



BSI British Standards

Power transformer and reactor fittings —

Part 11: Oil and winding temperature indicators

仅用于学习交流使用

National foreword

This British Standard is the UK implementation of EN 50216-11:2008.

The UK participation in its preparation was entrusted to Technical Committee PEL/14, Power transformers.

A list of organizations represented on this committee can be obtained on request to its secretary.

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EUROPEAN STANDARD

EN 50216-11

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EUROPÄISCHE NORM

September 2008

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English version

**Power transformer and reactor fittings -
Part 11: Oil and winding temperature indicators**

Accessoires pour transformateurs
de puissance et bobines d'inductance -
Partie 11: Indicateurs de température
de l'huile et des enroulements

Zubehör für Transformatoren
und Drosselspulen -
Teil 11: Öl- und
Wicklungstemperaturanzeiger

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard has been prepared by the Technical Committee CENELEC TC 14, Power transformers.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50216-11 on 2008-07-01

This EN 50216-11 is to be read in conjunction with EN 50216-1:2002, *Power transformer and reactor fittings - Part 1: General*.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2009-07-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2011-07-01

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1 Scope

EN 50216-11 covers oil temperature and winding temperature (thermal image) indicators of the interchangeable mechanical (not electronic) type with contacts for use with liquid immersed power transformers and reactors for indoor or outdoor installation.

This standard defines the characteristics of the instruments in order to ensure the interchangeability achieving the same performance.

Except where otherwise specified or implied herein, oil and winding temperature indicators shall comply with the requirements of EN 50216-1.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 50216-1:2002	Power transformer and reactor fittings - Part 1: General
EN 50216-4:2002	Power transformer and reactor fittings - Part 4: Basic accessories (earthing terminal, drain and filling devices, thermometer pocket, wheel assembly)
EN 60255-21-1	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section 1: Vibration tests (sinusoidal) (IEC 60255-21-1)
EN 60255-21-2	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section 2: Shock and bump tests (IEC 60255-21-2)
EN 60255-21-3	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section 3: Seismic tests (IEC 60255-21-3)
EN 60529	Degrees of protection provided by enclosures (IP Code) (IEC 60529)

3 Direct reading mechanical dial type oil and winding temperature indicators

The oil and winding temperature indicators must be of the mechanical dial type.

Winding temperature indicator must be only thermal image principle.

3.1 General

Nominal diameter (or equivalent size in case of non circular dial):

- ND = 150 mm (-10/+20) mm, for oil and winding temperature indicators.

For a good readability it is recommended that the scale diameter is minimum 130 mm for all.

The choice of the colours of the background, letters and pointer should guarantee good readability; for example: white background with black letters, black background with white letters.

The marking shall be 2 °C or 5 °C.

Marking of the dial plate shall be indelible and protected with UV stabilised polycarbonate or safety glass with UV filter.

Standard measuring ranges:

- -20 °C /+130 °C or -20 °C/+140 °C for oil temperature indicators;
- 0 °C/+150 °C or 0 °C /+160 °C for winding temperature indicators.

Special temperature ranges may be supplied by agreement between manufacturer and purchaser.

Temperature indicating arrow to be black colour or white colour depending on background.

The temperature indicator must be equipped with a maximum indicating pointer of red colour with a suitable reset knob.

3.2 Mechanical requirements

Housing and all exterior parts shall withstand either because of their own properties or because of an adequate treatment to the environmental conditions, seismic and operational vibrations in accordance with EN 50216-1.

The case must be provided with an air hole or a breathing system for ventilation.

3.3 Mechanical protection degree

The degree of protection shall be minimum IP54 in accordance with EN 50216-1.

3.4 Terminal box

A terminal box or equivalent solution shall be provided with three terminals for each contact and one earth terminal.

The terminals shall be designed to accept cables having a cross section between 1,5 mm² and 4 mm².

