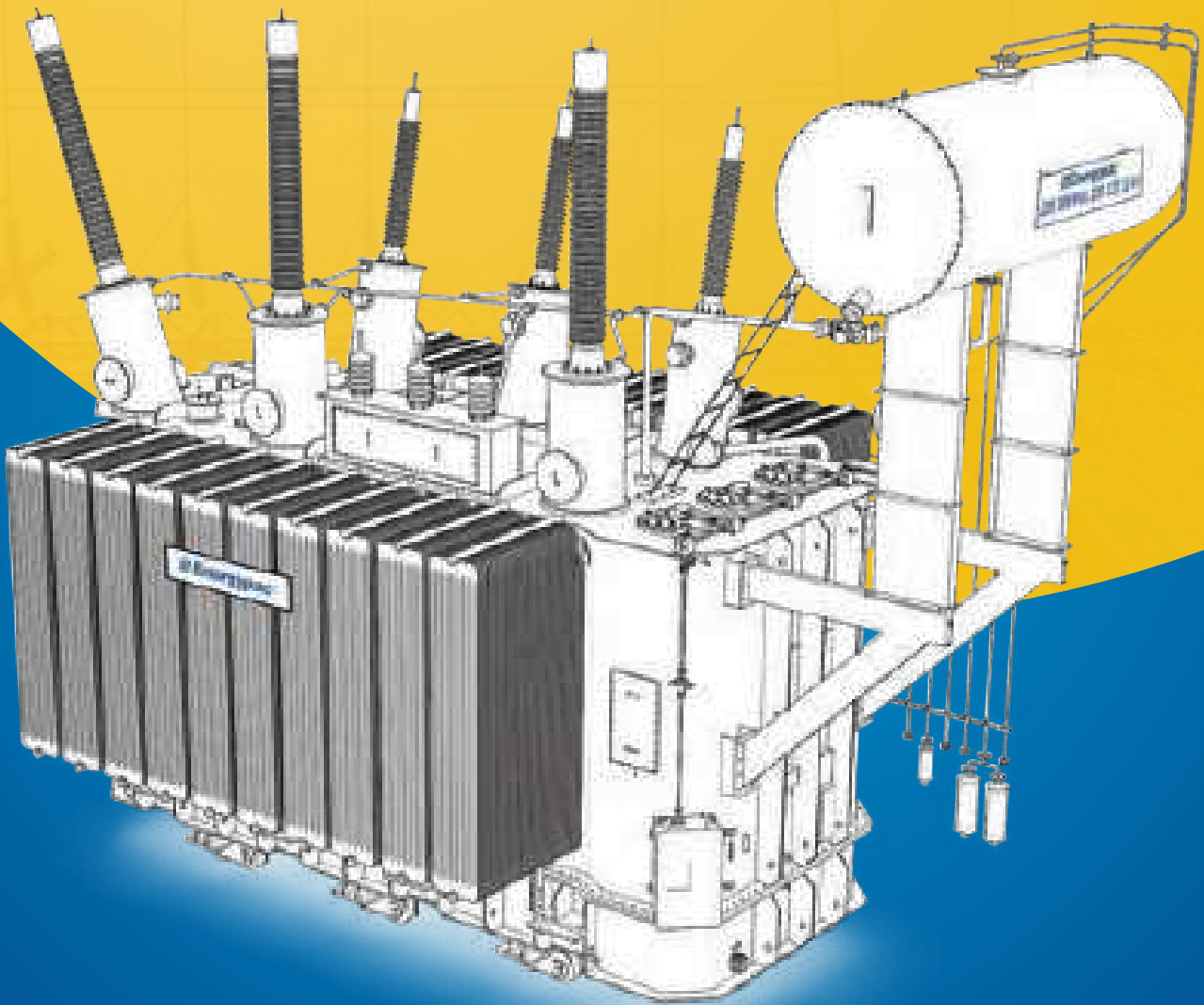


COMPREHENSIVE SOLUTIONS FROM DESIGN TO DELIVERY



TRANSFORMERS

300 MVA
230/132/33kV
AUTO TRANSFORMER

FIRST
300
MVA

POWER TRANSFORMER
IN BANGLADESH

Client
Power Grid Company of Bangladesh

 **Sirajganj, Bangladesh**

80 MVA

11/132kV

**GENERATOR STEP-UP
TRANSFORMER**

Client

United Jamalpur Power Limited



Jamalpur, Bangladesh

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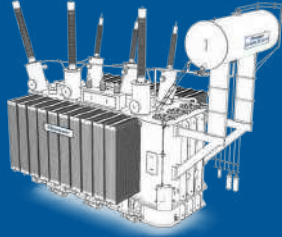
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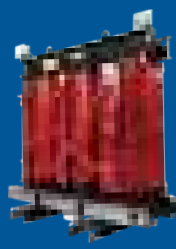
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POWER TRANSFORMER





