DISTRIBUTION SOLUTIONS

Instrument Transformers

Recommended and useful features

01 Examples of internal insulation defects:
- bubble effect (left)
- shrink effect (right)

Medium voltage instrument transformers are important part of medium voltage networks. This document was created to provide better knowledge about its important and useful features which shall be considered in order to guarantee long term performance and high reliability during operation and whole life time

General requirements

Medium voltage Instrument Transformers fully comply with the latest standards, supported by type test reports or declaration of conformity to those standards

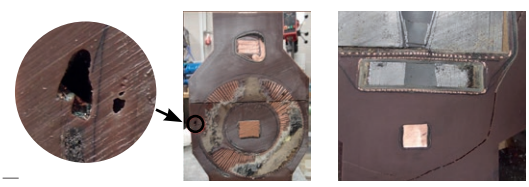
Type tests done either in accredited laboratory or in independent laboratory with witness

- Laboratory shall be accredited according to IEC/ ISO 17025:2005

All ITs routine tested according to relevant standards proven by Routine test protocol

Surface quality - no scratches, no bubbles, no other surface unevenness

- Insufficient surface quality might indicate poor quality and possible latent defects (bubbles or cracks) of internal insulation which could cause decreased dielectric performance and partial discharges in operation



01

IT designs proved for both 50 Hz and 60 Hz systems

- The same IT types are designed for both systems, where 60 Hz system places higher requirements on a design and testing. Ability to fulfill requirements of both systems proves high reliability and performance of instrument transformers in operation

Insulation class E

- It guarantees maximum permissible temperature rise of IT in range up to 75 K and thus corresponds to maximum permissible temperature rise in a switchgear. Different insulation classes (e.g. class B = 85 K) allow to generate more heat and may result in overheating inside the switchgear. Consequently different insulation classes might negatively affect the result of the switchgear temperature rise test which could lead even to the type test failure

Ambient temperature ranges from -25°C to 60°C for all ITs

- Standard temperature range from -5°C up to 40°C does not always meet the application requirement, thus shall be considered to specify extended temperature range

Product documentation – catalogue and manual including IT drawings

- All product types shall have available documentation, as catalogue, drawing and instruction for installation and maintenance, including all technical details and be easy accessible e.g. available online on webpages)

Life time 30 years as minimum

References and installed base

Long experience with product development and production, technical support

Quality control system according to ISO 9001, ISO 14001, OHSAS 18001

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02 Silver plated primary terminals
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03 Block type IT's secondary terminals directly grounded by screw to the base plate
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04 Block type CT with ribs on top

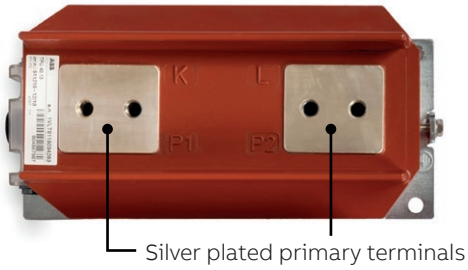
Instrument transformers

Recommended features

Product design proved by several different applications including type testing of ITs in application, e.g. medium-voltage switchgear

Silver plating of primary terminals for all ITs

- In case of using ITs with non-silver plated primary terminals for connection to busbar in switchgear may lead to reduced temperature rise limit in switchgear. The difference in temperature rise limit of switchgear might be 25 K, depending on used ITs. This difference could lead to non-validity of switchgear type test



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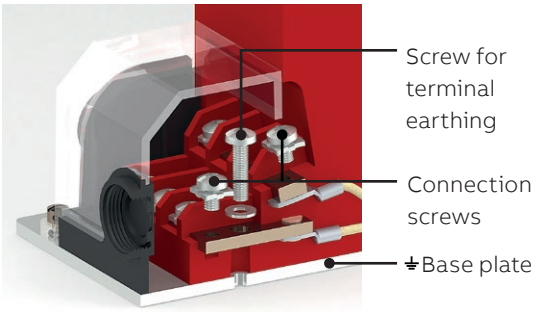
02

Block type ITs with secondary terminals directly grounded by screw to the base plate

- Efficient installation, with no need to use additional wires for earthing



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03

Block type ITs with secondary terminal cover fulfils IP40, IK7 and non-flammability V-0

