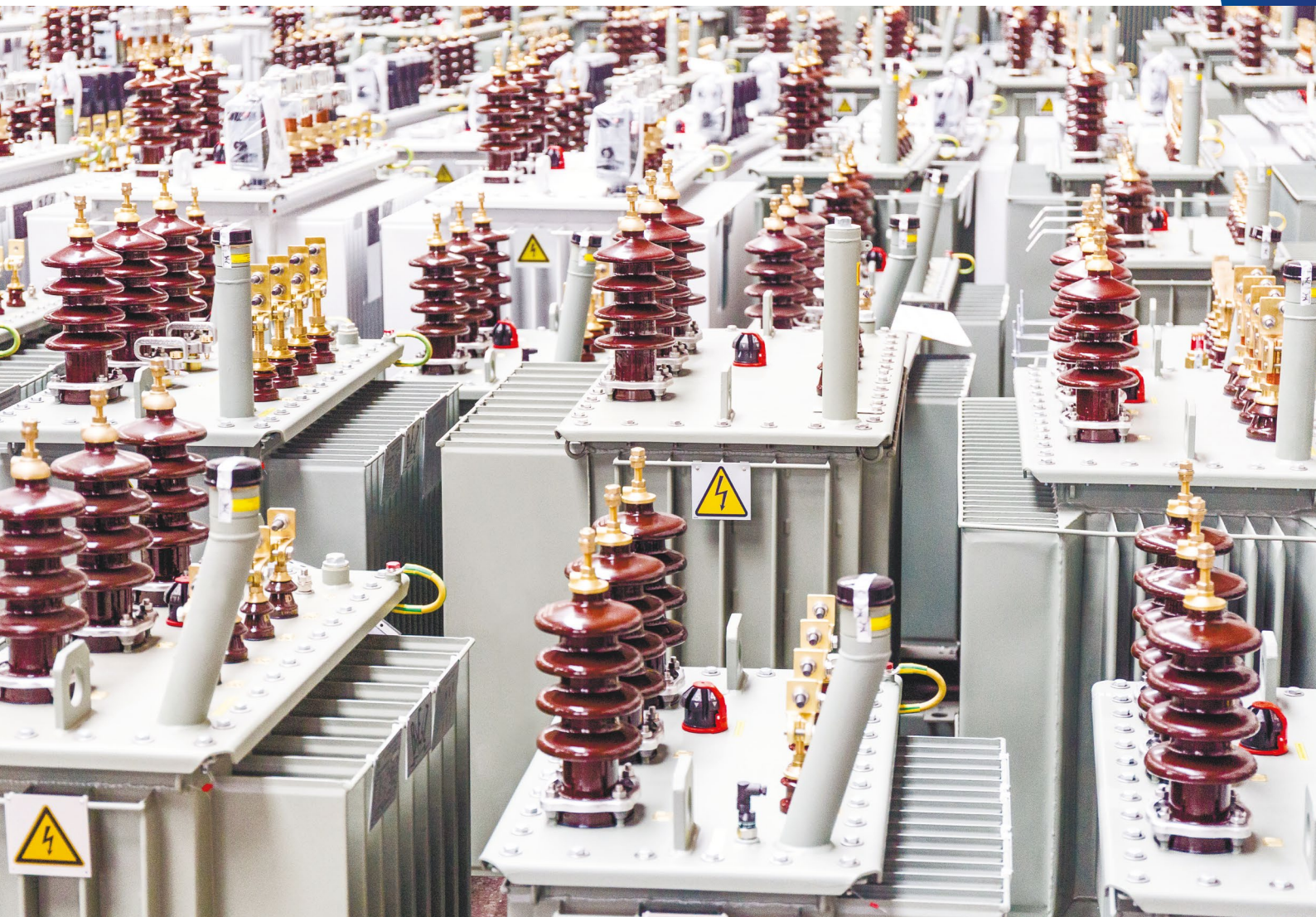


BEZ TRANSFORMÁTORY

MANUFACTURING TRANSFORMERS SINCE 1902



DISTRIBUTION TRANSFORMERS TECHNICAL CATALOGUE

FLUID IMMERSED TRANSFORMERS

eco **FIT**²



MANUFACTURING TRANSFORMERS SINCE 1902

**MORE THAN 250 000 PRODUCTS OVER THE
LAST 50 YEARS**

BEZ production site located in Bratislava, the Slovak Republic, enjoys over than 100 years of worldwide experience and more than 250 000 products over the last 50 years. BEZ ambitiously works to design and manufacture products with the highest quality and flawless functionality. BEZ products are widely represented in the world electrical equipment market. The advanced expertise ensures products reliability at a wide range of applications and environmental conditions. Our transformers are custom designed to meet their specific requirements such as stringent conditions of nuclear power plants, specifics of hydropower plants, infrastructure projects, Oil&Gas sites, as well as solar and wind farms.

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WE ARE INTRODUCING NEW PRODUCT LINE

ecoFIT²

Number 2 stands for Ecodesign 2 directive

ECO represents conformity to Ecodesign standard, same as our Company ecological vision to reduce carbon footprint

FIT is a shortcut for "fluid immersed transformers". Besides standard mineral oil, our transformers can be filled with biodegradable synthetic and natural esters.

FIT as a word also refers to things in great quality and shape thanks to continuous improvements – the same as our transformers.

ADVANCED ECOLOGICAL FLUID IMMERSED TRANSFORMER

The transformers fulfill all requirements of application from the heavy industry up to renewables:

- Resistance to significant load changes
- Ecodesign 2
- High temperature endurance
- Possibility of higher harmonic loading (THD – total harmonic distortion)
- Ambient temperature from -50 °C to +50 °C (deserts or arctics)
- Up to 8 secondary terminals
- Low noise level
- On load voltage regulation (OLTC)
- Monitoring functions

- Biodegradable synthetic and natural ester oils
- Seismic and vibration endurance
- Corrosive protection C5M available
- KNAN cooling ready
- Compact dimensions while keeping losses to a minimum.

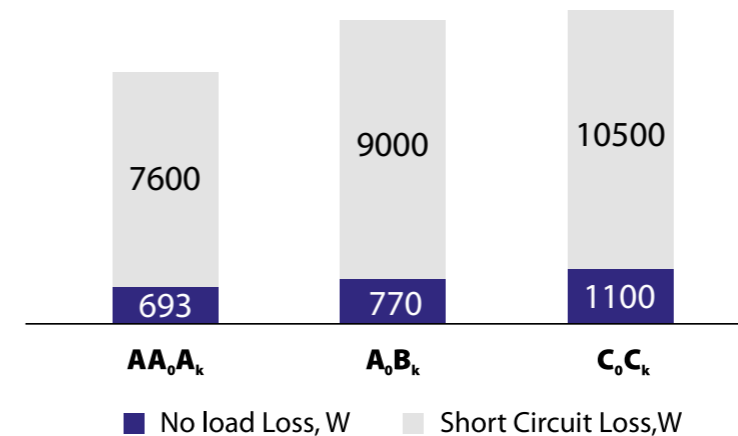
ecoFIT² is suitable for following applications photovoltaic, light and heavy industry, commercials and residential buildings, distribution systems, wind turbines, power grids, gas and oil, e-mobility, smart grids.

ecoFIT² product line contain following reference types: TOHn, aTOHn, TUOHn, aTUOHn

ECODESIGN OF TRANSFORMERS

The long-term efforts of European Union to reduce transformer loss and emissions are completed in May 2014 by publishing EU Commission Regulation 2019/1783 (548/2014). BEZ offers Ecodesign Oil-Filled Transformers that meet the requirements of No-Load and Short Circuit Loss imposed by the new Regulation.

EU Commission Regulation 548/2014 defines maximum No-Load and Short Circuit Loss. This Regulation applies to transformers in the market or commissioned in EU after publishing the Regulation, of which Tier 1 began on 1 July 2015, and Tier 2 released on 1 July 2021 (EU Commission Regulation 2019/1783).



AA₀A_k (Tier 2 - Ecodesign)

Energy Efficient (average total loss 28% less than C₀C_k), Low Operating Costs, Eco-friendly.

C₀C_k

Weighs less (average weight 7% less than AA₀A_k).

Note: Total Loss for BEZ Oil-Filled Transformers, Rated Power 1000 kVA

Compared to standard transformers, Ecodesign transformers have lower total loss. This means that they have lower operating costs, which converts into significant cost savings throughout equipment service life.

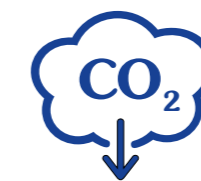
Low total loss also result in reducing CO₂ emissions. On the other hand, standard transformers require less space and have lower weight.

	AA ₀ A _k (Tier 2 - Ecodesign)	C ₀ C _k
Rated Power, kVA	1 000	1 000
No-Load Loss, W	693	1 100
Short Circuit Loss, W	7 600	10 500
Loss Cost, € per year	6 191	8 753

Note: operating costs for BEZ Oil-Filled Transformers for 30 years subject to electricity cost 0,16 Euro per 1 kWh, and transformer load factor of 0,7; 1 kWh equals to 0,513 kg of CO₂



Total Savings
€76 860 = 5 x Price



Saving on CO₂ emissions
246 Ton (480 MWh)



Payback term in favor of more energy-efficient transformer, due to price difference: 2 years



QUALITY MANAGEMENT

BEZ is driven by the fundamentals of Quality Management System. It is evidenced by the corresponding ISO 9001:2016 and ISO 45001:2019 Certificates. In addition to that, BEZ established the integrated management system including ISO 14001:2016 to ensure the environment requirements for all manufactured products. At the same time, we always

try to go beyond these standards and continuously improve our processes and methods. Careful use of all resources being environmentally friendly within the production workflow is the principal task of every employee. BEZ guarantees that our products are safe at each stage of their life cycle.