DISTRIBUTION TRANSFORMER (OIL FILLED)



DISTRIBUTION TRANSFORMER (DRY TYPE)



INSTRUMENT TRANSFORMER



VACUUM CIRCUIT BREAKER



SWITCHGEAR



BUSBAR TRUNKING SYSTEM

INDEX

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TRANSFORMERS

Transformers are one of the primary components for the transmission and distribution of electrical energy. Their design results mainly from range of application, construction, rated power and the voltage level. The scope of transformer starts with generator transformers and ends with distribution transformers. Transformers which are directly connected to the generator of the power stations are called generator transformers. Energypac's standard range goes up to 520MVA and 400kV. The connection between the different high voltage system levels are made via network transformers. Energypac is able to offer network transformers up to 520MVA, 400kV. Transformers from 5kVA to 2500kVA and up to 36kV on the high voltage side and 3.6kV on the low voltage side are referred as distribution transformers. In the last step, they distribute the electrical energy to the consumers by feeding from the high-voltage into the low-voltage distribution network. These are designed either as liquid-filled or as dry-type transformers. All transformers of higher ratings are classified as power transformers.

In addition, there are various special purpose transformers such as rectifier transformers, traction transformers which can be both in the range of power transformers and in the range of distribution transformers as far as rated power and rated voltage are concerned. Instrument transformers are available for high accuracy transformation of high current and high voltage levels down to low currents and low voltage outputs for measurement purposes. They are

tailored to maintain reasonable accuracy even in extreme fault level conditions. Energypac also manufactures variable autotransformers, which have a wide range of applications, including electronics testing. Variacs are low voltage autotransformers that provide a variable AC voltage.

The general overview of our manufacturing/ delivery program is shown in the table "Product Range".



Standards and specifications, general

The transformers comply with the relevant IEC specifications. Therefore, they also satisfy the requirements of IS 2026, and standards and specifications (HD and EN) of the European Union (EU). Enquiries should be directed to the manufacturer where other standards and specifications are concerned. Only the US (ANSI/NEMA) and Canadian (CSA) standards differ from IEC by any substantial degree, however, a design according to these standards are also possible.

PRODUCT RANGE



Power Transformers Above 2.5MVA, 36kV and up to 520MVA, 400kV (system and system interconnecting transformers, with separate windings or auto-connected), with on-load tap changers or off-circuit tap changers, of three- or single-phase design. Transformers up to 36kV, 10MVA are available in both oil filled and dry type varieties.



Pole Mounted Single-Phase Transformer 5kVA to 75kVA, highest voltage for equipment up to 36kV, with copper windings.



Distribution Transformer, Oil Filled 50 to 6250kVA, highest voltage for equipment up to 36kV, with copper or aluminum windings, hermetically sealed or with conservator of three-phase design.



Distribution Transformer, Cast Resin 100kVA to 6250kVA, highest voltage for equipment up to 36kV, of three or single-phase design substations.



Special Application Transformers Furnace transformers, rectifier transformers, traction transformers mounted on rolling stock and appropriate on-load tap-changers, substation transformers for traction systems.



Instrument Transformer Low voltage (<1.1kV), medium voltage (≤ 36 kV), oil filled or resin cast and oil filled high voltage instrument transformers up to 400kV.



Variac Variable autotransformers with input 240V, single phase or 415V, three-phase with variable output range in multiple mounting options.



Accessories Buchholz relays, oil testing equipment, oil flow indicators and other monitoring devices, fan control cabinets, control cabinets for parallel operation and automatic voltage control sensors (PTC, PT 100) as well as online monitoring facilities.



Service Advisory services for transformer specifications, organization, coordination and supervision of transportation, supervision of assembly and commissioning, service/ inspection troubleshooting services, training of customer personnel, investigation and assessment of oil problems amongst others.

