HIGH VOLTAGE.
INSTRUMENT
TRANSFORMERS.
Moving together
CURRENT TRANSFORMERS

CA Series
LB Series
CG Series
CX Series
Current transformers are designed to provide a scaled down replica of the current in the HV line and isolate the measuring instruments, meters, relays, etc., from the high voltage power circuit.

**APPLICATIONS**

Current input to different types of protection relays.
Ideal for installation at metering points due to its very high accuracy.
Excellent frequency response; applicable for monitoring power quality and measuring harmonics.
Suitable for installation in AC and DC filters in converter substations for HVDC projects.

**Examples of applications:**

1. Protection for high voltage lines and substations.

2. Protection for capacitor banks.

3. Protection for power transformers.

4. Revenue metering.
Oil-paper insulation: model CA up to 800 kV.

1. Top cover
2. Oil volume compensating system
3. Cores and secondary windings
4. Primary terminal
5. Primary winding
6. Head
7. Capacitive bushing
8. Insulator
9. Insulating oil
10. Reinforced ground connection
11. Lifting holes
12. Base
13. Tangent delta tap
14. Secondary terminals
15. Grounding terminal
16. Oil sampling valve
The current transformer primary conductor is usually a pass-through bar (with or without external reconnections) or sometimes a winding. The secondaries, which are one or several cores with their corresponding windings, are located in the top section of the unit within the external aluminum enclosure.

These active parts are inside a metal enclosure that acts as a low-voltage shield, with the main oil-paper insulation wrapped around, ending up with a high-voltage shield. The gap between this shield and the external enclosure is filled with oil. The secondary cable outputs run into the secondary terminal box through an oil-paper insulated capacitive bushing with several shields for proper electrical field distribution.

**CHARACTERISTICS**

› Very high and invariable accuracy (up to 0.1%) steady for the operational life of the equipment, with maximum reliability.
› All types of measurement and protection cores: multi-ratio, linear...
› Wide range of primary currents: from 1 to 5000 A.
› Primary and/or secondary reconnection.
› Very high rated currents and short-circuit currents.
› Reinforced safety design.
› Robust mechanical strength.
› Excellent response under extreme environmental conditions: Temperatures from -60°C up to +60°C, high altitudes, seismic hazard areas, violent winds, etc.
› Maintenance-free throughout their complete lifespan of more than 30 years. Only periodic monitoring is recommended.
› Tangent Delta (DDF) tap for on-site testing.
› Oil sampling valve and oil level indicator for monitoring.
› Hermetically sealed to guarantee complete water tightness with the minimum volume of oil. Each unit is tested individually.
› Metallic oil level compensating system that effectively regulates changes in oil volume mainly caused by temperature.
› Officially homologated in-house testing facilities.
› Quality management system certifications: ISO9001, ISO14001 and OHSAS 18001.
› Each unit is routine tested following applicable standards.
› Complete type tests reports following international standards.

› Compliance to any international or domestic standards.
› Environmentally friendly. The materials used for construction are recyclable and resistant to the elements. Its advanced design adheres to environmental regulations using high-quality insulating oils, free of PCBs.
› Reduced size due to a compact design that is easy to transport, store and install, and which reduces visual impact.
› May be transported and stored horizontally or vertically.

**OPTIONS:**

› Internal arc test compliant as per IEC 61869 and other standards.
› Porcelain or polymeric insulators.
› Sealable secondary terminals.
› Different cable glands and accessories.
› Wide range of primary and secondary terminals.
› Secondary protection devices inside the terminal box (spark gaps...).
› Capacitive voltage tap.
RANGE

This series is named with the letters CA, followed by 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

The table on the next page shows the range manufactured by ARTECHE. These characteristics are merely indicative; ARTECHE can manufacture transformers to comply with any domestic or international standard.

Ratio: Multiple combinations possible in a single device.

Secondary windings for:

› Protection: all possible types, including linear cores, low induction, etc.
› Metering: accuracy classes for any metering/billing need (including high accuracy class 0.1 / 0.15 with extended range in current).

Number of secondary windings: up to 10 secondary windings are possible in a single device.

Primary currents: from 1 A to 5000 A.

Short circuit current: up to 120 kA/1s.
### Oil-paper insulation > Model CA

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest voltage (kV)</th>
<th>Rated insulation level</th>
<th>Standard creepage distance (mm)</th>
<th>Dimensions</th>
<th>Weight (kg)</th>
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<td>Power frequency (kV)</td>
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<td>Switching impulse (kVp)</td>
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</table>

These dimensions and weights are approximate based on standard requirements.
For detailed values please consult with Arteche.
LB SERIES

Oil-paper insulation: model LB up to 245 kV.

1. Oil volume compensating system
2. Oil level indicator
3. Primary terminal
4. Cores and secondary windings
5. Primary winding
6. Insulator
7. Capacitive bushing
8. Oil sampling valve
DESIGN AND MANUFACTURING

The current transformer consists of one or several cores with their corresponding secondary windings (active parts).

CHARACTERISTICS

› Very high and invariable accuracy (up to 0.1%) steady for the operational life of the equipment, with maximum reliability.
› All types of measurement and protection cores: multi-ratio, linear...
› Wide range of primary currents: from 1 to 4000 A.
› Primary and/or secondary reconnection.
› Robust mechanical strength.
› Excellent response under extreme environmental conditions: Temperatures from -55°C up to +55°C, high altitudes, seismic hazard areas, violent winds, etc.
› Maintenance-free throughout their complete lifespan of more than 30 years. Only periodic monitoring is recommended.
› Tangent Delta (DDF) tap for on-site testing.
› Oil sampling valve and oil level indicator for monitoring.
› Hermetically sealed to guarantee complete water tightness with the minimum volume of oil. Each unit is tested individually.
› Metallic oil level compensating system that effectively regulates changes in oil volume mainly caused by temperature.
› Officially homologated in-house testing facilities.
› Quality management system certifications: ISO9001, ISO14001 and OHSAS 18001.
› Each unit is routine tested following applicable standards.
› Complete type tests reports following international standards.
› Compliance to any international or domestic standards.
› Environmentally friendly. The materials used for construction are recyclable and resistant to the elements. Its advanced design adheres to environmental regulations using high-quality insulating oils, free of PCBs.
› Reduced size due to a compact design that is easy to transport, store and install, and which reduces visual impact.
› May be transported and stored horizontally or vertically.