ISO 9001 Quality Management System



ISO 14001 Environmental Management System



ISO 45001 Occupational Health and Safety Management System

DESIGN FEATURES

HV Bushing

Complies with EN 50180 P2
Plug-in Bushing, Optional

Oil filling plug

Integrated Safety Detector (R.I.S) or Pressure Relief Valve could be installed at the request

LV Bushing

Complies with EN 50386
Protection Enclosure, optional

No Load Tap Changer $\pm 2 \times 2.5\%$

Bi-directional rollers (not shown in this photo)

Anti-vibration pads provide high level vibration damping, optional.

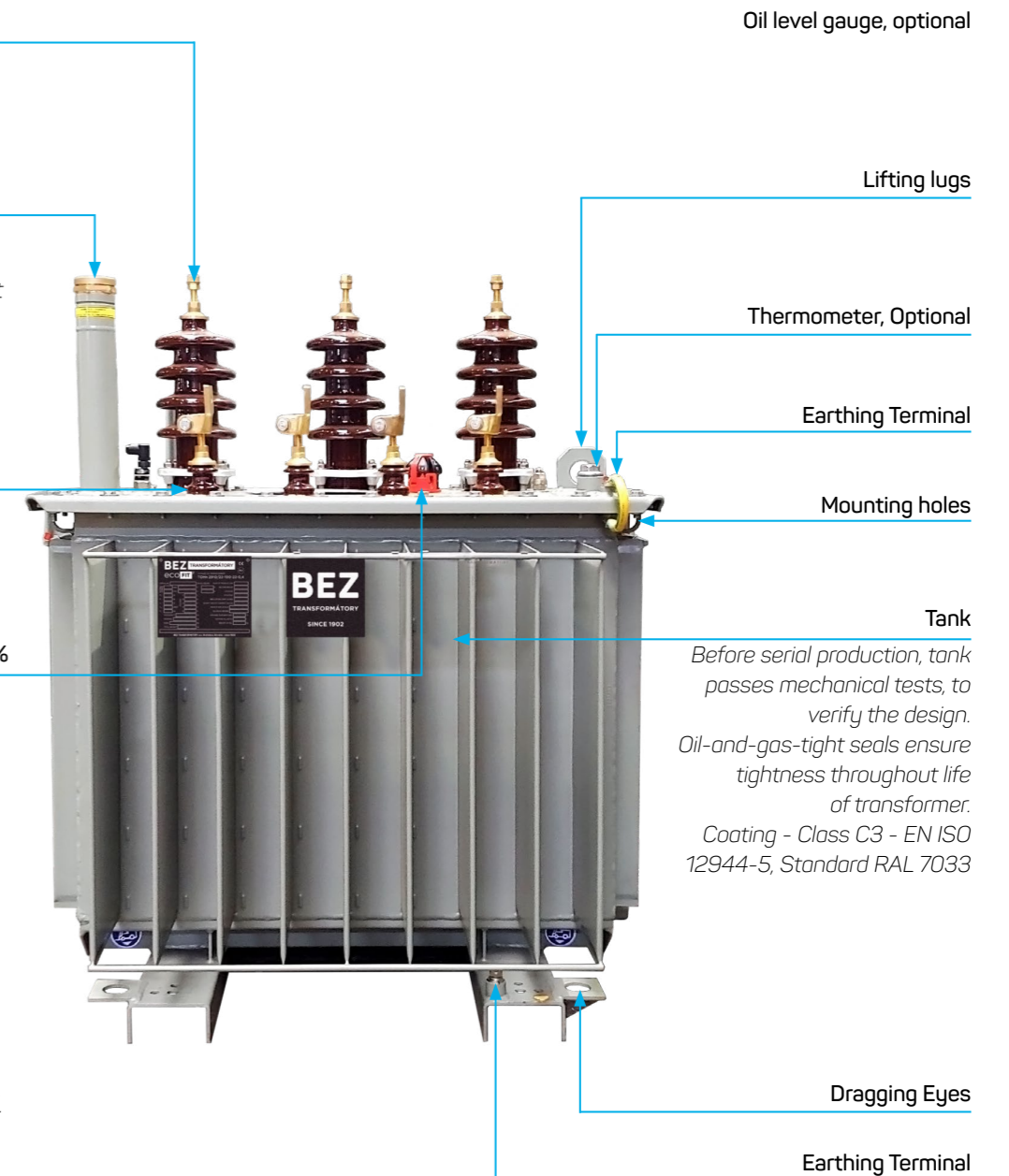
Magnetic Core

Cutting of cold rolled electrical steel improves its magnetic properties, reduces the mass-dimensional characteristics of transformer and decreases loss in magnetic circuit. STEP-LAP stacking technique is by far the most advanced design solution that provides minimal loss and the best noise characteristics.

Windings

Depending on requirements, windings can be made of aluminum or copper wire. Winding design takes into account such parameters as:

- Permissible temperature rise at maximum load
- Electric strength at high voltage
- Electrodynamic resistance at short circuit



FLUID IMMERSSED TRANSFORMERS

LOW NOISE LEVEL

BEZ transformers have a low noise level. In order to reduce the sound of transformer, the following design solutions are used:

- High-precision equipment for automatic cutting of magnet core plates
- High requirements to magnetic circuit quality
- Proper tension during winding
- High-quality winding compaction

MAINTENANCE FREE

There is no contact with environment in BEZ hermetically sealed transformers, which excludes preventive, routine and major repairs during the entire life of transformer. This also reduces the cost of commissioning and maintenance of transformer, therefore, reducing the cost of ownership of transformer.

ADVANTAGES OF VECTOR GROUP

BEZ transformers with Yzn vector group significantly reduce the effect of asymmetric load on phases. Transformers with this type of connection allow:

- improving quality of electricity supplied with asymmetric operating modes;
- reducing loss of electrical power in grids of 0,4 kV;



Transformer Type	With Conservator	Hermetically Sealed
Ready for operation, no need to set up on site.	-	+
No repair required	-	+
Sorbent moisture control and sorbent replacement are not required	-	+
No oil replacement, sampling and testing	-	+

GENERAL CHARACTERISTICS

Standard	EN IEC 60076, EN 50588-1
Continuous Loading	Overload Capacity – IEC 60076-7
Mineral Oil	EN 60296 (or Esters)
Power, kVA	up to 16 MVA
High Voltage, kV	6 - 35*
Tapping Range, HV	± 2 x 2,5 % off-load (OLTC, optional)
Low Voltage, V	400/231; 420/242
Frequency, Hz	50; 60
Insulation levels	Um 36 kV LI/AC 170/70 * Um 24 kV LI/AC 125/50 Um 12 kV LI/AC 75/28 Um 7,2 kV LI/AC 60/20 Um 1,1 kV LI/AC – /3
Vector Group	Yzn; Dyn; Yyn
Cooling	ONAN , ONAF
Ambient Temperature, °C	≤ 40
Altitude, m	≤ 1000
Thermal Class	105 °C (A) – temperature rise winding/oil 65/60 K
Corrosion Protection	Coating system – class C3 – EN ISO 12944-5 – Standard RAL 7033

Other parameter values - upon customer's request.

Please contact us to find out more details regarding specific requirements.

* - Products above 24 kV and 3150 kVA are part of the portfolio, but not listed in this catalogue. Please contact our sales representative for a specific solution.

SELECT PARAMETERS FOR YOUR ORDER

High Voltage	Power	Level of losses	Winding material	Ecodesign	Page
up to 24 kV	50-3150 kVA	loss AA ₀ A _k max	Al Winding	Tier 2 - Ecodesign	Pages 11-12
up to 24 kV	50-3150 kVA	loss AA ₀ A _k max	Cu Winding	Tier 2 - Ecodesign	Pages 13-14
ecoFIT²					
up to 24 kV	50-3150 kVA	loss A ₀ B _k max	Al Winding	Tier 1 - Ecodesign	Pages 15-16
up to 24 kV	50-1000 kVA	loss A ₀ C _k max	Al Winding	Tier 1 - Ecodesign	Page 17
up to 24 kV	50-3150 kVA	loss A ₀ B _k max	Cu Winding	Tier 1 - Ecodesign	Pages 18-19
up to 24 kV	25-1000 kVA	loss A ₀ C _k max	Cu Winding	Tier 1 - Ecodesign	Page 20

