Inductive Voltage Transformers

Types VEOT and VEOS
Introduction

Trench is a recognized world leader in the design and manufacture of high voltage equipment for application on electric utility and high energy industrial systems. As part of Trench’s product scope, the Company produces a diversified range of Instrument Transformers which are installed on 69-800 kV electrical systems. Instrument Transformers include: Voltage (Potential) Transformers (both inductive and capacitive type), Current Transformers and Combined Instrument Transformers (voltage and current transformer in one unit).

Voltage Transformers must convert transmission class voltages to standardized low and easily measurable values, which will be used for metering, protection and control of the high voltage system. As such, the need for accurate and reliable voltage transformation is essential.

This brochure will detail the features and characteristics of types VEO and VEOS inductive type Voltage Transformers. Please refer to Trench brochure E210 for additional general information concerning high voltage Instrument Transformers.
Features

- Meet all IEC and ANSI metering and protection classes (other standards on request)
- Standard thermal burden ratings of 2000 - 2500 VA (higher on request)
- Quality Assurance in accordance with ISO 9001

- highly refined and processed oil/paper insulation system
- low weight and minimum oil volume
- use of high quality mineral oil, PCB free, biological decomposition
- excellent seismic performance as a consequence of optimized designs of flanges, porcelain and their interconnection
- excellent control of internal and external insulation stresses through the use of a proprietary finely graded bushing system
- essentially unaffected by stray external magnetic fields
- hermetically sealed stainless steel metallic bellows for units rated 123 kV and above
- welded housings sealed without screws
- stable accuracy over a long period of time
- perfect transient performance
- suitable for line discharging
- exclusive use of corrosion-resistant materials
- explosion resistant by
  - insulating system with high reliability
  - fine graded bushing
  - weak point in the aluminium head and tank castings and the metallic bellows serving as pressure release device
- successful field experience since the manufacture of the first voltage transformer in 1926
- maintenance free during a long life time of more than 30 years
- composite insulator available on request

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Trench types VEOT and VEOS Inductive Voltage Transformers are designed and constructed with the well proven, highly reliable, oil/paper insulation system. Each porcelain housed, hermetically sealed Voltage Transformer is equipped with stainless steel expansion bellows, calibrated to the internal oil volume and extremes in ambient operating temperatures.

For voltage classes up to 300 kV, the type VEOT is offered. For applications above 300 kV, Trench offers the type VEOS design. The VEOS is designed with a primary winding which is located in the mid-point of the structure. This feature serves to reduce the dielectric stresses and ensures optimized voltage distribution within the transformer. Please refer to figure Fig. 3 for the internal schematic diagram and mechanical details for both the VEOT and VEOS units.

<table>
<thead>
<tr>
<th>Construction</th>
<th>Standard Equipment</th>
<th>Optional Equipment</th>
</tr>
</thead>
</table>

| • aluminum flat pad primary terminal/ground terminal |
| • lifting lugs |
| • bellows position indicator |
| • oil filling port |
| • oil drain valve |
| • secondary terminal box with removable gland plate |
| • stud type primary terminal |
| • primary or ground cable connector |
| • Anti-corona rings |
| • Capacitance tap for measurement of tan delta of bushing or high voltage winding |
| • Gas Detection System (contact Trench for additional details) |
| • Secondary fuses or circuit breakers |
| • Terminal box heater |
| • Composite insulator |
Fig. 3
Electrical and Mechanical design details
# Oil/Paper-insulated Inductive Voltage Transformers

**Electrical and Mechanical Data (1)**

<table>
<thead>
<tr>
<th>Type</th>
<th>Max. continuous operating voltage phase to phase kVeff</th>
<th>Test voltage 50/60Hz 1 min. dry/wet kVeff</th>
<th>Impulse withstand 1.2/50 µs kVpeak</th>
<th>Switching impulse test voltage kVpeak</th>
<th>Min. sparking distance mm</th>
<th>Standard creepage distance mm</th>
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</thead>
<tbody>
<tr>
<td>VEOT 72.5 HT</td>
<td>72.5 140 325 -</td>
<td>630 1815</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VEOT 72.5</td>
<td>72.5 140 325 -</td>
<td>700 1815</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VEOT 123</td>
<td>123 230 550 -</td>
<td>1200 3815</td>
<td></td>
<td></td>
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<tr>
<td>VEOT 145</td>
<td>145 275 650 -</td>
<td>1200 3815</td>
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<tr>
<td>VEOT 170</td>
<td>170 325 750 -</td>
<td>1400 4495</td>
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<tr>
<td>VEOT 245</td>
<td>245 395 950 -</td>
<td>2200 6300</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>VEOT 245</td>
<td>245 460 1050 -</td>
<td>2200 6300</td>
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<tr>
<td>VEOT 300</td>
<td>300 460 1050 850</td>
<td>2200 6300</td>
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<tr>
<td>VEOS 362</td>
<td>362 570 1300 950</td>
<td>2650 9050</td>
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<tr>
<td>VEOS 420</td>
<td>420 630 1425 1050</td>
<td>3200 11025</td>
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<tr>
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<td>3200 11025</td>
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<tr>
<td>VEOS 550</td>
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<td>3800 13750</td>
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Notes:
(1) Other ratings available on request
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<thead>
<tr>
<th>Fig</th>
<th>Weight of oil</th>
<th>Net weight (approx)</th>
<th>Dimension</th>
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<tr>
<td></td>
<td></td>
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<tr>
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<tr>
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<tr>
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<td>330</td>
<td>2760</td>
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</tr>
<tr>
<td>C</td>
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<tr>
<td>D</td>
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<td>6300</td>
<td>5960</td>
</tr>
</tbody>
</table>

Fig. A

Fig. B

Fig. C

Fig. D
The Trench Group is your partner of choice for electrical power transmission and distribution solutions today; and for the development of your new technology solutions of tomorrow.