FABRYKA TRANSFORMATORÓW
w Żychlinie
Spółka z ograniczoną odpowiedzialnością

ISO 9001:2000
ISO 14001:2004
PN-N-18001:2004

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OIL-IMMERSED EARTHING TRANSFORMERS

WITH VOLTAGE REGULATION IN DE-ENERGISED STATE

100-4000 kVA

1-37 kV

Applications

Earthing transformers are used in electric power grids and their purpose is to create an artificial neutral point the to which an arc suppressing coil or a resistor can be connected. Transformers are manufactured as three-phase devises and if there is no earth fault in the system, they feed the substation with auxiliary power. During fault of power grid the transformer is fed with line phase voltage in neutral point. During operation of the transformer the upper winding terminals are connected to power grid, and the neutral point 1N is connected with the 1A terminal of arc suppressing coil or with the resistor. The transformers can be permanently loaded with auxiliary power demand. The upper voltage winding can be loaded with earth-fault compensating current while the secondary winding is loaded with continuous rated power. The windings of earthing transformers are connected to form the Znyn11 vector group, therefore in case of earth fault allows to distribute short-circuit current over all phases, thus reducing the value of earth fault current in the damaged line.

Operating conditions

The transformers in standard version are designed for operation in the conditions of moderate climate.

Maximum installation height for the transformer: 1000 m a.s.l.

Operating place: Open space or the room with sufficient ventilation; atmosphere free of dust and chemically active or explosive gases.

Ambient temperature range: -25°C up to +40°C (248°K up to 313°K), average annual temperature not exceeding +20°C (293°K).

Rated frequency: 50 Hz

Load conditions are specified in the table below:

Compensating current expressed in % of rated current	**Operating time, hours**
100	2
87.5	4
75	8
62.5	continuous operation
50	continuous operation

NOTE:
Transformer in special version complying with other requirements is available on request.

Design

Transformer cores:	Three-legged cores made of cold-rolled transformer plates covered with inorganic insulating material.
Transformer windings:	The windings of transformers are made of electrolytic copper. The windings are wound from a wire or strip.
Voltage regulation:	Upper voltage winding is equipped with taps for voltage regulation. Voltage regulation can be effected within the range of ±5%. The tap changer is located inside transformer tank. Tap changer manual drive is located on the cover. The transformer ratio can be changed by selecting of desired taps after de-energizing of the transformer. Each tap of the tap changer is equipped with locking mechanism.
Tanks:	Tanks are made of steel. Tanks are made in the form of welded steel structure reinforced with stiffening members which ensure the required level of mechanical strength. The heat generated during transformer operation is carried away by radiators made of sheet steel and fixed to tank jacket or by corrugated walls. The tank is equipped with the undercarriage with adjustable wheels that can be positioned for longitudinal and transversal travel.

Tolerances:

- no-load losses +15%
- load losses +15%
- total losses +10%
- no-load current +30%
- short-circuit voltage +20%

International standards and requirements:

PN-EN 60076-6	- Power transformers. Reactors
PN-EN 60076-2	- Power transformers
PN-83/E-06040	- Power transformers. General requirements

Specifications:

Item	*Type*	*Compensating power*	*Auxiliary power*	*Upper side voltage*	*Lower side voltage*	*Compensating current*	*Short-circuit voltage*	*No-load losses*	*Load losses*	*Mass, total*	*Oil mass*
		kVA	*kVA*	*V*	*V*	*A*	*%*	*W*	*W*	*kg*	*kg*
1.	TUOe 275/15	273	100	15750	400	30-15	4,5	650	1350	1380	340
2.	TUOe 365/15	364	100	15750	400	40-20	4,5	800	1700	1380	340
3.	TUOe 545/15	546	100	15750	400	60-30	4,5	750	1800	1860	550
4.	TUOe 730/15	727	100	15750	400	80-40	4,5	750	1850	1880	490
5.	TUOe 1090/15	1091	100	15750	400	120-60	5,5	800	1900	2100	490
6.	TUOe 1640/15	1637	100	15750	400	180-90	4,5	950	2000	2500	610
7.	TUOe 2180/15	2180	100	15750	400	240-120	5	1050	1700	2970	875
8.	TUOe 365/20	364	100	21000	400	30-15	4,5	800	1700	1380	340
9.	TUOe 485/20	485	100	21000	400	40-20	4,5	800	1750	1860	550
10.	TUOe 730/20	727	100	21000	400	60-30	4,5	750	1800	1880	490
11.	TUOe 970/20	970	100	21000	400	80-40	5	800	1850	2100	490
12.	TUOe 1455/20	1455	100	21000	400	120-60	4,5	750	1650	2500	680
13.	TUOe 1940/20	1940	100	21000	400	160-80	5	950	1600	2970	875

<u>NOTE</u>:

• On Customer request we can build the transformer with auxiliary power rating of 160 kVA, 315 kVA or other rating.

