

VPU | IEEE

VPU

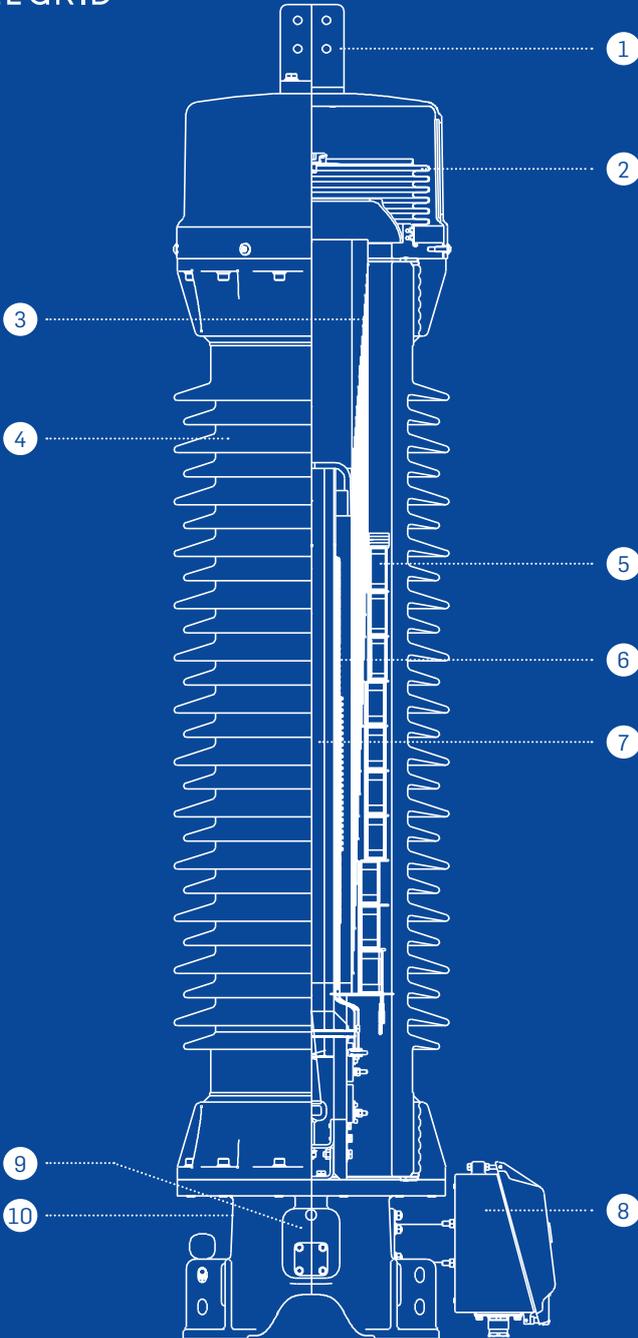
**INDUCTIVE VOLTAGE
TRANSFORMERS
72.5 TO 550 kV**

G CABLEGRID®

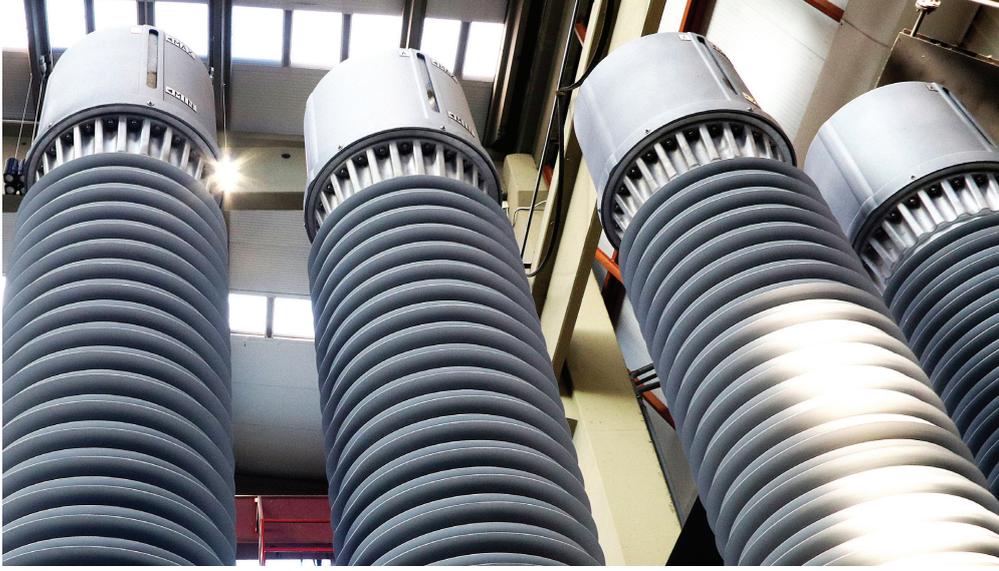
KONČAR
INSTRUMENT TRANSFORMERS



TAILOR-MADE
DESIGN



- | | |
|--|---------------------------|
| 1. PRIMARY TERMINAL | 6. SECONDARY WINDING |
| 2. STAINLESS STEEL BELLOWS / OIL LEVEL INDICATOR | 7. OPEN CORE |
| 3. MAIN INSULATION | 8. SECONDARY TERMINAL BOX |
| 4. INSULATOR | 9. BASE ASSEMBLY |
| 5. SECTIONED PRIMARY WINDING | 10. OIL SAMPLING VALVE |



DESIGN

Primary Winding

One of the significant advantages of the open-core design is the primary winding, which is composed of multiple independent and insulated sections uniformly stacked vertically along the transformer height. This ensures a controlled distribution of dielectric stress on internal and external insulation and excellent cooling properties, which allow for a high thermal output.

