

## APPLICATION

Capacitor voltage transformers are used to step-down high voltage to the specified values and provide standardized voltage levels in a variety of power system protection, monitoring and measurement applications, while insulating the measurement and protection equipment from high system voltage. At the same time, they can be used for power line communication.

## PERFORMANCE

- Um: 72,5 kV to 800 kV
- Up to 6 secondary windings
- Ability to comply with high-precision measurement accuracy and protection classes, with superior transient response
- Power line carrier application ready

## MAIN FEATURES

- Modern capacitor insulation technology - mixed dielectric impregnated with synthetic liquid
- Extremely low dielectric dissipation factor
- High capacitance stability
- Various transient performance options available
- Partial discharge free on power-frequency withstand voltage, with a separate PD test routinely performed on the electromagnetic unit
- Hermetically sealed with a stainless-steel bellows oil expansion system
- Standard ambient temperatures from -35°C to +40°C (extreme temperature ranges upon request)
- High-quality porcelain or composite (silicone shed) insulator, depending on customer preference
- High level of seismic performance according to the latest revision of the IEEE 693 standard. Conformance to any national or regional standard also possible
- Minimum oil design and PCB free - environment friendly
- Advanced corrosion protection for maritime, industrial or other demanding installation locations
- Maintenance free

## Included Accessories:

- HF (high-frequency) terminal for power line communication
- Oil level indicator on the electromagnetic unit
- Transport shock indicators (standard for Um≥362 kV, optional for other voltage levels)
- Bolt or connector for transformer earthing
- Oil sampling valve
- Provisions for lifting

## Optional Accessories:

- Carrier accessories (drain coil, earthing switch and surge arrester)
- Potential ground switch
- Fuses or Micro circuit breakers (MCB) for secondary winding protection
- Line trap mounting on top of the transformer
- Possibility of use as a power quality measurement capacitor divider
- Revenue metering secondary terminals can be sealed separately
- Internal overpressure indicator and relief device
- Terminal box heaters

## STANDARD CHARACTERISTICS AND DIMENSIONS

Our units are custom made according to customer specification and preference. The table below contains indicative values referring to our standard capacitance units with porcelain insulators. Custom capacitance values are available on request. Any dimension or characteristic listed can vary, depending on electrical, mechanical and environmental parameters specified in the customers' inquiry. The values are susceptible to change in the course of technical development.

TYPE	HIGHEST VOLTAGE FOR EQUIPMENT [kV]	RATED POWER-FREQUENCY WITHSTAND VOLTAGE [kV]	RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE [kV]	RATED CAPACITANCE [pF]	CREEPAGE DISTANCE [mm]	SMALL BASE MOUNTING □ 470 MM			LARGE BASE MOUNTING □ 530 MM		
						TOTAL HEIGHT [mm]	WEIGHT [kg]	OIL VOLUME [l] <sup>2</sup>	TOTAL HEIGHT [mm]	WEIGHT [kg]	OIL VOLUME [l] <sup>2</sup>
VCU-72,5	72,5	140	325	15000	1815	1580	290	8+45	1600	340	8+68
VCU-123	123	230	550	8800	3075	1800	300	8+45	1820	350	8+68
VCU-145	145	275	650	7300	3625	2020	320	10+45	2040	370	10+68
VCU-170	170	325	750	6300	4250	2515	360	12+45	2535	390	12+68
VCU-245	245	460	1050	4400	6125	3150	410	15+45	3170	460	15+68
VCU-300	300	460	1050	3500	7500	3755	500	30+45	3775	550	30+68
VCU-362	362	510	1175	3500	9050	3920	530	38+45	3940	580	38+68
VCU-420	420	630	1425	4400	10500	4480	600	50+45	4500	650	50+68
VCU-525	550	680	1550	3500	13750	5170	700	60+45	5190	750	60+68
VCU-765	800	975	2100	3000	20000	6480	920	75+45	6500	970	75+68

<sup>2</sup> Oil volume in the Capacitor Voltage Divider / Oil volume in the electromagnetic unit

## Quality assurance

Končar capacitor voltage transformers are designed in compliance with IEC, ANSI/IEEE, GOST, AS, IS, CAN/CSA, JIC or any other relevant standard. Product quality is assured through a certified quality standard, the ISO 9001, covering all aspects of design, production and testing. Končar - Instrument transformers Inc. is ISO 14001 and ISO 45001 certified, ensuring compliance with environmental and occupational health standards. Our testing facilities are accredited according to the ISO/IEC 17020 and 17025 standards, with results traceable to any ILAC signatory worldwide.



