



YOUR KEY ENERGY EFFICIENCY PARTNER



CAST RESIN DRY-TYPE

# TRANSFORMERS



Engineered for Egypt



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# ABOUT RUSSIAN AND EGIPTIAN RELATIONS

## RUSSIAN-EGYPTIAN RELATIONS IN THE PAST AND TODAY

Egypt, being one of the most respected states, is a traditional key partner of the Russian Federation.

Diplomatic relations between the USSR and Egypt were established on August 26, 1943.

Cooperation between the two countries began from signing of the first economic agreement dd. March 1948 on supplies of cotton from Egypt in exchange for corn, timber and other products from the USSR. Further years were noted with the high level of cooperation between our countries.

In 1955 an agreement on supplies of Soviet arms was achieved. A stage of reconstruction and renewal of Egyptian Armed Forces began.

In 1958, an agreement on rendering of economic and technical support was signed in Cairo which envisaged such a support in construction of the first stage of the high-rise Aswan Dam (the construction was completed by the Soviet Union in 1971). It was a beginning of our cooperation in the electric-engineering sphere.

The period of 1950s-60s was a peak of the bilateral relations when many thousand of Soviet specialists helped Egypt to construct plants and enterprises. More than 100 industrial projects were built in Egypt with

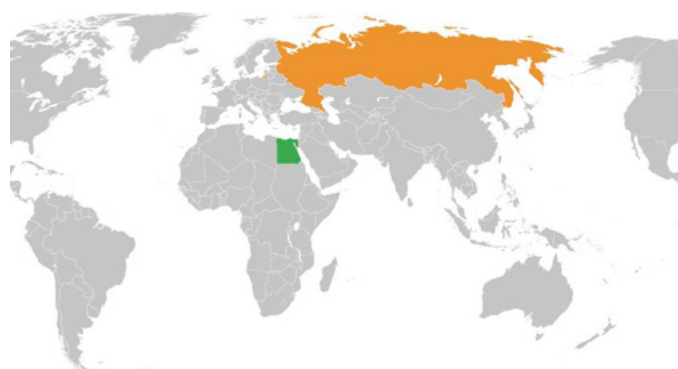
assistance from the Soviet Union; most famous among them are the high-rise Aswan Dam, Helwan iron and steel works, the aluminum plant in Nag-Hammadi, power transmission lines between Aswan and Alexandria and many others.

It is necessary to emphasize that in 1960s-70s the USSR supported Egypt both in international and domestic affairs.

In May 1990 the Soviet-Egyptian declaration and long-term program of economic, trade and scientific-technological cooperation between the two countries to year 2000 was signed.

At present the Russian Federation and the Arab Republic of Egypt are partners in their bilateral relations and on the international arena, and their cooperation is well at a high ebb. On the eve of the 20th and 21st centuries, political contacts between representatives of higher governmental management of the two countries are becoming more and more intense.

Egypt occupies one of leading positions in the Arab world in terms of the level of political and economic relations with Russia. According to declarations of high-ranked Russian leaders, Moscow "sees in Egypt a privileged partner in Middle-East and African affairs". Egypt is an important trade partner of Russia.





# ABOUT SVEL GROUP

# DRY-TYPE TRANSFORMERS MANUFACTURE

SVEL Group JSC is a leader among national manufacturers of the electrotechnical equipment. It is a producer of power dry-type and oil-immersed transformers, provider of solutions in electric power quality improvement and electric network protection. SVEL Group is also taking advantage of its cutting edge technologies to be a reliable provider in such products as switchgears, packaged transformer substations, instrument transformers, circuit breakers and disconnectors.

SVEL specialists solutions allow to produce the equipment that assists enterprises in the reduction of energy consumption up to 45%. Going forward, SVEL Group will continue to make big steps in other MV, HV and UHV equipment.

SVEL Group is specialized in manufacturing of cast resin and dry-type transformers for any kind of application from 16 kVA up to 25 MVA for LV and HV with rating voltage 12-17.5-24-36 kV.

Our experience in the field has enabled us to solve a wide range of requirements even for special units, i.e. earthing transformers, transformers for 6-12-18-24 pulse converters, HV-HV transformers, three-monophase transformers, triple windings transformers, Scott type transformers, start motor transformers and autotransformers.

SVEL are present in the national and international market and count on a 14-year technical experience in the field. The recently built new works are equipped with high-tech producing plants, the most sophisticated automation job order systems via real time production management.

Experience, constant dialogue with customer, suppliers and innovations applied by SVEL Group, allow to offer a reliable and qualitative product.

All products correspond to IEC, EN and GOST.

- Dry-type transformers and reactors
Manufacture of dry-type transformers and current limiting reactors;
- Power transformers
Manufacture of power oil immersed transformers
- Switchgears
Manufacture of switchgears and transformer substations
- Instrument transformers
Manufacture of current and voltage transformers
- Plant of metal structures
Manufacture of transmission angle and pipe towers, special distribution steel towers
- Engineering
Design and installation



# DRY-TYPE TRANSFORMERS: INTRODUCTION

Transformer is a static electromagnet device having two or more inductively coupled windings which are located on a magnet core and designed for conversion by electromagnetic induction of one or multiple AC systems (voltages) into one or multiple other systems (voltages), without frequency change.

Since the time of the discovery of electromagnetic induction, a plenty of researches and experiments were conducted, before transformers had become such as we are accustomed to, in terms of their design performance. The design of transformers was constantly becoming more and more perfect, including due to development of new insulation materials.

At present, the following standard designs of transformers are offered:

- cast coil dry-type transformers;
- air-barrier insulation dry-type transformers;
- oil-immersed transformers.

## CAST COIL DRY-TYPE TRANSFORMERS

Dry-type transformers HV windings whereof are cast with a special compound are referred to as cast coil dry-type transformers. Demonstrating good performance, this type of transformers is applied all over the world, and the specific number of cast coil transformers is constantly growing. Due to a large experience of practical application, this design is being constantly perfected. A range of applied voltage and power values is being expanded as well.

## AIR-BARRIER INSULATION DRY-TYPE TRANSFORMERS

Air-barrier insulation was used in the first models of transformers, even before application of oil dielectric material. A typical design of windings of such transformer is conductors with an insulation of distance (in form of air barriers) left between them. The conductors are coated with film or paper insulation. Transformers of such type are used but to a limited extent, not over 10% of the total number of dry-type power transformers.

To provide protection of conductors insulation, windings of such transformers should be impregnated in deep vacuum. As time passes, air gaps can be contaminated with dust which leads to deterioration of dielectric properties of insulation.

Contrary to general ideas, windings with air barrier insulation made in industrial environment cannot receive high-quality repair on site.


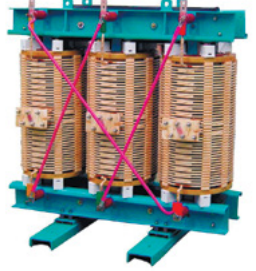

## OIL-IMMERSED TRANSFORMERS

Oil-immersed transformers are featured with use of transformer mineral oil as the main dielectric. In other aspects, the design of oil-immersed transformers is similar to that of air-barrier insulation transformers. Oil acts as an electric insulation and cooling medium. Due to temperature affect, oil can become contracted or expanded in its volume. To compensate this effect, corrugated-wall tanks are used, or the design can provide availability of an expansion tank which is installed over the general oil level.

Mineral oil under effect of internal and external factors can partially lose its dielectric properties, as time passes. To maintain the standardized characteristics, one have to monitor the oil level, quality and hermeticity of tanks. Inflammability of transformer oil can be regarded as its large disadvantage. Under a certain temperature or a flash, oil can be inflamed and burn by itself, regardless of the rate of elimination of factors of inflammation. Rapid expansion of gases emitted with burning can lead to an explosion. In high-capacity power transformers these risk factors are struggled against on all levels: from integration of extra monitoring systems in the design to regular inspections and evaluation of the equipment condition.

## HOW DESIGN OF THE TRANSFORMER INFLUENCES CONSUMER PROPERTIES

Design peculiarities will have an effect on engineering characteristics and operational features of transformers. The general set of such parameters shall determine universal nature and perspectives of use of this or that design of a transformer.

Parameter	Cast coil	Air-barrier	Oil-immersed
			
Fire safety	yes	yes	no
Fire-retardant properties of insulation under action of fire	yes	yes	no
Need of oil pick-up pit and refractory walls on the facility's site	no	no	yes
Hygroscopic properties of insulation materials	no	yes	yes
Deterioration of dielectric properties with time and under action of environment	no	yes	yes
Risk of environment pollution due to oil leakages	no	no	yes
Necessity of regular maintenance	no	yes	yes
Climatic stability: low sensibility to humid and salty environment	yes	no	yes
High endurance to dynamic loads due to use of bands as conductors	yes	no	no
Expanded possibilities of on-line monitoring of the equipment condition (temperature, appearance of active parts)	yes	yes	no

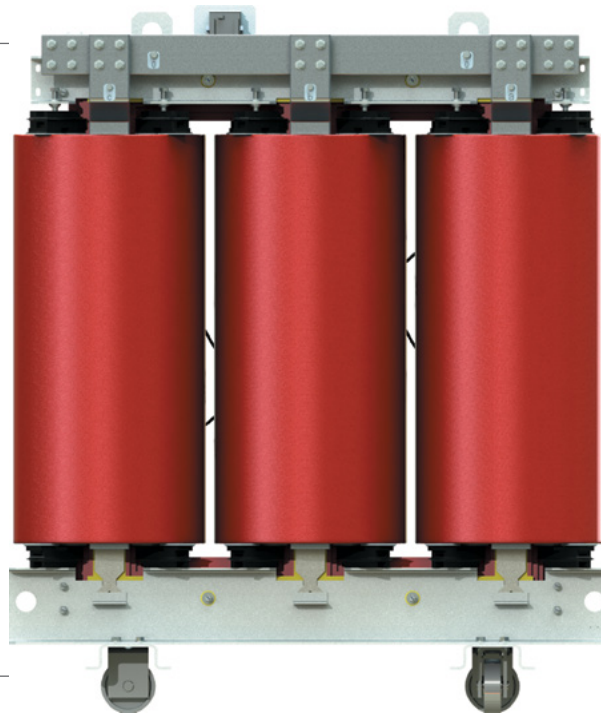
When selecting transformers for equipping power generating facilities, one has to be governed, first of all, by parameters of the power system, requirements to reliability and longevity of implemented solutions. Rising demands to such parameters, as properties of environmental protection, power efficiency and possibility of integration into "smart" networks should be taken into account even today!