All the terminals, the earth terminal included, shall be clearly marked. A suitable label or marking must indicate the general electrical performances and function.

The terminal box must have two or more entry for cables suitable to accept M20 x 1,5 or M25 x 1,5 cable glands.

4 Sensing bulb and capillary

Capillary tube: the standard values of capillary length are 6 m and 10 m.

Other lengths by agreement between customer and purchaser.

Capillary tube shall be adequately armoured in order to avoid accidental damages which can be prejudicial to a correct indication of the instrument.

Sensing bulb shall be suitable to be accepted inside pocket specified in EN 50216-4, 4.2.

5 Measuring accuracy

Measuring accuracy must be $\pm 1,5$ % of full scale value.

The accuracy shall be compensated over the ambient temperature range of -25°C to + 40 °C.

By agreement between purchaser and supplier the device can be supplied with accuracy of 1 % of full scale value.

6 Electric contacts

6.1 Number and type of contacts

Number of contacts: standard configuration is with 2 or 4 contacts; other contacts configuration (i.e. 3 or 5 or 6 contacts or more to be considered as special executions, subject to agreement between manufacturer and purchaser).

Electric contacts used on the temperature indicators must be microswitches change-over type.

Contact setting shall be adjustable over the whole range.

Commutation tolerance: 2 % of full scale value.

Commutation differential: recommended 3 % to 7 % of full scale value.

In any case contacts shall not contain mercury.

6.2 Breaking and making capacity

Table 1 – Breaking and making capacity

Voltage	Uninterrupted current (making capacity)	Interrupted current (breaking capacity)	
24 V d.c. to 220 V d.c.	2 A	100 mA	L/R < 40 ms
230 V a.c. (min requirement)	2 A	2 A	$\cos \varphi > 0,5$
230 V a.c. (common requirement)	5 A	5 A	$\cos \varphi > 0,5$

Other values (i.e. 10 A breaking capacity at 230 V a.c.) may be agreed between purchaser and supplier.

The minimum contact life shall be 10 000 operations.

Only in the case where the equipment has the special specified requirement that the device has to operate in a system at 24 V d.c. and making capacity up to 0,5 VA, the switches shall be able to make a low current down to 10 mA even after one year of non-operation.

7 Heating system on WTI

The winding temperature indicator (thermal image) must be equipped with a heating system able to simulate the over temperatures in the transformer windings above oil temperature.

Said heating system shall typically consist of a heating resistance and a trimming system for gradient adjustment.

The standard temperature gradient must be adjustable up to 35 °C.

The winding temperature indicator must be suitable to work connected with a current transformer with nominal output 2 A.

Upon request, by agreement between customer and manufacturer, the indicator can be supplied with a heating system suitable for a current transformer output of 1 A, 1,5 A, 5 A.

The maximum power absorbed by the heating system is 20 VA.

8 Special requirements

Upon request the temperature indicators may be fit with one or more outputs (type Pt100 or transmitters 4 mA - 20 mA) for remote indication or connection to SCADA system.

9 Tests

9.1 Routine tests

The following tests must be carried out on 100 % of instruments. Evidence of the measuring and commutation tests must be filed:

- dimensional test;
- leakage test;
- measuring tolerance test;
- commutation tolerance test;
- overheating or overpressure test;
- insulation test (2 kV between contact and earth);
- heating system functionality test (for thermal image only);
- analog/digital output functionality test (only in case of presence of analog or digital outputs).

9.2 Type tests

- dimensional test;
- measuring tolerance test;
- commutation tolerance test;
- overheating or overpressure test;
- insulation test;
- heating system functionality test (for thermal image only);
- corrosion test;
- degree of protection test (verification of IP in accordance with EN 60529);
- verification of special mechanical conditions (vibration fatigue test, EN 60255-21-1, shock test, EN 60255-21-2 and earthquake test, EN 60255-21-3);
- electrical performances test in accordance with the EMC standards;
- ambient temperature tests (functional).

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