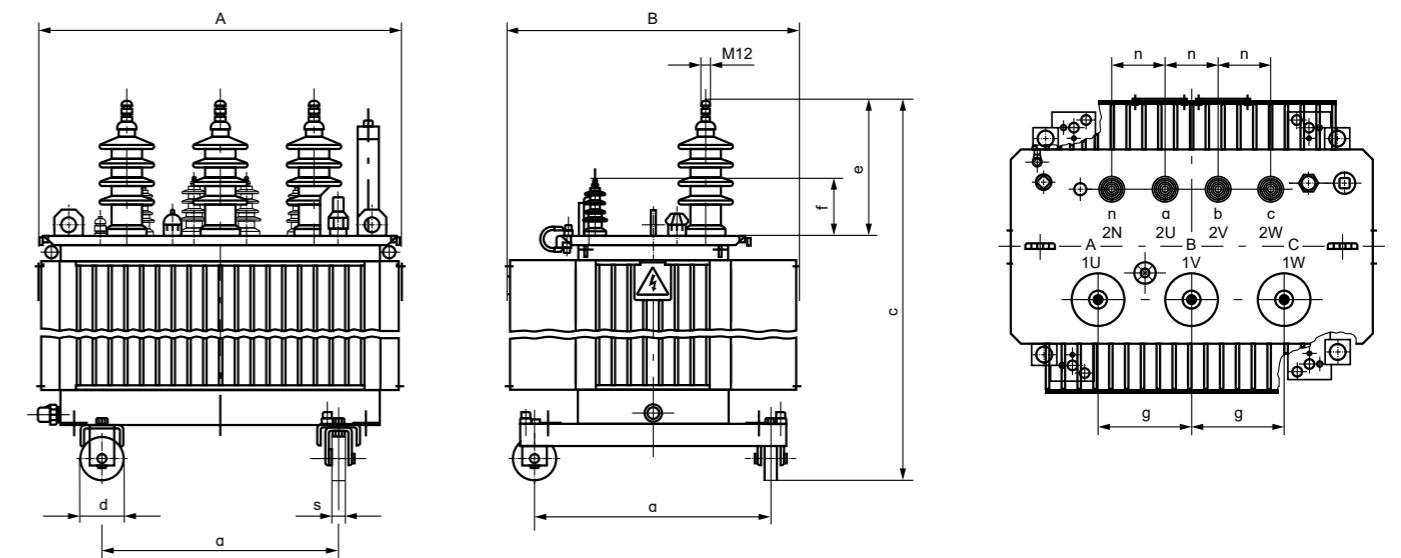
Power, kVA													
25	50	100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
AA ₀ A _k * (Tier 2 - Ecodesign 2021)													
A ₀ B _k * (Tier 1 - Ecodesign 2015)													
A ₀ C _k * (Tier 1 - Ecodesign 2015)													

* In accordance with EN 50588-1/A1 and 2019/1783 (548/2014) EU Regulation.
Losses for ecodesign are maximum

up to 24 kV 50-800 kVA loss AA₀A_k max Al Winding **ECOdesign 2 (2021)**

ecoFIT²

Main Electrical Characteristics									
Rated Power	kVA	50	100	160	250	400	630	800	
Reference name	aTOHn	2610/22	2910/22	3110/22	3310/22	3510/22	3710/22	3810/22	
No-Load Loss	P ₀ (W)	81	130	189	270	387	540	585	
No-Load Current	I ₀ (%)	0,60	0,60	0,50	0,40	0,30	0,20	0,15	
Short Circuit Loss	P _{k75°C} (W)	750	1250	1750	2350	3250	4600	6000	
Impedance Voltage	u _{k75°C} (%)	4	4	4	4	4	4	6	
Sound Level									
Pressure (0.3 m)	L _{pA} dB(A)	30	32	35	38	41	43	44	
Power	L _{WA} dB(A)	38	40	43	46	49	51	52	
Weight	Oil	m (kg)	135	165	200	235	320	345	495
	Total	m (kg)	670	880	1110	1345	1920	2450	3015

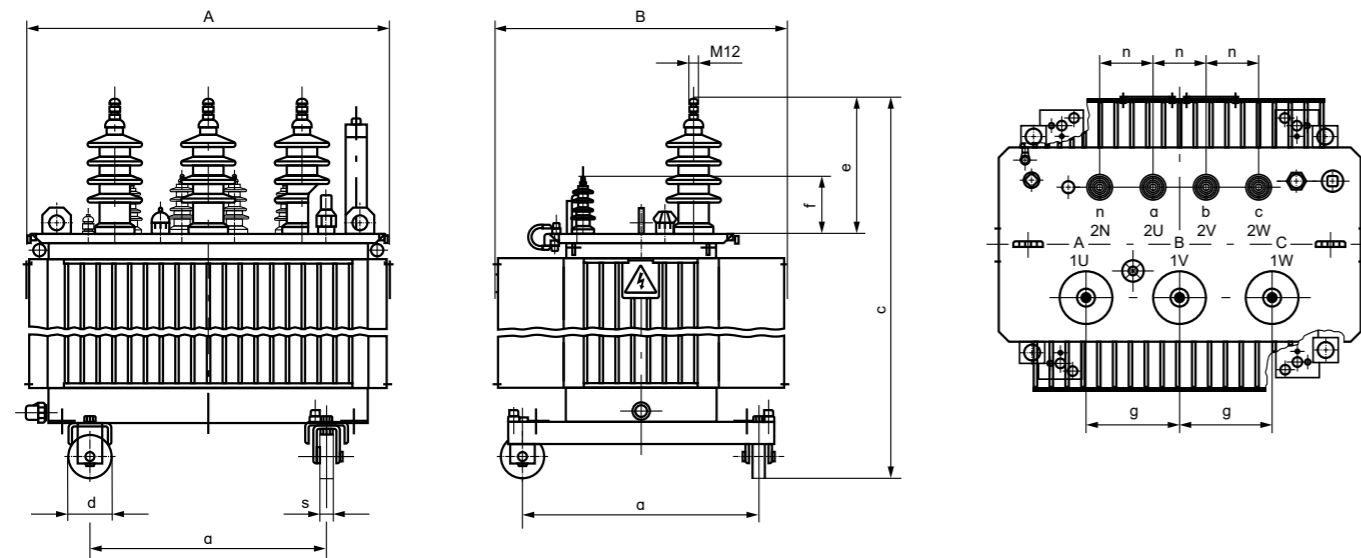


Dimensions								
Rated Power	kVA	50	100	160	250	400	630	800
Type - aTOHn		2610/22	2910/22	3110/22	3310/22	3510/22	3710/22	3810/22
A (mm)		995	1045	1080	1080	1250	1260	1475
B (mm)		635	685	690	760	820	850	940
C (mm) (6 kV,10 kV)		1205	1285	1355	1540	1590	1745	1735
C (mm) (20 kV, 22 kV)		1320	1400	1470	1655	1640	1860	1840
d (mm)		125	125	125	125	125	125	125
s (mm)		40	40	40	40	40	40	40
a (mm)		520	520	520	520	670	670	760
e (mm)	10 kV	270	270	270	270	270	270	270
	22 kV	385	385	385	385	385	385	385
f (mm)		125	165	165	205	205	245	245
g (mm)		265	265	265	265	265	265	265
n (mm)		125	125	125	150	150	150	150

up to 24 kV 1000-3150 kVA loss AA₀A_k max Al Winding **ECOdesign 2 (2021)**

ecoFIT²

Main Electrical Characteristics								
Rated Power	kVA	1000	1250	1600	2000	2500	3150	
Reference name	aTOHn	3910/22	4010/22	4110/22	4210/22	4310/22	4410/22	
No-Load Loss	P ₀ (W)	693	855	1080	1305	1575	1980	
No-Load Current	I ₀ (%)	0,10	0,10	0,10	0,08	0,08	0,08	
Short Circuit Loss	P _{k75°C} (W)	7600	9500	12000	15000	18500	23000	
Impedance Voltage	U _{k75°C} (%)	6	6	6	6	6	6	
Sound Level								
Pressure (0.3 m)	L _{pA} dB(A)	46	47	48	50	52	53	
Power	L _{WA} dB(A)	54	55	57	59	62	63	
Weight	Oil	m (kg)	560	615	760	830	900	1235
	Total	m (kg)	3330	3650	4140	5075	5675	7200

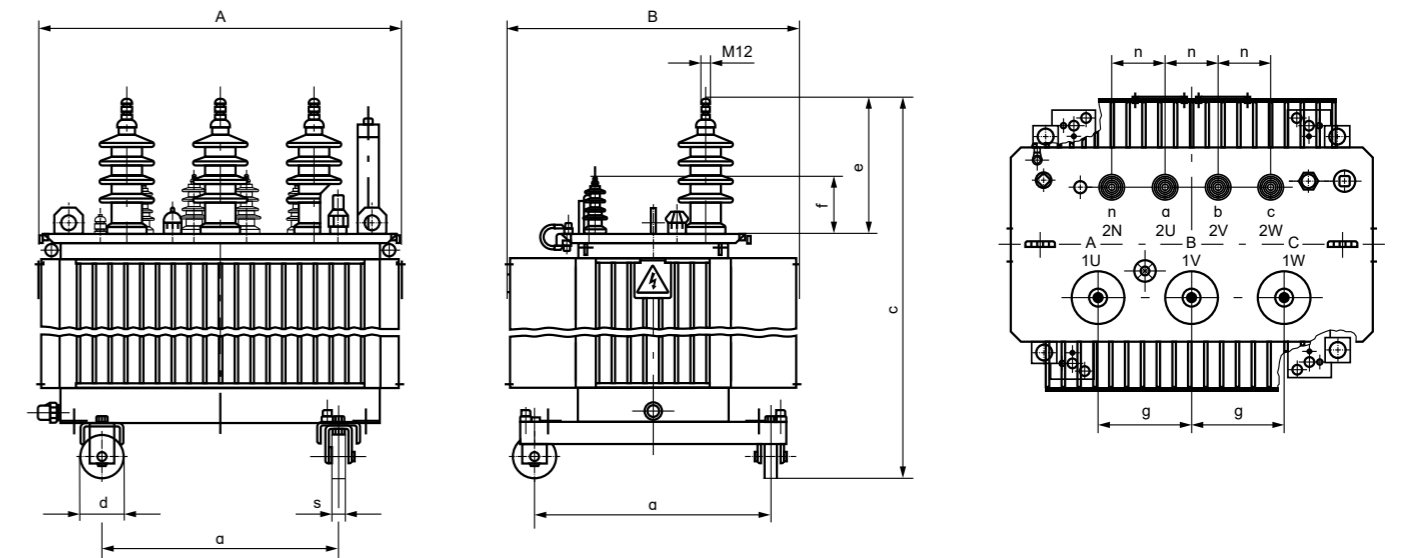


Dimensions							
Rated Power	kVA	1000	1250	1600	2000	2500	3150
Type - aTOHn		3910/22	4010/22	4110/22	4210/22	4310/22	4410/22
A (mm)		1470	1530	1905	1955	1965	2180
B (mm)		960	1020	1040	1190	1190	1250
C (mm) (6 kV,10 kV)		1910	1965	2070	2225	2390	2565
C (mm) (20 kV, 22 kV)		1975	2025	2105	2260	2390	2565
d (mm)		160	160	160	200	200	200
s (mm)		50	50	50	70	70	70
a (mm)		820	820	820	1070	1070	1070
e (mm)	10 kV	270	270	270	270	270	270
	22 kV	385	385	385	385	385	385
f (mm)		325	325	350	350	410	470
g (mm)		265	265	265	265	265	265
n (mm)		150	170	170	200	200	200

