4. CAPACITIVE VOLTAGE TRANSFORMERS AND COUPLING CAPACITORS

Oil-paper insulation

420 kV Capacitive voltage transformers. Fingrid, Visulahti (Finland).
INTRODUCTION

Capacitive voltage transformers isolate the measuring instruments, meter, relays, protections, etc., from the high voltage power circuit and provide a scaled replica of the voltage in the HV line. They enable transmission of high frequency signals through the high voltage HV lines.

Coupling Capacitors are only used for coupling high frequency communication signals and they are equivalent to the capacitive part of a CVT.

Capacitive voltage transformer
model DFK up to 800 kV, model DDB up to 170 kV.

Coupling capacitor:
model DFN up to 800 kV, model DDN up to 170 kV.
4. CAPACITIVE VOLTAGE TRANSFORMERS AND COUPLING CAPACITORS > Oil-paper insulation

SECTIONS
1. Primary terminal
2. Oil volume compensating system
3. Insulator (porcelain or silicone rubber)
4. Capacitors
5. Intermediate voltage tap
6. High frequency terminal
7. Inductive voltage transformer
8. Oil level indicator
9. Carrier accessories
10. Oil sampling valve
11. Earthing terminal
12. Secondary terminal box

> Capacitive voltage transformer
> Coupling capacitor
APPLICATIONS

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.

Examples of applications:

1. Revenue metering.
2. Protection for high voltage lines and substations.
3. Transmission of high frequency signals.

› 400 kV Capacitive voltage transformers. R.E.E. (Spain).
Capacitive voltage transformers consist of a series of capacitors connected in series on top of a tank in which the electromagnetic unit (inductive transformer (5), series reactor (8) and auxiliary elements) is housed. 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 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 (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 a box (7) enabling connections and has space with protection elements such as fuses or circuit breakers.
ADVANTAGES

› High stability of capacity, and therefore of accuracy.
› Reliable ferroresonance suppression system that does not affect transient response or accuracy.
› Excellent mechanical resistance to seismic forces.
› Pressure relief device to guarantee maximum safety.
› Robust mechanical strength and reduced size due to a compact design that is easy to transport, store and install, and which reduces visual impact.
› Hermetically sealed to guarantee complete water tightness with the minimum volume of oil or gas (Each unit is tested individually).
› Oil level compensating system that effectively regulates changes in oil volume.
› Maintenance-free throughout their lifespan.
› Environmental-friendly design through the use of materials recyclable and resistant to the elements. Its advanced design adheres to environmental regulations through the use of high quality insulating oils, free of PCB.
› Excellent response under extreme weather conditions (from -55°C up to +55°C), altitudes over 1.000 m.a.s.l., 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.
› Compliance to any international standards: IEC, IEEE, UNE, BS, VDE, SS, CAN, AS, NBR, JIS, GOST, NF...
› Officially homologated in-house testing facilities.

OPTIONS:

› Silicone rubber insulation.
› Carrier accessories.
› Earthing switch for the inductive part.
› Wide range of primary and secondary terminals.
› Sealable secondary terminals.
› Line traps can be installed on the top.
› Different cable glands and accessories available.
› Wide range of capacitances.
› Secondary terminal protection devices inside the terminal box.

Maximum safety and reliability within a custom-made design.
**RANGE**

ARTECHE capacitive voltage transformers and coupling capacitors are named with different letters (DDB or DFK for transformers; DDN or DFN for capacitors) followed by 2 or 3 numbers indicating the maximum voltage of the network for which they are designed.

The tables show the ranges of both types of devices currently built by ARTECHE. These characteristics are merely indicative; they can be manufactured to comply with any domestic or international standard.

**Standard accuracy classes and powers:**

- According to IEC standards
  - 100 VA Class 0.2 / 3P
  - 250 VA Class 0.5 / 3P
- According to IEEE standards
  - 0.3 WXYZ
  - 1.2 WXYZ, ZZ

Higher accuracy classes and burdens available.

- 245 kV Capacitive voltage transformers. NEPCO (Jordan).
- 525 kV Capacitive voltage transformers. UTE (Uruguay).
## Capacitive Voltage Transformers

<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 capacitance (pF)</th>
<th>High capacitance (pF)</th>
<th>Standard creepage distance (mm)</th>
<th>Dimensions</th>
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*Approximate dimensions and weights. For special requirements, please consult. Higher capacities available upon request.*

## Coupling Capacitors

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