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HIGH VOLTAGE.
INSTRUMENT
TRANSFORMERS.

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Contact ARTECHE to confirm the characteristics and
availability of the products described here.



Moving together

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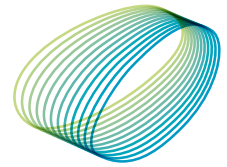
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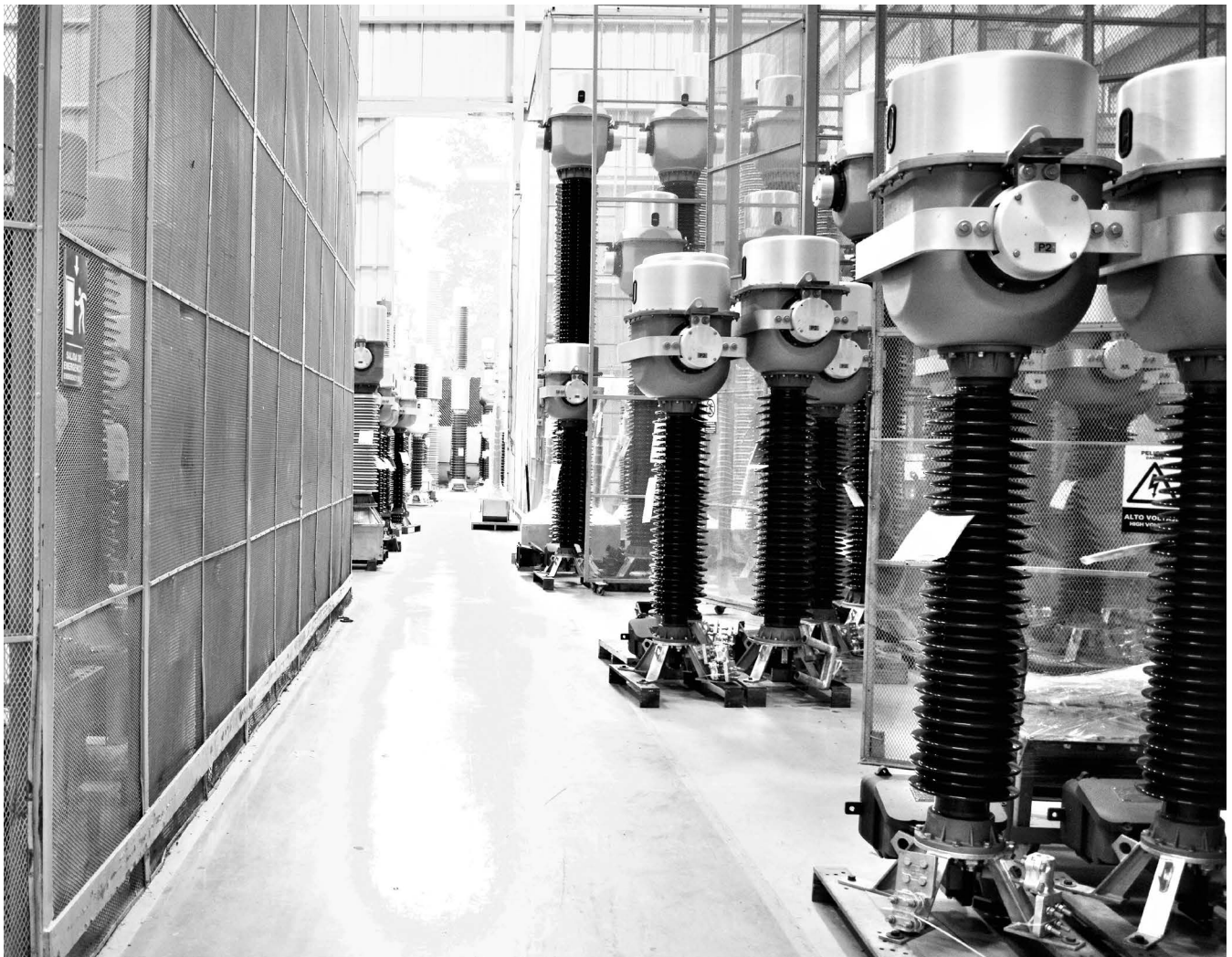
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CURRENT TRANSFORMERS

_ CA 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.

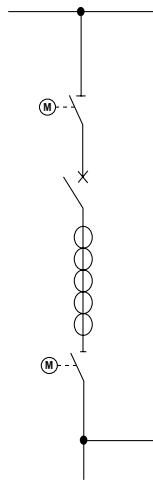
Ideal for installation at metering points due to its very high accuracy.

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

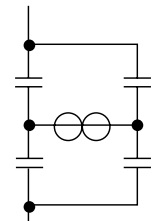
Suitable for installation in AC filters in converter substations for HVDC projects.

Examples of applications:

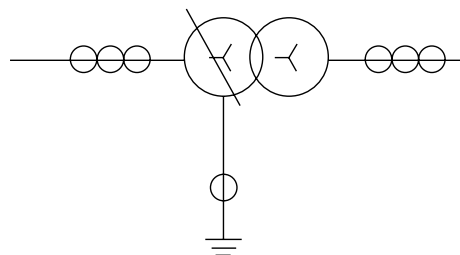
1. Protection for high voltage lines and substations.



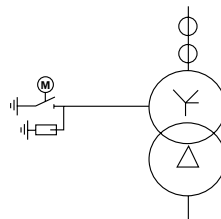
2. Protection for capacitor banks.



3. Protection for power transformers.



4. Revenue metering.

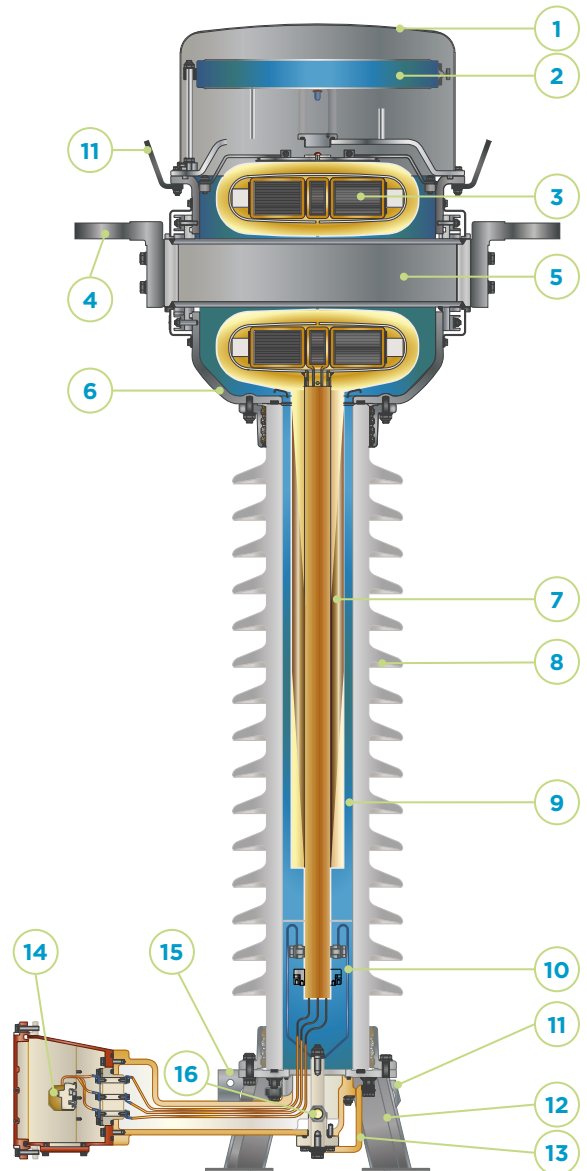


CA SERIES

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



DESIGN AND MANUFACTURING

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: ISO 9001, ISO 14001 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.