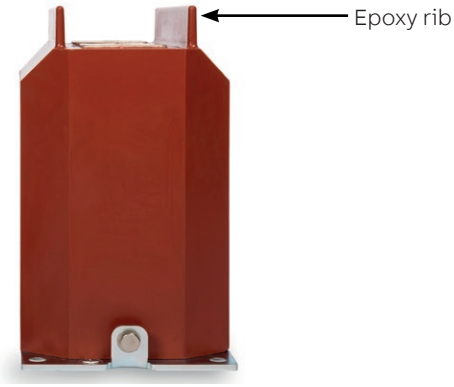
- It guarantees protection and endurance against penetration into secondary terminals and long-term performance in operation. Shall be proved by a functional test from a certified laboratory

Current transformers

Recommended features

Ribs on top of CTs

- The ribs of instrument transformers help to increase creepage distance and thus provide additional protection against flashovers between phases or grounded parts



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Current transformer with voltage indication feature according to IEC standard

- Integration of voltage indicator into current transformer represents optimized solution with no need of additional separate device as post insulator for example. Proper functionality of CT with voltage indication and voltage indication device shall be proven by functional test from a certified laboratory

Optional features

Reconnection on primary or secondary side

- Reconnection feature provides future proved solution for cases when the primary load is expected to be changed during lifetime

Block type CTs with special and transient classes (PX, TPX, TPY, TPZ, TPS, etc.)

- Transient classes are important for special protection applications, like differential or distance protections

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05 Back side of the VT's fuse holder with indication feature

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06 Example of the sealable secondary terminal cover

Voltage transformers

Recommended features

Voltage transformers with overvoltage factor 1.9 Un/8 hours (single pole VTs) and 1.2 Un/continuously (double pole VTs)

- Highest possible value given by IEC standard which guarantees high performance and reliability during transient condition or faults in network

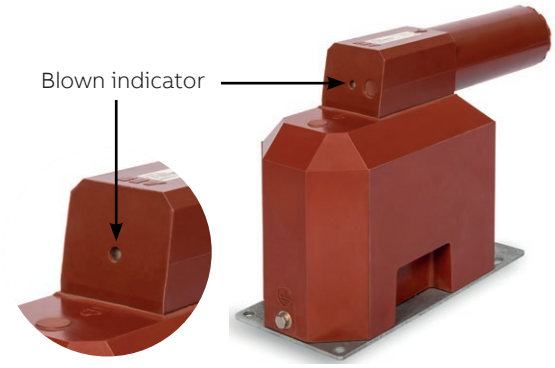
System solution for protection against Ferroresonance phenomena for single pole VTs

- **Instead of dumping resistor is recommended to use Ferroresonance protection device which provides better and efficient dumping ability. This system solution shall be proved by functional test**

Optional features

Single pole VTs with fuses having indication feature

- Fuses with striker pin allow easy and fast indication of blown fuses



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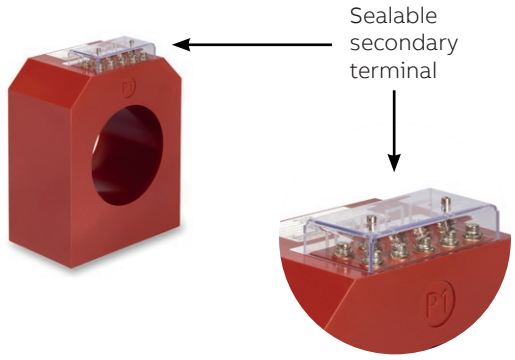
VT with 2 primary voltages reconnectable on secondary side

- Reconnection feature provides future proved solution for cases when the primary voltage is expected to be changed during lifetime

Ring core current transformers

Recommended features

Sealable secondary terminal for tariff metering applications



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Optional features

System solution of intermittent earth-fault protection based on RCCTs with dedicated parameters (phase displacement for low primary currents)

- For special applications e.g. intermittent earth fault protection is recommended to specify combined accuracy classes (metering and protection) or protection class with additional requirement on phase displacement for low primary currents

RCCTs with special and transient classes (PX, TPX, TPY, TPZ, TPS, etc.)

- Transient classes are important for special protection applications, like differential or distance protections

Big variability of RCCTs with ring designs, several window types and split-core CTs

- Variability of product portfolio provides optimized solution for various applications in term of dimensions and parameters

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