ELECTRICAL DESIGN

Power ratings and type of cooling

All power ratings in this guide are the product of rated voltage (times phase factor for three-phase transformers) and rated current of the line side winding (at center tap, if several taps are provided), expressed in kVA or MVA, as defined in IEC 76-1. If only one power rating and no cooling method is shown, natural oil-air cooling (ONAN or OA) is implied for oil-immersed transformers. If two ratings are shown, forced-air cooling (ONAF or FA) in one or two steps are applicable.

For cast resin transformers, natural air cooling (AN) is standard. Forced air cooling (AF) is also applicable.

Temperature rise

In accordance with IEC-76, the standard temperature rise for oil-immersed power and distribution transformers are:

- ❑ 65K average winding temperature (measured by the resistance method)
- ❑ 60K top oil temperature (measured by thermometer)
- ❑ In accordance with IS 1180, reduced temperature rise transformers are also available.

The standard temperature rise for Energypac cast-resin transformers are:

- ❑ 100K (insulation class F) at HV and LV winding.
- ❑ 120K (insulation class H) at HV and LV winding. Whereby the standard ambient temperatures are defined as follows:
 - ❑ 40°C maximum temperature,
 - ❑ 30°C average on any one day,
 - ❑ 20°C average in any one year,
 - ❑ -25°C lowest temperature outdoors,
 - ❑ -5°C lowest temperature indoors.

Higher Ambient temperatures require a corresponding reduction in temperature rise, and thus affect price or rated power as follows:

- ❑ 1.5% surcharge for each 1K above standard temperature conditions, or
- ❑ 1.0% reduction of rated power for each 1K above standard temperature conditions. These adjustment factors are applicable up to 15K above standard temperature conditions.

Transformer losses and efficiencies

Losses and efficiencies stated in this guide are average values for guidance only. They are applicable if no loss evaluation figure is stated in the inquiry (see following chapter) and they are subject to the tolerances stated in IEC 76-1, namely +10% of the total losses, or +15% of each component loss, provided that the tolerance for the total losses is not exceeded.

If optimized and/or guaranteed losses without tolerances are required, this must be stated in the inquiry.

Altitude of installation

The transformers are suitable for operation at altitudes up to 1000 meters above sea level. Site altitudes above 1000 m necessitate the use of special designs and an increase/or a reduction of the transformer ratings as follows (approximate values):

- 2% increase for every 500 m altitude (or part there of) in excess of 1000 m, or
- 2% reduction of rated power for each 500 m altitude (or part there of) in excess of 1000 m.

Connections and vector groups

Distribution Transformers

The transformers listed in this guide are primarily three-phase transformers with one set of windings connected in star (wye) and the other one in delta, whereby the neutral of the star-connected winding is fully rated and brought to the outside. The primary winding (HV) is normally connected in delta, the secondary winding (LV) in wye. The electrical offset of the windings in respect to each other is either 30, 150 or 330 degrees standard (Dy1, Dy5, Dy11). Single-phase transformers are also available and included in this catalogue. Details of autotransformers can be provided on request.

Power Transformers

Generator transformers and large power transformers are usually connected in Yd. For star/star-connected transformers and autotransformers normally a tertiary winding in delta, whose rating is a third of that of the transformer, has to be added. This stabilizes the phase-to-phase voltages in the case of an unbalanced load and prevents the displacement of the neutral point. Single-phase transformers and autotransformers are used when the transportation possibilities are limited. They will be connected at site to three-phase transformer banks.