up to 24 kV 50-800 kVA loss AA₀A_k max Cu Winding **ECOdesign 2 (2021)**

ecoFIT²

Main Electrical Characteristics									
Rated Power	kVA	50	100	160	250	400	630	800	
Reference name	TOHn	2610/22	2910/22	3110/22	3310/22	3510/22	3710/22	3810/22	
No-Load Loss	P ₀ (W)	81	130	189	270	387	540	585	
No-Load Current	I ₀ (%)	0,60	0,60	0,55	0,45	0,40	0,30	0,25	
Short Circuit Loss	P _{k75°C} (W)	750	1250	1750	2350	3250	4600	6000	
Impedance Voltage	u _{k75°C} (%)	4	4	4	4	4	4	6	
Sound Level									
Pressure (0.3 m)	L _{pA} dB(A)	30	32	35	38	41	43	44	
Power	L _{WA} dB(A)	38	40	43	46	49	51	52	
Weight	Oil	m (kg)	105	125	150	160	200	240	285
	Total	m (kg)	580	825	980	1170	1550	2045	2395

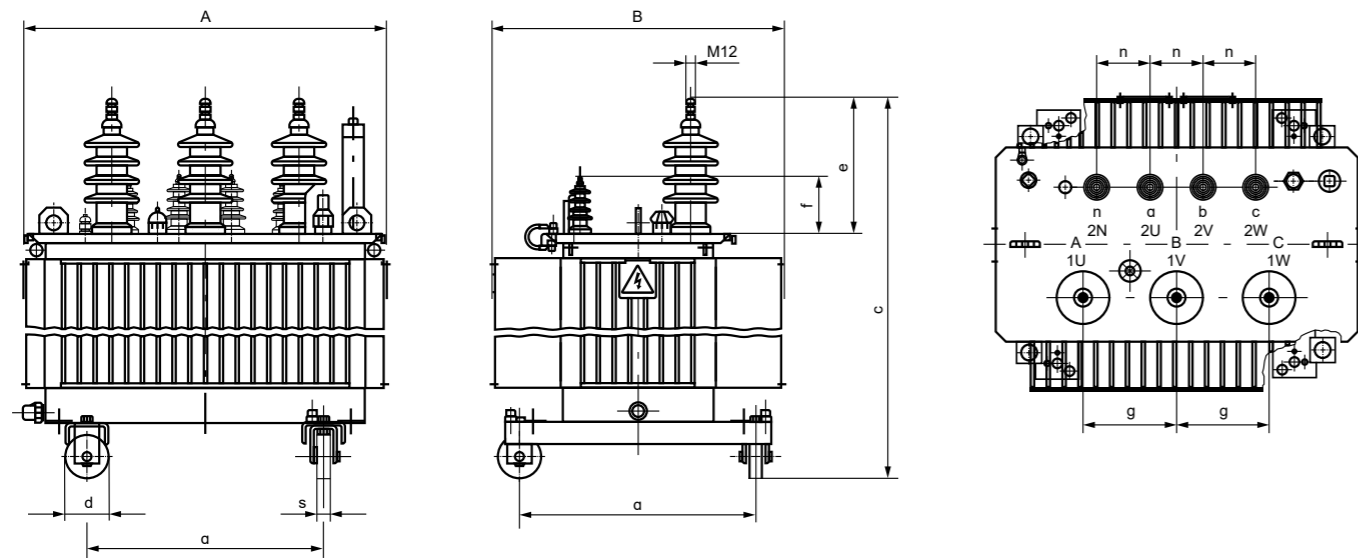


Dimensions								
Rated Power	kVA	50	100	160	250	400	630	800
Type - TOHn		2610/22	2910/22	3110/22	3310/22	3510/22	3710/22	3810/22
A (mm)		910	960	1030	1040	1080	1170	1260
B (mm)		610	680	710	680	820	845	920
C (mm) (6 kV,10 kV)		1185	1175	1195	1235	1355	1430	1430
C (mm) (20 kV, 22 kV)		1300	1290	1310	1350	1470	1545	1545
d (mm)		125	125	125	125	125	125	125
s (mm)		40	40	40	40	40	40	40
a (mm)		520	520	520	520	670	670	760
e (mm)	10 kV	270	270	270	270	270	270	270
	22 kV	385	385	385	385	385	385	385
f (mm)		125	165	165	205	205	245	245
g (mm)		265	265	265	265	265	265	265
n (mm)		125	125	125	150	150	150	150

up to 24 kV 1000-3150 kVA loss AA₀A_k max Cu Winding **ECOdesign 2 (2021)**

ecoFIT²

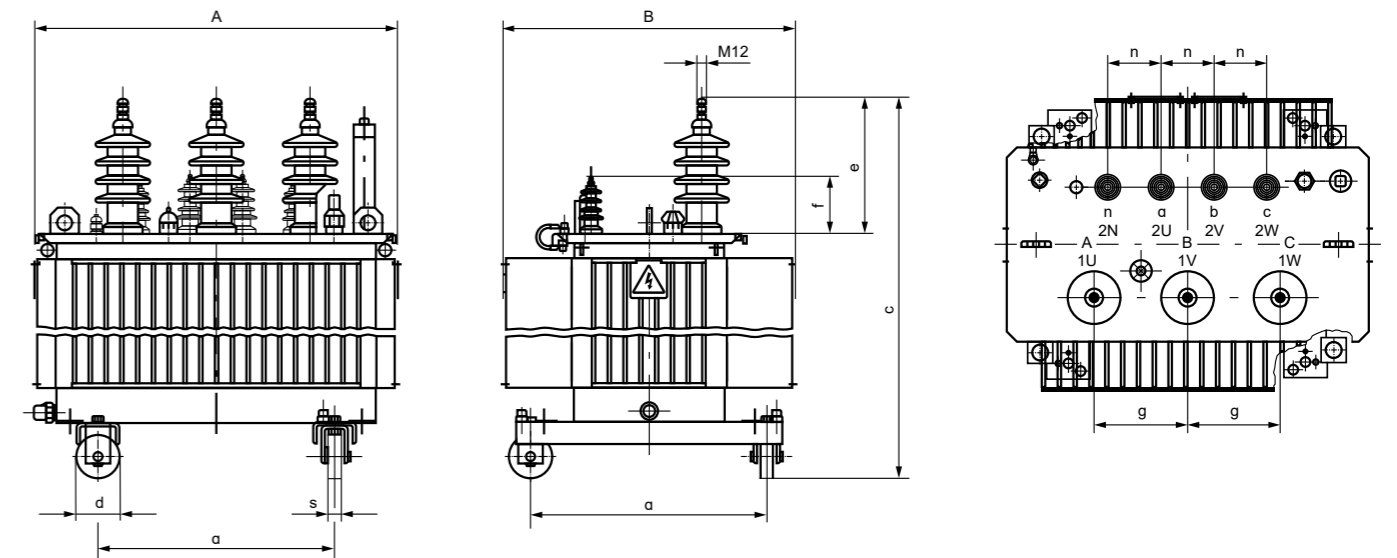
Main Electrical Characteristics								
Rated Power	kVA	1000	1250	1600	2000	2500	3150	
Reference name	TOHn	3910/22	4010/22	4110/22	4210/22	4310/22	4410/22	
No-Load Loss	P ₀ (W)	693	855	1080	1305	1575	1980	
No-Load Current	I ₀ (%)	0,20	0,17	0,15	0,13	0,13	0,13	
Short Circuit Loss	P _{k75°C} (W)	7600	9500	12000	15000	18500	23000	
Impedance Voltage	U _{k75°C} (%)	6	6	6	6	6	6	
Sound Level								
Pressure (0.3 m)	L _{pA} dB(A)	46	47	48	50	52	53	
Power	L _{WA} dB(A)	54	55	57	59	62	63	
Weight	Oil	m (kg)	400	490	540	795	820	920
	Total	m (kg)	2960	3310	3780	5080	5780	6380



