VCU | IEEE

VCU

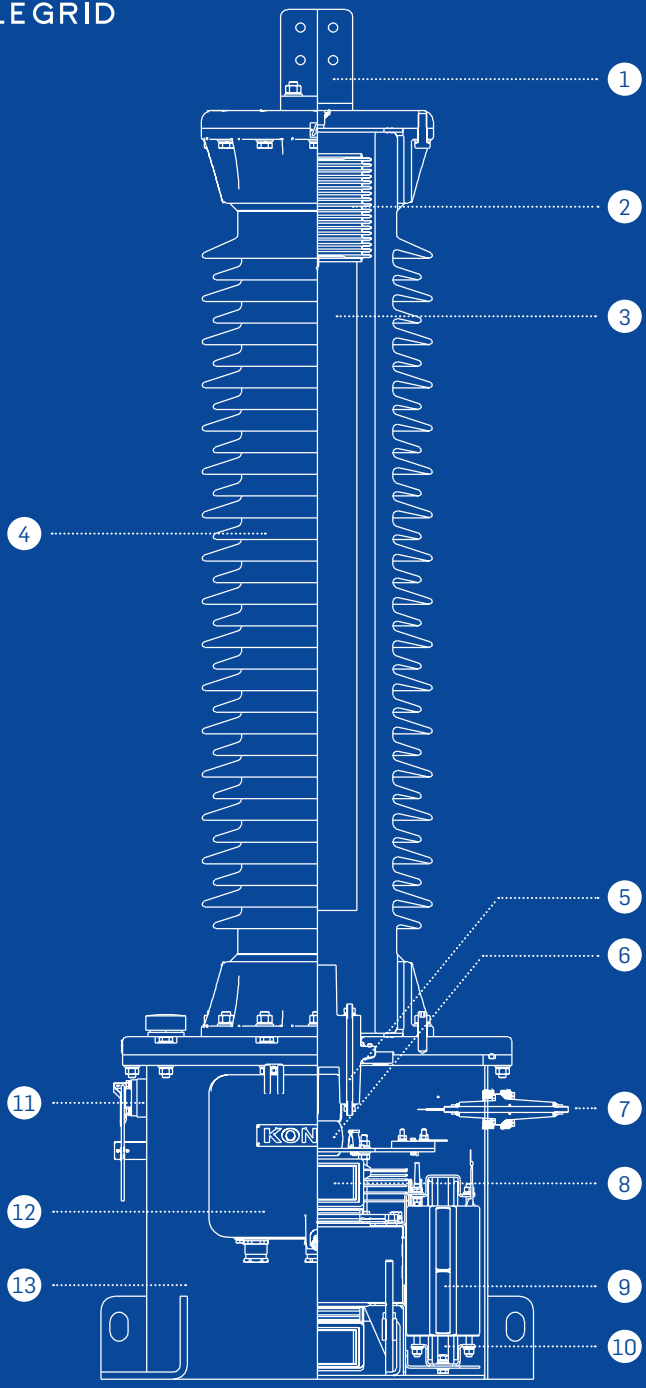
CAPACITOR VOLTAGE TRANSFORMERS 72.5 TO 800 kV