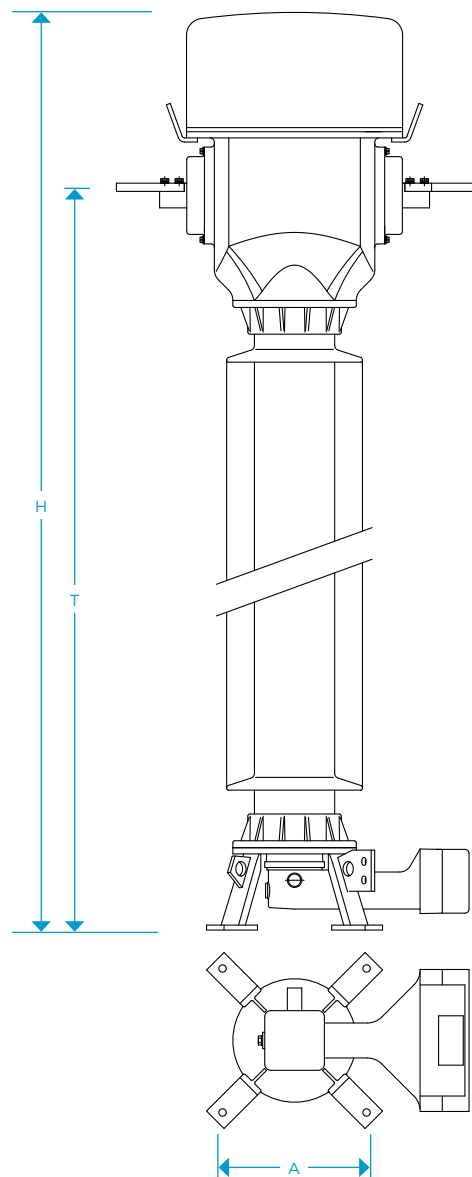
Secondary windings for:

- › 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									
Model	Highest voltage (kV)	Rated insulation level			Standard creepage distance (mm)	Dimensions			Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)		A (mm)	T (mm)	H (mm)	
CA-36	36	70	170	-	900	350	1350	1750	220
CA-52	52	95	250	-	1300	350	1350	1750	220
CA-72	72.5	140	325	-	1825	350	1350	1750	220
CA-100	100	185	450	-	2500	350	1350	1750	220
CA-123	123	230	550	-	3075	350	1785	2230	265
CA-145	145	275	650	-	3625	350	1785	2230	265
CA-170	170	325	750	-	4250	350	1945	2390	305
CA-245	245	460	1050	-	6125	350	2590	2975	375
		395	950						
CA-300	300	460	1050	850	7500	450	3070	3455	600
CA-362	362	510	1175	950	9050	600	4015	4495	1090
CA-420	420	630	1425	1050	10500	600	4015	4495	1090
		575	1300						
CA-525	550	680	1550	1175	13125	600	4525	5195	1150
CA-550	550	800	1800	1175	13750	600	5205	5960	1700
CA-765	800	880	1950	1425	15300	600	5720	6650	2250
		975	2100	1550					

These dimensions and weights are approximate based on standard requirements.

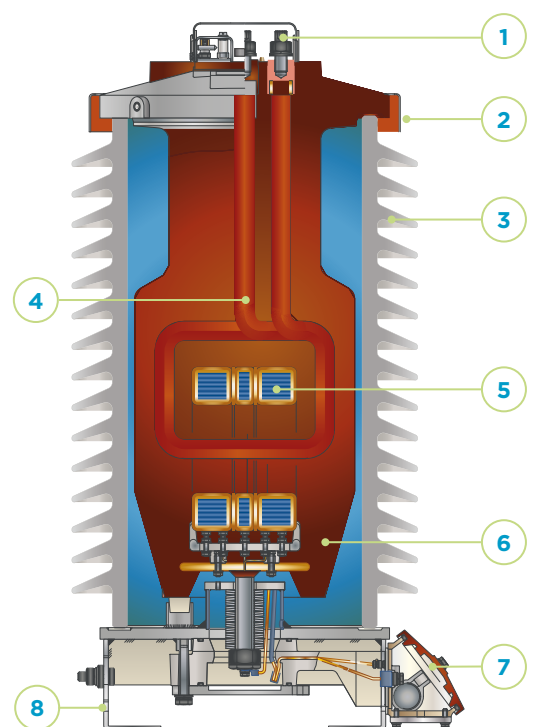
For detailed values please consult with Arteche.

CX SERIES

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: ISO 9001, ISO 14001 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.

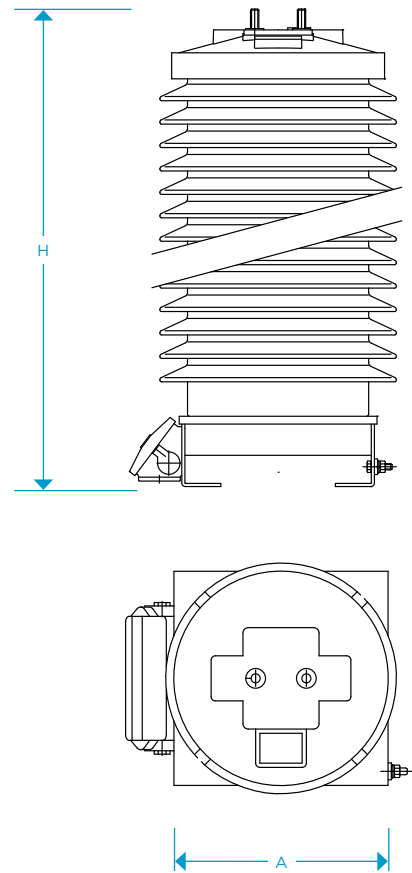
Secondary windings for:

- › 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 4 secondary windings (or more) are possible in a single device.

Primary currents: from 1 A to 2400 A.

Short circuit current: up to 50 kA/1s.



Dry insulation > Model CX

Model	Highest voltage (kV)	Rated insulation level		Standard creepage distance (mm)	Dimensions		Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)		A (mm)	H (mm)	
CXD-24	24	50	125	744	210	462	43
CXE-24	24	50	125	744	250	480	72
CXE-36	36	70	170	900	250	532	80
CXG-36	36	70	170	900	250	670	150
CXE-52	52	95	250	1440	250	712	111
CXG-52	52	95	250	1560	250	798	186
CXH-52	52	95	250	1560	330	800	263
CXG-72	72.5	140	325	1860	250	918	190
CXH-72	72.5	140	325	1860	330	920	305

These dimensions and weights are approximate based on standard requirements.

For detailed values please consult with Arteche.

INDUCTIVE VOLTAGE TRANSFORMERS

_UT 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

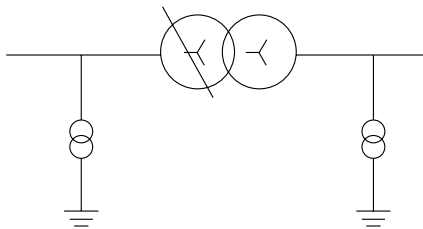
Voltage input to different types of protection relays.

