

5. AUXILIARY SERVICES

VOLTAGE TRANSFORMERS

Oil-paper insulation
Gas insulation



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

INTRODUCTION

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

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

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

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



> Model UTP



> Model UT



> Model SVR

APPLICATIONS

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

It can also be used as a primary power source in switching substations without power transformers to supply the substation and SCADA control systems.
2. **Power supply for telecommunication and monitoring systems:**
High quality electrical supply for booster antennas in remote locations using a voltage transformer connected to a nearby transmission line.
3. **Rural electrification of isolated populations:**
As a power source for supplying reliable power to rural populations in isolated areas where there are no distribution lines nearby, but there are transmission lines. This particular application supplies low voltage power directly from HV line in an economical and practical way.
4. **Temporary power supply** when building substations, wind farms, etc., and emergency supply during natural disasters.

> UTP-245 Voltage transformer for rural electrification. Chihuahua State (Mexico).



DESIGN AND MANUFACTURE

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

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

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



- > UTE Voltage transformer installation.
- > Packing for transporting SVR-20 transformers.

ADVANTAGES

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

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

Oil-paper:

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

Gas:

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

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

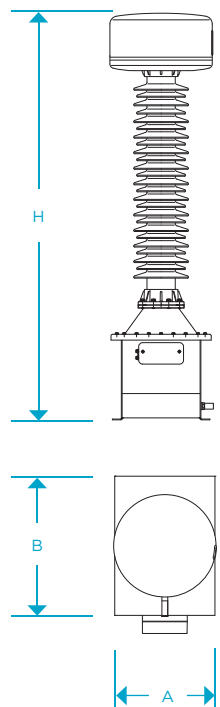


RANGE

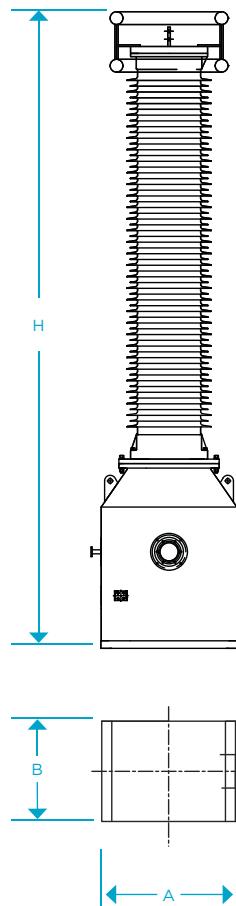
Auxiliary service inductive voltage transformers are named using different letters (UT followed by a third letter to indicate the model for oil-paper insulation and SVR for gas insulation) followed by 2 or 3 numbers to indicate their service voltages.

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

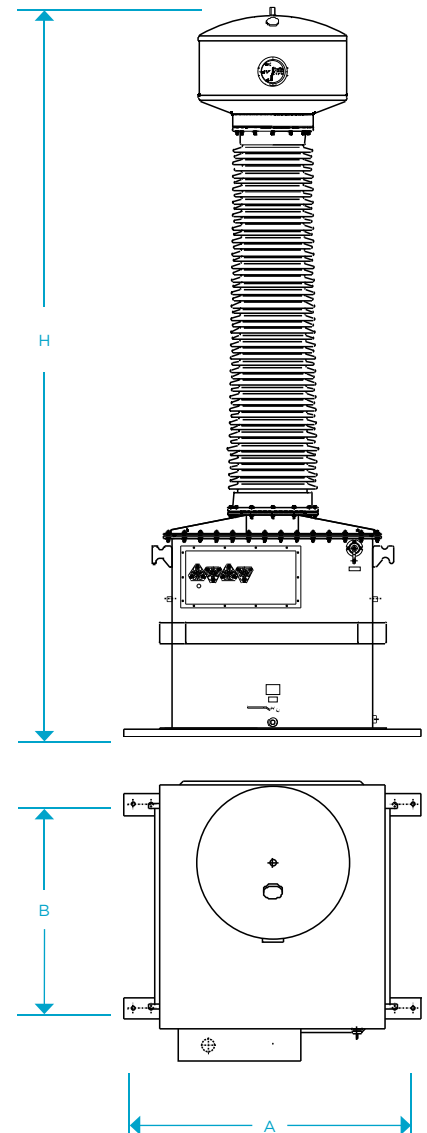
ARTECHE can also manufacture these transformers to comply with any domestic or international standards.



> Model UTE



> Model SVR



> Model UTP



- > 145 kV UTE Inductive voltage transformers. Transener (Argentina).
- > 420 kV SVR inductive voltage transformer. Routine tested in ARTECHE's laboratory.

5. AUXILIARY SERVICES VOLTAGE TRANSFORMERS > Oil-paper and gas insulation

Oil-paper insulation > Model UT

Model	Highest Voltage (kV)	Rated insulation level			Burden (kVA)	Standard creepage distance (mm)	Dimensions		Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)			AxB (mm)	H (mm)	
UTE-72	72.5	140	325	-	up to 10	1.825	400x430	1.645	285
UTE-145	145	275	650	-	up to 10	3.625	400x400	2.105	400
UTG-245	245	460	1.050	-	up to 10	6.125	500x640	3.260	800

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

Oil-paper insulation > Model UTP

Model	Highest Voltage (kV)	Rated insulation level			Burden (kVA)	Standard creepage distance (mm)	Dimensions		Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)			AxB (mm)	H (mm)	
UTP-145	145	275	650	-	50/100/333	3.625	1.450x1.220	4.005	4.100
UTP-245	245	395	950	-	50/100/333	6.125	1.450x1.220	4.590	4.500
		460	1.050						
UTP-362	362	510	1.1175	950	50/100/333	9.050	1.450x1.220	5.270	5.135
		575	1.300						

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

Gas insulation > Model SVR

Model	Highest Voltage (kV)	Rated insulation level			Burden (kVA)	Standard creepage distance (mm)	Dimensions		Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)			AxB (mm)	H (mm)	
SVR-6	72.5	140	325/350	-	25/50	1.825	500x390	2.950	1.400
SVR-12	145	275	650	-	25/50	3.625	500x390	3.500	1.550
SVR-20	245	395	950	-	25/50	6.125	500x390	4.750	1.600
		460	1.050						
SVR-38	420	575	1.300	950	25/50	10.500	520x490	6.550	2.800
		630	1.425	1.050					
SVR-50	(525) 550	680	1.550	1.175	25/50	13.125	600x560	7.400	3.200

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