OPTIONS:

› Sealable secondary terminals.
› Different cable glands and accessories.
› Wide range of primary and secondary terminals.
› Secondary protection devices inside the terminal box (spark gaps...).
RANGE

This series is named with the letters LB followed by 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

The table on the next page shows the range manufactured by ARTECHE. These characteristics are merely indicative; ARTECHE can manufacture transformers to comply with any domestic or international standard.

Ratio: Multiple combinations possible in a single device.

Secondary windings for:

› Protection: all possible types, including linear cores, low induction, etc.
› Metering: accuracy classes for any metering/billing need (including high accuracy class 0.1 / 0.15 with extended range in current).

Number of secondary windings: up to 10 secondary windings are possible in a single device.

Primary currents: from 1 A to 4000 A.

Short circuit current: up to 50 kA/1s.
## Oil-paper insulation > Model LB

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest voltage (kV)</th>
<th>Rated insulation level</th>
<th>Power frequency (kV)</th>
<th>Lightning impulse (BIL) (kVp)</th>
<th>Switching impulse (kVp)</th>
<th>Standard creepage distance (mm)</th>
<th>Dimensions</th>
<th>Weight (kg)</th>
</tr>
</thead>
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<td></td>
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<td></td>
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<td>T (mm)</td>
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<td></td>
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</table>

These dimensions and weights are approximate based on standard requirements.
For detailed values please consult with Arteche.
CG SERIES

Gas insulation:
model CG up to 170 kV.

1. Primary terminal
2. Cores and secondary windings
3. Primary winding
4. Secondary conductors
5. Insulator
6. Reinforced ground connection
7. Secondary terminal box
8. Pressure relief device
9. Head
10. Manometer
11. HV electrode
12. Gas filling valve
DESIGN AND MANUFACTURING

The current transformer primary conductor is usually a pass-through bar (with or without external reconnections). The secondaries, which are one or several cores with their corresponding windings, are located in the top section of the unit within the external aluminum enclosure.

These active parts are inside a metal enclosure that acts as a low-voltage shield. The gap between this shield and the external enclosure is filled with SF₆ gas. The secondary cable outputs run into the secondary terminal box through the bushing with electrodes for proper electrical field distribution.

CHARACTERISTICS

› Very high and invariable accuracy (up to 0.1%) steady for the operational life of the equipment, with maximum reliability.
› All types of measurement and protection cores: multi-ratio, linear...
› Wide range of primary currents: from 1 to 5000 A.
› Primary and/or secondary reconnection.
› Very high rated currents and short-circuit currents.
› Internal arc test compliant as per IEC 61869 and other standards.
› Designed to withstand rated voltage with internal atmospheric gas pressure.
› Robust mechanical strength.
› Silicone rubber insulator.
› Excellent response under extreme environmental conditions: Temperatures from -50°C up to +60°C, high altitudes, seismic hazard areas, violent winds, etc.
› Maintenance-free throughout their complete lifespan of more than 30 years. Only periodic monitoring is recommended.
› Temperature compensated densimeter with two levels of alarm that can be wired to the control equipment for remote monitoring.
› Designed to minimize gas volume, pressure and leaks, with a leakage rate <0.5%/year (lower values available upon request), thus reducing its environmental impact. Each unit is tested individually.
› Tanks and insulators are designed, manufactured and tested according to international pressure vessel standards.
› Officially homologated in-house testing facilities.
› Quality management system certifications: ISO9001, ISO14001 and OHSAS 18001.
› Each unit is routine tested following applicable standards.
› Complete type tests reports following international standards.
› Compliance to any international or domestic standards.

› Environmentally friendly. The materials used for construction are recyclable and resistant to the elements. Its advanced design adheres to environmental regulations.
› Reduced size due to a compact design that is easy to transport, store and install, and which reduces visual impact.
› May be transported and stored horizontally or vertically.

OPTIONS:

› Sealable secondary terminals.
› Different cable glands and accessories.
› Wide range of primary and secondary terminals.
› Secondary protection devices inside the terminal box (spark gaps...).
RANGE
This series is named with the letters CG followed by 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

The table on the next page shows the range manufactured by ARTECHE. These characteristics are merely indicative; ARTECHE can manufacture transformers to comply with any domestic or international standard.

Ratio: Multiple combinations possible in a single device.

Secondary windings for:
› Protection: all possible types, including linear cores, low induction, etc.
› Metering: accuracy classes for any metering/billing need (including high accuracy class 0.1 / 0.15 with extended range in current).

Number of secondary windings: as per customer needs, up to 10 secondary windings (or more) are possible in a single device.

Primary currents: from 1 A to 5000 A.

Short circuit current: up to 120 kA/1s.
### Gas insulation > Model CG

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest voltage (kV)</th>
<th>Rated insulation level</th>
<th>Standard creepage distance (mm)</th>
<th>Dimensions</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Power frequency (kV)</td>
<td>Lightning impulse (BIL) (kVp)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Switching Impulse (kVp)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td>A (mm)</td>
<td>T (mm)</td>
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<td>2070</td>
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</table>

These dimensions and weights are approximate based on standard requirements. For detailed values please consult with Arteche.
Dry insulation:
model CX up to 72.5 kV.

