



Power capacitors

# MEDIUM VOLTAGE SURGE CAPACITORS



# COMPANY PROFILE



ZEZ SILKO s.r.o. is a reputable manufacturer of power capacitors, capacitors for power electronics, capacitors for induction heating and many other capacitor types. Company ZEZ SILKO s.r.o. provides complete power factor correction service including: power system evaluation including harmonic analysis, technical and commercial quotations, capacitor banks production and commissioning. Components for power factor correction and regulation of electrical energy are also supplied. ZEZ SILKO products are being exported to countries all around the world. They are for use on traction systems (locomotives, trams, trolleybuses), green energy generation (wind and photovoltaic power plants), energy sector (power factor correction) and also induction heating equipment. ZEZ SILKO s.r.o. has always been and will continue to be your reliable business partner.



European manufacturer of capacitors



Tradition of capacitor production since 1930



Emphasis to quality of products



Quality control system (ISO 9001) since 1999



IRIS certification since 2014



Products are exported to countries all around the world



## General information

These surge capacitors are used to limit the surge wave shape to prevent damage of insulation of MV motors, generators and transformers. The best protection solution is to use surge arresters together with the surge capacitors. Then both wave shape and magnitude are limited.

## Basic characteristics

- High reliability
- High transient voltage withstand
- Long lifetime
- Low loss dielectric

## Surge protection for:

- MV motors and generators
- MV switchgears
- MV transformers

## Installation and maintenance

Surge capacitors are connected to ground and the motor, generator or transformer terminals.

## For maintenance please follow these instructions:

- prevent mechanical stress of the insulators
- max. torque for clamping bolt of insulators M12 – 20/25 Nm
- max. torque for clamping bolt of grounding clamp M10 – 15 Nm
- 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

## Applications



# MV Surge Capacitors



## General technical parametres

<b>Standards</b>	IEC 60871-1, EN 60871-1
<b>Rated voltage</b>	1 - 36 kV
<b>Rated frequency</b>	50 / 60 Hz
<b>Capacitance tolerance</b>	-5 / +10 %
<b>Test voltage terminal - terminal</b>	2 x U <sub>N</sub> AC / 10 s or 4 x U <sub>N</sub> DC / 10 s
<b>Test voltage terminal - case</b>	According to the insulation level / 10 s
<b>Capacitor losses</b>	0,06 ÷ 1 W / kvar
<b>Discharge resistors</b>	Built-in 75 V / 10 min
<b>Statistical life expectancy</b>	> 150 000 hours under standard conditions
<b>Protection degree</b>	IP 00
<b>Temperature category</b>	-25 / C - other on request
<b>Max. relative humidity</b>	95 %
<b>Cooling</b>	Natural Air
<b>Max. altitude</b>	4 000 m
<b>Mounting position</b>	Vertical or horizontal (narrow side)
<b>Case</b>	Stainless - steel
<b>Dielectric system</b>	All - film
<b>Impregnant</b>	Synthetic oil (non PCB)

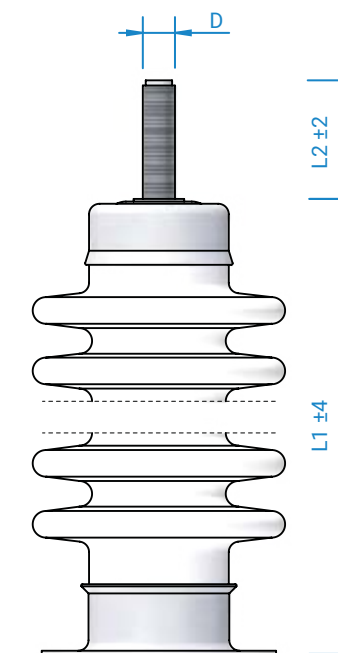
## Standard insulation levels

<b>Highest voltage for equipment U<sub>m</sub> (RMS)</b>	(kV)	2,4	3,6	7,2	12	17,5	24	36	52
<b>Rated power-frequency short duration withstand voltage (RMS)</b>	(kV)	8	10	20	28	38	50	70	95
<b>Rated lightning impulse withstand voltage (peak)</b>	(kV)	35	40	60	75	95	125	170	200

## Bushings

Type	Creepage (mm)	Insulating level (kV)	No. of skirts	L1 (mm)	L2 (mm)	Type of stud (D)
K2	190	28/75	4	151	45 55	M12 M16
K3	305	38/95	6	215	45 55	M12 M16
K4	458	50/125	8	253	45 55	M12 M16
K5	686	70/170	11	278	45 55	M12 M16

