

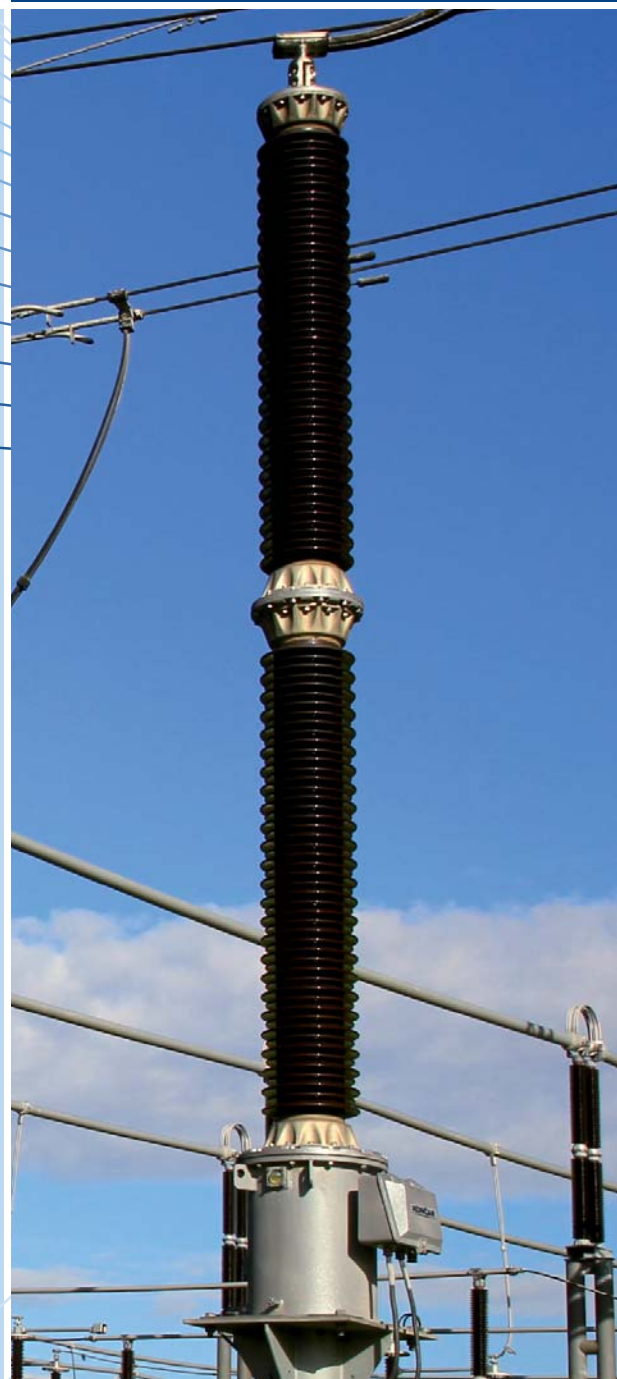
TRADITION - MANUFACTURING INSTRUMENT TRANSFORMERS SINCE 1947

EXTENSIVE EXPERIENCE - MORE THAN 45 YEARS OF SERVICE EXPERIENCE, WITH 15.000 CVT UNITS INSTALLED WORLDWIDE

FLEXIBLE DESIGN - READINESS AND WILLINGNESS TO COMPLY WITH CUSTOMER REQUIREMENTS

LONGEVITY AND RELIABILITY - DESIGNED FOR AT LEAST 50 YEARS OF SERVICE LIFE

VCU
CAPACITOR VOLTAGE
TRANSFORMERS
72,5 to 800 kV



KONČAR

Končar - Instrument Transformers Inc.



Application

Capacitor voltage transformers are used to step-down high voltage to defined values, and thus provide standardized, useable voltage in a variety of power system protection, monitoring and measurement applications while insulating the low voltage equipment from high system voltage.

At the same time they can be used as coupling capacitors for high frequency signal transfer - power line communication.

