5. AUXILIARY SERVICES
VOLTAGE TRANSFORMERS
Oil-paper insulation
Gas insulation

› 245 kV Transformer for substation auxiliary services, model UTE Coyote Switch (USA).
INTRODUCTION

This type of voltage transformer can supply several kVA low voltage power directly from a high voltage transmission line.

It offers all the benefits of a potential transformer with the applications of a distribution transformer.

Oil-paper insulation: model UT up to 245 kV and 10 kVA; model UTP up to 362 kV and 333 kVA.

Gas insulation: model SVR up to 550 kV and 50 kVA.
APPLICATIONS

1. Substations auxiliary services power supply:
   Power supply in conventional substations where low voltage power is needed as a primary or back-up supply; or in remote areas where building distribution lines is unsafe and with unreliable supply that requires frequent maintenance and high costs.

   It can also be used as a primary power source in switching substations without power transformers to supply the substation and SCADA control systems.

2. Power supply for telecommunication and monitoring systems:
   High quality electrical supply for booster antennas in remote locations using a voltage transformer connected to a nearby transmission line.

3. Rural electrification of isolated populations:
   As a power source for supplying reliable power to rural populations in isolated areas where there are no distribution lines nearby, but there are transmission lines. This particular application supplies low voltage power directly from HV line in an economical and practical way.

4. Temporary power supply when building substations, wind farms, etc., and emergency supply during natural disasters.

   ▶ UTP-245 Voltage transformer for rural electrification. Chihuahua State (Mexico).
5. AUXILIARY SERVICES VOLTAGE TRANSFORMERS > Oil-paper and gas insulation

DESIGN AND MANUFACTURE

Voltage transformers for auxiliary services with oil-paper insulation are made with a magnetic core inside a metallic tank with its primary and secondary windings around it. The primary conductor is enclosed by a capacitive bushing consisting of shields and layers of insulating paper impregnated in oil. In order to control oil level changes, they are fitted with metallic bellows.

Voltage transformers for auxiliary services with gas insulation are made with a magnetic core inside a metallic tank with its primary and secondary windings around it. These windings are made of heat-resisting electric wires coated in synthetic resin and a layer of plastic with a high dielectric resistance and excellent thermal and mechanical performance.

The SF6 and the plastic layer form the electrical insulation. An input valve for SF6 gas is provided on a side of tank together with a manometer for monitoring leakages and gas pressure.
ADVANTAGES

The conventional solution used for the previously mentioned applications is a dedicated medium voltage line. ARTECHE’S voltage transformer for auxiliary services has the following advantages:

› Wide range of designs meeting customer needs.
› Social benefits. Electrification of isolated rural areas, emergency power after natural disasters...
› Independent power supply, more flexible as the user does not have to depend on third parties.
› Cost effective.
› Quick and flexible solution compared to building new lines, since there is no need to apply for licence, conduct environmental studies, use eminent domain, etc.).
› Highly reliable power source within the substation.
› Safety for the most critical equipment in the substation (power transformer). Low voltage and auxiliary services are the most unreliable uses. With this solution there is no need for a tertiary winding that could put the power transformer in risk.
› Dual function, it can be used as a power source and as an instrument transformer in a single unit, since it can also be used for metering and/or protection.
› Hermetically sealed to guarantee complete water tightness with the minimum volume of oil or gas (Each unit is tested individually).
› May be transported and stored horizontally or vertically.
› Maintenance-free throughout their lifespan.
› Environmental-friendly design through the use of high quality insulating oils, free of PBC. The materials used are recyclable and resistant to the elements.
› Excellent response under extreme weather conditions, high altitudes, seismic hazard areas, violent winds, etc.
› Each transformer is routine tested for partial discharges, tangent delta (DDF), insulation and accuracy. Designed to withstand all the type test included in the standards.
› Officially homologated in-house testing facilities.

Oil-paper:
› Oil compensating system that effectively regulates changes in oil volume mainly caused by temperature.
› Oil sampling valve for periodic analysis.
› Porcelain or silicone rubber insulator.