## Drawing of Bushing



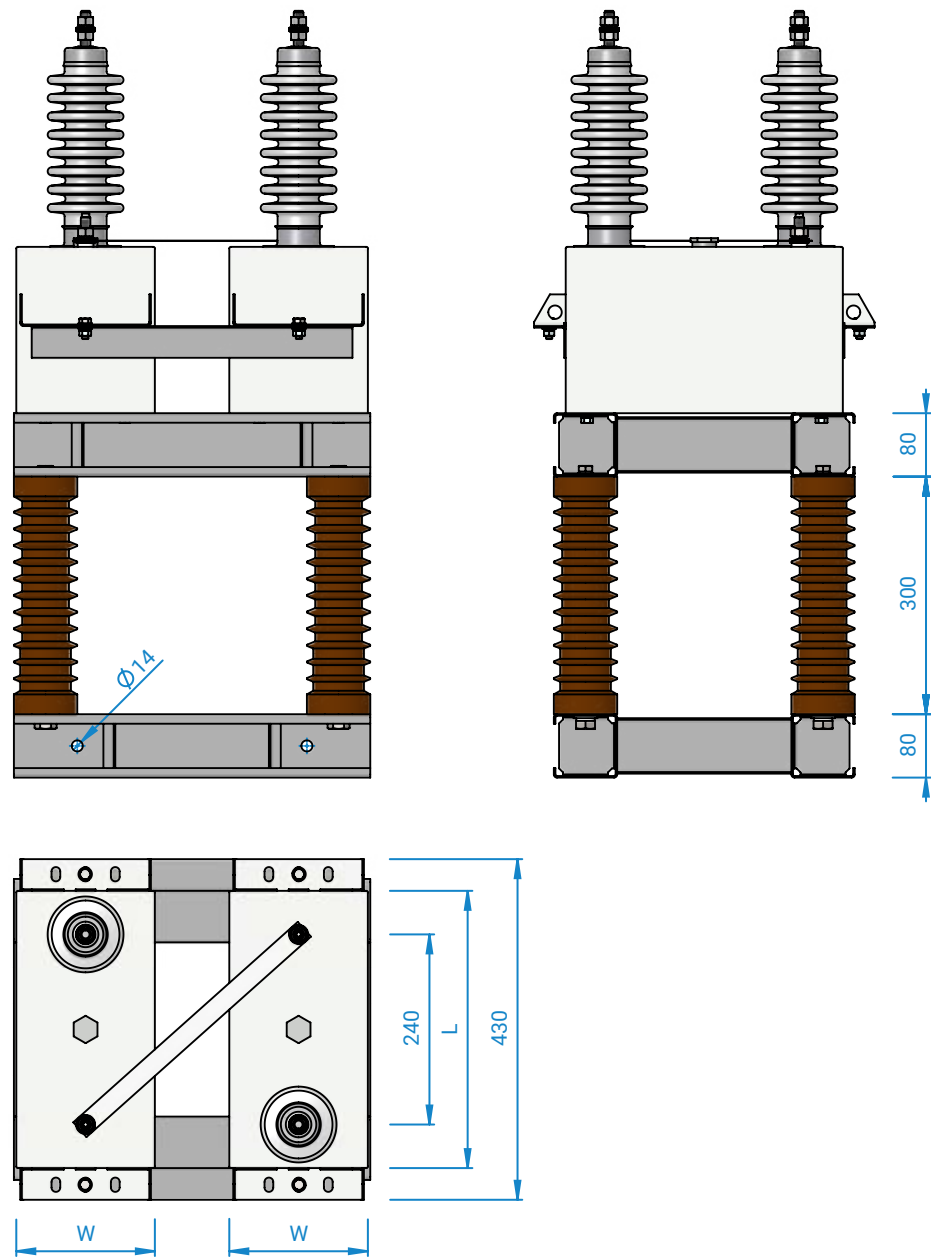
SCA

SCA - surge suppressor, serial assemblies, live case, single phase type

Type	U <sub>N</sub> (kV)	C <sub>N</sub> (μF)	I <sub>N</sub> (A)	U <sub>E</sub> (kV/1 min)	Impulse (kVp)
SCA 36-0,1/1	36	0,10	1,1	70	170
SCA 36-0,13/1		0,13	1,5		
SCA 36-0,15/1		0,15	1,7		
SCA 36-0,2/1		0,20	2,3		
SCA 36-0,25/1		0,25	2,8		
SCA 36-0,3/1		0,30	3,4		