In an unlikely case of a failure between turns or between layers within the primary winding, the fault remains localized to only one section and cannot spread to the entire primary winding. This feature limits the fault current and ensures inherent explosion safety of the VPU voltage transformers. This feature is independent of the insulator type.

Magnetic Core and Secondary Windings

The magnetic core is made of stacked silicone steel sheets. The open core (single limb) ensures a linearized transformer magnetizing characteristic, which eliminates the possibility of ferroresonance within the power system.

Secondary windings are wound with high-grade enamelled copper wire directly onto the core, ensuring uniform flux density along the core height, as well as phase displacement compensation. Furthermore, the large winding cross-section enables it to withstand a secondary short circuit, which ensures a safe operation in fault conditions.

The active part is designed to accommodate up to 6 secondary windings having any accuracy class for metering or protection purposes. Double transformation ratio can be achieved by taps on secondary windings.

Paper-Oil Insulation

The high-voltage primary side is insulated from the low-voltage secondary side with oil-impregnated paper of high dielectric strength.

Conductive capacitive screens are inserted between layers of paper insulation to adequately distribute the high-frequency overvoltages. Another advantage of the open-core design is that it enables the main insulation to be completely machine produced in the shape of a cylinder.

The paper insulation is then dried in high vacuum and impregnated with high-grade inhibited or uninhibited, degassed and dried (moisture content of no more than 2 ppm) mineral transformer oil.

The paper-oil insulation is closed in and hermetically sealed from ambient air with stainless steel bellows, which also compensate for thermal oil expansion and serve as both an expansion mechanism and an oil level indicator.

All these features ensure excellent and long-lasting dielectric properties of the transformer's main insulation system.

We guarantee the oil in our transformers does not contain polychlorinated biphenyls and terphenyls (PCB & PCT).

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 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.





Enclosure

The transformer enclosure consists of the base assembly, insulator, bellows and bellows cover.

The active part is located inside the insulator. This concept is similar to that of a power transformer bushing and is designed to achieve minimal oil volume.

The transformer base 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.

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

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

The VPU inductive 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.

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.



APPLICATION

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.

PERFORMANCE

- um: 72.5 kV to 550 kV (1800 kV BIL)
- Up to 6 secondary windings
- Ability to comply with high-precision measurement accuracy and protection classes
- Unique design with an open magnetic core – ensuring ferroresonance immunity and service safety

MAIN FEATURES

- high-quality paper-oil insulation
- Standard thermal burden up to 5000 VA, higher values available on request
- Partial discharge free on power-frequency withstand voltage
- 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
- Explosion-safe design that limits the energy under internal fault conditions
- Advanced corrosion protection for maritime, industrial or other demanding installation locations
- Maintenance free

Included Accessories:

- Terminal for dielectric dissipation factor (tgδ) measurement
- Oil level indicator
- Transport shock indicators (standard for $U_m \geq 362$ kV, optional for other voltage levels)
- Bolt or connector for transformer earthing
- Oil sampling valve
- Provisions for lifting

Optional Accessories:

- Fuses or Micro circuit breakers (MCB) for secondary windings protection
- Revenue metering secondary terminals can be sealed separately
- Internal overpressure indicator
- Terminal box heaters



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

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]	TYPICAL WINDING CHARACTERISTICS		DIMENSIONS [inch]			WEIGHT [lb]	OIL VOLUME [gal]
				TYPICAL RATIO	ACCURACY CLASS	TOTAL HEIGHT	BASE MOUNTING	CREEPAGE DISTANCE		
VPU-72,5	69	72.5	350	350 / 600 : 1	2 windings	75	□ 13	72	670	15
VPU-123	115	123	550	600 / 1000 : 1		85	□ 13	121	770	17
VPU-145	138	145	650	700 / 1200 : 1	0.15 wvx or 0.3 wxvz ¹	85	□ 13	143	815	20
VPU-170	161	170	750	800 / 1400 : 1		95	□ 13	167	1060	28
VPU-245	230	245	1050	1200 / 2000 : 1	Up to 5000 VA thermal burden	136	□ 16	241	1545	38
VPU-362	345	362	1300	1800 / 3000 : 1		179	□ 19	413	2755	85
VPU-525	500	550	1800	2500 / 4500 : 1		235	□ 26	541	4805	160

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.



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

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