SVEL Group possesses production facilities and competences allowing to manufacture transformers with accounting for state-of-the-art technologies and design solutions. While evaluating all advantages of cast coil transformers, our designers develop professional solutions for distribution networks with adaptation for specific features of various industries and with consideration of a customer's special requirements.

# CAST RESIN TRANSFORMERS - KEY COMPONENTS

LOW VOLTAGE  
OUTPUT BARS

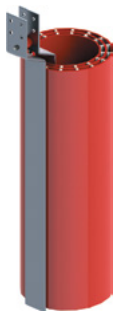
LIFTING EYEBOLTS



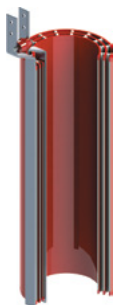
WINDING  
PRESSURE PLUGS

ORTHOGONAL  
REVOLVING WHEELS

EYEBOLTS FOR  
HORIZONTAL  
MOVEMENT



LOW VOLTAGE WINDING

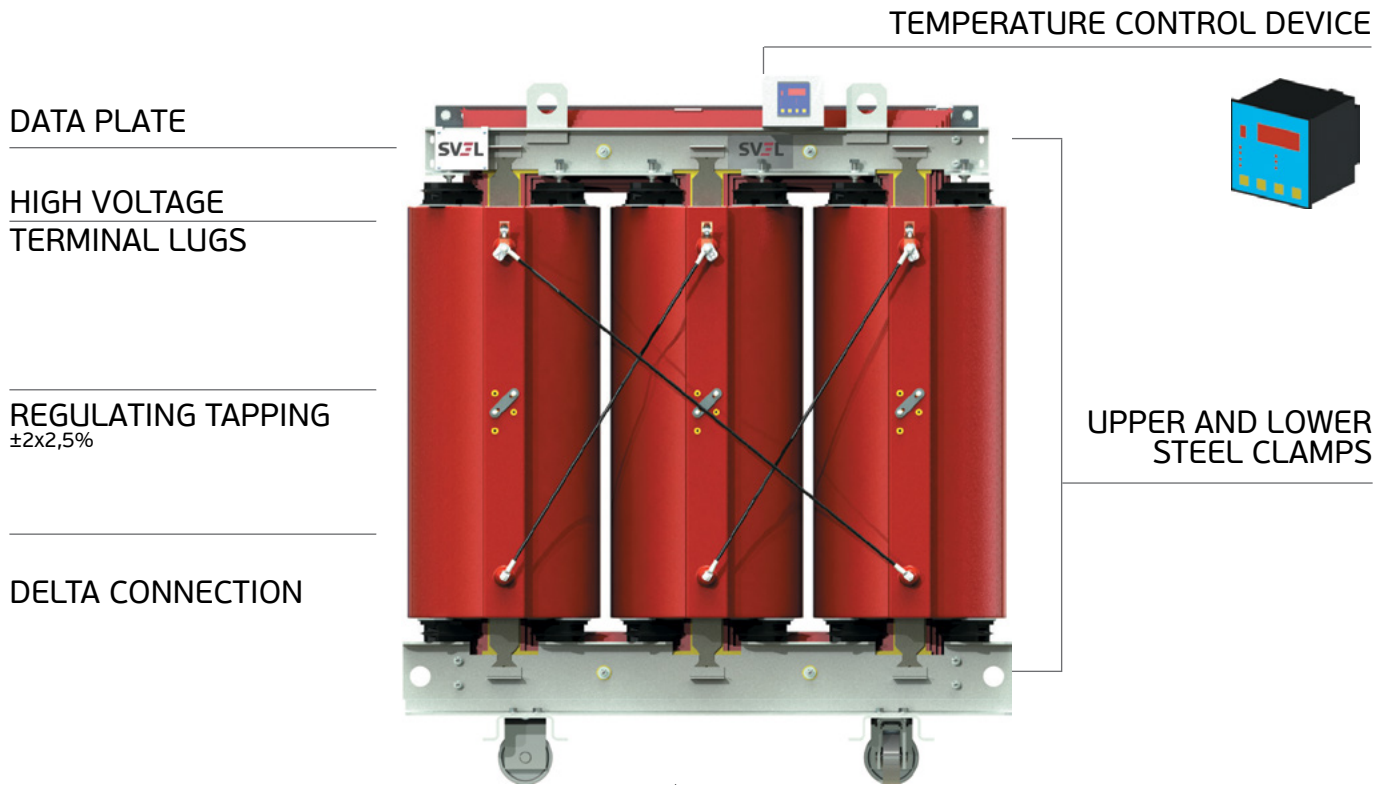


Low voltage windings are made of foil on automatic winding machine with simultaneous winding of interlaminar and frontal insulation. Number of cooling ducts in the winding depends on the transformer power. Ducts are provided with fiberglass profiles of a high heat resistance class. Windings are covered with insulating enamels and heat treated.

MAGNETIC CORE



Magnetic core is made of cold-rolled electrotechnical sheet steel with a heatproof coating. Stacking technology and «step-lap» cutting provide low level of no-load losses. Cutting of electrotechnical steel is carried out on the automatic cutting line with the high cut accuracy.



HIGH VOLTAGE WINDING



High voltage windings are made in section layer form with the series connection of sections. HV winding is made of insulated wire or foil on high accuracy coil-processing machines. Vacuum resin filling of windings is carried out during a completely automated process. Epoxy compound includes a number of components providing a good heat emission, and also a high thermostability.

PROTECTION ENCLOSURE

Enclosure provides necessary protection degree of the active part. It is made of steel construction with walls, a bottom and a roof. The walls and the bottom have vent holes, providing a normalized cooling level of the transformer. Wide walls have access panels for access to adjusting taps. All walls are detachable, that assures visual inspection and maintenance service on a schedule date.









The image shows a factory setting with several large, cylindrical coils of red material, likely copper wire, stacked on wooden pallets. Each coil is wrapped with horizontal bands of a lighter-colored material. White metal brackets are attached to the top of the coils. The background features blue industrial machinery and a safety fence. The logo 'CBEA' is overlaid in the center, with the 'E' stylized as three red horizontal bars.

CBEA

# ACCESSORIES

## STANDARD ACCESSORIES

- 4 bidirectional wheels
- 2 grounding terminals
- 1 identification plate
- 2 or 4 lifting lugs (according to the rating power)
- 4 connections for haulage
- Tapping terminal board on HV side
- Threaded pins provided with bolt for HV terminal connection

## ACCESSORIES UPON REQUEST

- PT 100 thermoresistances on LV windings and core

If connected to the suitable electronic device they allow logging of windings and core and remote transmission of data.

- PT 100 electronic unit

Supplied loose for assembly on the control room panel by the customer. It logs the signal coming from the PT100s (max 4) and indicates the measured temperature. It includes 2 relays with adjustable threshold for the alarm and release signals as well as an auxiliary contact to control a possible set of fans for air forced ventilation.

- Antivibrating pads

Standard version is composed of special rubber supports supplied loose to be positioned by the customer under the transformer's wheels. They allow a great reduction of the vibrations transmitted to the structure and therefore of the noise and possible structural resonances. Antivibrating supports may be designed and supplied for special application in compliance with customer's specification.

- Auxiliary service terminal board, protective type

It centralizes possible auxiliary services and protects the terminal boards.

- Air forced fun cooling system (AF)

Such set includes from 2 to 6 fans, based on transformer type and power, fixed to the base of the transformer. They allow increasing of nominal power of the transformer about 25÷40%, based on customer's needs. For a proper performance, the set of fans should be assembled together with a control and command switchboard (see electronic device for PT100 monitoring) to be ordered separately.

- Control panel

The control panels are produced according to gold standard design rules, so the devices mounted inside are as less as possible subject to electromagnetic interference generated by the transformer.

- Overvoltage protection devices

The aim is the transformer protection from impulsive or atmospheric overvoltages.

- Protection boxes and enclosures

A wide range of protection enclosures for every installation need according to the International Protection rating (up to IP 54) or NEMA standard, with natural or forced cooling. The outputs of the cables can be realized as usual from bottom or top; in case of special customer's needs the outputs can be projected accordingly.