Indoor installation

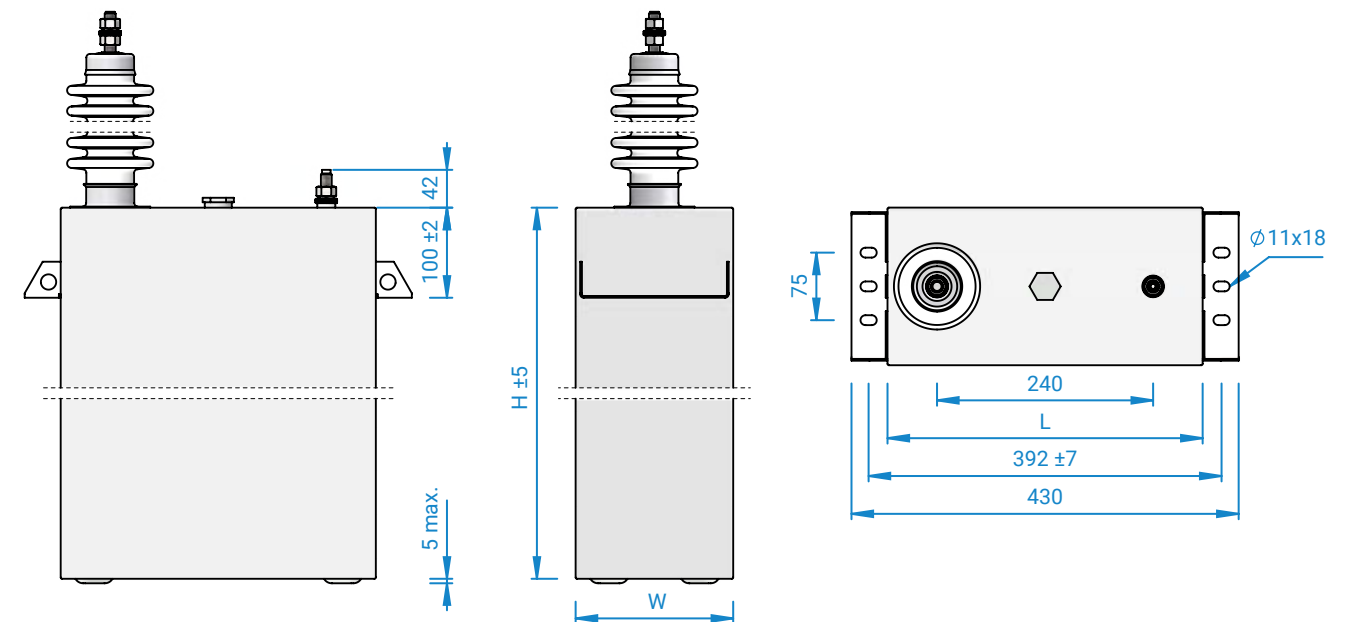
Other values of capacitance and voltage are available on request.



PUFFS - Un/Cn

PUFFS - surge suppressor, live case, single phase type

Type	U <sub>N</sub> (kV)	C <sub>N</sub> (μF)	I <sub>N</sub> (A)	U <sub>E</sub> (kV/1 min)	Impulse (kVp)
PUFFS-7,2/0,5	7,2	0,50	1,1	28	75
PUFFS-12/0,1	12,0	0,10	0,4	38	95
PUFFS-12/0,2		0,20	0,8		
PUFFS-12/0,25		0,25	0,9		
PUFFS-12/0,3		0,30	1,1		
PUFFS-12/0,4		0,40	1,5		
PUFFS-12/0,5		0,50	1,9		
PUFFS-17,5/0,1	17,5	0,10	0,5	50	125
PUFFS-17,5/0,2		0,20	1,1		
PUFFS-17,5/0,25		0,25	1,4		
PUFFS-17,5/0,3		0,30	1,6		
PUFFS-17,5/0,4		0,40	2,2		
PUFFS-17,5/0,5		0,50	2,7		
PUFFS-24/0,1	24,0	0,10	0,8	70	170
PUFFS-24/0,2		0,20	1,5		
PUFFS-24/0,25		0,25	1,9		
PUFFS-24/0,3		0,30	2,3		
PUFFS-24/0,4		0,40	3,0		
PUFFS-24/0,5		0,50	3,8		





**PUFFS - Un/Cn**

PUFFS - RC-surge suppressor with built in damping resistor, live case, single phase type