Ideal for installation at metering points due to its very high accuracy class.

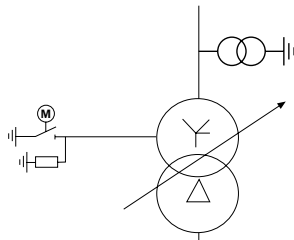
Suitable for the discharge of high-voltage lines and capacitor banks.

Examples of applications:

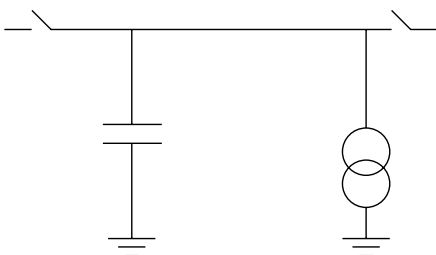
1. Protection for high voltage lines and substations.



2. Revenue metering.



3. Discharge of capacitor lines and banks.

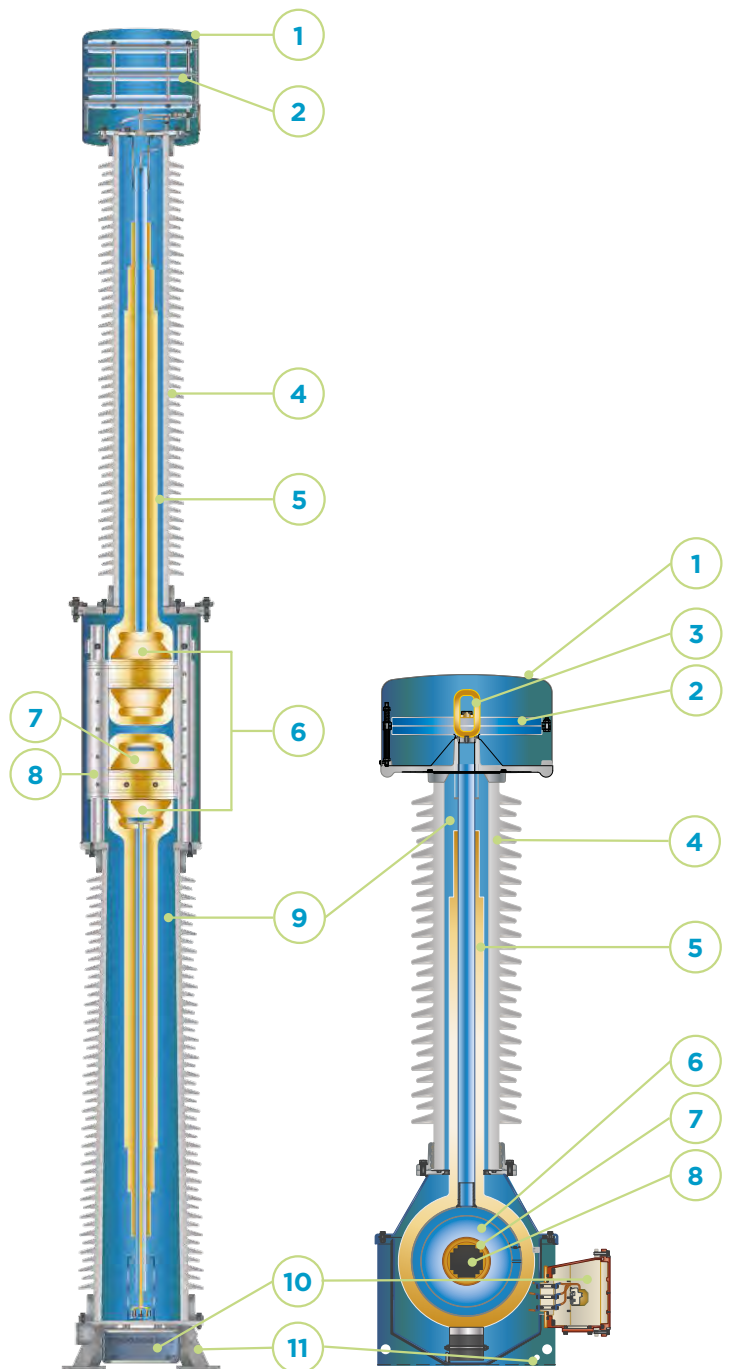


UT SERIES

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 wound thousands of times around the magnetic core. The secondary winding(s) are wound 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: ISO 9001, ISO 14001 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

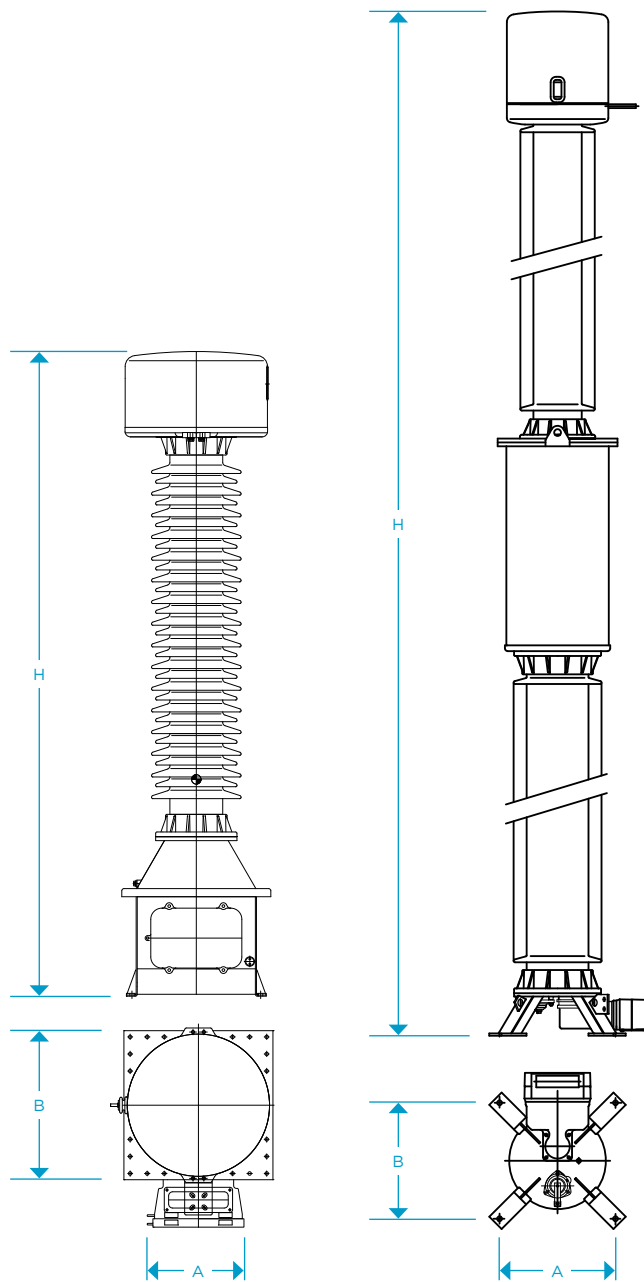
This series is named with the letters UT followed by 1 additional letter and 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

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).

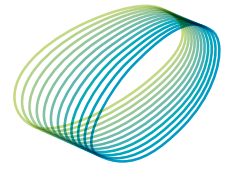
Number of secondary windings: up to 4 secondary windings are possible in a single device.