- Copper or aluminum busbars

- HV bushings

- On-load tap changer

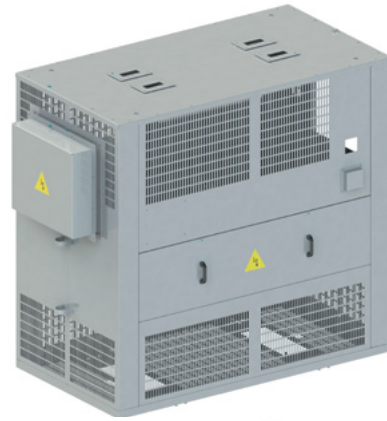
- Current transformers



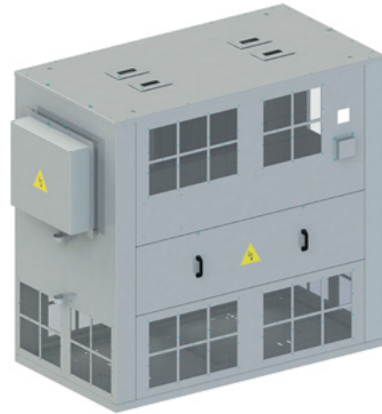
# ENCLOSURE AND HOUSING

## SVEL PROTECTION ENCLOSURE:

SVEL protection enclosures are made for indoors and outdoors installation with the required IP protection level. The housing is delivered already assembled with the transformer, in order to avoid any additional waste of time. The electrical continuity among all the metal parts of the enclosure is made according to the standards. The metal sheet is painted with epoxy paints and in requested color (standard normally used is RAL 7035) which give high resistance to the atmospheric agents. For external application it is possible to cover all the metal parts of the housing with hot galvanized painting. The cut-outs for the cable connection can be made on the bottom net or on the roof according to the customer's needs. GBE housings may be supplied with lockable doors on requested.



**IP21**  
protective enclosure

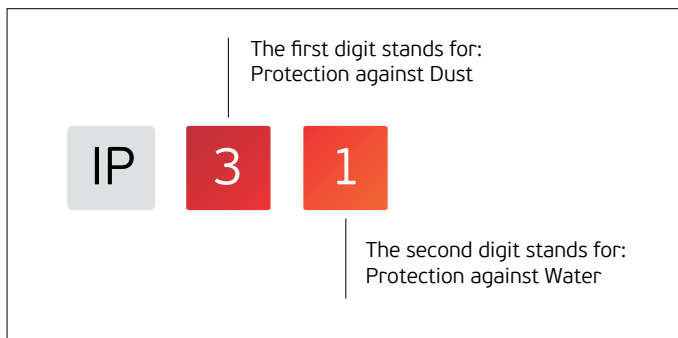


**IP31**  
protective enclosure



**IP54**  
transformer housing

## INGRESS PROTECTIONS IEC 60529



### DUST

Protection against contact and penetration of foreign objects

Degree of protection (contact/foreign bodies)

<b>0</b>	No protection	No contact protection, no protection against solid particles and bodies.
<b>1</b>	Protection against large foreign bodies	Protection against large contact area with hands and foreign bodies with $\varnothing > 50$ mm.
<b>2</b>	Protection against medium foreign bodies	Protection against contact with fingers, protection against foreign bodies $\varnothing > 12.5$ mm.
<b>3</b>	Protection against small foreign bodies	Protection against tool contact foreign bodies, wires or the like with $\varnothing > 2.5$ mm.
<b>4</b>	Protection against foreign grains	See 3, but $\varnothing > 1$ mm.
<b>5</b>	Dust-protected	Full contact protection. Protection against dust deposits inside.

### WATER

Degree of protection (water)

Degree of protection (water)

<b>0</b>	No protection	No protection against water.
<b>1</b>	Protection against dripping water	Protection against vertical water drops.
<b>2</b>	Protection against inclined water drops	Protection against inclined water drops up to 15° to vertical line.
<b>3</b>	Protection against spray-water	Protection against spray water drops up to 60° to vertical line.
<b>4</b>	Protection against splash-water	Protection against splash water from all directions.

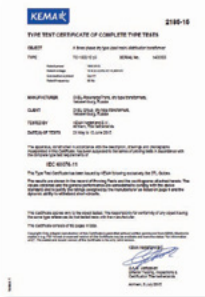
# TESTS AND QUALITY

All SVEL transformers are designed and manufactured according following basic standards:

- IEC 60076
- IEC 60076-11
- EN 50541-1
- IEC 61378-1
- GOST 52719-2007
- GOST 54827-2011
- ISO 9001:2008
- ISO 14001:2004

The company has an efficient quality control of the products in accordance with ISO 9001:2008. The Quality System covers all production stages from the offer to the after sale service. Furthermore our company work in respect of the environment according ISO: 14001:2004.

SVEL follows the current trends and follows the highest quality standards. That is why we certify management systems and products from leaders in their field.



## SVEL DRY-TYPE TRANSFORMER TEST LABORATORY





All SVEL transformers are built according to standard classes E2, C2, F1. The chart below shows the transformers working conditions. Units were tested by KEMA Nederland B.V. according to IEC 90076-11.

Class	Symbol	Definition
Environmental	E0	There is no condensation on the transformer and pollution is negligible. This condition takes place in indoor installation in a dry and clean environmental.
	E1	Occasional condensation can appear on the transformer. There could be pollution in a small
	E2	Condensation and pollution are of a consistent quantity with also a combination of both.
Climatic	C1	The transformer can work at ambient temperature not lower than -5°C, but it can withstand at temperature -25°C during the transportation and installation.
	C2	Outdoor installation. The transformer can work, be transported and be stored at temperature of up to -25°C.
Fire behavior	F0	No particularly risk of fire. No particular necessity to reduce inflammability accept the characteristics of transformer project.
	F1	Transformer subject to risk of fire. A reduce inflammability is required with a determinate period of time to be arranged between the constructor and the buyer, fire must die out. There must be a minimum emission of toxic substance and only limited to thermal energy and fire.

## SPECIAL TESTS



Fire protection test



Climatic test



Environmental

# ADDITIONAL FACTORS OF TRANSFORMER OPERATION

## Installing transformers indoors

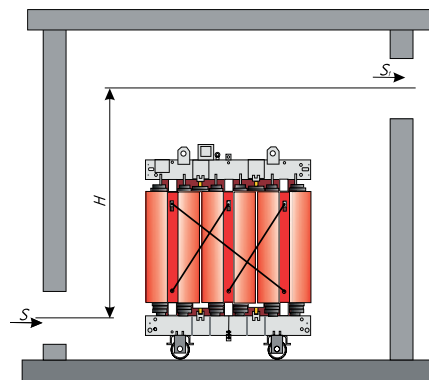
To provide normal operation of a transformer, the following conditions shall be observed when installing it indoors:



- distance from transformer's conductive parts to the walls shall be chosen in accordance with "Rules of operating electric installations";
- free access shall be provided for inspection and maintenance of the transformer (including access to NLTC adjusting taps);
- ventilation system shall be available which would provide heat removal from the transformer;
- transformer shall be protected against ingress of atmospheric precipitations, condensate and foreign particles and objects.

## Indoor ventilation

Calculation of the ventilation system shall include calculation of holes for inflow and exhaust of air into (from) the room, and, when necessary, calculation of power of the room forced cooling.



Initial data for calculation:

$P_{k.3}$  – short circuit losses of transformer, in kW, at 115°C;  
 $P_{xx}$  – no load losses, in kW;  
 $H$  – difference of holes height for air intake and exhaust, m;  
 $k$  – factor accounting for degree of protection of the transformer;  
 IP00:  $k=1$ ;  
 IP21, IP31:  $k=0,5$ .

Hole area  $S$  in m<sup>2</sup> (minus the area of grilles) for air intake shall be calculated as follows:

$$S = \frac{0,18 \times (P_{k.3} + P_{xx})}{k \times \sqrt{H}}$$

Hole area  $S_1$  в m<sup>2</sup> (minus the area of grilles) for air exhaust shall be calculated as follows:

$$S_1 = 1,1 \cdot S$$

Dimensions of holes calculated by the formulas will be correct at the air average temperature 20°C and height a.s.l. up to 1000 m.

If it is impossible to provide the required area of ventilation holes, it is necessary to envisage forced ventilation of the room.

The required capacity of the ventilation system in m<sup>3</sup>/min:

$$V = 4,5 \times (P_{k.3} + P_{xx})$$

## Operation of transformer under overloads

The operating resource of dry-type transformers shall be equal to thirty and over years, but it is quite difficult to identify the exact period, as it depends on operation conditions.

The service life shall depend on overloads the dry-type transformer is subjected to during the whole period of operation. Overloads, as a rule, generate heating of windings, which means unfavourable thermal effect on the insulation and leads to its thermal wearing.

Transformer can operate under certain overloads not influencing periods of operation. It is possible, provided that the usual load is less than the rated load. Allowable overloads are limited in time. Duration of the transformer overloads shall depend on the initial load which precedes the overload regime and on the average indicator of environment  $\theta_a$ .

Transformers are produced with accounting for functioning in conditions of rated power at the nominal ambient temperature as per IEC 60726:

- maximum temperature 40°C;
- average daily temperature 30°C;
- average yearly temperature 20°C.

Unless contrary is specified, average yearly temperature 20°C shall be regarded as the initial temperature.

Basic overload graphs are built on basis of the average yearly temperature 20°C. This climatic regime covers the bigger part of operating conditions and climatic regions.

To consider the specific nature of operation conditions, one can also use graphs with the average yearly temperature 10°C or 30°C (provided they are selected as basic for the complete number of years).

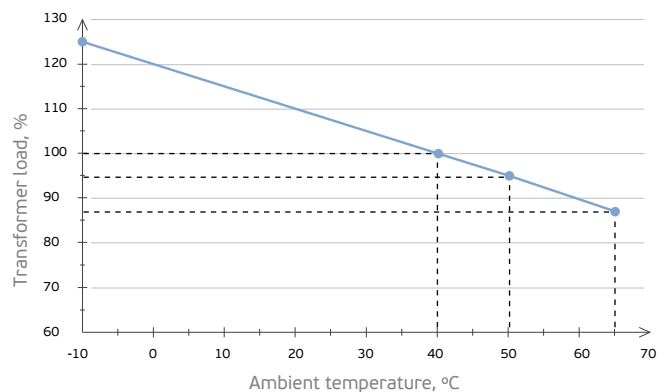
## Dependence graph of allowable load on ambient temperature

SVEL transformers can be operated in the nominal regime for a continuous time, independently on continuity of the preceding load at ambient temperature up to 40°C.