Gas:
› The silicone rubber insulator guarantees safety during transportation and service.
› Online monitoring of the insulation status with a manometer alarm.

ARTECHE developed in 2010 a pioneering pilot project in the State of Chihuahua (Mexico) in collaboration with the local government and C.F.E. to extend electrical service to the region’s rural population, using auxiliary service voltage transformers, helping to reduce their isolation.
RANGE

Auxiliary service inductive voltage transformers are named using different letters (UT followed by a third letter to indicate the model for oil-paper insulation and SVR for gas insulation) followed by 2 or 3 numbers to indicate their service voltages.

The table on the next page shows the range of transformers currently built by ARTECHE. These characteristics are merely indicative.

ARTECHE can also manufacture these transformers to comply with any domestic or international standards.
## 5. AUXILIARY SERVICES VOLTAGE TRANSFORMERS > Oil-paper and gas insulation

### Oil-paper insulation > Model UT

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest Voltage (kV)</th>
<th>Rated insulation level</th>
<th>Burden (kVA)</th>
<th>Standard creepage distance (mm)</th>
<th>Dimensions</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTE-72</td>
<td>72.5</td>
<td>140 325</td>
<td>up to 10</td>
<td>1.825</td>
<td>400x430</td>
<td>1.645</td>
</tr>
<tr>
<td>UTE-145</td>
<td>145</td>
<td>275 650</td>
<td>up to 10</td>
<td>3.625</td>
<td>400x400</td>
<td>2.105</td>
</tr>
<tr>
<td>UTEG-245</td>
<td>245</td>
<td>460 1.050</td>
<td>up to 10</td>
<td>6.125</td>
<td>500x640</td>
<td>3.260</td>
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</tbody>
</table>

Approximate dimensions and weights. For special requirements, please consult.

### Oil-paper insulation > Model UTP

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest Voltage (kV)</th>
<th>Rated insulation level</th>
<th>Burden (kVA)</th>
<th>Standard creepage distance (mm)</th>
<th>Dimensions</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTP-145</td>
<td>145</td>
<td>275 650</td>
<td>50/100/333</td>
<td>3.625</td>
<td>1.450x1.220</td>
<td>4.005</td>
</tr>
<tr>
<td>UTP-245</td>
<td>245</td>
<td>395 950</td>
<td>50/100/333</td>
<td>6.125</td>
<td>1.450x1.220</td>
<td>4.590</td>
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<tr>
<td>UTP-362</td>
<td>362</td>
<td>510 1.1175</td>
<td>50/100/333</td>
<td>9.050</td>
<td>1.450x1.220</td>
<td>5.270</td>
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</table>

Approximate dimensions and weights. For special requirements, please consult.

### Gas insulation > Model SVR

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest Voltage (kV)</th>
<th>Rated insulation level</th>
<th>Burden (kVA)</th>
<th>Standard creepage distance (mm)</th>
<th>Dimensions</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVR-6</td>
<td>72.5</td>
<td>140 325/350</td>
<td>25/50</td>
<td>1.825</td>
<td>500x390</td>
<td>2.950</td>
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<tr>
<td>SVR-12</td>
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<td>275 650</td>
<td>25/50</td>
<td>3.625</td>
<td>500x390</td>
<td>3.500</td>
</tr>
<tr>
<td>SVR-20</td>
<td>245</td>
<td>395 950</td>
<td>25/50</td>
<td>6.125</td>
<td>500x390</td>
<td>4.750</td>
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<td>SVR-38</td>
<td>420</td>
<td>575 1.300</td>
<td>25/50</td>
<td>10.500</td>
<td>520x490</td>
<td>6.550</td>
</tr>
<tr>
<td>SVR-50</td>
<td>(525) 550</td>
<td>680 1.550</td>
<td>25/50</td>
<td>13.125</td>
<td>600x560</td>
<td>7.400</td>
</tr>
</tbody>
</table>

Approximate dimensions and weights. For special requirements, please consult.