## TRANSFORM EVERYDAY

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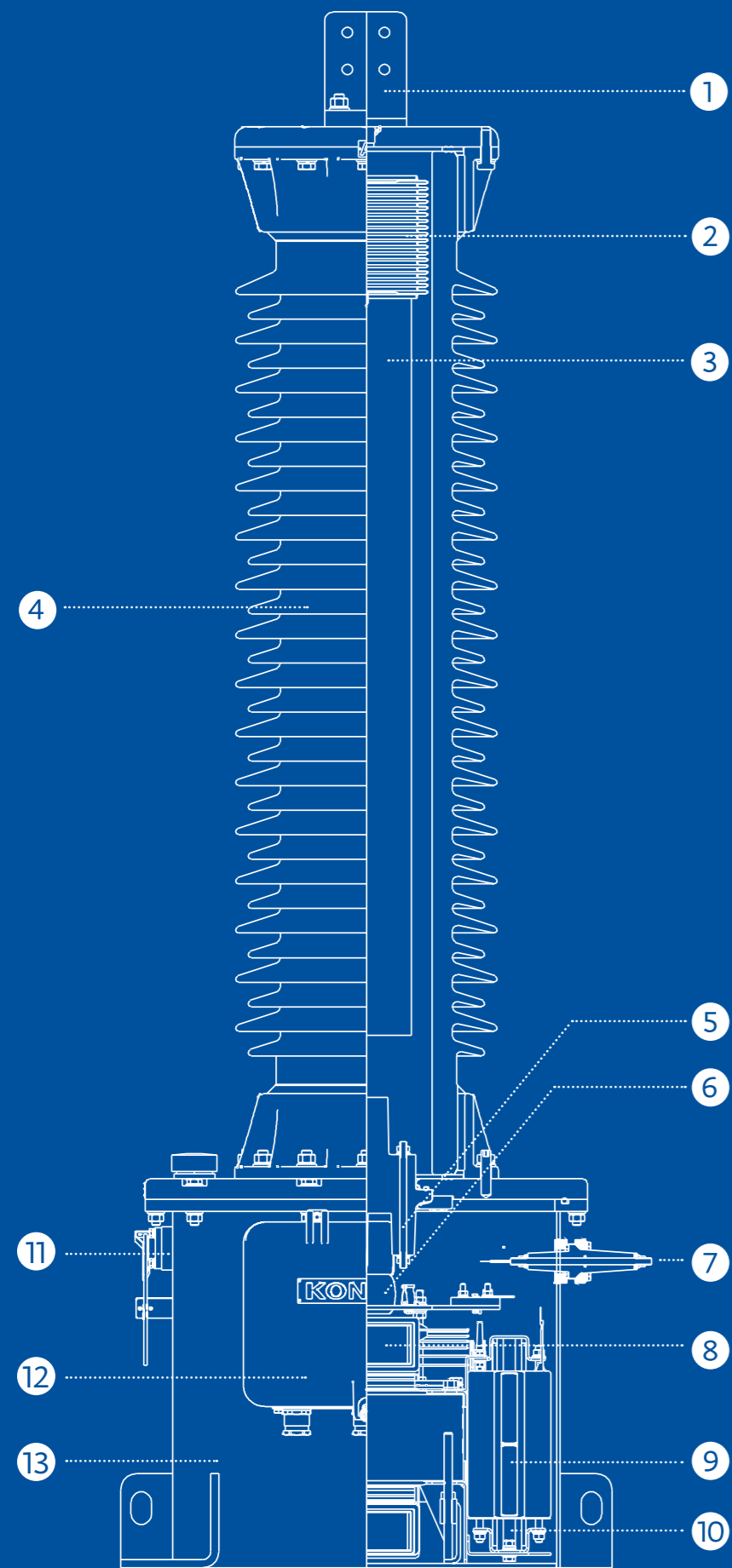


TAILOR - MADE  
DESIGN

# VCU

CAPACITOR VOLTAGE  
TRANSFORMERS  
72,5 to 800 kV

Končar - Instrument transformers, Inc.