Type	U <sub>N</sub> (kV)	C <sub>N</sub> (μF)	I <sub>N</sub> (A)	U <sub>E</sub> (kV/1 min)	Impulse (kVp)
PUFFS-12/0,1	12,0	0,10	0,38	28	75
PUFFS-12/0,15		0,15	0,57		
PUFFS-12/0,2		0,20	0,75		
PUFFS-12/0,25		0,25	0,94		
PUFFS-12/0,3		0,30	1,13		
PUFFS-12/0,4		0,40	1,51		
PUFFS-12/0,5	17,5	0,50	1,88	38	95
PUFFS-17,5/0,1		0,10	0,55		
PUFFS-17,5/0,15		0,15	0,82		
PUFFS-17,5/0,2		0,20	1,10		
PUFFS-17,5/0,25		0,25	1,37		
PUFFS-17,5/0,3		0,30	1,65		
PUFFS-17,5/0,4	0,40	2,20			
PUFFS-17,5/0,5	0,50	2,75	24,0	50	125
PUFFS-24/0,1	0,10	0,75			
PUFFS-24/0,15	0,15	1,13			
PUFFS-24/0,2	0,20	1,51			
PUFFS-24/0,25	0,25	1,88			
PUFFS-24/0,3	0,30	2,26			
PUFFS-24/0,4	0,40	3,02			
PUFFS-24/0,5	0,50	3,77			

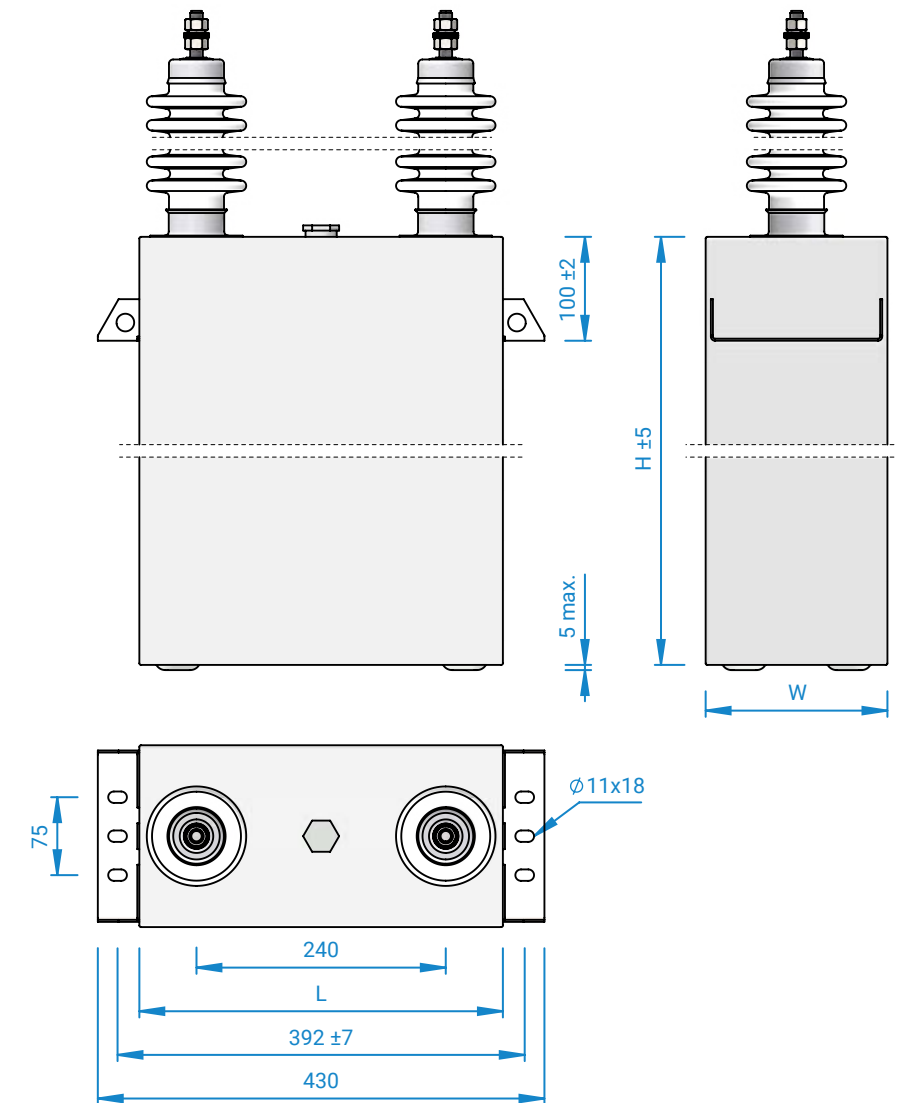
Damping resistance up to 100 Ω (preferred values 20Ω, 25Ω, 33Ω, 50Ω 100Ω). Losses (R x I<sup>2</sup>) max. 100 W (continuous).