The graph is intended for clarification of the allowable continuous load on the transformer at various values of ambient temperature.

Thus, even if the ambient temperature exceeds the regulated values (e.g., + 60°C), the transformer can be operated at these moments of time with loads not exceeding those on the graph. It is valid for operation at low temperatures as well.

Overload capacities of the transformer within the selected temperature regime shall be determined on overload graphs.



On this graph you can designate the allowable continuous load referred to the current ambient temperature.

# ADDITIONAL FACTORS OF TRANSFORMER OPERATION

## Curves of allowable overloads of dry-type transformers

The graph represent dependence curves of transformer overload on possible operation time in the preset regime.

The average annual temperature regime (and respective overload graphs) shall be selected for the transformer to be installed for the whole period of operation, regardless of the season and current temperature values. It allows planning and normalizing of overloads without extra corrections.

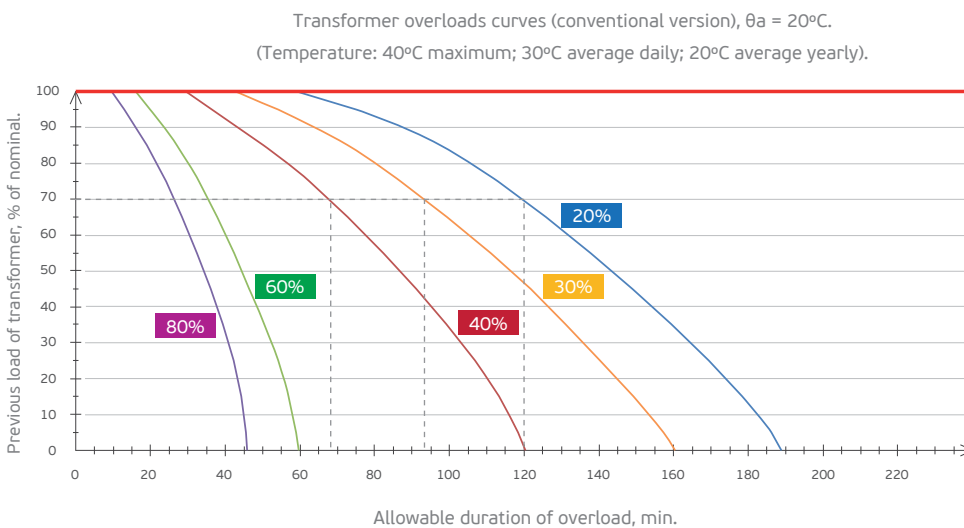
The value and duration of an overload shall be defined on basis of the preceding overload and average annual ambient temperature on the graphs presented below.

The graphs are undersigned with overload values exceeding the nominal load by the specified value. For instance, **80%** is 180% overload (nominal load 100% + overload 80%).

## How to use the graph

- 1) Define the graph on basis of climatic conditions of operation for the whole period of the equipment utilization;
- 2) Note the load before the overload on the graph vertical axis (the previous load of the transformer);
- 3) Draw the line to the right on the horizontal until it crosses the curve corresponding to the required value of overload (overload above the nominal one is given in the rectangular note);
- 4) From the intersection point, lay the value of allowable overload duration downward along the vertical on the line of the allowable overload time.

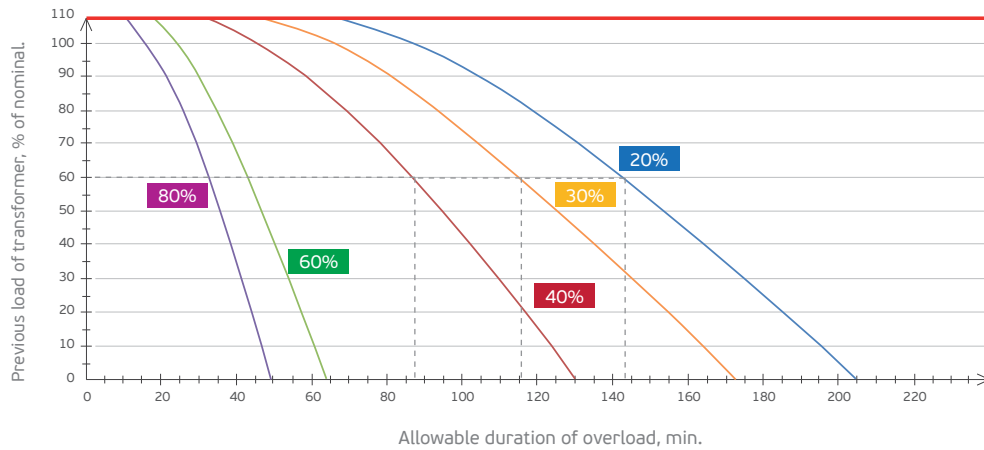
The company always paid top attention at reliability of transformers with accounting for various operation conditions all over the service life. It is also reflected in overload capacities which are advantageous features of SVEL transformers from most of alternative variants.



Example:

Initial load 70%  
Possibility of overload above nominal value by:  
+ 40% for 65-70 minutes;  
+ 30% for 90-95 minutes;  
+ 20% for 120-125 minutes.

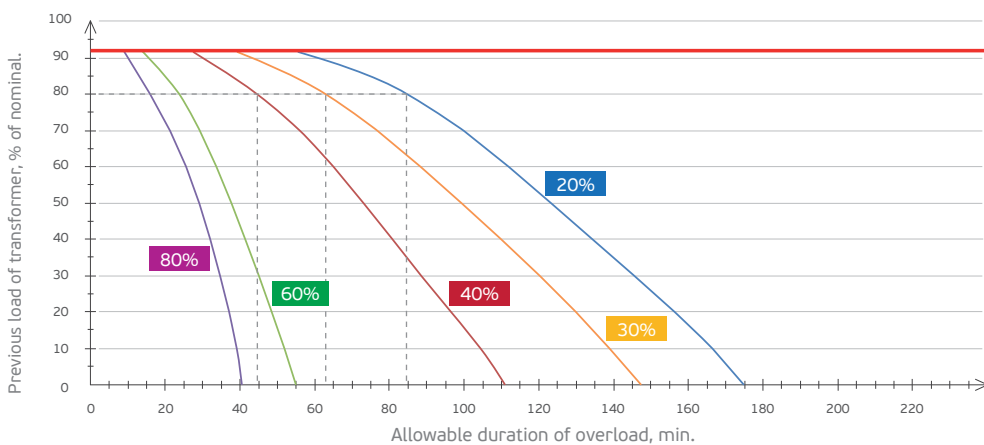
Transformer overloads curves (conventional version),  $\theta_a = 10^\circ\text{C}$ .  
(Temperature:  $30^\circ\text{C}$  maximum;  $20^\circ\text{C}$  average daily;  $10^\circ\text{C}$  average yearly).



Example:

Initial load 60%  
Possibility of overload above nominal value by:  
+ 40% for 85-90 minutes;  
+ 30% for 115-120 minutes;  
+ 20% for 140-145 minutes.

Transformer overloads curves (conventional version),  $\theta_a = 30^\circ\text{C}$ .  
(Temperature:  $50^\circ\text{C}$  maximum;  $40^\circ\text{C}$  average daily;  $30^\circ\text{C}$  average yearly).



Example:

Initial load 80%  
Possibility of overload above nominal value by:  
+ 40% for 40-45 minutes;  
+ 30% for 60-65 minutes;  
+ 20% for 80-85 minutes.

## Transformer additional cooling system

To increase overload characteristics of the transformer, additional ventilation will be used. Use of additional ventilation allows increasing of transformer overload characteristics by 40% in average.

When installing a transformer in a constrained space not allowing for adequate ventilation, or in ambient temperatures close to ultimate allowable documents ( $+40^\circ\text{C}$ ), it is recommended to apply additional ventilation for cooling of the transformer.

Some special types of SVEL transformers include a pre-installed forced ventilation system for provision of normalized working

regimes. In most cases, forced cooling will not be required, but in order to increase overload capacities and compensation of space restrictions of the installation place, additional ventilation can be installed by the customer's request.

Control of additional cooling fans shall be realized in accordance with the logic of the temperature control unit which has been accordingly preset before.



A young man with dark hair, wearing a blue and tan work uniform, is smiling and looking towards the camera. He is leaning over a red industrial machine, which has a control panel with a small screen and various buttons. He is holding a metal tool or component of the machine. The background is a blurred industrial setting with various equipment and lights.