Oil-paper insulation > Model UT									
Model	Highest voltage (kV)	Rated insulation level			Thermal burden (VA)	Standard creepage distance (mm)	Dimensions		Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)			A x B (mm)	H (mm)	
UTB-52	52	95	250	-	1500	1300	350x350	1385	100
UTD-52	52	95	250	-	2000	1300	350x350	1470	150
UTB-72	72.5	140	325	-	1500	1825	350x350	1385	100
UTD-72	72.5	140	325	-	2000	1825	350x350	1470	150
UTE-72	72.5	140	325	-	2500	1825	350x475	1760	255
UTE-100	100	185	450	-	2000	2500	350x475	1760	255
UTD-123	123	230	550	-	3000	3075	350x475	2160	300
UTE-123	123	230	550	-	3500	3075	350x475	2160	310
UTE-145	145	275	650	-	3500	3625	350x475	2160	310
UTE-170	170	325	750	-	3500	4250	350x475	2320	350
UTF-245	245	460	1050	-	3500	6125	450x450	3182	510
		395	950						
UTG-245	245	460	1050	-	3500	6125	500x640	3655	810
		395	950						
UTG-300	300	460	1050	850	3500	7500	500x640	3655	810
UTF-420	420	630	1425	1050	3500	10500	600x600	5300	1300
		575	1300	950					
UTF-525	550 (525)	680	1550	1175	3500	13125	600x600	6220	1630

These dimensions and weights are approximate based on standard requirements.

For detailed values please consult with Artech.



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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.

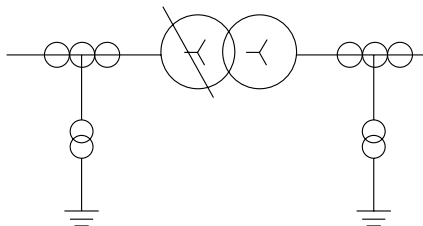
Ideal for installation at metering points due to their very high accuracy class, both in current and voltage.

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

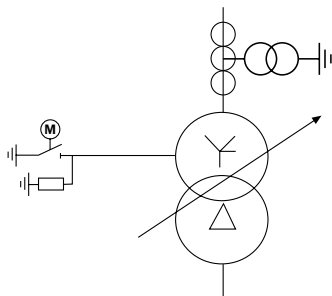
Excellent frequency response; ideal for monitoring power quality and measuring harmonics.

Examples of applications:

1. Protection for high voltage lines and substations.



2. Revenue metering.

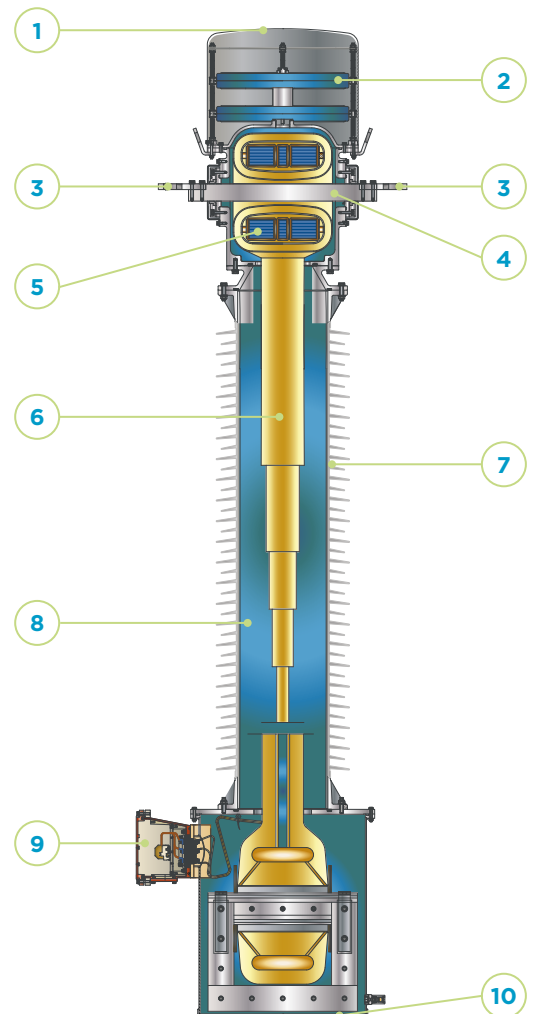


KA SERIES

Oil-paper insulation:
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.

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 wound thousands of times around the magnetic core. The secondary winding(s) are wound 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.
- › 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: ISO 9001, ISO 14001 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.

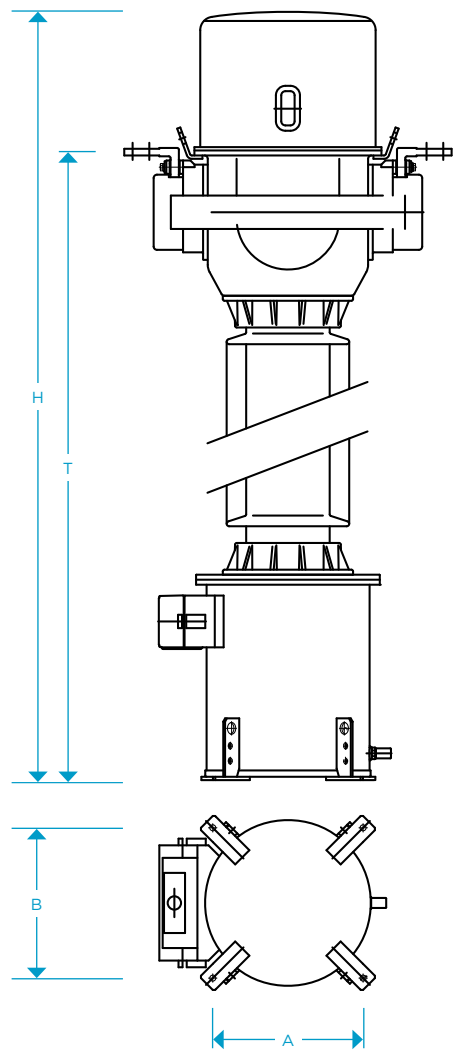
Secondary windings for:

- > 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.

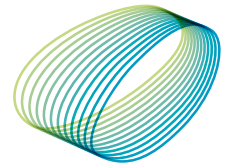
Short circuit current: up to 120 kA/1s.



Oil-paper insulation > Model KA									
Model	Highest voltage (kV)	Rated insulation level			Standard creepage distance (mm)	Dimensions			Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)		AXB (mm)	T (mm)	H (mm)	
KA-72	72.5	140	325	-	1825	350x350	1655	2270	375
KA-123	123	230	550	-	3075	450x450	2055	2655	570
KA-145	145	275	650	-	3625	450x450	2055	2655	580
KA-170	170	325	750	-	4250	450x450	2455	2945	755
KA-245	245	395	950	-	6125	450x450	3185	3820	1050
	300	460	1050	-					
			460	1050	850	7500	600x600	4340	5050

These dimensions and weights are approximate based on standard requirements.

For detailed values please consult with Arteche.



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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.

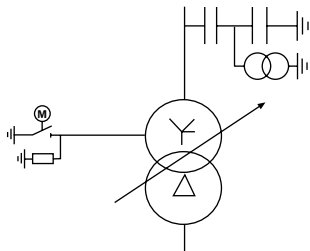
Transmission of high-frequency signals through the high voltage lines (PLC).