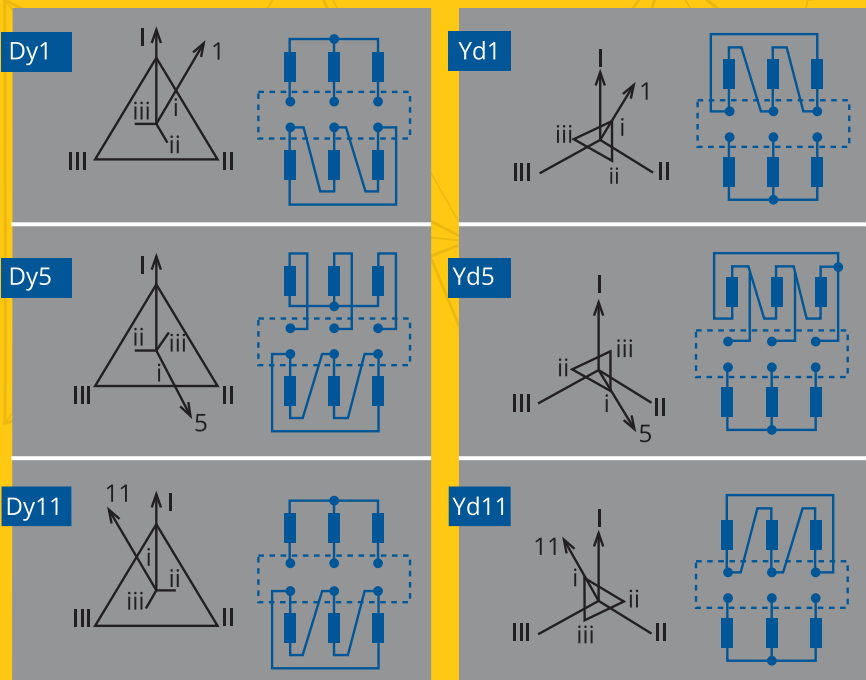


Fig.: Most commonly used vector groups

ELECTRICAL DESIGN

Insulation level

Power-frequency withstand voltages and lightning-impulse withstand voltages are in accordance with IEC 76-3, Para. 5, Table II, as follows:

Highest voltage for equipment U_m (r. m. s.)	Rated short duration power frequency withstand voltage (r. m. s.)	Rated lightning impulse withstand voltage (peak)	
		List 1	List 2
[kV]	[kV]	[kV]	[kV]
≤1.1	3	-	-
3.6	10	20	40
7.2	20	40	60
12.0	28	60	75
17.5	38	75	95
24.0	50	95	125
36.0	70	145	170
52.0	95	250	
72.5	140	325	
123.0	185	450	
145.0	230	550	
	275	650	
170.0	325	750	
	360	850	
245.0	395	950	

Higher test voltage withstand requirements must be stated in the inquiry and may result in a higher price.

Fig.: Insulation Level

Conversion to 60 Hz – possibilities

All ratings in the selection tables of this guide are based on 50 Hz operation.

For 60 Hz operation, the following options apply:

- Rated power and impedance voltage are increased by 10%, all other parameters remain identical.
- Rated power increases by 20%, but no-load losses increase by 30% and noise level increases by 3 dB, all other parameters remain identical (this lay out is not possible for cast-resin transformers).
- All technical data remain identical, price is reduced by 5%.
- Temperature rise is reduced by 10 K, load losses are reduced by 15%, all other parameters remain identical.

Overloading

Overloading of Energypac transformers are guided by the relevant IEC-354 "Loading guide for oil-immersed transformers" and the similar ANSI C57.92 "Guide for loading mineral oil-immersed power transformers". Overloading of cast resin transformers done on request.

Routine and special tests

All transformers are subjected to the following routine tests in the factory:

- Measurement of winding resistance
- Measurement of voltage ratio and check of polarity or vector group
- Measurement of impedance voltage
- Measurement of load loss
- Measurement of no-load loss and no-load current
- Induced overvoltage withstand test
- Separate-source voltage withstand test
- Partial discharge test (only cast-resin transformers)

The following special tests are optional and must be specified in the inquiry:

- Lightning-impulse voltage test (LI test), full-wave and chopped-wave (specify)
- Partial discharge test
- Heat-run test at natural or forced cooling (specify)
- Noise level test
- Short-circuit test

Test certificates are issued for all the above tests on request.

Transformer cell (indoor installation)

The transformer cell must have the necessary electrical clearances when an open air connection is used. The ventilation system must be large enough to fulfill the recommendations for the maximum temperatures according to IEC.

For larger power transformers either an oil/water cooling system has to be used or the oil/air cooler (radiator bank) has to be installed outside the transformer cell. In these cases a ventilation system has to be installed also to remove the heat caused by the convection of the transformer tank.

MECHANICAL DESIGN

General mechanical design for oil-immersed transformers:

For oil-immersed transformers:

- Iron core made of grain-oriented electrical sheet steel insulated on both sides, core type.
- Windings consisting of copper section wire or copper strip. The insulation has a high disruptive strength and is temperature resistant, thus guaranteeing a long service life.
- Designed to withstand short circuit for at least 2 seconds (IEC).
- Oil-filled tank designed as tank with strong corrugated walls or as radiator tank.
- Transformer base with plain or flanged wheels (skid base available).
- Cooling/insulation liquid: Mineral oil according to IEC 296. Silicone oil or biodegradable alternatives are available on request.
- Standard coating for indoor installation. Coatings for outdoor installation and for special applications (e.g. aggressive atmosphere) are available.