**YOUR KEY ENERGY  
EFFICIENCY PARTNER**



**Cast resin, Ao-Ak (from 100 to 3150 KVA 12 KV, losses Ao-Ak according to IEC EN 50541-1)**

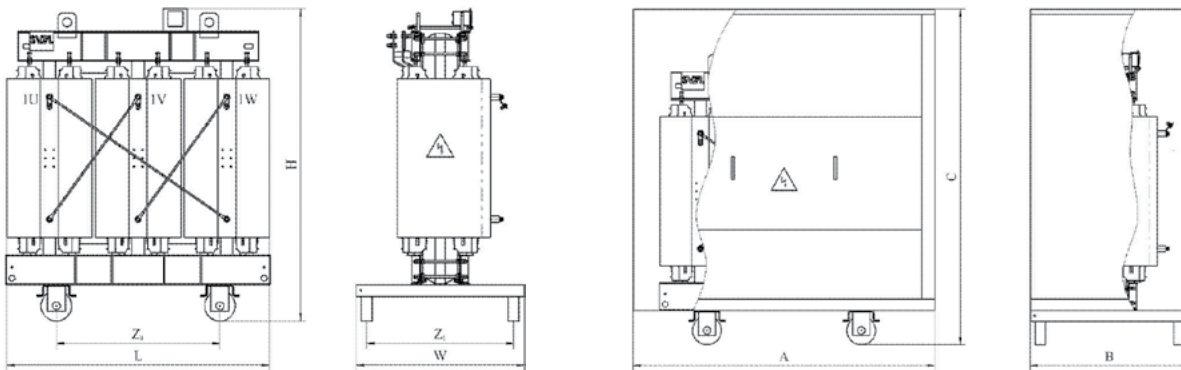
RATED OUTPUT, kVA		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
NO-LOAD LOSSES	W	260	350	500	700	1000	1100	1300	1500	1800	2200	2600	3150
LOAD LOSSES AT 75 °C	W	1650	2350	3050	4050	6400	7200	8100	9750	11500	14000	16600	19300
LOAD LOSSES AT 120 °C	W	1800	2600	3400	4500	7100	8000	9000	11000	13000	15500	18500	22000
NO-LOAD CURRENT	%	1,8	1,6	1,2	1	0,9	0,8	0,7	0,7	0,5	0,5	0,4	0,4
IMPEDANCE VOLTAGE	%	4	4	4	4	6	6	6	6	6	6	6	6

SOUND POWER LEVEL (LwA)	dB(A)	51	54	57	60	62	64	65	67	68	70	71	74

**DIMENSIONS AND WEIGHTS (INDICATIVE)**

Without enclosure IP00

With IP31 Protective enclosure



INSULATION VOLTAGE 12	kV	100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (L)	mm	1200	1200	1350	1350	1450	1500	1600	1650	1800	1950	2050	2150
WIDTH (W)	mm	640	650	650	750	850	850	1000	1000	1000	1310	1400	1400
HEIGHT (H)	mm	1270	1350	1380	1560	1700	1880	2030	2160	2230	2270	2430	2450
WHEEL INTERAXIS (Z)	mm	520	520	520	670	670	670	820	820	820	1070	1070	1070
WHEEL DIAMETER	mm	125	125	125	125	160	160	160	160	160	200	200	200
WEIGHT	kg	850	950	1200	1600	2000	2350	3000	3300	4050	4850	5950	7000

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
LENGTH (A)	mm	1450	1650	1750	1900	2250	2400
WIDTH (B)	mm	900	1050	1100	1250	1600	1650
HEIGHT (C)	mm	1600	1800	2150	2450	2650	2750
ENCLOSURE WEIGHT	kg	155	215	190	270	350	360

**Cast resin, Bo-Bk (from 100 to 3150 KVA 12 KV, losses Bo-Bk according to IEC EN 50541-1)**

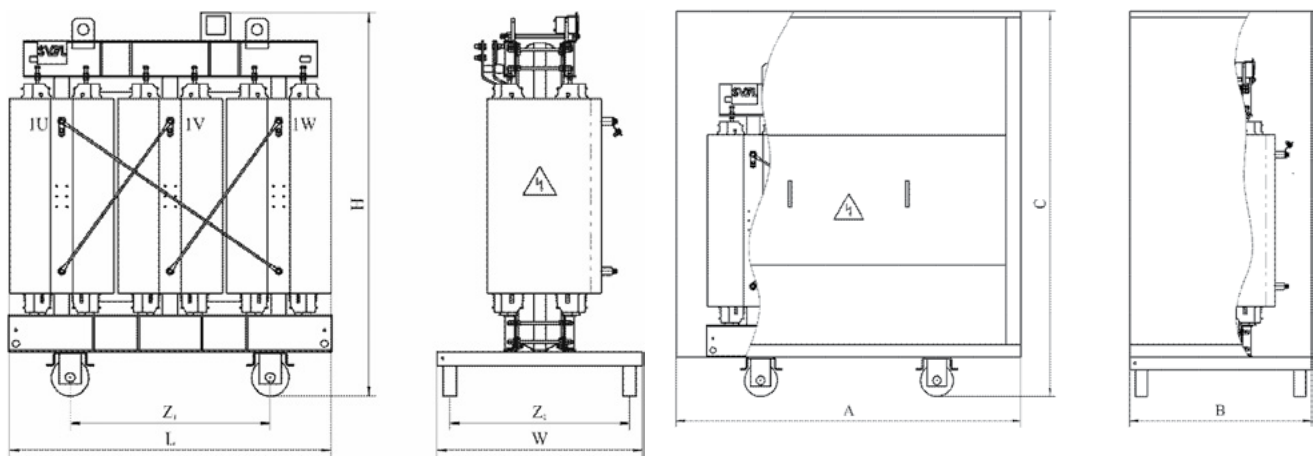
RATED OUTPUT, kVA		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
NO-LOAD LOSSES	W	330	450	610	880	1150	1300	1500	1800	2200	2600	3200	3800
LOAD LOSSES AT 75 °C	W	1800	2450	3150	4400	6600	8100	9000	10600	12900	16000	18600	23400
LOAD LOSSES AT 120 °C	W	2000	2700	3500	4900	7300	9000	10000	12000	14500	18000	21000	26000
NO-LOAD CURRENT	%	1,8	1,6	1,1	0,9	0,7	0,7	0,6	0,5	0,4	0,4	0,3	0,3
IMPEDANCE VOLTAGE	%	4	4	4	4	6	6	6	6	6	6	6	6

SOUND POWER LEVEL (LwA)	dB(A)	51	54	57	60	62	65	67	69	71	73	75	77

**DIMENSIONS AND WEIGHTS (INDICATIVE)**

Without enclosure IP00

With IP31 Protective enclosure



INSULATION VOLTAGE 12	kV	100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (L)	mm	1000	1100	1250	1300	1500	1500	1550	1550	1650	1800	2050	2150
WIDTH (W)	mm	600	600	630	750	850	850	1000	1000	1000	1310	1310	1310
HEIGHT (H)	mm	1100	1200	1220	1320	1590	1740	1820	2000	2180	2260	2390	2400
WHEEL INTERAXIS (Z)	mm	520	520	520	670	670	670	820	820	820	1070	1070	1070
WHEEL DIAMETER	mm	125	125	125	125	160	160	160	160	160	200	200	200
WEIGHT	kg	610	750	970	1400	1800	2030	2400	2700	3300	4000	4800	5900

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
LENGTH (A)	mm	1450	1650	1750	1900	2250	2400
WIDTH (B)	mm	900	1050	1100	1250	1600	1650
HEIGHT (C)	mm	1600	1800	2150	2450	2650	2750
ENCLOSURE WEIGHT	kg	155	215	190	270	350	360

**Cast resin, Co-Bk (from 100 to 3150 KVA 12 KV, losses Co-Bk according to IEC EN 50541-1)**

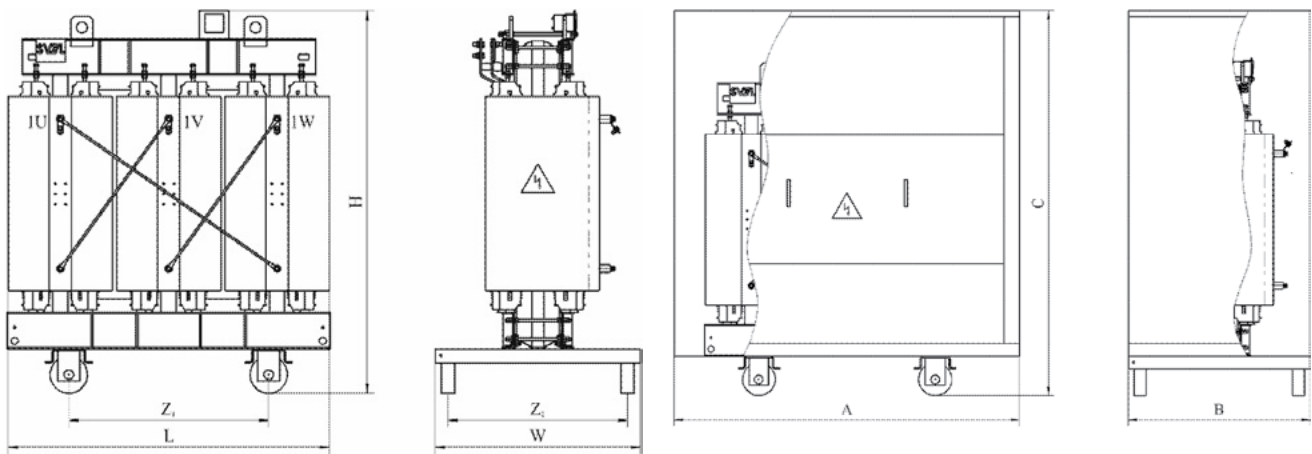
RATED OUTPUT, kVA		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
NO-LOAD LOSSES	W	440	610	820	1150	1500	1800	2100	2500	2800	3600	4300	5300
LOAD LOSSES AT 75 °C	W	1800	2450	3150	4400	6600	8100	9000	10600	12900	16000	18600	23400
LOAD LOSSES AT 120 °C	W	2000	2700	3500	4900	7300	9000	10000	12000	14500	18000	21000	26000
NO-LOAD CURRENT	%	1,8	1,6	1,1	0,9	0,7	0,7	0,6	0,5	0,4	0,4	0,3	0,3
IMPEDANCE VOLTAGE	%	4	4	4	4	6	6	6	6	6	6	6	6