Dimensions							
Rated Power	kVA	1000	1250	1600	2000	2500	3150
Type - TOHn		3910/22	4010/22	4110/22	4210/22	4310/22	4410/22
A (mm)		1505	1620	1685	1835	1940	2040
B (mm)		920	940	975	1190	1190	1300
C (mm) (6 kV,10 kV)		1630	1665	1775	2050	2070	2210
C (mm) (20 kV, 22 kV)		1690	1725	1810	2085	2070	2210
d (mm)		160	160	160	200	200	200
s (mm)		50	50	50	70	70	70
a (mm)		820	820	820	1070	1070	1070
e (mm)	10 kV	270	270	270	270	270	270
	22 kV	385	385	385	385	385	385
f (mm)		325	325	350	350	410	470
g (mm)		265	265	265	265	265	265
n (mm)		150	170	170	200	200	200

up to 24 kV 50-800 kVA loss A₀B_k max Al Winding **Ecodesign 1 (2015)**

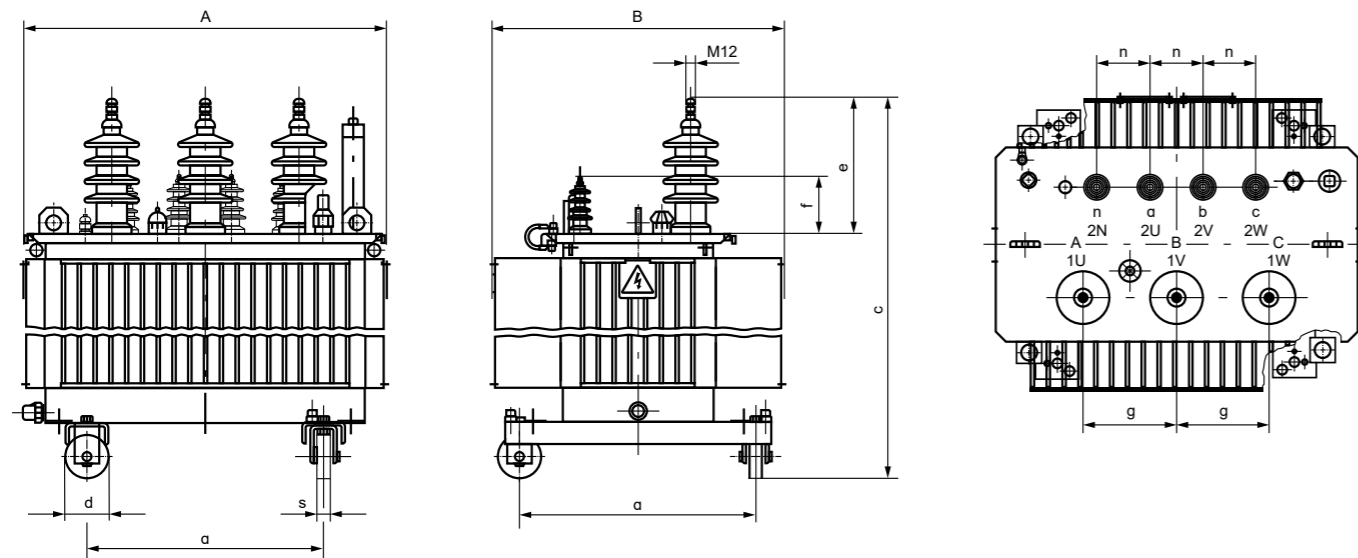
Main Electrical Characteristics									
Rated Power	kVA	50	100	160	250	400	630	800	
Reference name	aTOHn	269/22	299/22	319/22	339/22	359/22	379/22	389/22	
No-Load Loss	P ₀ (W)	90	145	210	300	430	600	650	
No-Load Current	I ₀ (%)	0.60	0.60	0.55	0.45	0.40	0.30	0.25	
Short Circuit Loss	P _{k75°C} (W)	1100	1475	2000	2750	3850	5400	7000	
Impedance Voltage	u _{k75°C} (%)	4	4	4	4	4	4	6	
Sound Level									
Pressure (0.3 m)	L _{pA} dB(A)	30	32	35	38	41	43	44	
Power	L _{WA} dB(A)	39	41	44	47	50	52	53	
Weight	Oil	m (kg)	130	165	230	245	290	425	600
	Total	m (kg)	640	810	1080	1230	1510	2250	2940



Dimensions								
Rated Power	kVA	50	100	160	250	400	630	800
Type - aTOHn		269/22	299/22	319/22	339/22	359/22	379/22	389/22
A (mm)		970	970	1090	1150	1185	1300	1500
B (mm)		625	680	700	750	820	850	950
C (mm) (6 kV,10 kV)		1185	1245	1340	1365	1465	1620	1655
C (mm) (20 kV, 22 kV)		1300	1360	1455	1480	1580	1735	1770
d (mm)		125	125	125	125	125	125	125
s (mm)		40	40	40	40	40	40	40
a (mm)		520	520	520	520	670	670	670
e (mm)	10 kV	270	270	270	270	270	270	270
	22 kV	385	385	385	385	385	385	385
f (mm)		140	180	180	220	220	263	263
g (mm)		265	265	265	265	265	265	265
n (mm)		150	150	150	150	150	150	150

up to 24 kV 1000-3150 kVA loss A_0B_k max Al Winding Ecodesign 1 (2015)

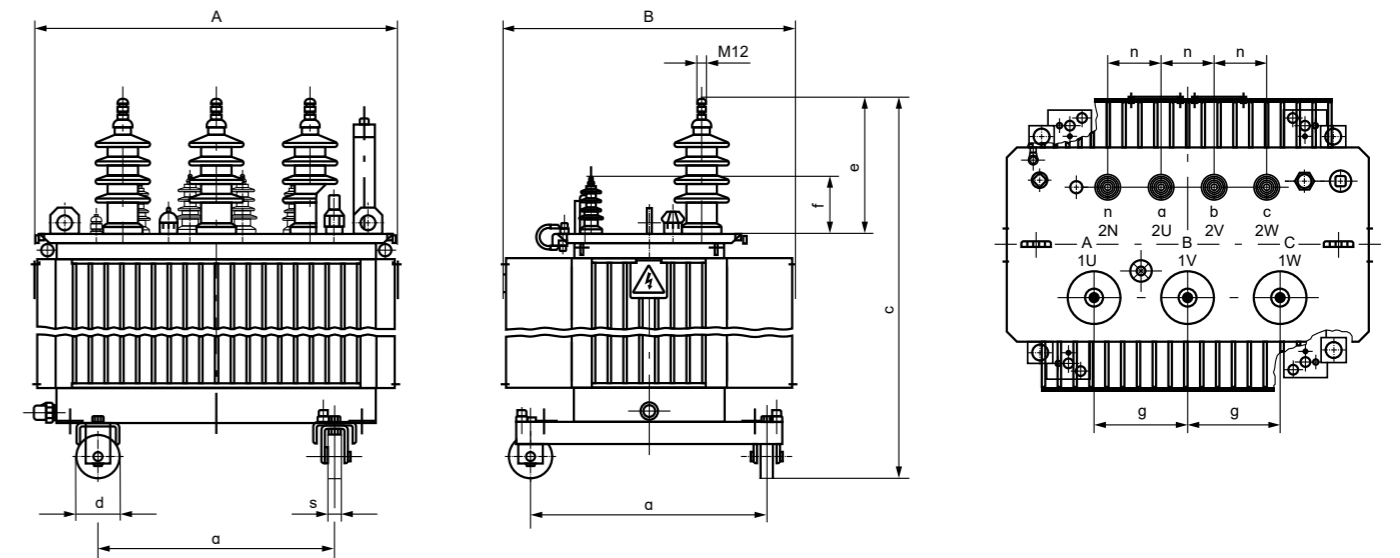
Main Electrical Characteristics								
Rated Power	kVA	1000	1250	1600	2000	2500	3150	
Reference name	aTOHn	399/22	409/22	419/22	429/22	439/22	449/22	
No-Load Loss	P_0 (W)	770	950	1200	1450	1750	2200	
No-Load Current	I_0 (%)	0,20	0,17	0,15	0,13	0,13	0,13	
Short Circuit Loss	$P_{k75^\circ C}$ (W)	9000	11000	14000	18000	22000	27500	
Impedance Voltage	$u_{k75^\circ C}$ (%)	6	6	6	6	6	6	
Sound Level								
Pressure (0,3 m)	L_{pA} dB(A)	46	47	48	50	52	55	
Power	L_{WA} dB(A)	55	56	58	60	63	66	
Weight	Oil	m (kg)	620	665	820	940	1130	1320
	Total	m (kg)	3130	3220	4000	4610	5895	8650



Dimensions							
Rated Power	kVA	1000	1250	1600	2000	2500	3150
Type - aTOHn		399/22	409/22	419/22	429/22	439/22	449/22
A (mm)		1555	1700	1925	1920	2050	2225
B (mm)		990	965	965	1190	1230	1360
C (mm) (6 kV,10 kV)		1755	1895	2050	2135	2255	2345
C (mm) (20 kV, 22 kV)		1770	1940	2060	2145	2255	2345
d (mm)		160	160	160	200	200	200
s (mm)		50	50	50	70	70	70
a (mm)		820	820	820	1070	1070	1070
e (mm)	10 kV	270	270	270	270	270	270
	22 kV	385	385	385	385	385	385
f (mm)		340	340	372	372	400	435
g (mm)		265	265	265	265	265	265
n (mm)		170	170	170	170	170	170

up to 24 kV 50-1000 kVA loss A_0C_k max Al Winding Ecodesign 1 (2015)