Tank design

Corrugated fin tank distribution transformers

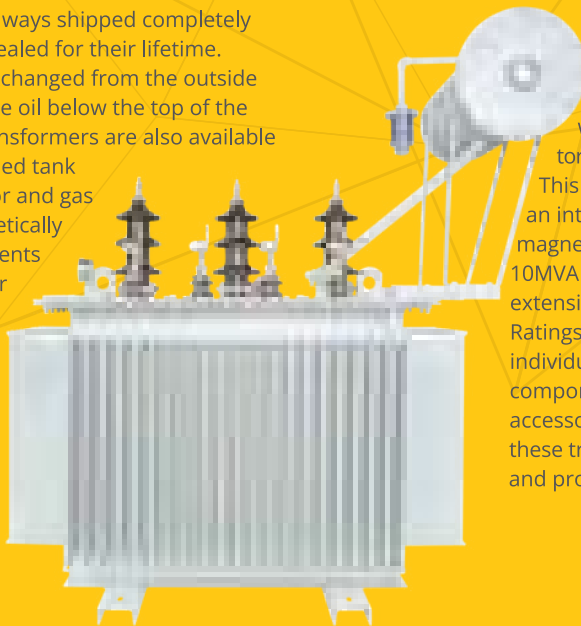
In ratings up to 3000kVA for 11kV and 6MVA for 33kV, the standard is corrugated fin tank transformers with conservator. The transformer is always completely filled with oil. Tanks are of the corrugated steel design, whereby the sidewalls are formed on automatic machines into integral cooling pockets. Suitable spot welds and braces render the required mechanical stability. Tank bottom and cover are fabricated from rolled and welded steel plate. Conventional radiators are available. Oil expansion is taken up by the flexible corrugated steel tank (variable volume tank design), whereby the maximum operating pressure remains at only a fraction of the usual. These transformers are always shipped completely filled with oil and sealed for their lifetime. Bushings can be exchanged from the outside without draining the oil below the top of the active part. The transformers are also available in hermetically sealed tank without conservator and gas cushion. The hermetically sealed system prevents oxygen, nitrogen, or humidity from contact with the insulating oil. This improves the aging properties of the oil to the extent that no maintenance is required on these transformers for their lifetime.

Detachable radiator type tank

This is the standard transformer design for all 11kV transformers from 3000kVA and all 36kV transformers from 7500kVA. The oil level in the tank and the top-mounted bushings are kept constant by a conservator vessel or expansion tank mounted at the highest point of the transformer. Oil-level changes due to thermal cycling affect the conservator only. The ambient air is prevented from direct contact with the insulating oil through oil traps and dehydrating breathers.

Power transformers

Power transformers of all ratings are equipped with conservators. Both the open and closed system are available. With the closed system the oil does not come into contact with the surrounding air. The oil expansion is compensated with an air bag. (This design is also available for greater distribution transformers on request). The sealing bag consists of strong nylon braid with a special double lining of ozone and oil resistant nitrile rubber. The interior of this bag is in contact with the ambient air through a dehydrating breather; the outside of this bag is in direct contact with the oil. All tanks, radiators and conservators (incl. conservator with airbag) are designed for vacuum filling of the oil. For transformers with on-load tap changers a separate smaller conservator is necessary for the diverter switch compartment. This separate conservator (without air bag) is normally an integrated part of the main conservator with its own magnetic oil level indicator. Power transformers up to 10MVA are fitted with weld-on radiators and are shipped extensively assembled; shipping conditions permitted. Ratings above 10 MVA require detachable radiators with individual butterfly valves, and partial dismantling of components for shipment. All the usual fittings and accessories for oil treatment, shipping and installation of these transformers are provided as standard. For monitoring and protective devices, see the listing on page 4/11.



CONNECTION SYSTEMS

Distribution transformers

All Energypac transformers have top-mounted HV and LV bushings according to EN/DIN in their standard version. Besides the open bushing arrangement for direct connection of bare or insulated wires, three basic insulated termination systems are available:

Fully enclosed terminal box for cables

Available for either HV and LV side, or for both. Horizontally split design in degree of protection IP 44 or IP 54 (totally enclosed and fully protected against contact with live parts, plus protection against drip, splash, or spray water). Cable installation through split cable glands and removable plates facing diagonally downwards. Optional conduit hubs suitable for single-core or three-phase cables with solid dielectric insulation, with or without stress cones. Multiple cables per phase are terminated on auxiliary bus structures attached to the bushings. Removal of transformer by simply bending back the cables.