1. Primary terminal
2. Equipotential ring
3. Insulator
4. Primary winding
5. Cores and secondary windings
6. Resin insulation
7. Secondary terminal box
8. Grounding terminal
DESIGN AND MANUFACTURING

The current transformer consists of one or several cores with their corresponding secondary windings (active parts).

The active parts are located approximately in the center of the resin body, vacuum cast with epoxy resin, which fixes and isolates the active parts, creating a rigid body with high mechanical resistance, excellent thermal performance and dielectric withstand capability.

This resin body is inside a hollow porcelain or silicone rubber insulator. The chamber between the resin body and the insulator is hermetically sealed with nitrile rubber gaskets; this space is filled with oil for insulation levels above 36 kV.

CHARACTERISTICS

› Very high and invariable accuracy (up to 0.1%) steady for the operational life of the equipment, with maximum reliability.
› All types of measurement and protection cores: multi-ratio, linear...
› Wide range of primary currents: from 1 to 2400 A.
› Primary and/or secondary reconnection.
› Robust mechanical strength.
› Excellent response under extreme environmental conditions: Temperatures from -60°C up to +60°C, high altitudes, seismic hazard areas, violent winds, etc.
› Maintenance-free throughout their complete lifespan of more than 30 years. Only periodic monitoring is recommended.
› Officially homologated in-house testing facilities.
› Quality management system certifications: ISO9001, ISO14001 and OHSAS 18001.
› Each unit is routine tested following applicable standards.
› Complete type tests reports following international standards.
› Compliance to any international or domestic standards.
› Environmentally friendly. The materials used for construction are recyclable and resistant to the elements. Its advanced design adheres to environmental regulations.
› Reduced size due to a compact design that is easy to transport, store and install, and which reduces visual impact.

OPTIONS:

› Porcelain or polymeric insulators.
› Sealable secondary terminals.
› Different cable glands and accessories.
› Wide range of primary and secondary terminals.
› Secondary protection devices inside the terminal box (spark gaps...).
RANGE

This series is named with the letters CX followed by 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

The table on the next page shows the range manufactured by ARTECHE. These characteristics are merely indicative; ARTECHE can manufacture transformers to comply with any domestic or international standard.

Ratio: Multiple combinations possible in a single device.

Secondary windings for:

› Protection: all possible types, including linear cores, low induction, etc.

› Metering: accuracy classes for any metering/billing need (including high accuracy class 0.1 / 0.15 with extended range in current).

Number of secondary windings: as per customer needs, up to 10 secondary windings (or more) are possible in a single device.

Primary currents: from 1 A to 5000 A.

Short circuit current: up to 120 kA/1s.
## Dry insulation > Model CX

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest voltage (kV)</th>
<th>Rated insulation level</th>
<th>Standard creepage distance (mm)</th>
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<td>140</td>
<td>325</td>
<td>1860</td>
<td>330</td>
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</table>

These dimensions and weights are approximate based on standard requirements.

For detailed values please consult with Arteche.
INDUCTIVE VOLTAGE TRANSFORMERS

_UT Series
_UG Series
Inductive voltage transformers are designed to provide a scaled down replica of the voltage in the HV line and isolate the measuring instruments, meters, relays, etc., from the high voltage power circuit.

APPLICATIONS

Voltage input to different types of protection relays. Ideal for installation at metering points due to its very high accuracy class. Suitable for the discharge of high-voltage lines and capacitor banks.

Examples of applications:
1. Protection for high voltage lines and substations.
2. Revenue metering.
3. Discharge of capacitor lines and banks.
UT SERIES

Oil-paper insulation: model UT up to 550 kV.

1. Top cover
2. Oil volume compensating system
3. Oil level indicator
4. Insulator
5. Capacitive bushing
6. Primary windings
7. Secondary windings
8. Core
9. Insulating oil
10. Secondary terminal box
11. Grounding terminal
DESIGN AND MANUFACTURING

The voltage transformer primary conductor runs from the primary terminal through an oil-paper insulated capacitive bushing with several shields for proper electrical field distribution. Then it is wounded thousands of times around the magnetic core. The secondary winding(s) are wounded around the same core, which is loaded with their combined burden, and located in the bottom part of the transformers within a metallic external enclosure.

The windings have an antiresonant design, which makes the transformer work properly both at power frequency and during temporary high frequency transients. Electrical insulation is made through layers of papers impregnated with oil.

CHARACTERISTICS

› Very high and invariable accuracy (up to 0.1%) steady for the operational life of the equipment, with maximum reliability.
› Up to 4 secondary windings with or without taps, with metering, protection, or dual function.
› Anti-resonant winding design.
› Reinforced safety design.
› Robust mechanical strength.
› Excellent response under extreme environmental conditions: Temperatures from -60°C up to +60°C, high altitudes, seismic hazard areas, violent winds, etc.
› Maintenance-free throughout their complete lifespan of more than 30 years. Only periodic monitoring is recommended.
› Oil sampling valve and oil level indicator for monitoring.
› Hermetically sealed to guarantee complete water tightness with the minimum volume of oil. Each unit is tested individually.
› Metallic oil level compensating system that effectively regulates changes in oil volume mainly caused by temperature.
› Officially homologated in-house testing facilities.
› Quality management system certifications: ISO9001, ISO14001 and OHSAS 18001.
› Each unit is routine tested following applicable standards.
› Complete type tests reports following international standards.
› Compliance to any international or domestic standards.
› Environmentally friendly. The materials used for construction are recyclable and resistant to the elements. Its advanced design adheres to environmental regulations using high-quality insulating oils, free of PCBs.
› Reduced size due to a compact design that is easy to transport, store and install, and which reduces visual impact.
› May be transported and stored horizontally or vertically.