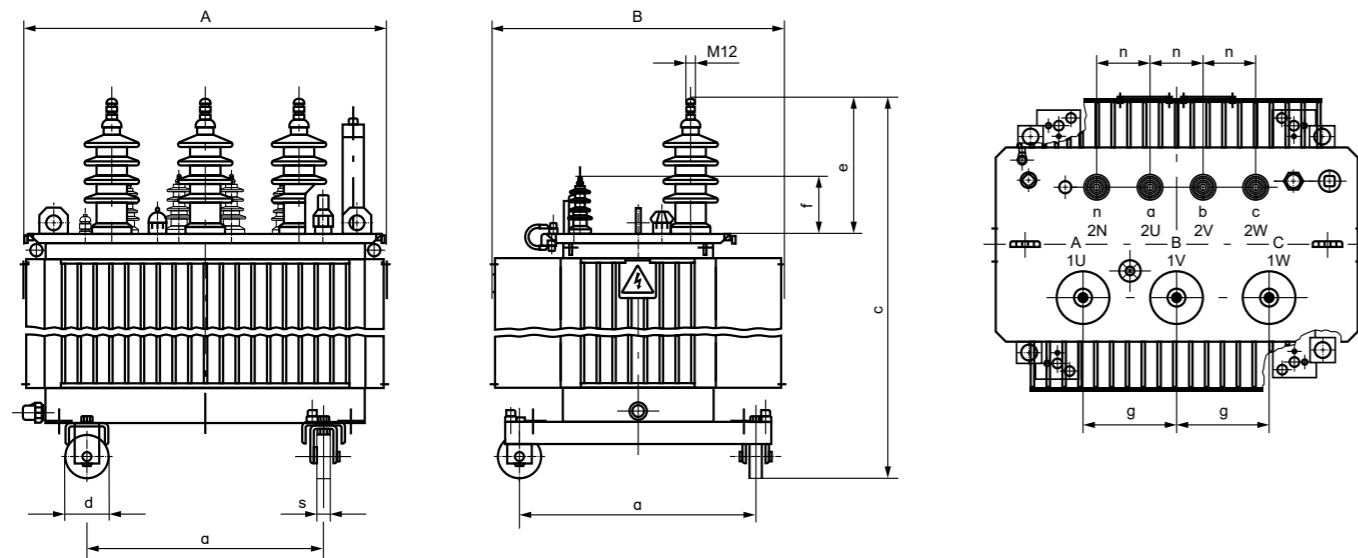
Main Electrical Characteristics											
Rated Power	kVA	50	100	160	250	315	400	500	630	800	1000
Reference name	aTOHn	269/22	299/22	319/22	339/22	349/22	359/22	369/22	379/22	389/22	399/22
No-Load Loss	P_0 (W)	90	145	210	300	360	430	510	600	650	770
No-Load Current	I_0 (%)	0,85	0,75	0,6	0,5	0,45	0,4	0,35	0,3	0,2	0,18
Short Circuit Loss	$P_{k75^\circ C}$ (W)	1100	1750	2350	3250	3900	4600	5500	6500	8400	10500
Impedance Voltage	$u_{k75^\circ C}$ (%)	4	4	4	4	4	4	4	4	6	6
Sound Level											
Pressure (0,3 m)	L_{pA} dB(A)	30	32	34	37	39	40	41	42	43	45
Power	L_{WA} dB(A)	39	41	44	47	49	50	51	52	53	55
Weight	Oil	m (kg)	130	180	200	220	250	305	325	355	600
	Total	m (kg)	605	810	975	1050	1290	1525	1715	1905	2485



Dimensions											
Rated Power	kVA	50	100	160	250	315	400	500	630	800	1000
Type - aTOHn		269/22	299/22	319/22	339/22	349/22	359/22	369/22	379/22	389/22	399/22
A (mm)		945	1045	1075	1040	1095	1160	1175	1290	1385	1710
B (mm)		670	665	710	700	810	800	845	870	940	970
C (mm) (6 kV,10 kV)		1145	1370	1285	1360	1390	1445	1505	1480	1610	1745
C (mm) (20 kV, 22 kV)		1260	1485	1400	1475	1505	1560	1620	1595	1715	1790
d (mm)		125	125	125	125	125	125	125	125	125	160
s (mm)		40	40	40	40	40	40	40	40	40	50
a (mm)		520	520	520	520	670	670	670	670	670	820
e (mm)	10 kV	270	270	270	270	270	270	270	270	270	270
	22 kV	385	385	385	385	385	385	385	385	385	385
f (mm)		138	180	180	220	220	220	220	263	263	340
g (mm)		265	265	265	265	265	265	265	265	265	265
n (mm)		125	125	125	150	150	150	150	150	150	150

up to 24 kV 50-800 kVA loss A_0B_k max Cu Winding Ecodesign 1 (2015)

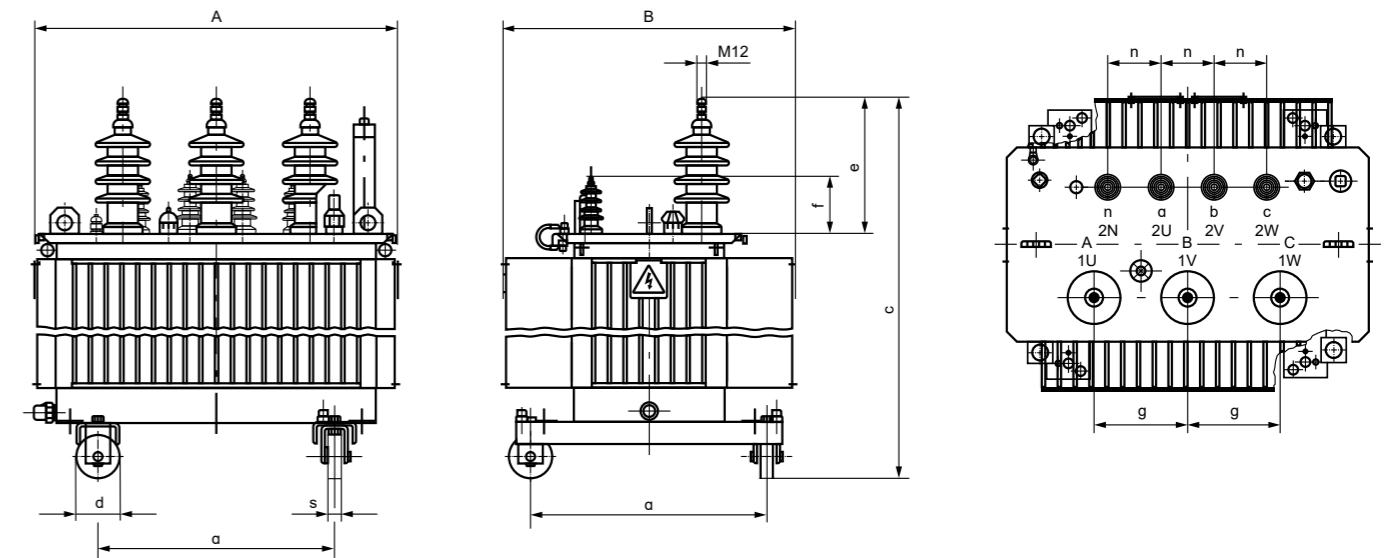
Main Electrical Characteristics									
Rated Power	kVA	50	100	160	250	400	630	800	
Reference name	TOHn	269/22	299/22	319/22	339/22	359/22	379/22	389/22	
No-Load Loss	P_0 (W)	90	145	210	300	430	600	650	
No-Load Current	I_0 (%)	0,60	0,45	0,40	0,35	0,30	0,25	0,18	
Short Circuit Loss	$P_{k75°C}$ (W)	875	1475	2000	2750	3850	5400	7000	
Impedance Voltage	$u_{k75°C}$ (%)	4	4	4	4	4	4	6	
Sound Level									
Pressure (0,3 m)	L_{pA} dB(A)	30	32	35	38	41	43	44	
Power	L_{WA} dB(A)	39	41	44	47	50	52	53	
Weight	Oil	m (kg)	100	135	155	170	220	285	390
	Total	m (kg)	555	690	870	1035	1410	1930	2440



Dimensions								
Rated Power	kVA	50	100	160	250	400	630	800
Type - TOHn		269/22	299/22	319/22	339/22	359/22	379/22	389/22
A (mm)		855	975	1020	990	1080	1215	1265
B (mm)		630	610	610	705	805	840	950
C (mm) (6 kV,10 kV)		1190	1155	1245	1240	1295	1405	1445
C (mm) (20 kV, 22 kV)		1305	1270	1360	1355	1410	1520	1560
d (mm)		125	125	125	125	125	125	125
s (mm)		40	40	40	40	40	40	40
a (mm)		520	520	520	520	670	670	670
e (mm)	10 kV	270	270	270	270	270	270	270
	22 kV	385	385	385	385	385	385	385
f (mm)		140	180	180	220	220	265	265
g (mm)		265	265	265	265	265	265	265
n (mm)		125	125	125	150	150	150	150

up to 24 kV 1000-3150 kVA loss A_0B_k max Cu Winding Ecodesign 1 (2015)