**PUEFS - Un/Cn**

PUEFS - surge suppressor, dead case, single phase type

Type	U <sub>N</sub> (kV)	C <sub>N</sub> (μF)	I <sub>N</sub> (A)	U <sub>E</sub> (kV/1 min)	Impulse (kVp)
PUEFS-12/0,25	12,0	0,25	0,9	28	75
PUEFS-12/0,5		0,50	1,9		
PUEFS-15/0,5	15,0	0,50	2,4	38	95
PUEFS-17,5/0,25	17,5	0,25	1,4		
PUEFS-20/0,3	20,0	0,30	1,9	50	125
PUEFS-24/0,3	24,0	0,30	2,3	70	170

Other values of capacitance and voltage are available on request.



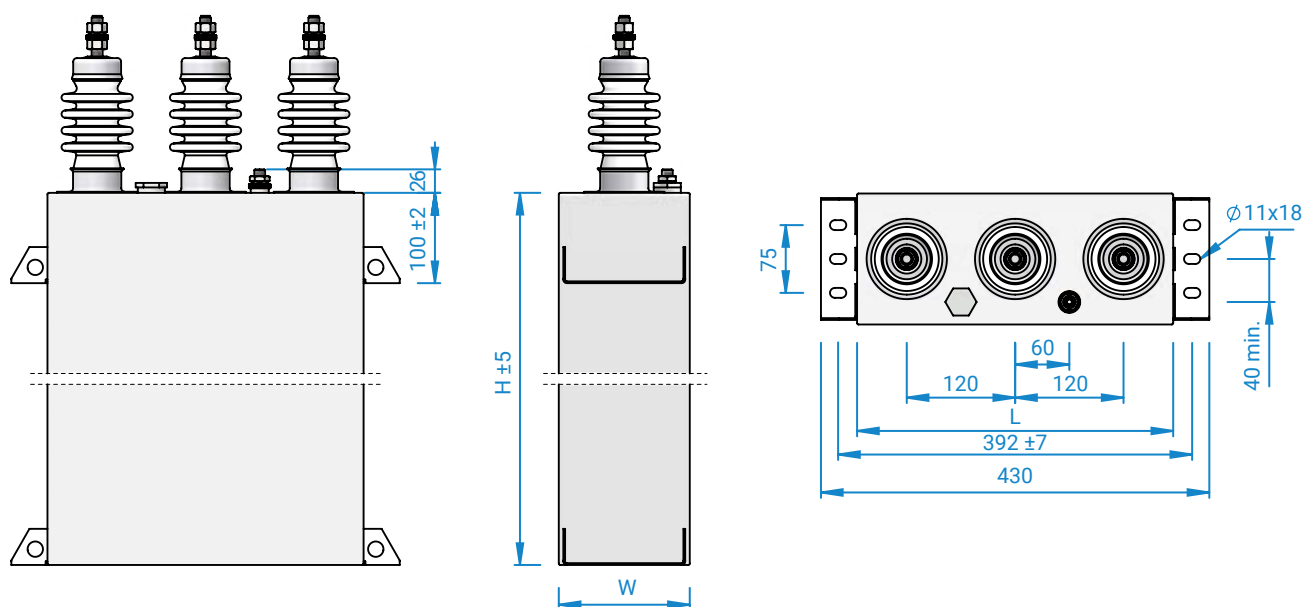


## PPFFS - Un/Cn

## PPFFS - surge suppressor, live case YN, up to 12kV, three phase type

Type	$U_N$ (kV)	$C_N$ ( $\mu$ F)	$I_N$ (A)	$U_E$ (kV/1 min)	Impulse (kVp)
PPFFS-7,2/3x0,25	7,2	0,25	0,3	20	60
PPFFS-7,2/3x0,3		0,30	0,4		
PPFFS-7,2/3x0,4		0,40	0,5		
PPFFS-7,2/3x0,5		0,50	0,7		
PPFFS-7,2/3x0,6		0,60	0,8		
PPFFS-7,2/3x0,8		0,80	1,0		
PPFFS-7,2/3x1		1,00	1,3		
PPFFS-12/3x0,1	12,0	0,10	0,2	28	75
PPFFS-12/3x0,15		0,15	0,3		
PPFFS-12/3x0,2		0,20	0,4		
PPFFS-12/3x0,25		0,25	0,5		
PPFFS-12/3x0,3		0,30	0,7		
PPFFS-12/3x0,4		0,40	0,9		
PPFFS-12/3x0,5		0,50	1,1		
PPFFS-17,5/3x0,4	17,5	0,40	1,3	38	95
PPFFS-17,5/3x0,8		0,80	2,5		

Other values of capacitance and voltage are available on request.



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