Helps to reduce voltage peaks in the line.

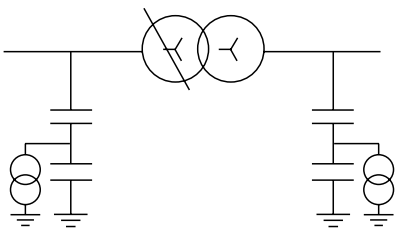
Harmonic measurement in conjunction with PQSensor®.

Examples of applications:

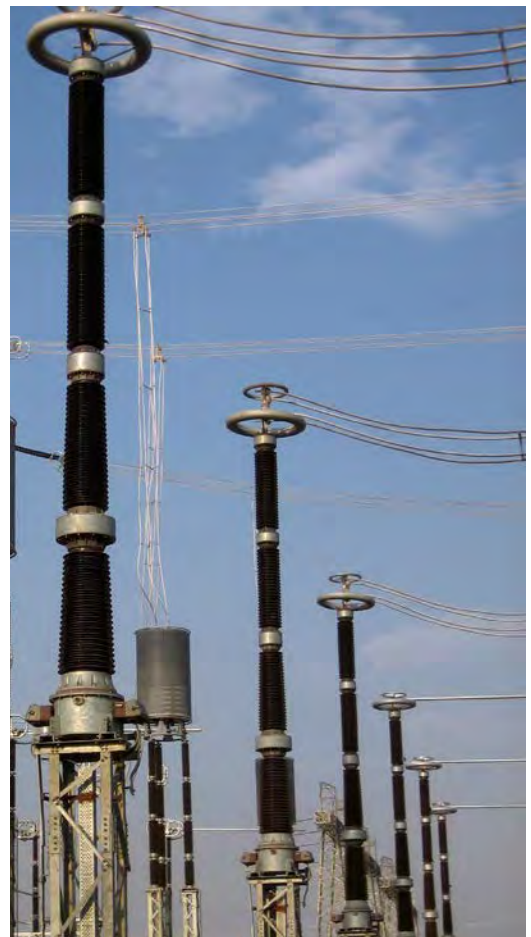
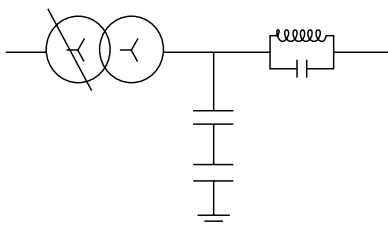
1. Revenue metering.



2. Protection for high voltage lines and substations.



3. Transmission of high frequency signals.

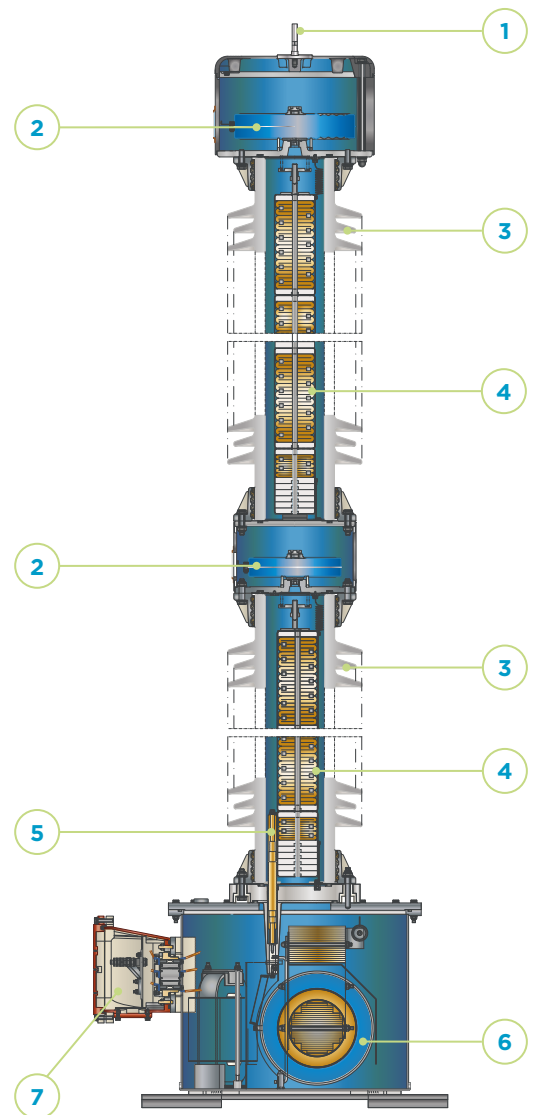


DDB/DFK SERIES

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

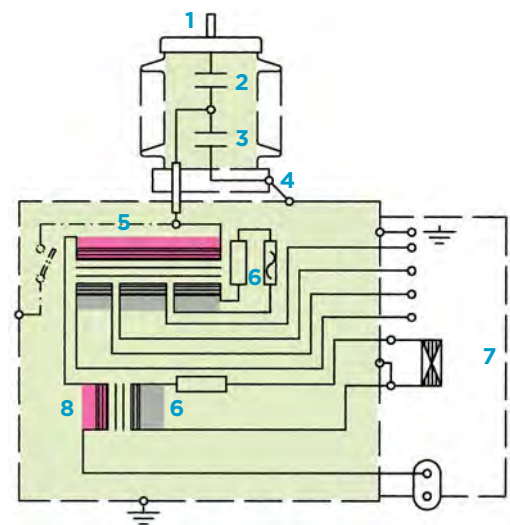
Capacitive voltage transformers consist of a number of capacitors connected in series on top of a tank in which the electromagnetic unit (EMU) is housed. The EMU includes an inductive transformer (5), a series reactor (8) and other auxiliary elements. These capacitors form a voltage divider (2, 3) between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



1. Primary terminal
2. Capacitors (C1)
3. Capacitors (C2)
4. High frequency terminal
5. Inductive voltage transformer
6. Ferroresonance suppression circuit
7. Secondary terminal box
8. Compensating reactor

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: ISO 9001, ISO 14001 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:

- › 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

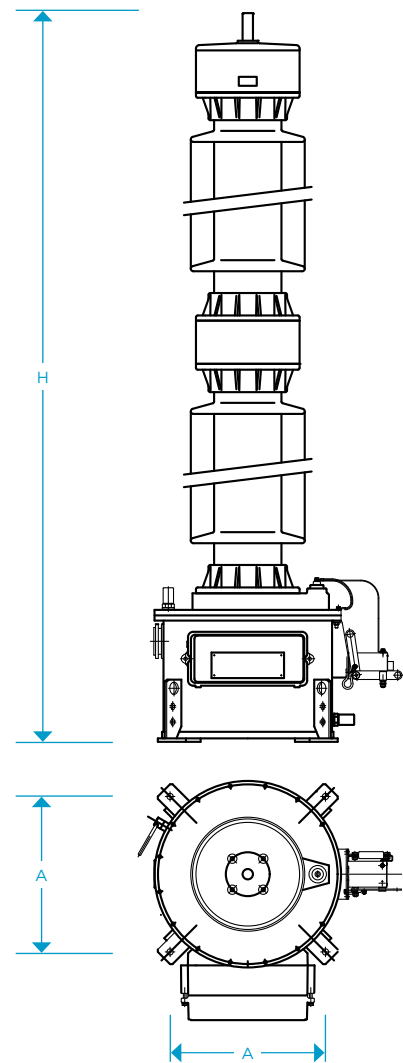
This series is named with the letters DDB or DFK followed by 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