SOUND POWER LEVEL (LwA)	dB(A)	59	62	65	68	70	71	73	75	76	78	81	83

**DIMENSIONS AND WEIGHTS (INDICATIVE)**

Without enclosure IP00

With IP31 Protective enclosure



INSULATION VOLTAGE 12	kV	100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (L),	mm	1050	1080	1180	1335	1450	1510	1525	1605	1665	1760	1850	2070
WIDTH (W)	mm	650	650	650	795	820	835	945	945	945	1195	1195	1195
HEIGHT (H)	mm	1200	1250	1260	1350	1530	1670	1675	1860	2035	2180	2360	2550
WHEEL INTERAXIS (Z)	mm	520	520	520	670	670	670	820	820	820	1070	1070	1070
WHEEL DIAMETER	mm	125	125	125	125	160	160	160	160	160	200	200	200
WEIGHT	kg	610	750	970	1400	1800	2030	2400	2580	2580	3910	4480	6000

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
LENGTH (A)	mm	1450	1650	1750	1900	2250	2400
WIDTH (B)	mm	900	1050	1100	1250	1600	1650
HEIGHT (C)	mm	1600	1800	2150	2450	2650	2750
ENCLOSURE WEIGHT	kg	155	215	190	270	350	360

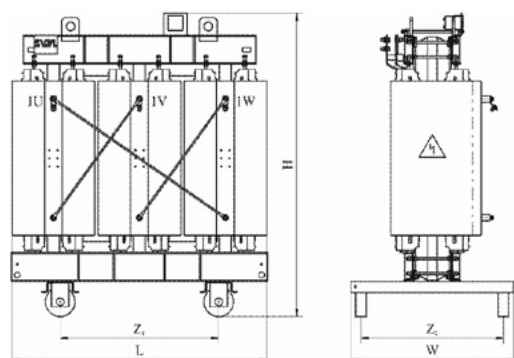
**Cast resin, Ao-Ak (from 100 to 3150 KVA 17,5-24 KV, losses Ao-Ak according to IEC EN 50541-1)**

RATED OUTPUT, kVA		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
NO-LOAD LOSSES	W	280	350	520	750	1100	1300	1550	1800	2200	2600	3100	3800
LOAD LOSSES AT 75 °C	W	1575	2275	2975	3950	6200	7000	7875	9625	11375	14000	16625	19250
LOAD LOSSES AT 120 °C	W	1800	2600	3400	4500	7100	8000	9000	11000	13000	16000	19000	22000
NO-LOAD CURRENT	%	1	0,9	0,8	0,8	0,8	0,6	0,6	0,6	0,6	0,6	0,4	0,4
IMPEDANCE VOLTAGE	%	4	4	4	4	6	6	6	6	6	6	6	6

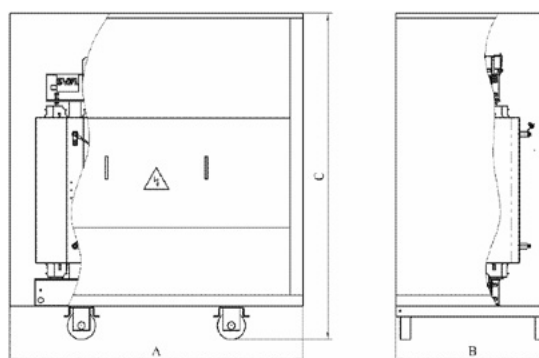
SOUND POWER LEVEL (LwA)	dB(A)	51	54	57	60	62	64	65	67	68	70	71	74

**DIMENSIONS AND WEIGHTS (INDICATIVE)**

Without enclosure IP00



With IP31 Protective enclosure



INSULATION VOLTAGE 17,5	kV	100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (L)	mm	1000	1100	1250	1450	1450	1650	1650	1650	1900	1900	1900	2200
WIDTH (W)	mm	650	650	650	800	800	1000	1000	1000	1200	1200	1200	1200
HEIGHT (H)	mm	1150	1250	1350	1500	1700	1800	1900	2050	2150	2250	2350	2550
WHEEL INTERAXIS (Z)	mm	520	520	520	670	670	820	820	820	1000	1000	1000	1000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	1000	1400	1750	2150	2550	2900	3400	3900	4750	6100

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
LENGTH (A)	mm	1400	1650	1850	2050	2250	2650
WIDTH (B)	mm	1050	1050	1200	1400	1600	1550
HEIGHT (C)	mm	1450	1800	2000	2350	2650	2850
ENCLOSURE WEIGHT	kg	200	215	255	310	350	390

INSULATION VOLTAGE 24	kV	100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (L)	mm	1100	1150	1250	1450	1650	1650	1650	1900	1900	1900	1900	2200
WIDTH (W)	mm	650	650	650	800	1000	1000	1000	1200	1200	1200	1200	1200
HEIGHT (H)	mm	1200	1350	1400	1550	1750	1850	1950	2050	2150	2250	2400	2550
WHEEL INTERAXIS (Z)	mm	520	520	670	670	820	820	820	1000	1000	1000	1000	1000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	700	850	1150	1600	1900	2350	2750	3100	3700	4400	5250	6250

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (A)	mm	1650	1850	2050	2250	2650
WIDTH (B)	mm	1050	1200	1400	1600	1550
HEIGHT (C)	mm	1800	2000	2350	2650	2850
ENCLOSURE WEIGHT	kg	215	255	310	350	390

**Cast resin, Bo-Bk (from 100 to 3150 KVA 17,5-24 KV, losses Bo-Bk according to IEC EN 50541-1)**

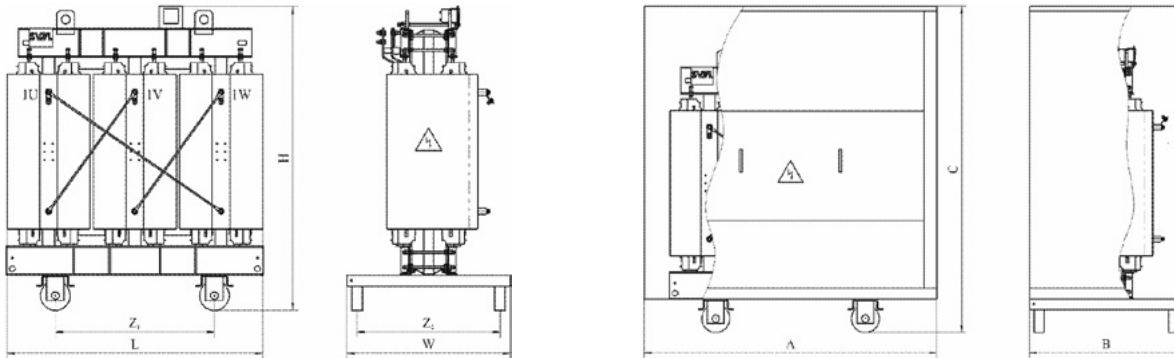
RATED OUTPUT, kVA		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
NO-LOAD LOSSES	W	340	480	650	940	1250	1500	1800	2100	2400	3000	3600	4300
LOAD LOSSES AT 75 °C	W	1800	2550	3325	4800	6650	8225	9625	11375	14000	15750	20125	24500
LOAD LOSSES AT 120 °C	W	2050	2900	3800	5500	7600	9400	11000	13000	16000	18000	23000	28000
NO-LOAD CURRENT	%	1,5	1,4	1,4	1	0,8	0,8	0,8	0,8	0,6	0,8	0,6	0,6
IMPEDANCE VOLTAGE	%	4	4	4	4	6	6	6	6	6	6	6	6

SOUND POWER LEVEL (LwA)	dB(A)	51	54	57	60	62	64	65	67	68	70	71	74

**DIMENSIONS AND WEIGHTS (INDICATIVE)**

Without enclosure IP00

With IP31 Protective enclosure



INSULATION VOLTAGE 17,5	kV	100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (L)	mm	1000	1100	1250	1250	1450	1450	1650	1650	1900	1900	1900	2200
WIDTH (W)	mm	650	650	650	650	800	800	1000	1000	1000	1200	1200	1200
HEIGHT (H)	mm	1100	1200	1350	1500	1700	1800	1850	2050	2150	2250	2350	2400
WHEEL INTERAXIS (Z)	mm	520	520	520	520	670	670	820	820	820	1000	1000	1000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	550	700	900	1200	1600	1900	2300	2600	3150	3800	4450	5400

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
LENGTH (A)	mm	1400	1650	1850	2050	2250	2650
WIDTH (B)	mm	1050	1050	1200	1400	1600	1550
HEIGHT (C)	mm	1450	1800	2000	2350	2650	2850
ENCLOSURE WEIGHT	kg	200	215	255	310	350	390

INSULATION VOLTAGE 24	kV	100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (L)	mm	1100	1150	1250	1450	1450	1450	1650	1650	1900	1900	1900	2200
WIDTH (W)	mm	650	650	650	800	800	800	1000	1000	1200	1200	1200	1200
HEIGHT (H)	mm	1150	1300	1400	1550	1750	1900	1950	2050	2150	2400	2400	2450
WHEEL INTERAXIS (Z)	mm	520	520	670	670	820	820	820	820	1000	1000	1000	1000
WHEEL WIDTH	mm	40	40	40	40	50	50	50	50	50	50	50	50
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	900	1350	1750	2000	2450	2700	3400	3900	4750	6050

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
LENGTH (A)	mm	1500	1650	1850	2050	2250	2650
WIDTH (B)	mm	1050	1050	1200	1400	1600	1550
HEIGHT (C)	mm	1550	1800	2000	2350	2650	2850
ENCLOSURE WEIGHT	kg	200	215	255	310	350	390