Flange connection

Air-insulated bus ducts, insulated busbars, or throat-connected switchgear cubicles are connected via standardized flanges on steel terminal enclosures. These can accommodate either HV, LV, or both bushings. Fiberglass-reinforced epoxy partitions are available between HV and LV bushings if flange/flange arrangements are chosen.

The following combinations of connection systems are possible besides open bushing arrangements:

HV	LV
Cable Box	Cable Box
Cable Box	Flange/throat
Flange	Cable Box
Flange	Flange/throat

Fig.: Combinations of connection systems

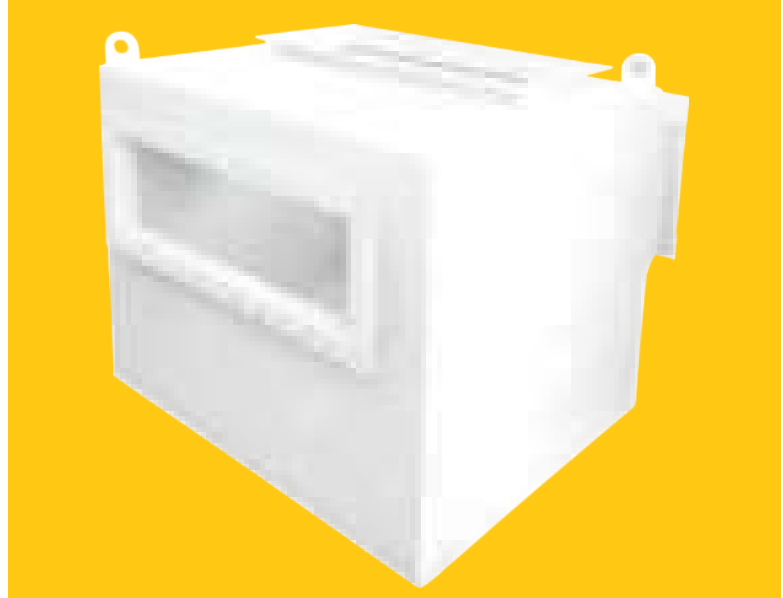


Fig.: Terminal box for cables for distribution transformers

Power transformers

The most frequently used type of connection for transformers is the outdoor bushing. Depending on voltage, current, system conditions and transport requirements, the transformers will be supplied with bushings arranged vertically, horizontally or inclined. Up to about 110kV is usual to use oil-filled bushings; condenser bushings are normally used for higher voltages. Limited space or other design considerations often make it necessary to connect cables directly to the transformer. For voltages up to 36kV, air-filled cable boxes are used. For higher voltages, the boxes are oil-filled. They may be attached to the tank cover or to its walls.



Fig.: High voltage transformer bushing

ACCESSORIES AND PROTECTIVE DEVICES

Buchholz relay

This is installed at a small angle (sloping from conservator to cover) between the conservator and the cover plate. Generally, isolating valves are provided on either side of the relay. A separate gas relay is provided for the conservator or partition for the on-load tap changer. The isolating valves help in opening or removal of the gas relay for inspection or maintenance purposes, without having to drain the oil from the conservator. The gas relay has alarm and trip contacts. The relay can be provided with a gas-sampling valve, which can be located at a convenient height for ease of use.



Fig.: Buchholz relay

Bushing & current transformers

Bushings for voltages less than or equal to 36 kV class are porcelain bushings but based on customer requirements, these can also be of the OIP type. For voltages above 36 kV, these are of the OIP type (oil impregnated paper). High current low voltage connections for core-coil assemblies are made with copper busbars, which are connected to the bushings by means of flexible risers. The terminations can be either on cover plate or on the sides of the tank. These can be housed in special cable boxes as per requirement.

Any specially required current transformers are housed either in separate turrets or on the cover plate or as part of the core-coil assembly. The secondary circuits of the current transformers are brought out in separate terminal boxes, from where the secondary is wired in to the marshalling box. The current transformers can either be for protection or for monitoring (for ammeters and temperature indicators).