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										
Model	Highest Voltage (kV)	Rated insulation level			Standard capacitance (pF)	High capacitance (pF)	Standard creepage distance (mm)	Dimensions		Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)				A (mm)	H (mm)	
DDB-72	72.5	140	325	-	10300	25500	1825	450	1510	245
DDB-100	100	185	450	-	5700	14300	2500	450	1600	255
DDB-123	123	230	550	-	5600	14000	3075	450	1830	300
DDB-145	145	275	650	-	3900	19500	3625	450	1920	310
DDB-170	170	325	750	-	7500	16500	4250	450	2065	330
DFK-245	245	460	1050	-	5800	11000	6125	450	2885	450
		395	950							
DFK-300	300	460	1050	850	6000	12500	7500	450	3205	480
DFK-362	362	510	1175	950	4500	10100	9050	450	3675	520
DFK-420	420	630	1425	1050	3500	7700	10500	450	4595	670
		575	1300	950						
DFK-525	(525) 550	680	1550	1175	3000	6200	13125	450	5560	1065
		800	1800	1175						
DFK-765	(765) 800	880	1950	1425	3000	4500	15300	450	7010	1270
		975	2100	1550						

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: ISO 9001, ISO 14001 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:

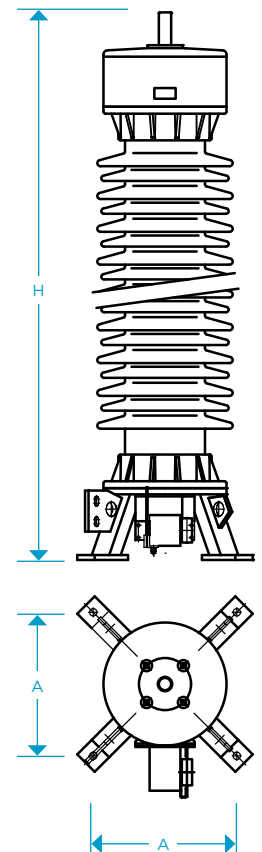
- › Line trap mounted on top of the Coupling Capacitor.
- › Porcelain or polymeric insulators.
- › Wide range of capacitance values available.
- › Wide range of primary terminals.

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.

Coupling capacitors										
Model	Highest Voltage (kV)	Rated insulation level			Standard capacitance (pF)	High capacitance (pF)	Standard creepage distance (mm)	Dimensions		Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)				A (mm)	H (mm)	
DDN-72	72.5	140	325	-	10300	25500	1825	450	1235	115
DDN-100	100	185	450	-	5700	14300	2500	450	1325	120
DDN-123	123	230	550	-	5600	14000	3075	450	1585	145
DDN-145	145	275	650	-	3900	19500	3625	450	1675	150
DDN-170	170	325	750	-	7500	16500	4250	450	1805	170
DFN-245	245	460	1050	-	5800	11000	6125	450	2625	255
DFN-300	300	460	1050	850	6000	12500	7500	450	2945	305
DFN-362	362	510	1175	950	4500	10100	9050	450	3415	345
DFN-420	420	630	1425	1050	3500	7700	10500	450	4335	495
		575	1300	950						
DFN-525	(525) 550	680	1550	1175	3000	6200	13125	450	5300	890
		800	1800	1173						
DFN-765	(765) 800	880	1950	1425	3000	4500	15300	450	6760	1095
		975	2100	1550						



These dimensions and weights are approximate based on standard requirements. For detailed values please consult with Artech. Higher capacitances available on request.

POWER VOLTAGE TRANSFORMERS SSVT

- _ UTP Series
- _ UG Series
- _ UTY 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 550 kV. Located within the own substation they can provide power up to 333 kVA 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,

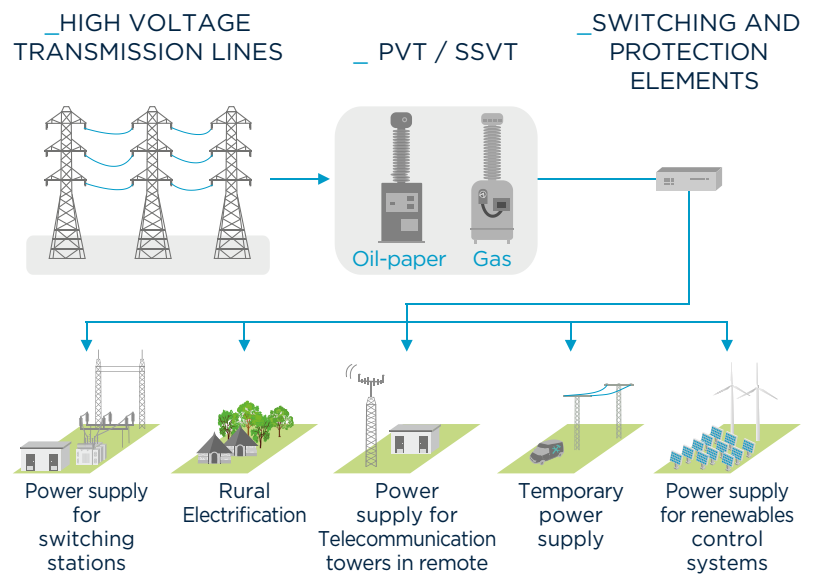
transmission lines, and the like). Depending on the size, location and climate conditions, the LV power needs range between 100-500 kVA. A transmission line connecting this substation to the main transmission system is therefore needed with a typical voltage ranging from 115 to 500 kV. PVTs are located 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 333 kVA can be taken directly from a 245 kV 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

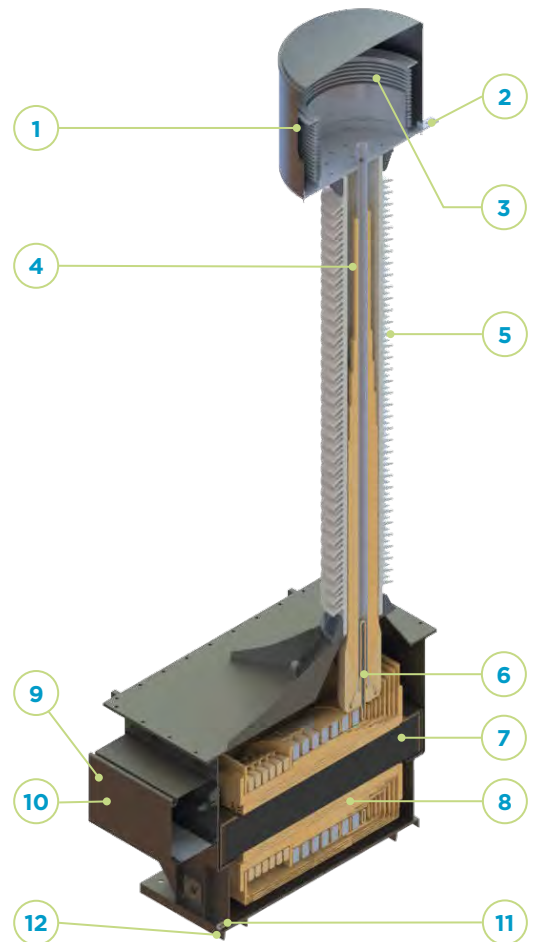
	Initial Cost	Life cost	Reliability	Maintenance	Environmental impact	Commissioning time	Independence
PVT	oo	-	ooo	-	-	o	ooo
Distribution Line + Distr. Transformer	ooo	o	oo	o	oo	ooo	o
Diesel Generator	o	ooo	oo	oo	ooo	o	o
PT Tertiary	oo	-	ooo	o	-	oo	ooo

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 through 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.