**Cast resin, Co-Bk (from 100 to 3150 KVA 17,5-24 KV, losses Co-Bk according to IEC EN 50541-1)**

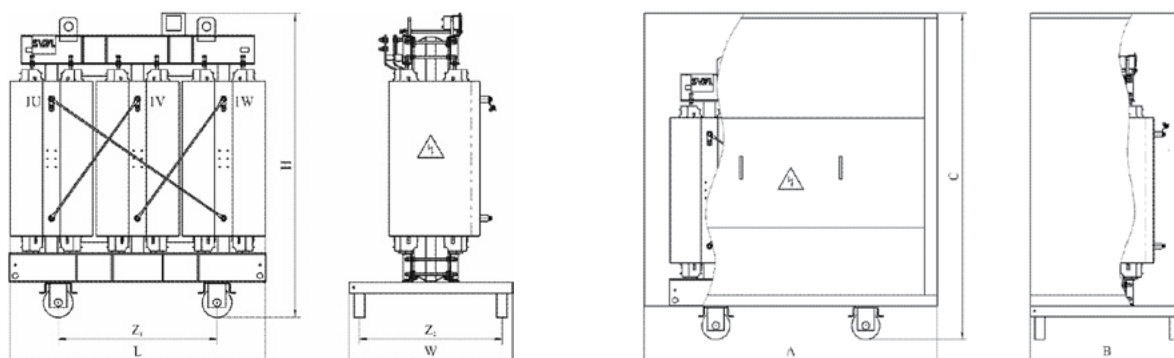
RATED OUTPUT, kVA		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
NO-LOAD LOSSES	W	460	650	880	1200	1650	2000	2300	2800	3100	4000	5000	6000
LOAD LOSSES AT 75 °C	W	1800	2550	3325	4800	6650	8225	9625	11375	14000	15750	20125	24500
LOAD LOSSES AT 120 °C	W	2050	2900	3800	5500	7600	9400	11000	13000	16000	18000	23000	28000
NO-LOAD CURRENT	%	1,4	1,4	1,2	1	0,8	0,8	0,8	0,8	0,7	0,7	0,6	0,6
IMPEDANCE VOLTAGE	%	4	4	4	4	6	6	6	6	6	6	6	6

SOUND POWER LEVEL (LwA)	dB(A)	59	62	65	68	70	72	73	75	76	78	81	83
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**DIMENSIONS AND WEIGHTS (INDICATIVE)**

Without enclosure IP00

With IP31 Protective enclosure



INSULATION VOLTAGE 17,5	kV	100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (L)	mm	1000	1100	1250	1250	1450	1450	1650	1650	1900	1900	1900	2200
WIDTH (W)	mm	650	650	650	650	800	800	1000	1000	1000	1200	1200	1200
HEIGHT (H)	mm	1100	1200	1350	1500	1700	1800	1850	2050	2150	2250	2350	2400
WHEEL INTERAXIS (Z)	mm	520	520	520	520	670	670	820	820	820	1000	1000	1000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	550	700	900	1200	1600	1900	2300	2600	3150	3800	4450	5350

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
LENGTH (A)	mm	1500	1650	1850	2050	2250	2650
WIDTH (B)	mm	1050	1050	1200	1400	1600	1550
HEIGHT (C)	mm	1550	1800	2000	2350	2650	2850
ENCLOSURE WEIGHT	kg	200	215	255	310	350	390

INSULATION VOLTAGE 24	kV	100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (L)	mm	1100	1150	1250	1250	1450	1450	1650	1650	1900	1900	1900	2200
WIDTH (W)	mm	650	650	650	800	800	800	1000	1000	1200	1200	1200	1200
HEIGHT (H)	mm	1150	1300	1400	1550	1750	1900	1950	2050	2150	2400	2400	2450
WHEEL INTERAXIS (Z)	mm	520	520	670	670	820	820	820	820	1000	1000	1000	1000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	900	1300	1700	2000	2400	2700	3300	3900	4650	5850

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
LENGTH (A)	mm	1500	1650	1850	2050	2250	2650
WIDTH (B)	mm	1050	1050	1200	1400	1600	1550
HEIGHT (C)	mm	1550	1800	2000	2350	2650	2850
ENCLOSURE WEIGHT	kg	200	235	255	310	350	390



**Cast resin, Ao-Ak (from 250 to 2500 KVA 36 KV, losses Ao-Ak according to IEC EN 50541-1)**

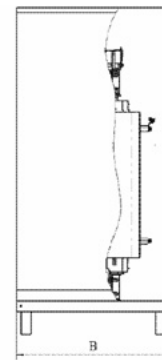
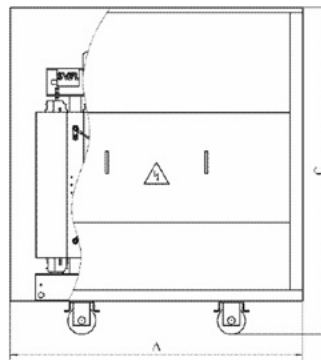
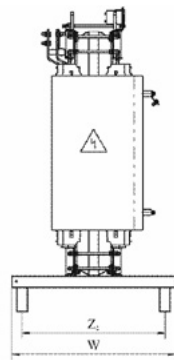
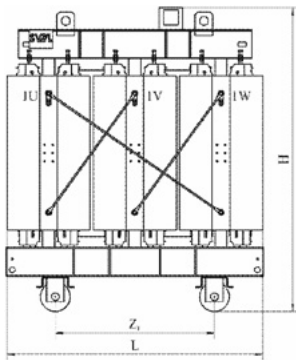
RATED OUTPUT, kVA		250	400	630	800	1000	1250	1600	2000	2500
NO-LOAD LOSSES	W	1000	1200	1400	1650	1900	2200	2550	3000	3500
LOAD LOSSES AT 75 °C	W	3150	4500	6250	7500	8900	10800	12600	15300	18000
LOAD LOSSES AT 120 °C	W	3500	5000	7000	8400	10000	12000	14000	17000	20000
NO-LOAD CURRENT	%	1,3	1,1	1	0,9	0,8	0,7	0,6	0,6	0,5
IMPEDANCE VOLTAGE	%	6	6	6	6	6	6	6	6	6

SOUND POWER LEVEL (LwA)	dB(A)	59	61	63	64	65	67	68	72	73

**DIMENSIONS AND WEIGHTS (INDICATIVE)**

Without enclosure IP00

With IP31 Protective enclosure



INSULATION VOLTAGE 36	kV	250	400	630	800	1000	1250	1600	2000	2500
LENGTH (L),	mm	1650	1650	1650	1850	1950	2000	2150	2300	2500
WIDTH (W)	mm	850	850	1000	1000	1000	1000	1310	1310	1310
HEIGHT (H)	mm	1750	1850	2000	2100	2200	2350	2400	2500	2600
WHEEL INTERAXIS (Z)	mm	670	670	820	820	820	820	1070	1070	1070
WHEEL DIAMETER	mm	160	160	160	160	160	160	200	200	200
WEIGHT	kg	1900	2200	2800	3400	3700	4500	5300	6600	7500

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (A)	mm	2400	2550	2650	2950	3200
WIDTH (B)	mm	1350	1500	1550	1850	1850
HEIGHT (C)	mm	2200	2500	2850	2900	3150
ENCLOSURE WEIGHT	kg	290	340	390	435	700

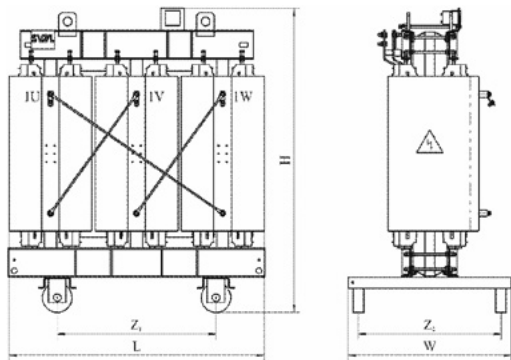
**Cast resin, Bo-Bk (from 250 to 2500 KVA 36 KV, losses Bo-Bk according to IEC EN 50541-1)**

RATED OUTPUT, kVA		250	400	630	800	1000	1250	1600	2000	2500
NO-LOAD LOSSES	W	1100	1300	1600	1900	2250	2600	3000	3500	4200
LOAD LOSSES AT 75 °C	W	3400	4800	6700	8000	9800	11600	14300	16500	20100
LOAD LOSSES AT 120 °C	W	3800	5400	7500	9000	11000	13000	16000	18500	22500
NO-LOAD CURRENT	%	1,3	1,1	1	0,9	0,8	0,7	0,6	0,6	0,5
IMPEDANCE VOLTAGE	%	6	6	6	6	6	6	6	6	6

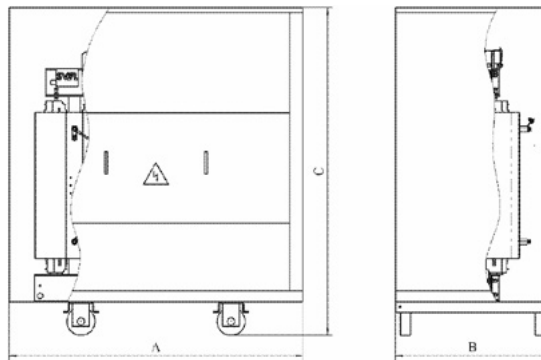
SOUND POWER LEVEL (LwA)	dB(A)	64	65	68	69	70	72	73	74	78

