



DESCRIPTION • INSTALLATION • OPERATION INSTRUCTIONS

HOTTEST SPOT THERMAL INDICATOR Thermocouple Type for Dry Type Transformers

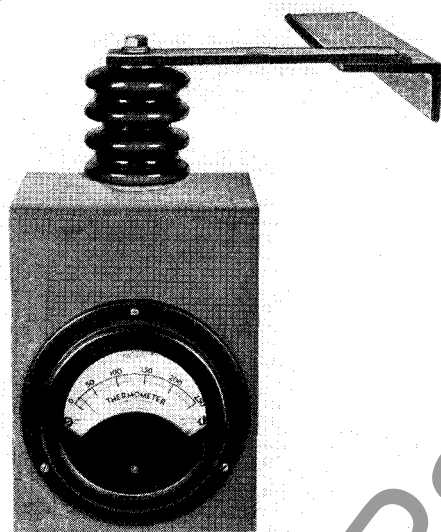


FIG. 1—Front View of Thermal Indicator

THE HOTTEST SPOT THERMAL INDICATOR is an auxiliary piece of apparatus used to indicate the hottest spot in the transformer winding. This hottest spot temperature is read directly by means of a thermocouple imbedded in the winding and brazed to the winding copper. The thermal indicator is therefore at winding potential.

DESCRIPTION

The thermocouple lead wires are brought through protective copper tubing to the terminals of the temperature indicator. The dial type temperature indicator is permanently mounted inside the transformer case and is designed to be read through a viewing window in the case. As the thermocouple and protective copper tube are directly connected to the winding copper and to the temperature indicator, the indicator is therefore mounted on a stand-off insulator as it is at winding potential.

The dial type temperature indicator is a d-c millivoltmeter with the scale graduated in degrees centigrade for use with a chromel constantan ther-

mocouple. The movement includes an Alnico magnet with accurately machined pole faces, frameless moving coil, hardened steel pivots, and sapphire jewels. This rugged construction was designed for the vibration this instrument might receive during shipment and operation. The scale is $3\frac{7}{16}$ inches long with a range from 0 to 200 degrees Centigrade in large black numbers on a white background. The thermal indicator is automatically cold end compensated for the change in ambient air inside the case.

INSTALLATION AND MAINTENANCE

The thermal indicator is completely mounted and adjusted at the factory before shipment and should not require any service at the time of installation. The thermal indicator may be checked to see that the cold junction compensator is properly set only when the transformer is de-energized for inspection or maintenance.

Caution: The temperature indicator is at winding potential and for safety reasons should be regarded at all times as a part of the winding.

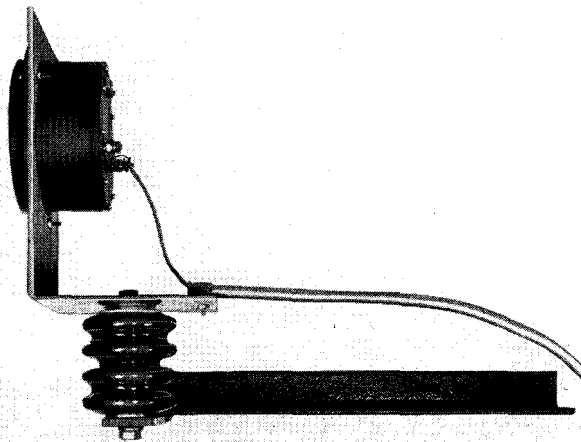


FIG. 2—Side View of Thermal Indicator

HOTTEST SPOT THERMAL INDICATOR

To check and set this meter, disconnect one thermocouple lead and hold a thermometer in the vicinity of the binding posts of the temperature indicator.

A small error is introduced in the cold end compensator due to the range of ambient air in the transformer case. The instrument has been adjusted at the factory in ambient air of the transformer case at 100% load, which is the most important part of the range of temperature. This introduces a small error at normal room temperature. Do not reset the instrument if it reads a few degrees higher than the thermometer reading.

If the temperature indicator needs to be reset, turn the adjusting screw located on the face of the meter until the instrument reads the temperature of the thermometer. Note that this is not a zero adjustment and that it should not be set at zero unless the ambient air in the case is actually zero.

OPERATION

The thermocouple used with this temperature indicator is imbedded in the transformer winding, and the hot junction is attached directly to the copper of the winding. The electromotive force developed by the thermocouple at the hot junction is therefore a function of the actual copper temperature.

The leads of the thermocouple are connected to the instrument, thus forming what is nominally the cold junction. The instrument is located inside the transformer case and will be subjected to whatever increase in air temperature occurs there. Consequently, the cold junction, too, will assume the temperature of the air inside the transformer case. An electromotive force is therefore developed at the cold junction which tends to oppose and obscure the effect of the electromotive force due to the temperature at the hot junction.

However, the instrument is provided with an automatic cold junction compensator which counteracts the effect of the electromotive force at the cold junction so that the net reading on the instrument scale is a function only of the winding copper temperature. The reading of the instrument therefore gives the total winding temperature referred to the ambient temperature for which the instrument was initially adjusted.

Normally, the thermocouple is located at that point in the transformer winding where the hottest spot usually occurs. The system gives a direct reading of the copper temperature, and follows very closely any variations due to loading.

RENEWAL PARTS

If it becomes necessary to repair the instrument contact the nearest Westinghouse Sales Office.



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