Oil-paper insulation > Model UTP

Model	Highest Voltage (kV)	Rated insulation level			Max. Power Output per phase (KVA)	Standard creepage distance (mm)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)		
UTP-123	123	230	550	-	100	4525
UTP-145	145	275	650	-	100	4525
UTP-170	170	325	750	-	100	5285
UTP-245	245	395	900	-	333	6125
		460	1050			
UTP-362	362	510	1175	950	167	9050
		575	1300			

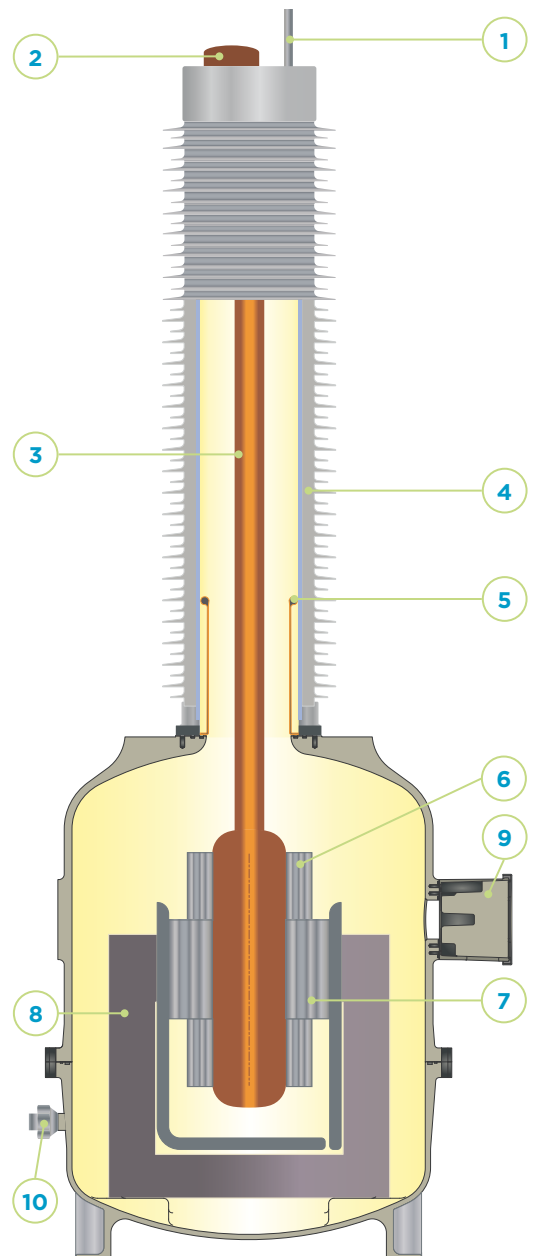


UG SERIES

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 IEC 61869, 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.

Gas insulation > Model UG						
Model	Highest Voltage (kV)	Rated insulation level			Max. Power Output per phase (KVA)	Standard creepage distance (mm)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching Impulse (kVp)		
UG-72	72.5	140	325	-	75	1800
UG-145	123	230	550	-	125	3125
	145	275	650	-	125	3625
	170	325	750	-	125	4230
UG-245	245	460	1050	-	125	6125
	300	460	1050	850	125	7350
UG-420	362	510	1175	950	125	9050
	420	630	1425	1050	125	10300
UG-550	550	680	1550	1175	125	13750

For detailed values please consult with Arteche.
For higher rated power values consult with Arteche.

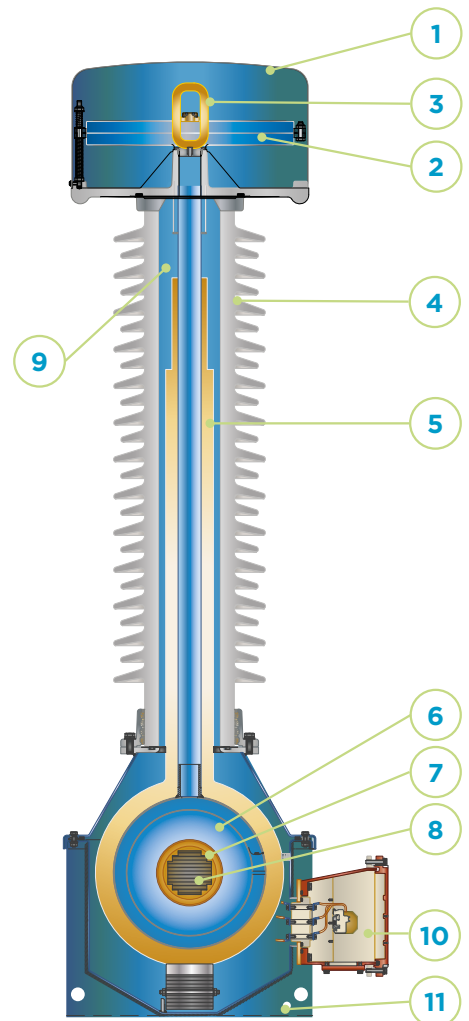


UTY SERIES

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.

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.

Oil-paper insulation > Model UTY

Model	Highest Voltage (kV)	Rated insulation level			Max. Power Output per phase (KVA)	Standard creepage distance (mm)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)		
UTY-72	72.5	140	325	-	10	1825
UTY-145	145	275	650	-	16	3625
UTY-245	245	460	1050	-	10	6125



INSTRUMENT TRANSFORMERS ASSOCIATED SERVICES



More than 70 years of experience in the design and manufacturing of products and solutions for the electrical sector and the millions of pieces of equipment installed all over the world have allowed us to acquire a wide knowledge of the electrical system in its different areas.

Knowledge and experience allow us to understand the particular needs of each electrical installation and each client, and to propose action plans suited to the achievement of the intended outcome.

We have a large team of highly qualified professionals with proven experience in the field, something which, together with our well-known customer orientation, makes ARTECHE a natural partner, capable of offering a wide range of integral services, covering the areas of:

TRAINING

Instrument transformers are deceptively simple equipment, but they require a high degree of knowledge for correct sizing and specification to ensure that the rest of the measurement and protection system works correctly.

ARTECHE offers its customers years of experience in the design and manufacture of a range of instrument transformers starting from low voltage going up to 800 kV, with the most demanding electrical, mechanical and environmental requirements. We have prepared a training program that covers the needs of new personnel, as well as for professionals who work with instrument transformers but may require a deeper knowledge on some aspects:

- › **IT Approach Course:** Dedicated to personnel who, having studied technical subjects, are starting at a job where they need more knowledge about this equipment.
- › **IT Introductory Course:** Dedicated to technical personnel with experience in IT, who require a greater knowledge of specific parameters.
- › **IT Operation and Maintenance Course:** Dedicated to technical operation and maintenance personnel who require greater knowledge of asset behavior.