OPTIONS:

› Tangent Delta (DDF) tap for on-site testing.
› Internal arc test compliant as per IEC 61869 and other standards.
› Porcelain or polymeric insulators.
› Sealable secondary terminals.
› Different cable glands and accessories.
› Wide range of primary and secondary terminals.
› Current through connection to the HV line.
› Secondary protection devices inside the terminal box (fuses, MCBs...).
› Ferroresonance suppressing devices.
RANGE

This series is named with the letters UT followed by 1 additional letter and 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

The table on the next page shows the range currently manufactured by ARTECHE. These characteristics are merely indicative. ARTECHE can manufacture these transformers to comply with any domestic or international standard.

Secondary windings for:

› Protection: all possible types.
› Metering: accuracy classes for any metering/billing need (including high accuracy class 0.1 / 0.15 with extended range in current).

Number of secondary windings: up to 4 secondary windings are possible in a single device.
### Oil-paper insulation > Model UT

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest voltage (kV)</th>
<th>Power frequency (kV)</th>
<th>Lightning impulse (BIL) (kVp)</th>
<th>Switching impulse (kVp)</th>
<th>Thermal burden (VA)</th>
<th>Standard creepage distance (mm)</th>
<th>Dimensions A x B (mm)</th>
<th>Dimensions H (mm)</th>
<th>Weight (kg)</th>
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<tbody>
<tr>
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<td>-</td>
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<td>-</td>
<td>2000</td>
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These dimensions and weights are approximate based on standard requirements. For detailed values please consult with Arteche.
UG SERIES

Oil-paper insulation: model UG up to 420 kV.

1. Primary terminal
2. Pressure relief device
3. HV Electrode
4. Insulator
5. LV Electrode
6. Manometer
7. Primary windings
8. Secondary windings
9. Core
10. Secondary terminal box
11. Gas filling valve
INDUCTIVE VOLTAGE TRANSFORMERS > UG Series

DESIGN AND MANUFACTURING

The voltage transformer primary conductor runs from the primary terminal through an SF₆ insulated bushing with electrodes for proper electrical field distribution. Then it is wounded thousands of times around the magnetic core. The secondary winding(s) are wounded around the same core, which is loaded with their combined burden, and located in the bottom part of the transformers within a metallic external enclosure.

The windings have an antiresonant design, which makes the transformer work properly both at power frequency and during temporary high frequency transients. Layers of plastic with a high dielectric resistance and excellent thermal and mechanical performance and the SF₆ form the electrical insulation.

CHARACTERISTICS

› Very high and invariable accuracy (up to 0.1%) steady for the operational life of the equipment, with maximum reliability.
› Up to 4 secondary windings with or without taps, with metering, protection, or dual function.
› Anti-resonant winding design.
› Internal arc test compliant as per IEC 61869 and other standards.
› Designed to withstand rated voltage with internal atmospheric gas pressure.
› Robust mechanical strength.
› Silicone rubber insulator.
› Excellent response under extreme environmental conditions: Temperatures from -50°C up to +60°C, high altitudes, seismic hazard areas, violent winds, etc.
› Maintenance-free throughout their complete lifespan of more than 30 years. Only periodic monitoring is recommended.
› Temperature compensated densimeter with two levels of alarm that can be wired to the control equipment for remote monitoring.
› Designed to minimize gas volume, pressure and leaks, with a leakage rate <0.5%/year (lower values available upon request), thus reducing its environmental impact. Each unit is tested individually.
› Tanks and insulators are designed, manufactured and tested according to international pressure vessel standards.
› Officially homologated in-house testing facilities.
› Quality management system certifications: ISO9001, ISO14001 and OHSAS 18001.
› Each unit is routine tested following applicable standards.
› Complete type tests reports following international standards.
› Compliance to any international or domestic standards.
› Environmentally friendly. The materials used for construction are recyclable and resistant to the elements. Its advanced design adheres to environmental regulations.

OPTIONS:

› Sealable secondary terminals.
› Different cable glands and accessories.
› Wide range of primary and secondary terminals.
› Secondary protection devices inside the terminal box (fuses or MCB).
› Ferroresonance suppressing devices.
RANGE

This series is named with the letters UG followed by 3 numbers indicating the maximum service voltage for which they have been designed.

The table on the next page shows the range currently manufactured by ARTECHE. These characteristics are merely indicative. ARTECHE can manufacture these transformers to comply with any domestic or international standard.

Secondary windings for:

› Protection: all possible types.
› Metering: accuracy classes for any metering/billing need (including high accuracy class 0.1 / 0.15 with extended range in current).

Number of secondary windings: up to 4 secondary windings are possible in a single device.
### Gas insulation > Model UG

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest voltage (kV)</th>
<th>Rated insulation level</th>
<th>Thermal burden (VA)</th>
<th>Standard creepage distance (mm)</th>
<th>Dimensions A x B (mm)</th>
<th>Dimensions H (mm)</th>
<th>Weight (kg)</th>
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</thead>
<tbody>
<tr>
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<td>123</td>
<td>230</td>
<td>550</td>
<td>-</td>
<td>1000</td>
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<td>315x315</td>
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<td>650</td>
<td>-</td>
<td>1000</td>
<td>4495</td>
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<td>-</td>
<td>1000</td>
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<td>315x315</td>
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<td>1000</td>
<td>7595</td>
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<td>1000</td>
<td>9300</td>
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<td>1050</td>
<td>1000</td>
<td>13020</td>
<td>600x600</td>
</tr>
</tbody>
</table>

These dimensions and weights are approximate based on standard requirements.
For detailed values please consult with Arteche.
COMBINED TRANSFORMERS
_KA Series
Combined transformers are designed to provide a scaled down replica of the current and voltage in the HV line and isolate the measuring instruments, meters, relays, etc., from the high voltage power circuit.