- |                            |                             |                            |
|----------------------------|-----------------------------|----------------------------|
| 1. PRIMARY TERMINAL        | 6. SURGE ARRESTER           | 10. DAMPING UNIT           |
| 2. STAINLESS STEEL BELLOWS | 7. HF TERMINAL              | 11. OIL LEVEL INDICATOR    |
| 3. CAPACITOR ELEMENTS      | 8. INTERMEDIATE TRANSFORMER | 12. SECONDARY TERMINAL BOX |
| 4. INSULATOR               | 9. SERIES REACTOR           | 13. TRANSFORMER TANK       |
| 5. CAPACITOR BUSHING       |                             |                            |



## DESIGN

### Capacitor voltage divider

The capacitor voltage divider is located inside one or more insulator enclosures – capacitor units. Electrically, the divider consists of two capacitors, a high-voltage capacitor ( $C_1$ ) and an intermediate voltage capacitor ( $C_2$ ). It is composed of a large number of series-connected, plate-shaped capacitor elements, made of mixed dielectric (polypropylene and capacitor paper films) placed between aluminium foil electrodes.

Capacitor set elements are compressed, bound, dried and filled with synthetic impregnating liquid in high vacuum, thus preventing any change of capacitance over time.

A large number of identical capacitor elements ensures a uniform and smooth distribution of dielectric stresses on internal and external insulation and provides service safety with regards to insulation failure.

Each capacitor unit is hermetically sealed from ambient air with stainless-steel bellows, located inside the insulator enclosure, which also compensate for thermal oil expansion. A routine sealing test is performed in order to ensure a perfect hermetical sealing of the enclosure.

### Electromagnetic unit

The electromagnetic unit is located inside the transformer base tank. It consists of an intermediate transformer, a series reactor, a surge arrester and a ferroresonance damping unit.

The ferroresonance damping device is a series connection of a saturable inductor and a damping resistor, which provides excellent damping properties and stability, without affecting transformer accuracy while retaining the possibility of different transient performance.

The paper insulation of the electromagnetic unit is dried in high vacuum and impregnated with high-grade inhibited or uninhibited, degassed and dried mineral transformer oil.

An air cushion is used to compensate for the thermal dilatation of the oil in the electromagnetic unit. We guarantee the oil in our transformers does not contain polychlorinated biphenyls and terphenyls (PCB & PCT).

Every electromagnetic unit is subjected to a rigorous vacuum sealing test to ensure a perfect hermetical sealing of the entire enclosure.

The tank is made of either aluminium alloy or high-quality steel, which is hot dip galvanized and additionally painted for long-lasting corrosion resistance. It contains the secondary terminal box, oil sampling and filling valve, lifting lugs, earthing terminals and an optional oil overpressure indicator. Several levels of corrosion protection can be specified, depending on environmental conditions at the installation site.

Potential ground switch, used to directly earth the intermediate voltage tap, can be provided on the tank. It enables safe access to the electromagnetic unit, continuous power line communication with the electromagnetic unit deenergized, and on-site measurement of individual capacitances  $C_1$  and  $C_2$  and corresponding dielectric loss factors.



### Insulator

As per request, the external insulation can be either porcelain or composite. The porcelain insulators are made of the highest quality C130 aluminous porcelain, while the composite insulators are composed of a glass-fibre reinforced resin tube and silicone rubber sheds.

The insulator creepage distance is based on the ambient air pollution and is to be quoted in the inquiry.

The VCU capacitor voltage transformer has been seismically tested and it meets all the requirements of the latest version of the IEEE 693 standard or equivalent seismic standards.

### Terminals

The high-voltage primary terminal can be made of aluminium or galvanic corrosion-protected electrolytic copper. Standard secondary terminals are stainless-steel threaded bolts (size M8).

Other terminal types, materials and dimensions are available on request.

Secondary terminals, along with protective devices and other additional accessories, reside in the secondary terminal box. Cable glands or plates provide entry to the box and are designed according to customer specification and preference.

### Carrier accessories

Every capacitor voltage transformer is equipped with an external HF terminal, located on the bushing on the tank side. This makes every transformer ready to be used as a coupling capacitor for power line carrier coupling at any time during service.

On request, HF terminal can be provided in the secondary terminal box. Furthermore, carrier accessories can be provided inside the secondary terminal box as well. Additionally, the choke coil with surge arrester can be provided inside the tank, together with the potential ground switch.

## KEY VALUES

### EXPERIENCE

More than 70 years of experience in the design, manufacture, testing and delivery of instrument transformers

### PRESENCE

Over 100 countries across all continents

### EXPERTISE

We are not only manufacturers, but also engineers and researchers. Turn to us for advice, recommendations and guidance

### TAILOR-MADE DESIGN

We cater to any customer requirement. Your units are being built just for you

### LONGEVITY

Our insulation system design philosophy, rigorous internal testing criteria and advanced quality control allow us to declare a 50-year service life of our units

### SERVICE

Continuous after-sales services are always available for any questions or doubts you may have, both technical and commercial