LIFE CYCLE

Over the years, we have created close bonds with our customers, by fostering collaboration beyond the supply of a product, thus accompanying them throughout the life of the equipment as well. This has allowed us to develop knowledge of the key factors that influence the equipment's correct operation - from its installation in the field to the end of its life cycle.

In addition, Arteche's participation in IEC Working Groups, CIGRÉ committees, and other international collaboration groups allows us to learn and provide knowledge on the latest advances in materials, installations, test instrumentation, electrical phenomena, etc. We can help you know what affects the correct functioning of the equipment, how to measure it, and evaluate the results obtained.

Having Arteche's support during the whole life of your transformer guarantees your peace of mind and the sense of security that comes with having an expert at your side.

We offer:

- › Assembly, Site testing and Commission Supervision of both oil-insulated and gas-insulated transformers.
- › Commissioning of gas-insulated transformers.
- › Preventive and Corrective Maintenance Service.
- › Execution of diagnostic tests, measurement of electrical parameters, evaluation of insulation (oil sampling and DGA).
- › Warranty extensions linked to diagnostic tests.



INSTRUMENT TRANSFORMERS SPECIALIZED SERVICES: EFFICIENCY IN ASSET MANAGEMENT

TESTS

Located in the Arteche Group facilities in Mungia (Spain), the LUAT per its initials in Spanish (Ultra High Voltage Laboratory) is the largest High Voltage laboratory in Spain, and one of the largest in Europe.

Inaugurated in May 2013, this laboratory is designed to test instrumentation and instrument transformers of up to 1,200 kV under ENAC accredited certification in accordance with ISO/IEC 17025.

TECHNICAL ADVICE ON ASSET MANAGEMENT

Bringing the experience of years of manufacturing and support to thousands of installations all over the world, ARTECHE offers:

Specialized consultancy for asset behavior:

We specialize in Instrument Transformers, to help get a picture of the current situation of the installed park and of the information quality available. Also a guidance on how to improve said information. Among the actions to be carried out there is:

- › Analysis, Diagnosis and Report of the quality of the data collected on the assets.
- › Review and complement and Reports of Technical Specifications of Instrument Transformer Operation and Maintenance, proposing improvements and suggestions for optimizing these processes, and getting an image of the transformer condition with the fullest guarantees.

Studies, Analysis and Preventive Diagnosis based on Capacitor Transformer Condition:

As an alternative to conventional methods, Arteche has developed a condition-based preventive diagnosis method, **valid for any Capacitive Voltage Transformer, from any manufacturer, for any voltage level and under live conditions. There is no need to plan outages or disconnect the HV lines.**

This diagnostic detects which units might be failing, and what level of degradation they might have. There are no models or simulations: CVTs' accuracy is measured under real operating conditions.

This method is non-invasive, so it is not necessary to intervene in transformers or in their loads, it is not subject to obsolescence, it does not require wiring or patterns; it is a reliable and efficient method, based on the CVT accuracy verification, that periodically identifies the deviation of the accuracy of an equipment, thus giving an idea of how its isolation can evolve over time.

The most characteristic advantages of the method are that it allows us to diagnose the capacitor transformer on load and without the need for a standard transformer, reducing the costs of operation. In addition, it detects the level of deterioration in order to plan the necessary actions and investments, reducing financial and operating costs as well. As no active high-voltage parts are handled, the risk to people and installations is practically zero.

The periodic integral diagnosis service of all the installed base of CVTs with this method allows our clients:

- › to have statistics on the aging of the installed base according to brands, models, location, use, etc.
- › to adapt maintenance and replacement plans to real needs and risks.

SPECIALIZED SERVICES IN NETWORKS AND SYSTEMS: SOLUTIONS AND INNOVATION AT YOUR SERVICE

Our model and strategy is based on a detailed situation analysis of the networks and systems where operation is taking place, on evaluating the different scenarios and on providing a clear

and objective response, recommendations, suggestions, solutions and actions to reduce inefficiencies and to increase the network's performance potential.

TECHNICAL CONSULTING IN NETWORKS AND SYSTEMS

Analysis of the state of installations and components and recommendations, even via electrical studies:

- › Accompanying our client in the installation, from the moment of information gathering, data collection.
- › Supply of solutions to mitigate the harmful effects detected in the analyses and studies, guaranteeing a correct and satisfactory operation of said transformer from start to finish: Derived from electrical studies, Arteche proposes specific and adequate technical solutions for the different network

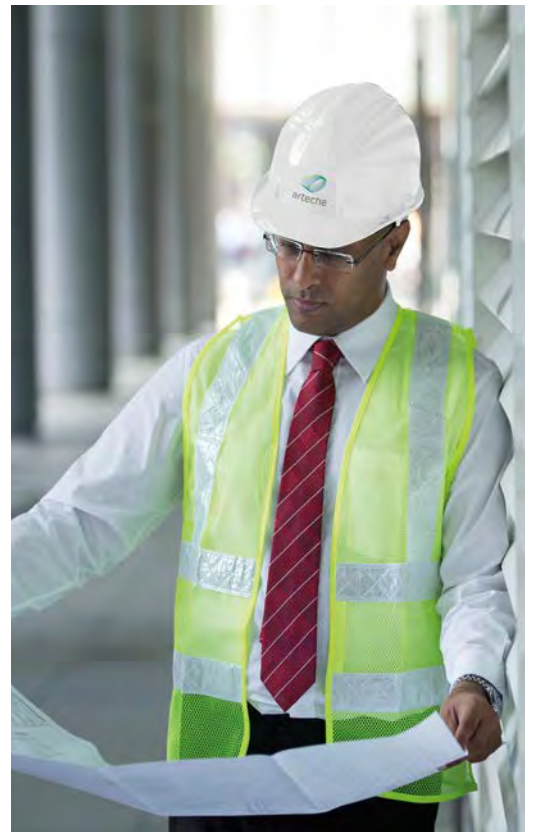
faults and disturbances, both for resonant phenomena, for example, as well as for harmonics situations or transients in a system. These solutions, which range from field assistance for data collection and information gathering, or even staff training, personalized attention during installation, all the way to the necessary equipment supply, assembly, installation and commissioning supervision, jointly and fully guaranteeing the network's correct operation, increasing its efficiency and reducing personal and economic risks.

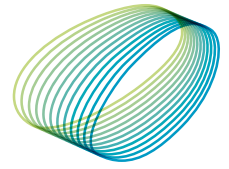
STUDIES, ANALYSIS AND DIAGNOSTICS IN NETWORKS AND SYSTEMS

Whether it is to guarantee the reliability of a system, its optimum performance or its correct compliance with regulations, the electrical study is the ideal tool for any type of installation or network to be analyzed. Arteche offers a wide range of electrical studies devised for analyzing network situations and behavior, as well as for proposing efficient solutions either to mitigate harmful effects and fatal consequences or to improve network performance, complying with the regulatory standards.

- › Studies, Analysis and Diagnostics in Networks and Systems:
 - An analysis and study of ferroresonance is recommended for any installation where inductive voltage transformers are already mounted, or where new positions, changes or replacements, reconditioning, substitutions of said transformers, etc. - which depend on an associated circuit breaker exposed to large number of switching operations of its respective position - take place. Overall, when changes in plant topologies take place, changes in plant operating sequences, changes or additions to positions adjacent to the inductive transformer and changes in parameters, characteristics and series and parallel capacity values.

* For more information, see Arteche's Service Catalog.





arteche
Moving together