APPLICATIONS

Combined transformers are suitable for use in substations where space or installation costs make using independent transformers difficult.

Ideal for installation at metering points due to their very high accuracy class, both in current and voltage.

Suitable for the discharge of high-voltage lines and capacitor banks.

Excellent frequency response; ideal for monitoring power quality and measuring harmonics.

Examples of applications:

1. Protection for high voltage lines and substations.

2. Revenue metering.
KA SERIES

Model KA up to 245 kV.

1. Top cover
2. Oil volume compensating system
3. Primary terminals
4. Primary winding
5. Core and secondary windings
6. Capacitive bushing
7. Insulator
8. Insulating oil
9. Secondary terminal box
10. Grounding terminal
DESIGN AND MANUFACTURING

These Transformers combine the characteristics of current transformers (CA series) and inductive voltage transformers (UT series).

The current transformer primary conductor is usually a pass-through bar (with or without external reconnections) or sometimes a winding. The secondaries, which are one or several cores with their corresponding windings, are located in the top section of the unit within the external aluminum enclosure. These active parts are inside a metal enclosure that acts as a low-voltage shield, with the main oil-paper insulation wrapped around, ending up with a high-voltage shield. The gap between this shield and the external enclosure is filled with oil. The secondary cable outputs run into the secondary terminal box through an oil-paper insulated capacitive bushing with several shields for proper electrical field distribution.

CHARACTERISTICS

› Very high and invariable accuracy (up to 0.1%) steady for the operational life of the equipment, with maximum reliability.
› CT: All types of measurement and protection cores: multi-ratio, linear...
› VT: Up to 4 secondary windings with or without taps, with metering, protection, or dual function.
› Wide range of primary currents: from 1 to 5000 A.
› Primary and/or secondary reconnection.
› Very high rated currents and short-circuit currents.
› Anti-resonant winding design.
› Reinforced safety design.
› Robust mechanical strength.
› Excellent response under extreme environmental conditions: Temperatures from -60°C up to +60°C, high altitudes, seismic hazard areas, violent winds, etc.
› Maintenance-free throughout their complete lifespan of more than 30 years. Only periodic monitoring is recommended.
› Oil sampling valve and oil level indicator for monitoring.
› Hermetically sealed to guarantee complete water tightness with the minimum volume of oil. Each unit is tested individually.
› Metallic oil level compensating system that effectively regulates changes in oil volume mainly caused by temperature.
› Officially homologated in-house testing facilities.
› Quality management system certifications: ISO9001, ISO14001 and OHSAS 18001.
› Each unit is routine tested following applicable standards.
› Complete type tests reports following international standards.
› Compliance to any international or domestic standards.
› Environmentally friendly. The materials used for construction are recyclable and resistant to the elements. Its advanced design adheres to environmental regulations using high-quality insulating oils, free of PCBs.
› Reduced size due to a compact design that is easy to transport, store and install, and which reduces visual impact.
› May be transported and stored horizontally or vertically.

OPTIONS:

› Tangent Delta (DDF) tap for on-site testing.
› Internal arc test compliant as per IEC 61869 and other standards.
› Porcelain or polymeric insulators.
› Sealable secondary terminals.
› Different cable glands and accessories.
› Wide range of primary and secondary terminals.
› Secondary protection devices inside the terminal box (spark gaps, fuses, MCBs...).
RANGE

This series is named with the letters KA followed by 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

The table on the next page shows the range currently manufactured by ARTECHE. These characteristics are merely indicative. ARTECHE can manufacture these transformers to comply with any domestic or international standard.

Ratio: Multiple combinations possible in a single device.

Secondary windings for:

› Protection: all possible types, including linear cores, low induction, etc.
› Metering: accuracy classes for any metering/billing need (including high accuracy class 0.1 / 0.15 with extended range in current).

Number of secondary windings: up to 6 current and 4 voltage secondary windings are possible in a single device.

Primary currents: from 1 A to 5000 A.

Short circuit current: up to 120 kA/1s.
# COMBINED TRANSFORMERS > KA Series

## Oil-paper insulation > Model KA

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest voltage (kV)</th>
<th>Power frequency (kV)</th>
<th>Lightning impulse (BIL) (kVp)</th>
<th>Switching impulse (kVp)</th>
<th>Rated insulation level</th>
<th>Standard creepage distance (mm)</th>
<th>Dimensions</th>
<th>Weight (kg)</th>
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<td>72.5</td>
<td>140</td>
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<td>1825</td>
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<td>-</td>
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<td>300</td>
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<td>-</td>
<td>6125</td>
<td>450x450</td>
<td>3185</td>
<td>3820</td>
</tr>
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</table>

These dimensions and weights are approximate based on standard requirements. For detailed values please consult with Arteche.
CAPACITIVE VOLTAGE TRANSFORMERS AND COUPLING CAPACITORS
_DDB/DFK Series
_DDN/DFN Series
Capacitive voltage transformers are designed to provide a scaled down replica of the voltage in the HV line and isolate the measuring instruments, meters, relays, etc., from the high voltage power circuit. They enable transmission of high frequency signals through the high voltage (HV) lines. Coupling capacitors are only used for coupling high frequency communication signals, making them equivalent to the capacitive part of a CVT.

**APPLICATIONS**

Voltage input to different types of protection relays. Ideal for installation at metering points due to its very high accuracy class and extremely steady capacitance. Transmission of high-frequency signals through the high voltage lines (PLC). Helps to reduce voltage peaks in the line. Harmonic measurement in conjunction with PQSensor®.

