Combined Instrument Transformers

Types IVOKT and TMC
Combined Instrument Transformers

Introduction

Trench is a recognized world leader in the design and manufacture of high voltage equipment for application on electric utility and high energy industrial systems. As part of Trench's product scope, the Company produces a diversified range of Instrument Transformers which are installed on 69 - 800 kV electrical systems. Instrument Transformers include: Voltage (Potential) Transformers (both inductive and capacitive type), Current Transformers and Combined Instrument Transformers (voltage and current transformer in one unit).

Combined Instrument Transformers must convert transmission class voltages and currents to standardized low and easily measurable values, which will be used for metering, protection and control of the high voltage system. As such, the need for accurate and reliable voltage and current transformation is essential.

This brochure will detail the features and characteristics of type IVOKT Combined Instrument Transformers. Please refer to Trench brochure E210 for additional general information concerning high voltage Instrument Transformers.
Features

Oil/paper-insulated units

- highly refined and processed oil/paper insulation system
- low weight and minimum oil volume
- use of high quality mineral oil, PCB free, biological decomposition
- short symmetrically arranged low reactance bar-type primary conductor permits higher short circuit currents and avoids large voltage drop across primary winding
- excellent control of internal and external insulation stresses through the use of a proprietary finely graded bushing system
- excellent seismic capability as a consequence of optimized design of flanges, porcelain and their interconnection
- hermetically sealed by stainless steel metallic bellows
- welded housing sealed without screws
- only one foundation required in the switchyard as a consequence of combining the voltage and current sensing functions in one transformer
- uniformly distributed secondary windings guarantee accurate transformation at both rated and high current
- essentially unaffected by stray external magnetic fields
- stable accuracy over a long period of time
- perfect transient performance
- suitable for line discharging
- exclusive use of corrosion-resistant materials
- explosion resistant by
  - insulating system with high reliability
  - fine graded bushing
  - weak point in the aluminium head - and tank casting and the metallic bellows serving as pressure release device
- successful field experience since the manufacture of the first combined instrument transformer in 1928
- maintenance free during a long life time of more than 30 years
- composite insulator available on request

- Meet all IEC and ANSI metering and protection classes, including special core classes TPS, TPX, TPY and TPZ (other standards on request)
- rated primary currents up to 5000 A
- rated secondary current 1 A, 2 A or 5 A
- Primary reconnection available
- standard thermal burden ratings of 2000-2500 VA (higher on request)
- quality Assurance in accordance with ISO 9001.

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Construction

Trench types IVOKT and TM C Combined Instrument Transformers are designed and constructed with the well proven, highly reliable, oil/paper insulation system. Each porcelain housed, hermetically sealed combined instrument transformer is equipped with stainless steel expansion bellows, calibrated to the internal oil volume and extremes in operating and ambient temperatures.

The current transformer section is based on the head type construction of Trench type IOSK current transformers, while the voltage transformer is the conventional base mounted design also used in Trench type VEOT inductive voltage transformers. The bushing, although complex in nature, is a finely graded design resulting in low dielectric stresses and uniform voltage gradient. The bushing design is based on 70 years of experience in designing and manufacturing high voltage bushings.

Standard Equipment

- Aluminum flat pad primary terminal and ground terminal
- lifting lugs
- bellows position indicator
- oil filling port
- oil drain valve
- secondary terminal box with removable gland plate.

Optional Equipment

- Stud type primary terminal
- Primary or ground cable connector
- Anti-corona rings
- Capacitance tap for tan delta insulation monitoring or voltage indication
- Gas Detection System (contact Trench for additional details)
- Secondary fuses
- Terminal box heater
- Composite insulators
1 Primary terminal
2 Metallic expansion bellows
3 Oil filling screw
4 Porcelain insulator
5 Secondary terminal box
6 Secondary terminals
7 Oil drain valve
8 Grounding terminal
9 Gland plate
10 Lifting lugs
11 Bellows indicator
12 Bushing
13 Secondary winding
14 Primary winding
15 Transformer head (aluminum)
16 Tank (aluminum)
17 Iron core
18 Primary winding current transformer
19 Secondary winding and cores current transformer

Fig. 4 Electrical and Mechanical design details
Oil/Paper-insulated Combined Instrument Transformers

Electrical and Mechanical Data (1)

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<th>Type</th>
<th>Max. continuous operating voltage phase to phase</th>
<th>Test Voltage 50/60 Hz 1 min dry/wet</th>
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(1) Other ratings available on request
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