• The transformer can be made for the voltage complying with the standard: 6, 10, 15, and 20 kV or other (from the range of 1-37 kV), as well as for various compensation currents, short-circuit voltages, no-load losses and load losses.

• It is also possible to build the transformer equipped with:

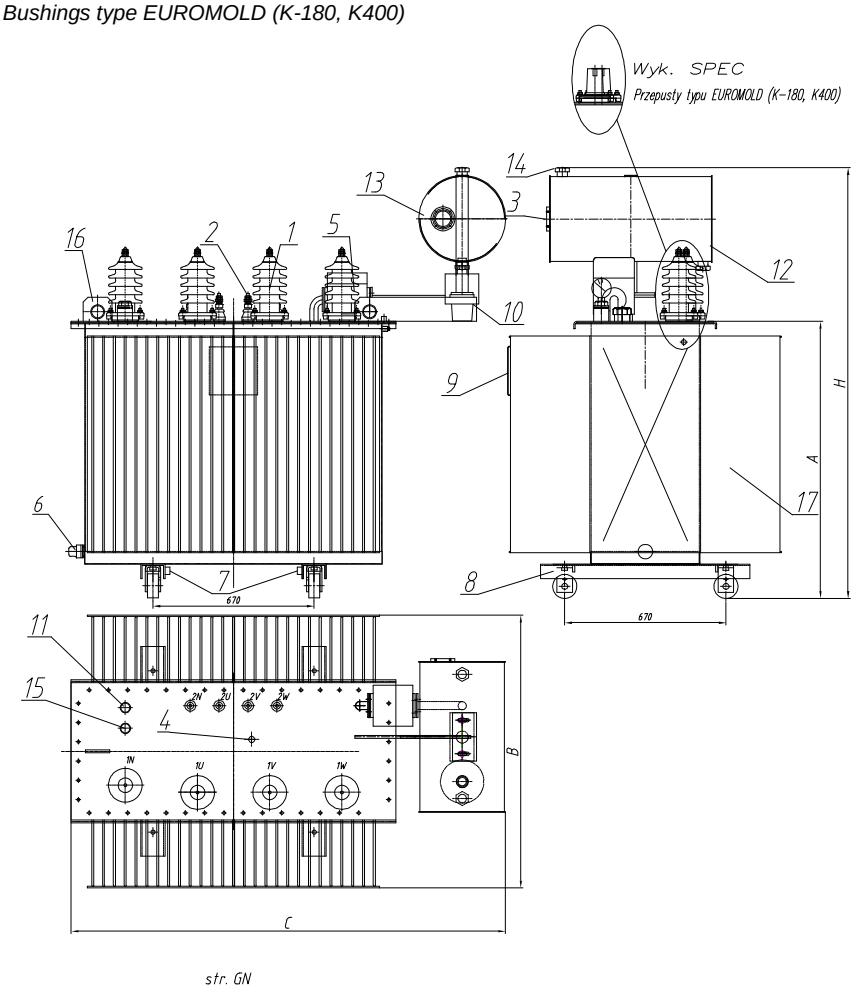
- connector bushings

- accessories (connector heads, surge arresters, transformer terminals, anti-vibration pads and so on)

Dimensional drawing :

Earthing transformer with oil conservator

Version: SPEC
Bushings type EUROMOLD (K-180, K400)



Equipment of the transformer:

1 *Upper voltage bushing*
2 *Lower voltage bushing*
3 *Oil level gauge Ø100*
4 *Tap changer drive*
5 *Buchholz relay BF 25*
6 *Drain valve and oil test valve*
7 *Earthing terminals*
8 *Adjustable undercarriage*
9 *Rating plate*
10 *Dehumidifier*
11 *Maximum reading thermometer R3/4”*
12 *Oil drain from conservator*
13 *Oil conservator*
14 *Conservator oil filling cap*
15 *Oil filling cap on the cover*
16 *Brackets for lifting the transformer*
17 *Corrugated-wall tank*