**Examples of applications:**

1. Revenue metering.

2. Protection for high voltage lines and substations.

3. Transmission of high frequency signals.
DDB/DFK SERIES

Capacitive voltage transformer: model DDB 72.5 kV to 170 kV; model DFK 245 kV to 800 kV.

1. Primary terminal
2. Oil volume compensating system
3. Insulator
4. Capacitors
5. Intermediate voltage tap
6. Inductive voltage transformer
7. Secondary terminal box
DESIGN AND MANUFACTURING

Capacitive voltage transformers consist of a number of capacitors connected in series on top of a tank in which the electromagnetic unit (EMU) is housed. The EMU includes an inductive transformer (5), a series reactor (8) and other auxiliary elements. These capacitors form a voltage divider (2, 3) between the high voltage terminal (1) and the high frequency terminal (4).

The capacitors, impregnated with high grade dielectric oil, are housed within one or more insulators. Each of them forms an hermetically sealed independent unit, with a very stable capacitance over time.

The high frequency terminal (4) for the PLC signal comes out of one side through a piece of resin that separates the capacitive unit from the inductive voltage transformer.

The medium voltage inductive voltage transformer is immersed in mineral oil and housed inside an hermetically sealed metallic tank.

The secondary terminals are located inside the secondary terminal box (7) enabling connection; sufficient space is available to install protection elements such as fuses or circuit breakers.

CHARACTERISTICS

› High stability of capacitance, and therefore of accuracy, steady for the operational life of the equipment, with maximum reliability.
› Up to 4 secondary windings with or without taps, with metering, protection, or dual function.
› Reliable ferroresonance suppression system that does not affect transient response or accuracy.
› Robust mechanical strength.
› Excellent response under extreme environmental conditions: Temperatures from -60°C up to +60°C, high altitudes, seismic hazard areas, violent winds, etc.
› Maintenance-free throughout their complete lifespan of more than 30 years. Only periodic monitoring is recommended.
› Oil sampling valve and EMU oil level indicator for monitoring.
› Hermetically sealed to guarantee complete water tightness with the minimum volume of oil. Each unit is tested individually.
› Metallic oil level compensating system that effectively regulates changes in oil volume mainly caused by temperature.
› Officially homologated in-house testing facilities.
› Quality management system certifications: ISO9001, ISO14001 and OHSAS 18001.
› Each unit is routine tested following applicable standards.

OPTIONS:

› Carrier accessories for HF signal transmission.
› Line trap mounted on top of the CVT.
› EMU grounding switch.
› PQSensor® for HF harmonic measurement.
› Porcelain or polymeric insulators.
› Sealable secondary terminals.
› Different cable glands and accessories.
› Wide range of capacitance values available.
› Wide range of primary and secondary terminals.
› Secondary protection devices inside the terminal box (fuses, MCBs...).
RANGE

This series is named with the letters DDB or DFK followed by 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

The table on the next page shows the range currently manufactured by ARTECHE. These characteristics are merely indicative. ARTECHE can manufacture these transformers to comply with any domestic or international standard.

Secondary windings for:

› Protection: all possible types.
› Metering: accuracy classes for any metering/billing need (including high accuracy class 0.1 / 0.15 with extended range in current).

Number of secondary windings: up to 4 secondary windings are possible in a single device.
### Capacitive Voltage Transformers

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest Voltage (kV)</th>
<th>Rated Insulation Level</th>
<th>Standard capacitance (pF)</th>
<th>High capacitance (pF)</th>
<th>Standard creepage distance (mm)</th>
<th>Dimensions</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Power frequency (kV)</td>
<td>Lightning impulse (BIL) (kVp)</td>
<td>Switching impulse (kVp)</td>
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<td>A (mm)</td>
<td>H (mm)</td>
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<td>-</td>
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<td>-</td>
<td>750</td>
<td>4250</td>
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<td>1050</td>
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<td>5800</td>
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</table>

These dimensions and weights are approximate based on standard requirements. For detailed values please consult with Arteche. Higher capacitances available on request.
DDN/DFN SERIES

Coupling capacitor:
model DFN up to 800 kV;
model DDN up to 170 kV.

DESIGN AND MANUFACTURING

Coupling capacitors consist of a number of capacitors connected in series. The capacitors, impregnated with high grade dielectric oil, are housed in one or more insulators. Each of them forms an hermetically sealed independent unit, with a very stable capacitance over time.

The high frequency terminal for the PLC signal comes out from the bottom of the unit and it is connected to the HF carrier accessories.
CHARACTERISTICS

- Carrier accessories for HF signal transmission.
- Robust mechanical strength.
- Excellent response under extreme environmental conditions: Temperatures from -60°C up to +60°C, high altitudes, seismic hazard areas, violent winds, etc.
- Maintenance-free throughout their complete lifespan of more than 30 years. Only periodic monitoring is recommended.
- Hermetically sealed to guarantee complete water tightness with the minimum volume of oil. Each unit is tested individually.
- Metallic oil level compensating system that effectively regulates changes in oil volume mainly caused by temperature.
- Officially homologated in-house testing facilities.
- Quality management system certifications: ISO9001, ISO14001 and OHSAS 18001.
- Each unit is routine tested following applicable standards.
- Complete type tests reports following international standards.
- Compliance to any international or domestic standards.
- Environmentally friendly. The materials used for construction are recyclable and resistant to the elements. Its advanced design adheres to environmental regulations using high-quality insulating oils, free of PCBs.
- Reduced size due to a compact design that is easy to transport, store and install, and which reduces visual impact.

OPTIONS:

- Line trap mounted on top of the Coupling Capacitor.
- Porcelain or polymeric insulators.
- Wide range of capacitance values available.
- Wide range of primary terminals.

