
ZEZ-QRF7-350/7(or/8)	350	50(25+ 25)+ 50+ 50+ 50+ 50+ 50+ 50	440/480
ZEZ-QRF7-400/8	400	50+ 50+ 50+ 50+ 50+ 50+ 50+ 50	440/480
400V, 3P, 50Hz, p=14%, fr=134Hz, Contactor Switching 接触器投切			
ZEZ-QRF14-200/4(or/5)	200	50(25+ 25)+ 50+ 50+ 50	480/525
ZEZ-QRF14-250/5(or/6)	250	50(25+ 25)+ 50+ 50+ 50+ 50	480/525
ZEZ-QRF14-300/6(or/7)	300	50(25+ 25)+ 50+ 50+ 50+ 50+ 50	480/525
400V, 3P, 50Hz, p=7%, fr=189Hz, Thyristor Switching 可控硅投切			
ZEZ-QRR7-200/4(or/5)	200	50(25+ 25)+ 50+ 50+ 50	480/525
ZEZ-QRR7-250/5(or/6)	250	50(25+ 25)+ 50+ 50+ 50+ 50	480/525
ZEZ-QRR7-300/6(or/7)	300	50(25+ 25)+ 50+ 50+ 50+ 50+ 50	480/525
ZEZ-QRR7-350/7(or/8)	350	50(25+ 25)+ 50+ 50+ 50+ 50+ 50+ 50	480/525
ZEZ-QRR7-400/8	400	50+ 50+ 50+ 50+ 50+ 50+ 50+ 50	480/525
400V, 3P, 50Hz, p=14%, fr=134Hz, Thyristor Switching 可控硅投切			
ZEZ-QRR14-200/4(or/5)	200	50(25+ 25)+ 50+ 50+ 50	525
ZEZ-QRR14-250/5(or/6)	250	50(25+ 25)+ 50+ 50+ 50+ 50	525
ZEZ-QRR14-300/6(or/7)	300	50(25+ 25)+ 50+ 50+ 50+ 50+ 50	525

Option APF A50、A100、A150, when the numbers of step  $\leq 6$ .

可选择 A50、A100、A150 有源滤波器，适用于回路数  $\leq 6$  的补偿装置。

Other voltage, power, frequency and single phase compensation are available on request.

可提供其它电压、容量、频率和单相补偿产品，请咨询我公司。



BUREAU VERITAS  
Certification



## Certification

Awarded to

**ZEZ SILKO s.r.o.**  
Pod Černým lesem 683, 564 01 Žamberk  
Czech Republic

Bureau Veritas certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standard detailed below:

Standard

**ČSN EN ISO 9001:2009**

Scope of supply

DEVELOPMENT, PRODUCTION, SALE AND SERVICE OF POWER CAPACITORS AND INDUCTORS.  
PRODUCTION OF SWITCHGEAR CABINETS AND METAL PARTS.  
DESIGN, PRODUCTION, INSTALLATION AND SERVICE IN A BRANCH OF THE POWER FACTOR COMPENSATION.  
SALE OF COMPONENTS FOR POWER ELECTRONICS.

Original Approval Date: 8<sup>th</sup> FEBRUARY 2014

Certification cycle start Date: 8<sup>th</sup> FEBRUARY 2014

Subject to the continued satisfactory operation of the organisation's Management System, this certificate is valid until: 27<sup>th</sup> NOVEMBER 2016

To check this certificate validity please call: +420 210 088 215

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.

Version 1, Revision Date: 20<sup>th</sup> FEBRUARY 2014

Certificate Number: CZ003415



S 3100

MANAGING OFFICE: BUREAU VERITAS CZECH REPUBLIC, spol. s r.o., Olbrachtova 1, 140 02 Praha 4, Czech Republic.  
ISSUING OFFICE: ADDRESS: BUREAU VERITAS CZECH REPUBLIC, spol. s r.o., Olbrachtova 1, 140 02 Praha 4, Czech Republic.



CESI

IRIS  
Certification

VDE

CE



STIEE 报告编号: AT13-1093  
CNAS L1145 2015001885A

## 检验报告

Test Report

产品名称: 电容器  
Name of product: 电容器

型号: CSADG1-0.48/33.3  
Type: CSADG1-0.48/33.3

委托方: 上海初雄电气有限公司  
Client: 上海初雄电气有限公司

检验类别: 委托检验  
Kind of test: 委托检验

上海电器设备检测所  
SHANGHAI TESTING & INSPECTION INSTITUTE  
FOR ELECTRICAL EQUIPMENT

No. AT13-1093 共10页 第1页

上海电器设备检测所  
检验报告

产品名称	电容器	规格	ZEE MLKAD
型号	CVADG1-0.48/33.3		
技术参数	$U_N=400V$ 50Hz; $I_N=2+40.1A$ ; $Q_N=33.3mvar$ ; 正负偏压 $C_U=1-103.4\mu F$		
检验类别	委托检验		
委托方	上海初雄电气有限公司	地址	上海市长寿路360号812室
制造厂	ZEE MLKAD s.r.o.	地址	Zambouk CZECH REPUBLIC
抽样地点	/	抽样者	/
送样数量	2台	送样者	/
抽样日期	/年/月/日	检验日期	2013年08月30日
样品编号	#01; #02		
检验依据	GB/T17471.2-2004《额定电压12kV及以下交流金属箔层自愈式并联电容器 第1部分:总则》、GB/T17471.3-2004《额定电压12kV及以下交流金属箔层自愈式并联电容器 第2部分:瓷化封装、自愈式金属箔层电容器》、IEC/EN 60831:2014《自愈式并联电容器的试验方法》(适用于具有自愈电压的自愈式电容器)		
检验日期	2013年08月30日		
检验结论	试验项目 01-12 (见检验项目列表) 符合检验标准要求。		
备注	无		

