Inductive Voltage Transformers
Type VPU - 72,5 to 550 kV

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

Main Features & Performance
- Um: 72,5 kV up to 550 kV
- Up to 6 secondary windings
- High-precision measurement accuracy and protection classes
- Unique design with an open magnetic core - ensuring ferroresonance immunity
- Explosion safe design
- Maintaining of designated accuracy class during entire transformer lifetime
- High quality paper-oil main insulation
- High thermal burden - up to 2500 VA in standard design, higher ratings possible
- Stainless steel bellows oil expansion system
- Sealing for life - every single transformer is vacuum tested with helium

- Nitrogen free
- Standard ambient temperatures from -35 to +40 °C (extreme temperature ranges upon request)
- High quality porcelain or composite (silicone shed) insulator
- Extensive experience in seismically active regions
- Minimum oil design and PCB free - environment friendly
- Non-corrosive hardware
- Partial discharge free on power-frequency withstand voltage
Design

Primary Winding
The advantage of the open core design lies in having the primary winding composed of multiple sections uniformly stacked vertically along the height of the transformer. This ensures controlled distribution of dielectric stress on internal and external insulation.

Being composed of independent and insulated sections, the primary winding is explosion safe. In an unlikely case of a between-turns or between-layers failure within primary winding, fault remains localized to only one section and cannot spread to the entire primary winding. This ensures inherent explosion safety of the inductive voltage transformers.

Sectioned primary winding additionally ensures excellent cooling properties, which makes this transformer have high thermal output ability.

Paper-Oil Insulation
The high voltage primary side is insulated from the low voltage secondary side by means of oil impregnated paper of high dielectric strength.

A substantial number of semi-conductive capacitive screens are inserted into the layers of paper insulation so as 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 shape of a cylinder.

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

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

The paper-oil insulation is closed in and hermetically sealed off from ambient air by means of a stainless steel bellows. The stainless steel bellows compensates the thermal oil expansion and thus also serves as an expansion mechanism and an oil level indicator.

All of the points mentioned above ensure excellent and long lasting dielectric properties of the transformers main insulation.

Magnetic Core and Secondary Windings
The magnetic core is made of stacked silicone steel sheets. Open core (single limb) design ensures a linearized magnetizing characteristic of the transformer, which eliminates possibility of ferroresonance within the power system.

Secondary windings are wound with high-grade enameled 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 makes it capable of withstanding a secondary short circuit, thus contributing to transformer safety.

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

The inductive voltage transformer has been seismically tested and meets all of the IEEE Standards 693-2005 requirements.

**Housing**

The transformer housing consists of a base, insulator, head and bellows cover.

During production, before the oil-filling process, a vacuum sealing test is performed on every transformer, ensuring perfect hermetical sealing of the enclosure.

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. The transformer base accommodates the secondary terminal box, along with various other accessories, such as name plate, oil sampling and filling valve, lifting lugs, earthing terminals and an optional oil overpressure indicator.

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

**Terminals**

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

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

The secondary terminals, along with protective devices 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 customer’s needs.

**Cross-section Drawing**

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Maximum System Voltage</th>
<th>Total Height</th>
<th>Total Weight</th>
<th>Oil Weight</th>
<th>Base Mounting</th>
<th>Minimal Creepage Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVEO-72.5</td>
<td>72.5 kV</td>
<td>1900 mm</td>
<td>305 kg</td>
<td>50 kg</td>
<td>330x330 mm</td>
<td>1815 mm</td>
</tr>
<tr>
<td>PVFO-123</td>
<td>123 kV</td>
<td>2170 mm</td>
<td>350 kg</td>
<td>60 kg</td>
<td>330x330 mm</td>
<td>3075 mm</td>
</tr>
<tr>
<td>PVGO-145</td>
<td>145 kV</td>
<td>2170 mm</td>
<td>370 kg</td>
<td>65 kg</td>
<td>330x330 mm</td>
<td>3625 mm</td>
</tr>
<tr>
<td>PVIO-245</td>
<td>245 kV</td>
<td>3460 mm</td>
<td>700 kg</td>
<td>13 kg</td>
<td>410x410 mm</td>
<td>6740 mm</td>
</tr>
<tr>
<td>PVKO-525</td>
<td>550 kV</td>
<td>5050 mm</td>
<td>1760 kg</td>
<td>460 kg</td>
<td>510x510 mm</td>
<td>13750 mm</td>
</tr>
</tbody>
</table>

The given indicative values refer to our standard porcelain versions and vary depending on electrical, mechanical and environmental parameters specified in the customer’s inquiry.

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

In a span of two decades, PPI Pazifik Power, Inc. successfully supplied the Philippine market a wide range of high quality innovative power and infrastructure equipment from the best manufacturers in Europe and from its own automated design concept to more than 200 customers who are at the forefront of the country’s engines of industrial growth.

Among PPI’s most sought after power product lines are: Turnkey projects for Supply of Substations rated voltage of up to 230kV, Electricity Meters, Transformers, Switchgears, Disconnectors, Fault Indicators, Surge Arresters, Protective Relays, Diagnostic and Testing Equipments, Batteries, Harmonic Filters, UPS and AVR systems.

PPI’s seasoned Electrical Engineers deliver the unique support tailored fit for each customer’s needs. PPI’s cutting edge is its high product quality with an unparalleled delivery of after-service performance.

TRANSMISSION EQUIPMENT

Smart Navigator Fault Indicator with Communication
Designed and engineered for Smart Grid Distribution, Automation, Application

Power Voltage Transformer
72.5 to 550 kV
Unique design with an open magnetic core – ensuring ferroresonance immunity, rated output capacity of 10-100kVA per phase

Combined Instrument Transformers
Type VAU - 72.5 to 550 kV
High-precision measurement accuracy and protection classes with superior transient response

Digital Recorder System
Combine the monitoring function of digital fault recorder with the features of power quality analyzer in a single system

PPI Pazifik Power, Inc.
4/F South Park Plaza, Santiago Street
Paseo de Magallanes Commercial Center
1232 Makati City, Metro Manila, Philippines
Tel. : +63 2 511 88 88
Fax : +63 2 628 80 81
E-mail : info@ppi.ph