RANGE

This series is named with the letters DDN or DFN followed by 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

The table shows the range currently manufactured by ARTECHE. These characteristics are merely indicative. ARTECHE can manufacture these transformers to comply with any domestic or international standard.

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<thead>
<tr>
<th>Coupling capacitors</th>
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<td>Model</td>
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<td>DDN-123</td>
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<td>DFN-765</td>
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</table>

These dimensions and weights are approximate based on standard requirements. For detailed values please consult with Arteche. Higher capacitances available on request.
POWER VOLTAGE TRANSFORMERS
SSVT
_UTP Series
_UTY Series
_UG Series
Power Voltage Transformers (PVT) also known as Station Service Voltage Transformers (SSVT) are used to supply Low Voltage power directly from a High Voltage line up to 550kV. Located within the own substation they can provide power up to 333kVA per phase in a reliable and cost-effective way. They offer a wide range of applications, but they excel when substation auxiliary service power supply is needed in remote areas, making them an ideal solution for Renewable Energy substations.

PVTs were firstly used in North America decades ago. Due to the nature of the electrical network, SSVTs were intended to cover the auxiliary power supply needs in switching substations where neither a Power Transformer or a distribution line were available. Since then, the power output capabilities and the applications have expanded dramatically mainly for Renewable Energies.

PVTs design is close to an inductive voltage transformer to satisfy the dielectric requirement, coupled to a larger core similar to that used in distribution transformers. Using advanced materials and design, a fully rated compact dielectric design is developed. Such design is very akin between all kinds of PVTs despite there are different characteristics between them. PVTs are developed in both the oil and SF₆ insulated format, with a direct phase to ground connection and galvanic insulation between primary and secondary windings, which are coiled over the same magnetic core with independent insulation. Low losses with impedance protection to limit fault currents.

APPLICATIONS

Power Voltage Transformers can be used within any high voltage substation as a low voltage power source to supply the substation auxiliary services (control and protection equipment, air-con, lightning, security systems, etc.). For this application, regulations require two or three reliable and independent sources. PVT is also exclusive and dedicated auxiliary service power source that ensure the reliability of the substation and compliance with the regulations. It can be used as a primary or back-up source.

These are some of the cases where PVTs can be used within substations:

› **Power supply for switching stations.** Switching substations are used to connect several transmission lines. The difference with usual step-up or step-down substations is that there is not any power transformer, and therefore, auxiliary service power supply cannot be obtained from the power transformer tertiary winding. Moreover, these substations are mostly located in remote areas, so distribution lines are not usually present nearby. The alternative options to PVTs are a new dedicated MV line (high construction and maintenance costs and unreliable) or a Diesel generator (Fuel cost, maintenance, CO₂ emissions).  

› **Power Supply for Renewable Energy Substations.** High Voltage substations are needed to connect renewable energy generation plants such as wind or solar farms, to the main transmission network. These power plants are usually located in isolated areas, so a brand-new infrastructure is often needed (substation, transmission lines, and the like). Depending on the size, location and climate conditions, the LV power needs range between 100-500kVA. A transmission line connecting this substation to the main transmission system is therefore needed with a typical voltage ranging from 115 to 500kV. PVTs are located within the HV switchyard, and they can be connected in the busbars or at the entrance of the line, depending on the overall substation design.

› **Power supply for Conventional Substation Auxiliary services.** Unlike in the switching stations, there are usually distribution lines and/or medium voltage switchyards available within the substation, so the PVT can be used as a backup source.

Out of substations, PVTs can also be used as a LV power source. There are situations where there are not distribution networks in the area and power could be obtained directly from the HV line. Some of these applications are listed below:

› **Rural Electrification.** PVTs can act as a power source for supplying reliable power to small communities where there are no distribution lines nearby, but there are transmission lines. This application supplies low voltage power directly from HV line in an economical and practical way. With a single instrument transformer, up to 333kVA can be taken directly from a 245kV line and hundreds of households can get a cheap and reliable access to electricity. It is estimated that the costs saving compared to the traditional substation range between 60 to 80%.
Power supply for Telecommunication towers in remote areas. Wide cellphone reception coverage is a demand for telecom companies. Due the relatively short range of each cellphone tower, there is a need to locate many of them in remote locations in order to provide cellphone network coverage to the users (i.e. while traveling along a freeway). Having a nearby transmission line, a PVT can provide the power needed to power up these towers in a reliable and economic way.

Temporary power supply for under construction substations. Due to the quick erection and location flexibility, the PVT can be used to get electric supply during the construction and then transferred to another location.

Mining, oil & gas pumping stations. These locations are usually far from electrical distribution networks, so the PVT can supply power from the transmission line already built to supply power to the site.

Railway substations.

Lighting of towers.

Voltage elevator for High voltage electrical test laboratories, and small wind and solar farms.
ADVANTAGES

The conventional solutions used for auxiliary services power supply are a dedicated medium voltage line, diesel generators or the power transformer tertiary winding. ARTECHE’S power voltage transformer has the following advantages:

› Reliable power supply: Since the PVTs are connected in the high voltage switchyard of the substation, there will be power available as long as the line is energized. Since this line is connected to the main transmission system, the power availability is guaranteed.

› Maintenance-free and long-life design.

› Quick commissioning: Delivery time from the factory is similar to the rest of the HV switchyard equipment (circuit breakers, instrument transformers, disconnecting switches or surge arrestors), and the commissioning of the equipment is relatively simple, similar to that of instrument transformers. In addition, it can already supply during construction, if the HV line is already energized.

› Reduced environmental impact: PVTs are part of the HV switchyard, so other than that they do not represent any additional environmental impact. This is particularly remarkable when they are part of a renewable energy project. The units are hermetically sealed avoiding insulation fluid leakages to the environment.