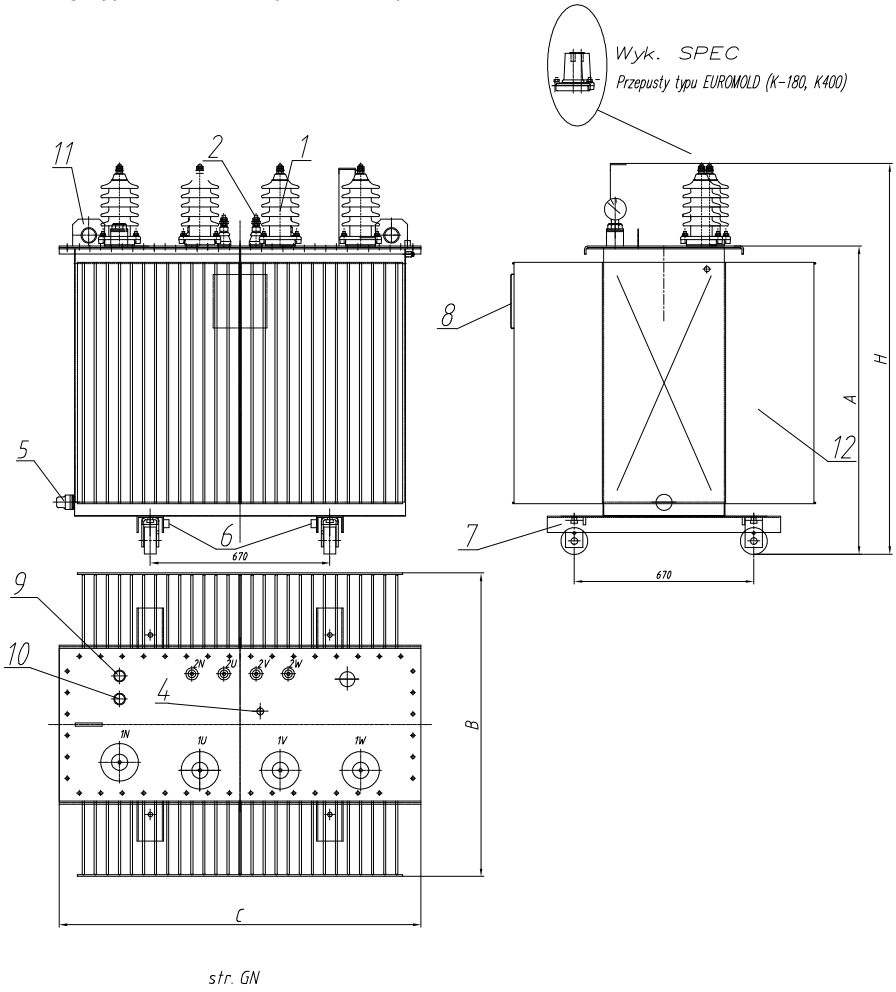
Approximate dimensions:

Item	*Type*	*A*	*B*	*C*	*H*
		mm	*mm*	*mm*	*mm*
1.	TUOe 275/15	1155	720	1610	1795
2.	TUOe 365/15	1155	720	1610	1795
3.	TUOe 545/15	1150	1135	1805	1790
4.	TUOe 730/15	1150	1135	1805	1790
5.	TUOe 1090/15	1150	1135	1805	1790
6.	TUOe 1640/15	1150	1205	1825	1790
7.	TUOe 2180/15	1450	1205	1820	2130
8.	TUOe 365/20	1155	720	1610	1795
9.	TUOe 485/20	1150	1135	1805	1790
10.	TUOe 730/20	1150	1135	1805	1790
11.	TUOe 970/20	1150	1135	1805	1790
12.	TUOe 1455/20	1150	1205	1825	1790
13.	TUOe 1940/20	1450	1205	1820	2130

Dimensional drawing :

Earthing transformer, air-tight

Version: SPEC
Bushings type EUROMOLD (K-180, K400)



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Equipment of the transformer:

1 *Upper voltage bushing*
2 *Lower voltage bushing*
3 *Oil level gauge Ø100*
4 *Tap changer drive*
5 *Drain valve and oil test valve*
6 *Earthing terminals*
7 *Adjustable undercarriage*
8 *Rating plate*
9 *Maximum reading thermometer R3/4”*
10 *Oil level gauge*
11 *Brackets for lifting the transformer*
12 *Corrugated-wall tank*

Approximate dimensions:

Item	*Type*	*A*	*B*	*C*	*H*
		mm	*mm*	*mm*	*mm*
1.	TUOe 275/15	1155	720	1160	1540
2.	TUOe 365/15	1155	720	1160	1540
3.	TUOe 545/15	1150	1135	1350	1540
4.	TUOe 365/20	1155	720	1160	1540
5.	TUOe 730/20	1150	1135	1350	1540

<u>NOTE</u>:

The manufacturer reserves the right to change specifications presented in the catalogue and resulting from technical progress.