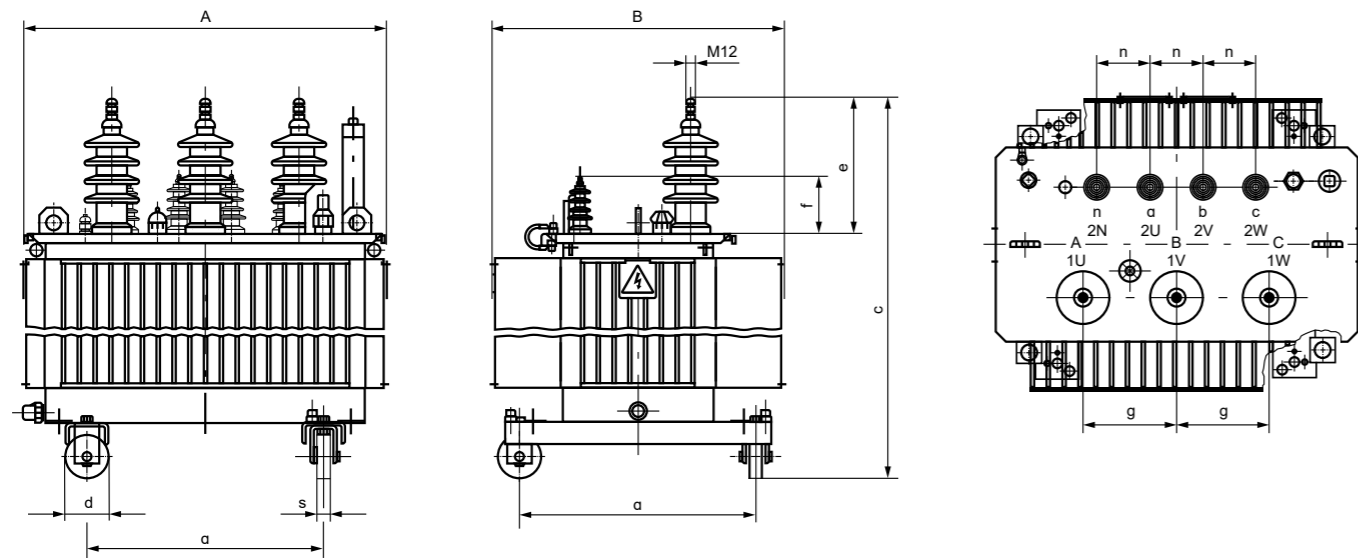
Main Electrical Characteristics								
Rated Power	kVA	1000	1250	1600	2000	2500	3150	
Reference name	TOHn	399/22	409/22	419/22	429/22	439/22	449/22	
No-Load Loss	P_0 (W)	770	950	1200	1450	1750	2200	
No-Load Current	I_0 (%)	0,16	0,14	0,12	0,10	0,10	0,10	
Short Circuit Loss	$P_{k75°C}$ (W)	9000	11000	14000	18000	22000	27500	
Impedance Voltage	$u_{k75°C}$ (%)	6	6	6	6	6	6	
Sound Level								
Pressure (0.3 m)	L_{pA} dB(A)	46	47	49	50	50	50	
Power	L_{WA} dB(A)	55	56	58	60	60	60	
Weight	Oil	m (kg)	480	520	700	860	985	1130
	Total	m (kg)	2785	3115	4060	4750	5705	6520



Dimensions								
Rated Power	kVA	1000	1250	1600	2000	2500	3150	
Type - TOHn		399/22	409/22	419/22	429/22	439/22	449/22	
A (mm)		1565	1625	1740	1980	1975	2110	
B (mm)		920	950	1030	1265	1290	1410	
C (mm) (6kV,10 kV)		1640	1625	1840	1940	2045	2115	
C (mm) (20kV, 22 kV)		1685	1665	1870	1955	2045	2115	
d (mm)		160	160	160	200	200	200	
s (mm)		50	50	50	70	70	70	
a (mm)		820	820	820	1070	1070	1070	
e (mm)	10 kV	270	270	270	270	270	270	
	22 kV	385	385	385	385	385	385	
f (mm)		340	340	372	372	400	435	
g (mm)		265	265	265	265	265	265	
n (mm)		150	150	170	170	170	170	

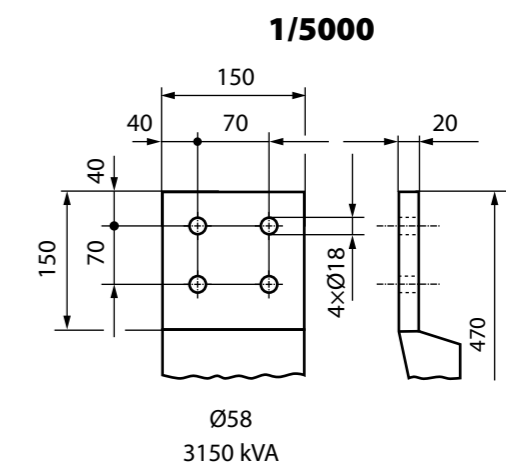
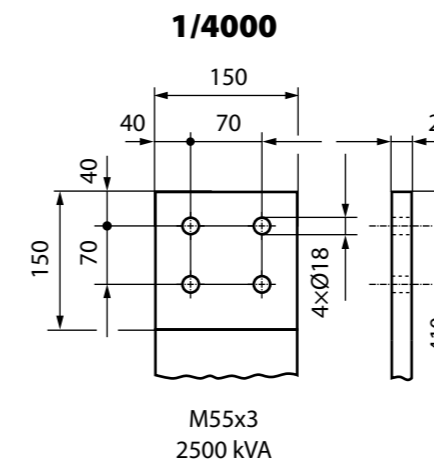
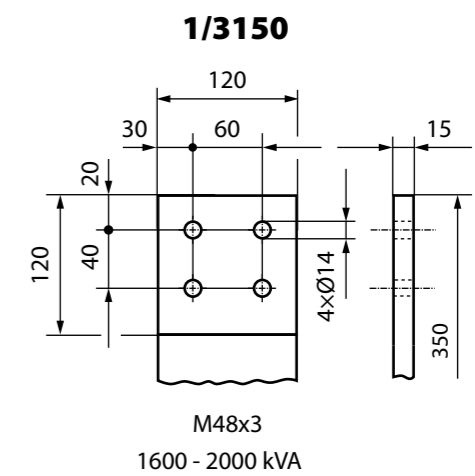
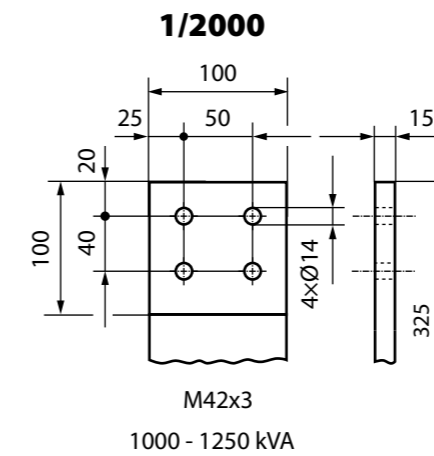
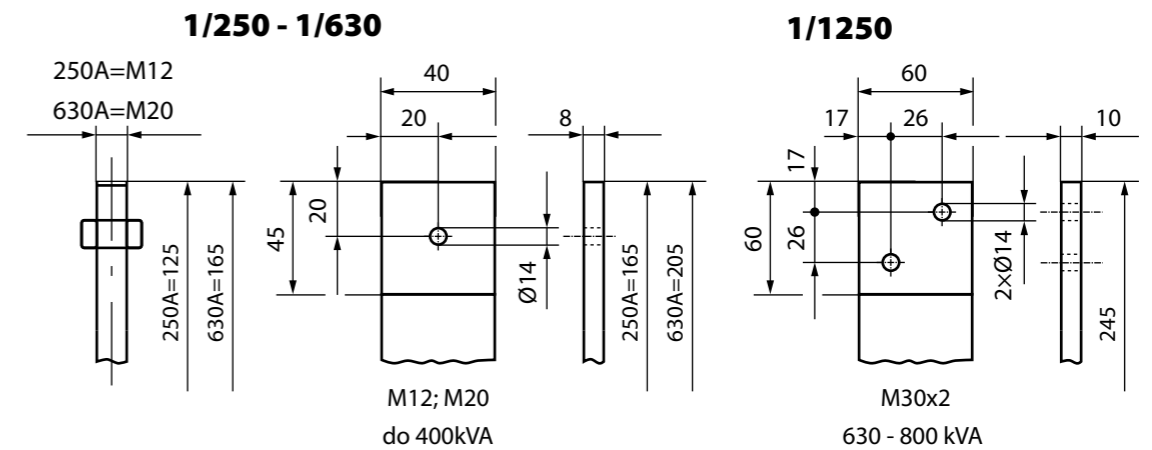
up to 24 kV 25-1000 kVA loss A_0C_k max Cu Winding Ecodesign 1(2015)

Main Electrical Characteristics											
Rated Power	kVA	25	50	100	160	250	400	630	800	1000	
Reference name	TOHn	239/22	269/22	299/22	319/22	339/22	359/22	379/22	389/22	399/22	
No-Load Loss	P_0 (W)	70	90	145	210	300	430	600	650	770	
No-Load Current	I_0 (%)	0,8	0,65	0,45	0,40	0,35	0,30	0,20	0,18	0,16	
Short Circuit Loss	$P_{k75^\circ C}$ (W)	900	1100	1750	2350	3250	4600	6500	8400	10500	
Impedance Voltage	$u_{k75^\circ C}$ (%)	4	4	4	4	4	4	4	6	6	
Sound Level											
Pressure (0,3 m)	L_{pA} dB(A)	28	30	32	35	38	41	43	44	46	
Power	L_{WA} dB(A)	37	39	41	44	47	50	52	53	55	
Weight	Oil	m (kg)	85	110	130	150	170	235	265	380	445
	Total	m (kg)	365	505	760	925	1010	1400	1685	2105	2545



Dimensions										
Rated Power	kVA	25	50	100	160	250	400	630	800	1000
Type - TOHn		239/22	269/22	299/22	319/22	339/22	359/22	379/22	389/22	399/22
A (mm)		790	830	915	970	970	1075	1360	1500	1605
B (mm)		665	610	670	685	705	825	780	910	925
C (mm) (6kV,10 kV)		1025	1195	1145	1185	1245	1340	1355	1395	1565
C (mm) (20kV, 22 kV)		1135	1310	1255	1295	1355	1430	1470	1510	1605
d (mm)		125	125	125	125	125	125	125	125	160
s (mm)		40	40	40	40	40	40	40	40	50
a (mm)		520	520	520	520	520	670	670	670	820
e (mm)	10 kV	270	270	270	270	270	270	270	270	270
	22 kV	385	385	385	385	385	385	385	385	385
f (mm)		138	138	180	180	220	220	263	263	340
g (mm)		265	265	265	265	265	265	265	265	265
n (mm)		125	125	125	125	150	150	150	150	150

LV TERMINAL



ACCESSORIES

Transformer is delivered ready to run upon easy installation and commissioning.

Basic configuration of transformer includes all necessary components for their normal operation.

Optional components are provided to expand

functions and meet specific requirements to the equipment.