**DIMENSIONS AND WEIGHTS (INDICATIVE)**

Without enclosure IP00



With IP31 Protective enclosure



INSULATION VOLTAGE 36	kV	250	400	630	800	1000	1250	1600	2000	2500
LENGTH (L),	mm	1450	1470	1560	1740	1750	1790	1850	1980	2120
WIDTH (W)	mm	790	870	880	920	990	1000	1010	1200	1200
HEIGHT (H)	mm	1750	1790	1970	2030	2180	2220	2440	2540	2580
WHEEL INTERAXIS (Z)	mm	520	670	670	670	820	820	820	1070	1070
WHEEL DIAMETER	mm	160	160	160	160	160	160	200	200	200
WEIGHT	kg	1480	1680	2130	2880	3160	3520	4200	5460	6090

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4
LENGTH (A)	mm	2400	2550	2650	2950
WIDTH (B)	mm	1350	1500	1550	1850
HEIGHT (C)	mm	2200	2500	2850	2900
ENCLOSURE WEIGHT	kg	290	340	390	435

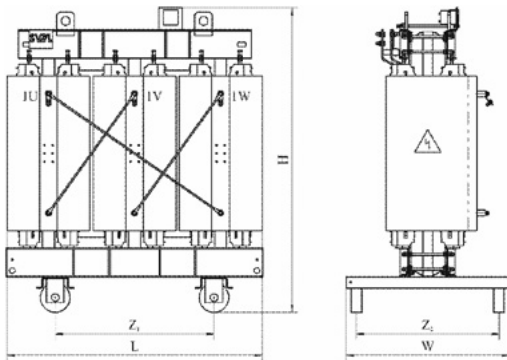


**Cast resin, Co-Bk (from from 250 to 2500 KVA 36 KV, losses Co-Bk according to IEC EN 50541-1)**

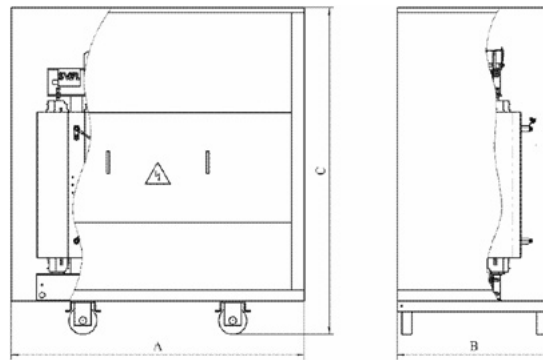
RATED OUTPUT, kVA		250	400	630	800	1000	1250	1600	2000	2500
NO-LOAD LOSSES	W	1100	1300	1600	1900	2250	2600	3000	3500	4200
LOAD LOSSES AT 75 °C	W	3400	4800	6700	8000	9800	11600	14300	16500	20100
LOAD LOSSES AT 120 °C	W	3800	5400	7500	9000	11000	13000	16000	18500	22500
NO-LOAD CURRENT	%	1,3	1,1	1	0,9	0,8	0,7	0,6	0,6	0,5
IMPEDANCE VOLTAGE	%	6	6	6	6	6	6	6	6	6
SOUND POWER LEVEL (LwA)	dB(A)	64	65	68	69	70	72	73	74	78

**DIMENSIONS AND WEIGHTS (INDICATIVE)**

Without enclosure IP00



With IP31 Protective enclosure



INSULATION VOLTAGE 12	kV	250	400	630	800	1000	1250	1600	2000	2500
LENGTH (L),	mm	1450	1470	1560	1740	1750	1790	1850	1980	2120
WIDTH (W)	mm	790	870	880	920	990	1000	1010	1200	1200
HEIGHT (H)	mm	1750	1790	1970	2030	2180	2220	2440	2540	2580
WHEEL INTERAXIS (Z)	mm	520	670	670	670	820	820	820	1070	1070
WHEEL DIAMETER	mm	160	160	160	160	160	160	200	200	200
WEIGHT	kg	1480	1680	2130	2880	3160	3520	4200	5460	6090

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4
LENGTH (A)	mm	2400	2550	2650	2950
WIDTH (B)	mm	1350	1500	1550	1850
HEIGHT (C)	mm	2200	2500	2850	2900
ENCLOSURE WEIGHT	kg	290	340	390	435

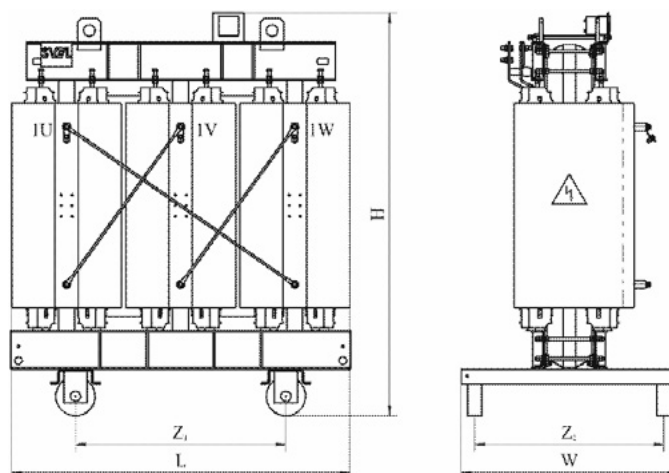
**Cast resin transformers for Egypt, Insulation voltage 12 kV**

<b>RATED OUTPUT kVA</b>		<b>500</b>	<b>1 000</b>	<b>1 500</b>
RATED VOLTAGE	kV	10.5 / 0.4	10.5 / 0.4	10.5 / 0.4
NO-LOAD LOSSES	W	1300	1850	2600
LOAD LOSSES AT 75 °C	W	5100	8000	10300
LOAD LOSSES AT 120 °C	W	5740	9000	11600
NO-LOAD CURRENT	%	0.5	0.35	0.35
IMPEDANCE VOLTAGE	%	4	5	6

SOUND LEVEL (LpA)	dB(A)	56	59	61
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**DIMENSIONS AND WEIGHTS (INDICATIVE)**

Without enclosure IP00



<b>INSULATION VOLTAGE 12 kV</b>		<b>500</b>	<b>1 000</b>	<b>1 500</b>
LENGTH (L)	mm	1540	1670	1900
WIDTH (W)	mm	780	970	1190
HEIGHT (H)	mm	1600	1890	2050
WHEEL INTERAXIS (Z)	mm	670	820	820
WHEEL DIAMETER	mm	125	160	160
WEIGHT	kg	2200	3100	3900

## Cast resin transformers for Egypt, Insulation voltage 24 kV

RATED OUTPUT kVA		500	1 000	1 500
RATED VOLTAGE	kV	22 / 0.4	22 / 0.4	22 / 0.4
NO-LOAD LOSSES	W	1 500	2 200	2 800
LOAD LOSSES AT 75 °C	W	5600	8900	12800
LOAD LOSSES AT 120 °C	W	6 300	10 000	14 400
NO-LOAD CURRENT	%	0.5	0.35	0.35
IMPEDANCE VOLTAGE	%	4	5	6
SOUND LEVEL (LpA)	dB(A)	56	59	61
LENGTH (L)	mm	1630	1850	2000
WIDTH (W)	mm	780	970	1270
HEIGHT (H)	mm	1640	1950	2300
WHEEL INTERAXIS (Z)	mm	670	820	820
WHEEL DIAMETER	mm	125	160	160
WEIGHT	kg	2400	3600	4200

\* SVEL Group shall warrant the dry type transformer to be free from defects in both material and workmanship for period of 12 months from the time of installation or 18 months after shipment ever occurs first. In case of supplying for the first time the warranty may be 4 years starting from delivery date. Also you may clarify the expanded warranty from the company.

# SVEL PRODUCE FOLLOW DRY-TYPE TRANSFORMERS

- Distribution transformers
- Earthing transformers
- Transformers for 6-12-18-24 pulse converter
- HV-HV transformers
- Scott type transformers
- Autotransformers
- Marine transformers
- Transformers for Urban electric transport
- Transformers for renewable energy
- Amorphous cast resin dry-type transformers





# APPLICATION



ENERGY



INDUSTRIAL ENTERPRISES



OIL & GAS



METALLURGY



BUILDING INDUSTRY



TRANSPORT

NORWAY

# GEOGRAPHY OF DELIVERIES

ECUADOR



LATVIA

BELARUS

UKRAINE

GEORGIA

AZERBAIJAN

ARMENIA

EGYPT

KAZAKHSTAN

UZBEKISTAN

TURKMENISTAN

КИРГИЗИЯ

TAJIKISTAN

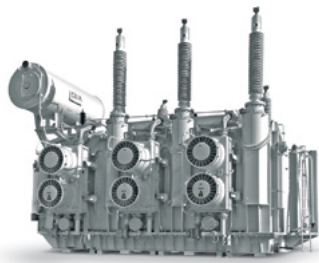
INDIA

MYANMAR

RUSSIA

SOUTH  
KOREA

## OUR OTHER PRODUCTS:



OIL-IMMERSED TRANSFORMERS



REACTORS EQUIPMENT



INSTRUMENT TRANSFORMERS



PACKAGED SWITCHGEAR DEVICES



TRANSFORMER SUBSTATIONS



LOW-VOLTAGE SWITCHGEAR DEVICE

Более подробная информация на сайте: [www.svel.ru/en](http://www.svel.ru/en)



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[youtube.com/user/SVELcorporate](https://youtube.com/user/SVELcorporate)









YOUR KEY ENERGY EFFICIENCY PARTNER

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*The information in this contains general descriptions of the technical options available, which do not always have to be present in individual cases.*

*The required features should therefore be specified in each individual case at the time of closing the contract.*