Fig.: Bushing current transformers

All bushing current transformers provided are manufactured by Energypac unless otherwise requested by the customer.



Fig.: Dial type contact thermometer

Oil & winding temperature indicators

These are capillary dial type thermometers, the bulbs of which are immersed in oil filled thermometer pockets located on the cover plate. For the winding temperature indicator, the winding gradient is adjusted by means of thermal imaging. This can be part of the thermometer pocket, which is heated by a resistance fed by representative current (through current transformer) or can be done externally by an adjustable shunt resistor, which is part of the temperature indicator. The temperature indicators are provided with alarm and trip contacts. They can also be provided with contacts for changeover from natural cooling to forced cooling (control of fans) at pre-determined temperatures.

Oil level gauge

This gives a clear visible indication of the oil level in the conservator. It is normal practice to use magnetic oil level gauges with low level alarm and trip contacts. This can also be of the plain glass or prismatic type. The oil level gauge is marked to indicate minimum, normal and maximum oil levels in the conservator (as a function of conservator capacity). The conservator (or partition) for on-load tap changer carries its own oil level gauge. For bigger units, it is our standard practice to fit a normal oil level gauge on the tank also.



Fig.: Oil level gauge

ACCESSORIES AND PROTECTIVE DEVICES

Dehydrating breather

This is to prevent ingress of moisture into the conservation system, where air circulation is controlled by liquid seal and special re-chargeable moisture absorbing material. The volume of charge in the breather is a function of the oil quantity in the transformer. The breathers are located at convenient height for inspection and recharging. Separate breathers are provided for the conservator (or partition) of the on-load tap changer. The charge is placed in a visible container so that the changes in the colour of the charge are easily visible.

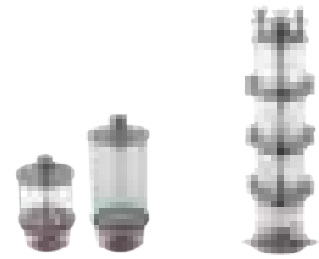


Fig.: Dehydrating breather

Self dehydrating breathers are also available on request.

Other accessories

1. Pressure relief device with or without contacts

2. Explosion vents with diaphragm

3. Bi-directional roller bases

4. Lightning arresters

5. Tap changer control panels

6. Remote measurement systems for temperature monitoring

7. Valves for oil filling, draining, filtering and sampling with locking facility.



Fig.: Online dissolved gas monitoring system

Marshalling box

As the name implies, this is the master control panel for the protection devices. This is a panel with a door, part of which is with glass, allowing easy visibility of the instruments and their readings. This houses the indicating instruments. In addition, all the secondary wiring of the transformer from current transformers, relays, oil level gauges etc., are terminated on to terminal blocks, from which cables can be taken to the supply and control connections. The necessary control switches, contactors etc., are housed in this cabinet. The cabinet may be provided with heating and anti-condensation facility. The cabinet has a ventilation facility, which is protected against insect entry. The fixing is carried out with anti-vibration pads.