CABLEGRID®

KONČAR
INSTRUMENT TRANSFORMERS

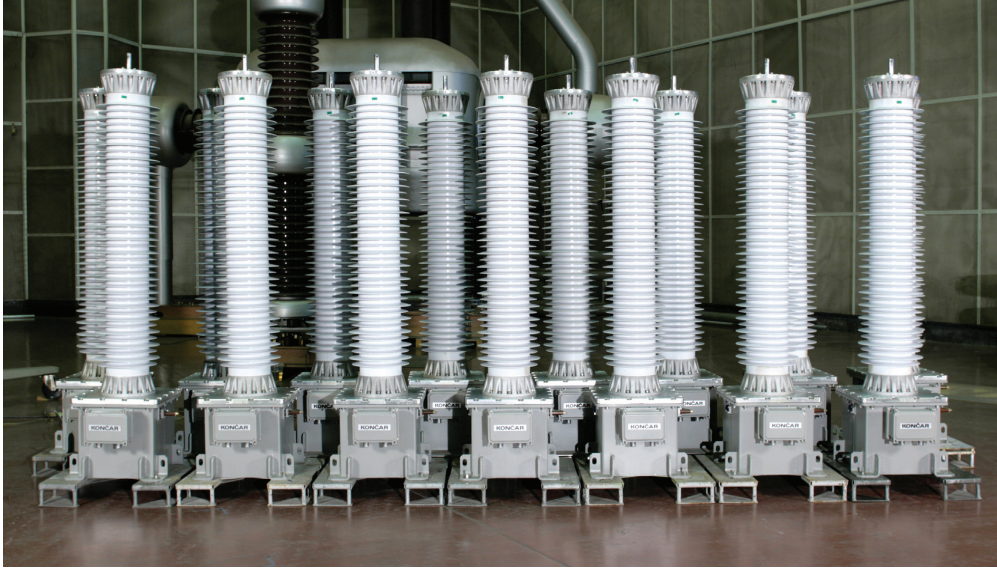
TAILOR – MADE DESIGN

CABLEGRID®



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

P: 1300 780 831 **E:** info@cablegrid.com.au **W:** www.cablegrid.com.au



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 (C1) and an intermediate voltage capacitor (C2). 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 C1 and C2 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.

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.

CABLEGRID®

P: 1300 780 831 **E:** info@cablegrid.com.au **W:** www.cablegrid.com.au

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 (extended 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

Quality assurance

Končar current transformers are designed in compliance with IEC, ANSI/IEEE, GOST, AS, IS, CAN/CSA, JIS 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.

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 units with porcelain insulators. 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	NOMINAL SYSTEM VOLTAGE [kV]	MAXIMUM SYSTEM VOLTAGE [kV]	BIL [kV]	RATED CAPACITANCE [pF]	TYPICAL RATIO	CREEPAGE DISTANCE [inch]	2 WINDINGS ACCURACY CLASS 0.3 WXY BASE MOUNTING □ 18.5			2 WINDINGS ACCURACY CLASS 0.15 WXY OR 0.3 WXYZ [1] BASE MOUNTING □ 21		
							TOTAL HEIGHT [inch]	WEIGHT [lb]	OIL VOLUME [gal][2]	TOTAL HEIGHT [inch]	WEIGHT [lb]	OIL VOLUME [gal][2]
VCU-72,5	69	72.5	350	15000	350 / 600 : 1	72	62	640	2 / 12	63	750	2 / 18
VCU-123	115	123	550	8800	600 / 1000 : 1	121	71	660	2 / 12	72	770	2 / 18
VCU-145	138	145	650	7300	700 / 1200 : 1	143	80	705	2.5 / 12	81	815	2.5 / 18
VCU-170	161	170	750	6300	800 / 1400 : 1	167	99	795	3 / 12	100	905	3 / 18
VCU-245	230	245	1050	5000	1200 / 2000 : 1	241	124	904	4 / 12	125	1015	4 / 18
VCU-362	345	362	1300	3500	1800 / 3000 : 1	356	176	1320	13 / 12	177	1430	13 / 18
VCU-525	500	550	1800	3500	2500 / 4500 : 1	541	204	1545	16 / 12	205	1655	16 / 18
VCU-765	765	800	2100	3000	3750 / 6250 : 1	787	255	2030	20 / 12	256	2140	20 / 18

1 These ratings represent the optimal compromise between the accuracy performance and the dimensions of the unit. Other ratings (e.g. 0.3 WXYZ ZZ or 0.15 WXYZ) can affect transformer dimensions and weight.

2 Oil volume in the Capacitor Voltage Divider / Oil volume in the Electromagnetic Unit

TRANSFORM EVERYDAY

KONČAR - INSTRUMENT TRANSFORMERS INC.
JOSIPA MOKROVIĆA 10, P.O. BOX 202
HR-10090 ZAGREB, CROATIA

TEL: +385 1 379 4112 • FAX: +385 1 379 4040
E MAIL: INFO@KONCAR-MJT.HR
WEB: KONCAR-MJT.HR