批准: [Signature] 审核: [Signature] 编制: [Signature]  
2013-08-01 R02311.1-2013

STIEE 报告编号: AT13-1094  
CNAS L1145 2015001885A

## 检验报告

Test Report

产品名称: 电容器  
Name of product: 电容器

型号: CVADG1-0.28/6.9  
Type: CVADG1-0.28/6.9

委托方: 上海初雄电气有限公司  
Client: 上海初雄电气有限公司

检验类别: 委托检验  
Kind of test: 委托检验

上海电器设备检测所  
SHANGHAI TESTING & INSPECTION INSTITUTE  
FOR ELECTRICAL EQUIPMENT

No. AT13-1094 共10页 第1页

上海电器设备检测所  
检验报告

产品名称	电容器	规格	ZEE MLKCO
型号	CVADG1-0.28/6.9		
技术参数	$U_N=280V$ 50Hz; $I_N=28A$ ; $Q_N=6.9var$ ; $C_U=280.3\mu F$		
检验类别	委托检验		
委托方	上海初雄电气有限公司	地址	上海市长寿路360号812室
制造厂	ZEE MLKCO s.r.o.	地址	Zambouk CZECH REPUBLIC
抽样地点	/	抽样者	/
送样数量	2台	送样者	/
抽样日期	/年/月/日	检验日期	2013年08月30日
样品编号	#01; #02		
检验依据	GB/T17471.2-2004《额定电压12kV及以下交流金属箔层自愈式并联电容器 第1部分:总则》、GB/T17471.3-2004《额定电压12kV及以下交流金属箔层自愈式并联电容器 第2部分:瓷化封装、自愈式金属箔层电容器》、IEC/EN 60831:2014《自愈式并联电容器的试验方法》(适用于具有自愈电压的自愈式电容器)		
检验日期	2013年08月30日		
检验结论	试验项目 01-12 (见检验项目列表) 符合检验标准要求。		
备注	无		

批准: [Signature] 审核: [Signature] 编制: [Signature]  
2013-08-01 R02311.1-2013

STIEE 报告编号: AT13-1092  
CNAS L1145 2015001885A

## 检验报告

Test Report

产品名称: 电抗器  
Name of product: 电抗器

型号: TKAI-56.2-189/400/440  
Type: TKAI-56.2-189/400/440

委托方: 上海初雄电气有限公司  
Client: 上海初雄电气有限公司

检验类别: 委托检验  
Kind of test: 委托检验

上海电器设备检测所  
SHANGHAI TESTING & INSPECTION INSTITUTE  
FOR ELECTRICAL EQUIPMENT

No. AT13-1092 共10页 第1页

上海电器设备检测所  
检验报告

产品名称	电抗器	规格	ZEE MLKAD
型号	TKAI-56.2-189/400/440		
技术参数	$U_N=400V$ 50Hz; 额定频率: 189Hz; $Q_N=56.2var$ ; 电感: 0.76mH		
检验类别	委托检验		
委托方	上海初雄电气有限公司	地址	上海市长寿路360号812室
制造厂	ZEE MLKAD s.r.o.	地址	Zambouk CZECH REPUBLIC
抽样地点	/	抽样者	/
送样数量	1台	送样者	/
抽样日期	/年/月/日	检验日期	2013年08月30日
样品编号	#01		
检验依据	GB/T1984.2-2011《高压交流断路器 第2部分:型式试验》、IEC/EN 60676-6:2007《400V-10kV的变压器-Part 6:Reactors》、GB/T21-2008《电力变压器、电源、电抗器和类似产品的安全 第1部分:通用要求和试验》、IEC/EN EN 61838-3:2007《Safety of power transformers, power supplies, reactors and similar products-Part 3: Particular requirements and tests for separating transformers and power supplies interpreting separating transformers for general applications》、GB/T 6084-1992《交流电抗器设备型式试验和型式试验尺寸 第一部分:采用Y型铁芯的固定式和电感器》、IEC/EN 60825-1:2006《Outline dimensions of transformers and inductors for use in telecommunication and electronic equipment-Part 1: Transformers and inductors using E-type core》		
检验日期	2013年08月30日		
检验结论	试验项目 01-407 (见检验项目列表) 符合检验标准要求。		
备注	无		

批准: [Signature] 审核: [Signature] 编制: [Signature]  
2013-08-01 R02311.1-2013

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