Performance

- Um: from 72,5 kV up to 800 kV
- Up to 6 secondary windings
- Ability to satisfy high-precision measurement accuracy and protection classes, with superior transient response
- Stainless steel bellows expansion system
- Power line carrier application ready

Main Features

- Modern capacitor insulation technology - mixed dielectric with synthetic impregnating liquid
- Extremely low dielectric dissipation factor
- Virtually no temperature rise in service
- High capacitance stability with temperature change and time
- Maintaining of designated accuracy class during entire transformer lifetime
- Custom transient performance requirements can be met
- Experience in production of capacitor voltage transformers for highest voltage levels (up to 800 kV)
- Stainless steel bellows expansion system
- Taps on secondary windings - enabling variations of primary and/or secondary rated voltage
- Standard ambient temperatures from -35 to +40 °C, upon request extreme temperature ranges available
- High quality porcelain or composite (silicone shed) insulator
- Extensive experience in seismically active regions
- Minimum impregnating liquid quantity and PCB free - environmentally friendly
- Non-corrosive hardware
- Maintenance free
- Partial discharge free on power-frequency withstand voltage

Accessories

- Every transformer equipped with HF (high frequency) terminal
- Carrier accessories (drain coil, earthing switch and surge arrester) can be provided in secondary terminal box on request
- Oil level indicator on electromagnetic unit
- Potential ground switch (optional)
- Fuses or MCBs for secondary windings protection (optional)
- Line trap mounting on top of transformer (optional)
- Transport shock indicators (optional)

Quality Assurance

Končar capacitor voltage transformers are designed in compliance with IEC, ANSI/IEEE, GOST, AS, IS, CAN/CSA, 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 OHSAS 18001 certified, ensuring environmental and occupational health standards are met.

And most importantly, our tireless ambition to satisfy customers has sealed long lasting quality and reliability onto our product.



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DESIGN

Capacitor Voltage Divider

The capacitor voltage divider is located inside one or more insulator enclosures - capacitor units. 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.

These elements have been, after assembly in the set, compressed, bound, dried and filled with synthetic impregnating liquid in high vacuum. The compression and bounding of the capacitor set elements is performed in such way that no change of capacitance occurs in the course of 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 of the unit regarding insulation failure. Capacitor elements are connected in such way to achieve low inductance and very high resonant frequency of the capacitor divider.

At the top of each capacitor unit, inside the insulator enclosure, a stainless steel expansion bellows is provided for compensation of the impregnating liquid thermal density variations. This makes each capacitor unit free from air or inert gas, hermetically sealed and maintenance free.

After impregnation, every capacitor unit is subjected to a routine sealing test in order to ensure the enclosure perfect hermetical sealing.

When the capacitor stack is composed of more than one unit, the upper units are transported disassembled. They are to be mechanically coupled together at site using supplied stainless steel hardware by simple bolt coupling, without necessity for special tools. Bottom capacitor unit always remains assembled to the electromagnetic unit, which ensures simple on-site installation.

Electrically, the divider consists of two capacitors, high-voltage capacitor (C1) and intermediate voltage capacitor (C2). Intermediate voltage tap and low voltage connection of the capacitor voltage divider are brought out from the capacitor units through an internal bushing directly into the electromagnetic unit.

Electromagnetic Unit

The electromagnetic unit is placed in the transformer base tank. It consists of an intermediate transformer, a series reactor which compensates phase displacement caused by capacitor divider, a surge arrester which ensures overvoltage protection of the intermediate capacitor and EMU, and a ferroresonance damping unit.

The ferroresonance damping device is a series connection of a saturable inductor and a damping resistor, which provides high damping properties and stability, without deteriorating transformer accuracy and transient response.

By adjusting the damping system, it is possible to satisfy custom transient performance requirements - superior ferroresonance damping or transient response to comply with actual protection system needs.

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

Thermal dilatation of oil in the electromagnetic unit is compensated using air cushion. We guarantee the oil in our transformers not to contain polychlorinated biphenyls and terphenyls (PCB & PCT).