› Cost effective: Compared to the other alternatives PVTs are in many cases a cost-effective solution. Installation costs are generally lower, and the life cost is definitely lower, as there is no need to pay for the energy to 3rd parties.

› Robust design. Based on instrument transformers and tested according the same standards to guarantee the same high reliability as any inductive voltage instrument transformer.

› Independent auxiliary services supply. The user does not have to rely on third parties, such as distribution utilities, fuel suppliers, etc.

› Safety and freedom for power transformer. Power transformer is the core of the substations and LV applications are usually less reliable, therefore there is less operation risks if the tertiary winding is not used for auxiliary services. In addition, if there is already a tertiary winding it can be used for other applications.

› Social benefit. Rural isolated area electrification, emergency supply after natural disasters...

› Design flexibility. Different secondary voltages available. Independent secondary windings. 3-phase/single phase secondary systems using 3, 2 or 1 PVT.

› Self-contained and exclusive power source directly from the transmission line.

› High seismic performance.

› Line Discharge. PVTs can also be used for line discharge, this can be of interest if they are located at the line entrance in the substation.

COMPARISON BETWEEN PVTs AND CONVENTIONAL SOLUTIONS TO SUPPLY AUXILIARY POWER

<table>
<thead>
<tr>
<th></th>
<th>Initial Cost</th>
<th>Life cost</th>
<th>Reliability</th>
<th>Maintenance</th>
<th>Environmental impact</th>
<th>Commissioning time</th>
<th>Independence</th>
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<td>PVT</td>
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<td>000</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>000</td>
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UTP SERIES

Oil-paper insulation: model UTP up to 362 kV and 333 kVA.

1. Oil level indicator
2. Primary terminal
3. Oil volume compensating system
4. Capacitive bushing
5. Insulator
6. Primary winding
7. Core
8. Secondary windings
9. Secondary terminals
10. Secondary terminal box
11. Oil sampling valve
12. Grounding terminal
DESIGN AND MANUFACTURING

PVTs 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 filled with oil. There is an oil compensating system that effectively regulates changes in oil volume mainly caused by temperature. The oil can be analyzed though an oil sampling valve located on the tank.

OPTIONS:
› Porcelain or silicone rubber insulator.
› Terminal for main insulation monitoring (tangent δ measurement).
› Inner temperature monitoring sensor.
› Over-pressure relief valve with connection capability to SCADA system.
› Additional secondaries for measuring and/or protection.
› Taps for voltage regulation.

RANGE

This series is named with the letters UTP followed by 3 numbers indicating the maximum service voltage for which they have been designed.

The table shows the range currently manufactured by ARTECHE. These characteristics are merely indicative. ARTECHE can manufacture these transformers to comply with any domestic or international standard.

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest Voltage (kV)</th>
<th>Rated insulation level</th>
<th>Max. Power Output per phase (KVA)</th>
<th>Standard creepage distance (mm)</th>
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<td></td>
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<td>Power frequency (kV)</td>
<td>Lightning impulse (BIL) (kVp)</td>
<td>Switching impulse (kVp)</td>
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<td>510</td>
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</tr>
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</table>
UG SERIES

Gas insulation: model UG up to 550 kV and 125 kVA.

1. Primary terminal
2. Pressure relief device
3. HV Electrode
4. Insulator
5. LV Electrode
6. Primary windings
7. Secondary windings
8. Core
9. Secondary terminal box
10. Gas filling valve
**DESIGN AND MANUFACTURING**

PVTs 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 this 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 gas pressure.

The silicone rubber insulator guarantees safety during transportation and service.

The transformer is equipped with temperature compensated densimeter with two levels of alarm that can be wired to the control equipment for remote monitoring. In case of a working pressure drop, the PVT can still withstand rated voltage with internal atmospheric gas pressure.

Safe design, Internal arc class II as per IEC61869, thanks to:
- Active parts located inside metallic tank, separated from the insulator.
- Pressure relief device located on the upper part.
- Electrical connections resistant to short circuit.

Designed to minimize gas volume, pressure and leaks, with a leakage rate <0.5%/year (lower values available upon request), thus reducing its environmental impact.

 Tanks and insulators are designed, manufactured and tested according to international pressure vessel standards.

**OPTIONS:**
- Inner temperature monitoring sensor.
- Actual pressure value monitoring signal.
- Additional secondaries for measuring and/or protection.

**RANGE**

This series is named with the letters UG followed by 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

The table shows the range currently manufactured by ARTECHE. These characteristics are merely indicative. ARTECHE can manufacture these transformers to comply with any domestic or international standard.

<table>
<thead>
<tr>
<th>Model</th>
<th>Highest Voltage (kV)</th>
<th>Rated Insulation level</th>
<th>Max. Power Output per phase (KVA)</th>
<th>Standard creepage distance (mm)</th>
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</tr>
</tbody>
</table>

For detailed values please consult with Arteche.
For higher rated power values consult with Arteche.
Oil-paper insulation: model UTY up to 245 kV and 16 kVA.

1. Top cover
2. Oil volume compensating system
3. Oil level indicator
4. Insulator
5. Capacitive bushing
6. Primary windings
7. Secondary windings
8. Core
9. Insulating oil
10. Secondary terminal box
11. Grounding terminal
DESIGN AND MANUFACTURING

PVTs 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 filled with oil. There is an oil compensating system that effectively regulates changes in oil volume mainly caused by temperature. The oil can be analyzed through an oil sampling valve located on the tank.

OPTIONS:
› Porcelain or silicone rubber insulator.
› Terminal for main insulation monitoring (tangent δ measurement).

RANGE

This series is named with the letters UTY followed by 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

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