Station Service Voltage Transformers for low and medium voltage outputs (SSVT and SSMV)

Reliable power in a small, flexible package

Hitachi ABB Power Grid’s family of oil-filled Station Service Voltage Transformers combine the characteristics of voltage transformers with the power rating capability of distribution transformers. This results in fully-insulated products, up to 362 kV, with power performance up to 333 kVA.

Built around rugged transformer designs, the SSVT and SSMV feature high-creepage insulators, high over-voltage capabilities, and impedance protection geared toward limiting fault currents.

**Station Service Voltage Transformer (SSVT)**

Used in line-to-ground applications, the SSVT can be installed either individually for single-phase loads, or in a bank to support three-phase loads with higher kVA ratings. Voltage classes range from 46 to 345 kV with standard maximum kVA ratings up to 250 kVA (333 kVA available for select higher voltage classes). The SSVT can transmit power up to 0.75 km (0.47 mi).

**SSVT for internal arc protection (SSVT-IPC)**

The SSVT-IPC is designed with an increased level of protection to safeguard against collateral damage from eventful failures for the safety-conscious users of SSVTs up to 170 kV. It meets the stringent requirements for Internal Arc Protection Class II, Stage 2 as outlined by both IEC 61869-1 and IEEE C57.13.5.

The housing is tested to stay intact during a 40 kA (rms) fault for a 300 ms duration, due to two Pressure Relief Devices (PRD), a polymer insulator, enhanced tank wall thickness, and an increased size and number of tank cover bolts. The dual PRDs also facilitate a rapid resealing of the tank to minimize environmental impact from oil contamination and reduce the risk of fires.

**Applications**

- Switching and substation control power use
- Wind and solar power generation
- Flood control and pumping stations
- Lighting of transmission lines for aviation safety
- Remote cell phone towers

**Station Service Voltage Transformer for Medium Voltage (SSMV)**

A variation of the SSVT, the SSMV steps down the power from a high-voltage transmission line to a medium-voltage output. High side voltage classes range from 46 to 138 kV with a 15 kV output, and a maximum rating of 200 kVA. Distances from the transmission line can reach up to 30 km (18.6 mi).

**Applications**

- Rural / remote area electrification
- Oil and gas field power
- Railroad electrification
- Mining and construction power
- Hospital and defense installations
- Airports and transportation hubs
An SSVT can supply control power from transmission lines even when a wind farm generates no power.

**Project cost advantages**
In addition to increased system flexibility and decreased footprint, the SSVT/SSMV line of products offers a cost advantage over mainstream solutions.

See the cost-saving advantages for using the SSVT/SSMV for station service supply as compared to:

**Distribution feeder**
The SSVT power solution offers better availability and reliability, especially where severe weather conditions occur and can reduce costs as compared to distribution line construction.

**Diesel generator**
Use of the SSVT/SSMV significantly reduces high environmental and carbon footprint.

**Traditional substation**
Installing an SSVT/SSMV in a remote application can be a fraction of the cost of a traditional substation equipped with a power transformer. Opting for the SSVT/SSMV ensures reduced equipment requirements, loads, and costs.

**Main power transformer tertiary winding**
Eliminating the use of the tertiary winding on the main power transformer for auxiliary power purposes subsequently eliminates the need for additional equipment to step down the medium voltage to low voltage. This configuration safeguards the main transformer against short circuits or voltage surges.

**Electrical standards**
Station service voltage transformers are built to the latest version of the following standards:

- IEEE C57.13 for Instrument Transformers
- IEEE C57.12.00 for Power Transformers
- CAN/CSA C61869-3 regarding Voltage Transformers
- IEC 61869-1 & -3 regarding Instrument Transformers
- IEC 60076 For Power and Distribution transformers, oil filled type
Benefits of Hitachi ABB Power Grid’s advanced technology

- Reliable power for a substation or a stand-alone project tapped directly from available substation HV bus.
- Minimum footprint impact on a pedestal.
- Power ratings up to 333 kVA per phase directly from a high voltage transmission line to a lower voltage in one step.
- Low initial and running costs low electrical losses compared to alternative solutions.
- Medium voltage output for long distance power delivery.
- Engineered solutions can be configured to accommodate special outputs.
- Standardized design and installation.
- More easily transported to inaccessible areas.
- Similar units can be paralleled for incremental power capacity addition.
- Substantial internal composition enables withstand of severe faults (short circuit tested).
- Low sound level.
- Low insulating fluid content eliminates the need for oil containment precautions.
- SSVT product variations can offer voltage measurement winding(s) for bus potential information.
- Transformers shipped to site filled and ready for use.
### Ratings

<table>
<thead>
<tr>
<th></th>
<th>SSVT</th>
<th>SSVT-IPC</th>
<th>SSMV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal system voltage range</strong> kV</td>
<td>46 -345</td>
<td>46 - 161</td>
<td>69 -138</td>
</tr>
<tr>
<td><strong>BIL range</strong> kV</td>
<td>250 - 1300</td>
<td>250 - 650</td>
<td>350 - 650</td>
</tr>
<tr>
<td><strong>Maximum continuous overvoltage (MCOV)</strong>*</td>
<td>115%</td>
<td>115%</td>
<td>115%</td>
</tr>
<tr>
<td><strong>Maximum momentary overvoltage (MMOV)</strong>*</td>
<td>125% for 1 min</td>
<td>125% for 1 min</td>
<td>125% for 1 min</td>
</tr>
<tr>
<td><strong>Partial discharge free (minimum level)</strong></td>
<td>150% of rated voltage</td>
<td>150% of rated voltage</td>
<td>150% of rated voltage</td>
</tr>
<tr>
<td><strong>LV and neutral bushing rating</strong> kV</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td><strong>LV and neutral bushing BIL</strong> kV</td>
<td>30</td>
<td>30</td>
<td>125</td>
</tr>
<tr>
<td><strong>Creepage distance (line-to-ground voltage)</strong> mm/kV</td>
<td>&gt;44</td>
<td>&gt;44</td>
<td>&gt;44</td>
</tr>
</tbody>
</table>

*This IPC design launch beginning with 138 kV / 650 BIL.

**MCOV / MMOV listed for power windings only; power + metering may be higher.