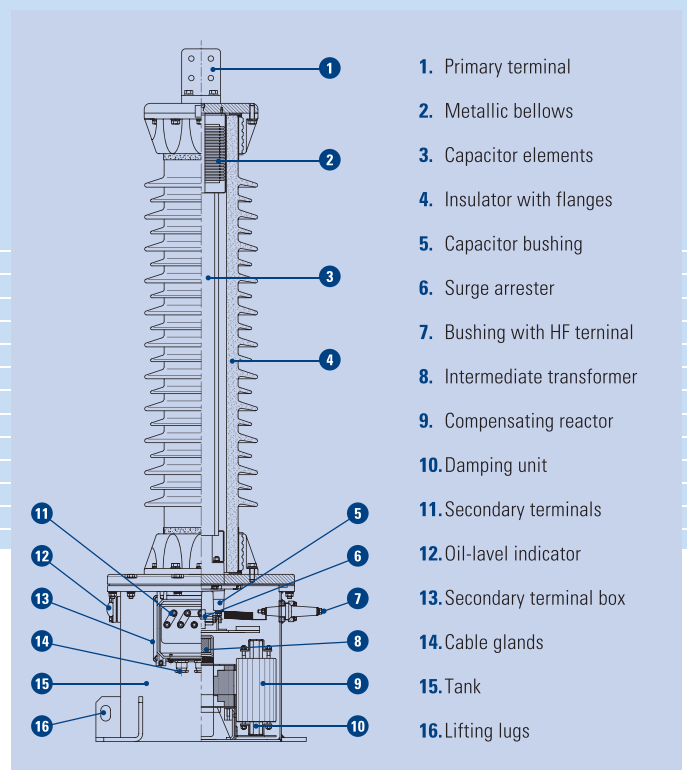
During production, a vacuum sealing test is performed on every single electromagnetic unit, ensuring perfect hermetical sealing of the enclosure.

The tank is made either of aluminium alloy or of high quality steel which is hot dip galvanized and additionally painted for long-lasting corrosion resistance.

The electromagnetic unit is also fitted with secondary connections within the secondary terminal box as well as the following standard accessories: sight glass as an oil level indicator, oil sampling valve, transformer lifting lugs, earthing terminal and name plate.

Potential ground switch, used to directly earth the intermediate voltage tap, can be provided on the EMU tank. It enables safe access to the electromagnetic unit, continuous power line communication with EMU deenergized, and enables on-site measurement of individual capacitances C1 and C2 and corresponding dielectric loss factors.

Cross-section Drawing



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 insulators 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 meets all of the IEEE Standard 693-2005 requirements.



Terminals

The primary terminal is made of aluminium alloy or, alternatively, of corrosion protected (tin or silver plated) electrolytic copper. The terminal shape and type are chosen according to applicable standard and customers requirements and practice.

The secondary terminals, along with optional protective fuses and tariff terminal sealing, reside in the secondary terminal box. Cable glands or plates provide entry to the box and are designed in accordance with the customers needs.

Standard secondary terminals are M8 in size and are of the threaded bolt type. They are made of stainless steel. Other terminal types, materials and dimensions are available on request.

Earthing terminal size and type are to be defined in the inquiry. The standard connection is of the screw type (M12 x 35) or a stranded copper conductor clamp.

Carrier accessories

Every capacitor voltage transformer is equipped with an external HF terminal, located on the bushing on the EMU tank side. This makes every Končar capacitor voltage 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, choke coil with surge arrester can be provided inside EMU tank, together with the potential ground switch.

Dimensions

Type	Maximum System Voltage	Rated Capacitance	Total Height	Total Weight	Oil weight (CVD+ EMU)	Base mounting	Minimal Creepage Distance
	kV	pF	mm	kg	kg	mm	mm
VCU-72,5	72,5	15.000	1770	285	10+40	470x470	1815
VCU-123	123	8.800	1770	285	10+40	470x470	3075
VCU-145	145	7.300	1990	305	12+40	470x470	3625
VCU-170	170	6.300	2270	350	14+40	470x470	4250
VCU-245	245	4.400	3015	400	20+40	470x470	6125
VCU-300	300	3.500	3720	480	26+40	470x470	7500
VCU-362	362	3.000	3870	495	28+40	470x470	9050
VCU-420	420	4.400	4490	630	50+40	470x470	10500
VCU-525	550	3.500	5365	730	60+40	470x470	13750
VCU-765	800	3.000	6600	1160	105+70	470x470	20000

The given indicative values refer to our standard capacitance versions with porcelain insulators. Custom capacitance values are available on request. Actual transformers dimensions depend on electrical, mechanical and environmental parameters specified in the customers' inquiry.

The values are susceptible to change in the course of technical developments.

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