Requirements to any transformer are determined at the stage of work order preparation, or datasheet filling.

BASIC CONFIGURATION



- No Load Tap Changer
- 4 bi-directional flat rollers
- Thermometer pocket
- Oil level gauge pocket
- Pressure relief valve pocket
- 2 lashing eyes
- 2 earthing points
- 1 rating plate

OPTIONAL COMPONENTS

- Integrated Safety Detector (R.I.S)
- Pressure Relief Valve
- Thermometer (with or without output contacts)
- Oil Level Gauge
- LV Bushing Protection Enclosure
- HV Plug-in Bushing
- Anti-Vibrations Pads



BASIC AND OPTIONAL COMPONENTS

BASIC CONFIGURATION	
	No Load Tap Changer NLTC allows adjusting with preliminary de-energizing of the equipment.
	Rollers The rollers may be positioned in the longitudinal or transverse direction to ensure relocation to any place.
OPTIONAL COMPONENTS	
	Integrated Safety Detector (R.I.S.) R.I.S. integrates the functions performed by different transformer accessories into a single device that keeps control of the transformer's pressure, temperature, oil level and gassing.
	Pressure Relief Valve It allows to avoid damage to the transformer case with an increase in internal pressure, which is associated with increased gas separation during the decomposition of oil from an electric arc. When the gas pressure reaches a certain level, the valve opens and the pressure is released.
	Oil Level Gauge Oil level gauge is used to control the oil level in the transformer tank and is mounted on the top cover of the transformer. The oil level may change during operation due to temperature changes in the oil volume due to changes in the ambient temperature or the load that the transformer feeds.
	Dial Thermometer The temperature inside the transformer is shown by a pointer on the dial (with or without output contacts).
	LV Bushing Protection Enclosure Protection of personnel against accidental contact of live parts.
	HV Plug-in Bushing The plug connection allows a very rapid connection of the cable to the transformer and can be touched when the transformer is under voltage.
	Anti-vibrations pads BEZ Transformers' design ensures partial vibration damping due to their structural elements. To decrease vibration, additional set of vibration absorbers may be installed. Standard option includes rubber pads decreasing the transient vibrations of equipment.

INSULATING FLUIDS

Alternative insulating fluids are an effective complement to the standard mineral oils used in fluid immersed transformers, but offer a higher degree of sustainability and safety. One of the main advantages of these alternative fluids is environmental protection, especially for environments near lakes, drinking water reservoirs or protected landscape areas. Thanks to the chemical composition of alternative fluids, they enable higher temperature limits.

MINERAL OIL

- The most popular fluid for transformers
- Made from crude oil
- Limited biodegradability
- Lower fire point compared to others
- Suitable for all types of transformers

SYNTHETIC ESTER

- Derived from chemicals
- Oxidation stability, suitable for cold climates
- Biodegradability
- Lower fire point than Silicone and Natural ester
- Suitable also for conservator transformers

SILICONE OIL

- Fully synthetic material
- Self-extinguishing (ignition source is removed)
- High fire and flash points
- No biodegradability
- Suitable for all types of transformers

NATURAL ESTER

- Made from plant seed oils - fully biodegradable
- The highest fire and flash points
- Flexible loading capacity (great for renewables)
- Can extend the insulation life
- Suitable for hermetized transformers

BIODEGRADABLE MINERAL OIL

- Made from crude oil
- Biodegradable
- Suitable for environmentally sensitive locations
- Excellent cold temperature performance
- Suitable for all types of transformers

OTHER SERVICES

- Direct sales support
- Customer modifications made by our R&D
- Consulting services
- Supervised Installation on site
- Noise level tests
- Special tests in our laboratory
- Simulations and calculations
- Development of the new transformers
- Payback calculations
- Aftersale service
- Warranty service, including warranty repair
- Revisions and repairs

ORDER FORM: FLUID IMMERSED TRANSFORMERS

PLEASE CHOOSE THE REQUIRED PARAMETERS OR FILL IN THE BLANKS

Company Name _____
 Contact _____
 Phone _____
 Email _____

Type _____
 Quantity _____

Rated Power, kVA	25 50 100 160 250 400 630 800 1000 1250 1600 2000 2500 3150
High Voltage, kV	6 10 20 22 35
Low Voltage, V	400/231 420/242
Frequency, Hz	50 60
Impedance Voltage, %	4 6
Vector Group	Yzn Dyn Yyn
No Load Loss, W	
Short Circuit Loss 75 °C, W	
MAX./MIN. Ambient Temperature, °C	
Altitude, m	≤1000

Location	Winding Material	Optional Components
<input type="checkbox"/> Outdoors	<input type="checkbox"/> Aluminum, Al	<input type="checkbox"/> Integrated Safety Detector (R.I.S)*
<input type="checkbox"/> Under roof	<input type="checkbox"/> Copper, Cu	<input type="checkbox"/> Pressure Relief Valve*
<input type="checkbox"/> Indoors		* - select either Integrated safety detector or Pressure relief valve

Thermometer	<input type="checkbox"/> Oil Level Gauge
<input type="checkbox"/> with output contacts	<input type="checkbox"/> LV Bushing Protection Housing
<input type="checkbox"/> without output contacts	<input type="checkbox"/> HV Plug-in Bushing
	<input type="checkbox"/> Antivibrations Pads

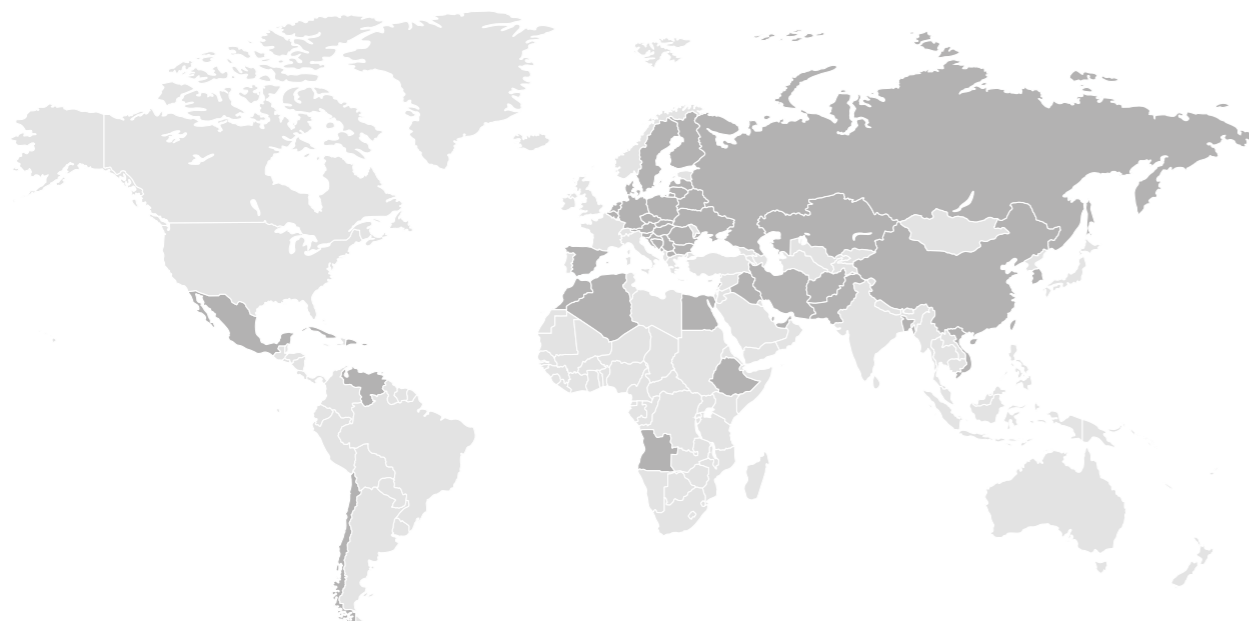
Additional Requirements _____

Other parameter values - upon customer's request

TRADITION, RELIABILITY, QUALITY

SINCE 1908

Our solutions are used in more than 50 countries around the globe, more than 250 000 transformers were manufactured and delivered to customers.



Czech republic, Slovak republic, Poland, Germany, Austria, Switzerland, Holland, Latvia, Lithuania, Croatia, Slovenia, Serbia, othern Macedonia, Bosnia and Herzegovina, Montenegro, Finland, Belgium, Hungary, Spain, Bulgaria, Romania, Ukraine, Belarus, Russia, Kazakhstan, Egypt, United Arab Emirates, Bahrain, Angola, Venezuela, Mexico, Chile, Cuba, Dominican republic, Denmark, Afghanistan, Irak, Iran, Pakistan, Bangladesh, Maroco, Ethiopia, Lebanon, China, Korea, Vietnam, Algeria.

PRODUCT RANGE

APPLICATION: ENERGY * INDUSTRIAL ENTERPRISES * OIL & GAS * METALLURGY
* BUILDING INDUSTRY * TRANSPORT



CAST-RESIN TRANSFORMERS

50 kVA to 6300 kVA
up to 36 kV



OIL-FILLED HERMETICALLY SEALED TRANSFORMER

25 kVA to 3150 kVA
up to 36 kV



SPECIAL TRANSFORMERS

Single-phase Transformers
Rectifier Transformers
Excitation Transformers
Amorphous Transformers



OIL-FILLED POWER TRANSFORMER

4 MVA to 16 MVA
up to 36 kV



BEZ TRANSFORMÁTORY

MANUFACTURING TRANSFORMERS SINCE 1902

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e-mail: bez.or@bez.sk
bez-transformers.com

*This catalog is subject to further changes
in terms of technical details due to our continuous
improvement, without prior notification.
Therefore, please refer to our specialists to obtain
the latest information.*

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