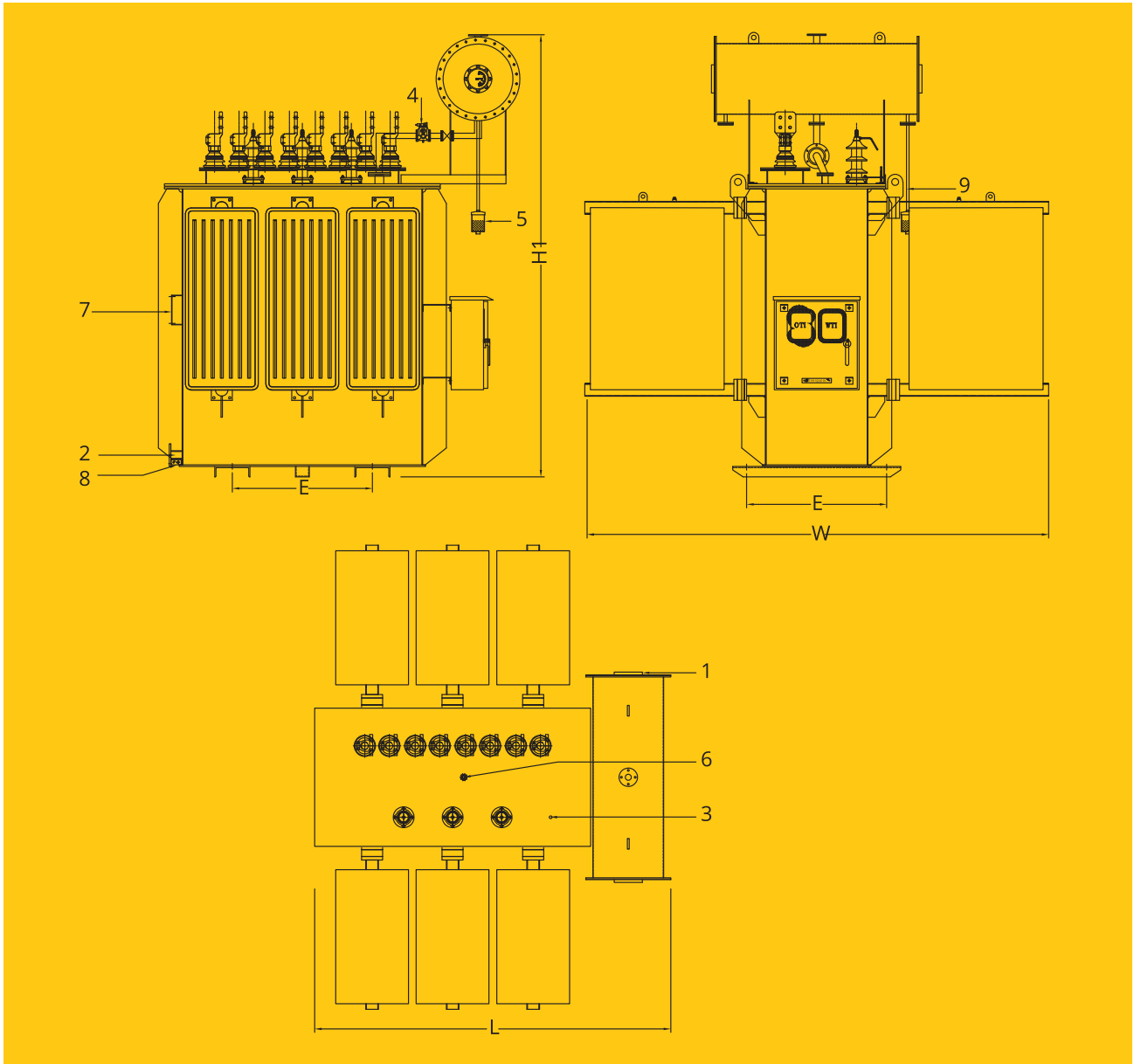
Fig.: Marshalling box

POWER TRANSFORMERS



TECHNICAL DATA

POWER TRANSFORMERS



- 01. Oil level gauge
- 02. Oil drain plug
- 03. Thermometer pocket

- 04. Buchholz relay (optional)
- 05. Dehydrating breather (optional)
- 06. Off-load tap changer

- 07. Rating plate (relocatable)
- 08. Grounding terminals
- 09. Lifting lug

Note: Tank with detachable radiator walls shown in illustration is the preferred design. The conservator is fitted on the long side just above the LV Bushings.

Fig.: Details of radiator tank

TECHNICAL DATA

POWER TRANSFORMERS

UP TO 36kV, 2.5MVA – 47MVA

** This is only exemplary; specifications will vary based on individual client requirements		
Applied Standard		IEC - 60076
Type		Outdoor
Rated Power	MVA	ONAN/ONAF, 2.5MVA - 47MVA
Number of Phases		3
Rated Voltage, Phase to Phase		
High Voltage Winding	kV	36
Low Voltage Winding	kV	12
Rated Frequency	Hz	50
Rated Insulation Level		
Impulse Withstand, Full Wave		
High Voltage Winding	kV	170
Low Voltage Winding	kV	75
Neutral Side		Full insulation
AC Withstand Voltage		
High Voltage Winding	kV	70
Low Voltage Winding	kV	28
Impedance Voltage at 75°C and at Nominal Ratio and 100% Rated Power	%	As per IEC 76-5/ as required
Vector Diagram (IEC 76-4)		Dyn1/Dyn11
Type of Cooling		ONAN/ONAF
On load Tap- changer		
Type		With oil/ vacuum switches
Rated Tap	kV	36
Tapping Range Capacity	%	(+10 to -10)% or as required
	Positions	17 or higher
Temperature Rise at Rated Power (Maximum Ambient Temperature: 40°C)		
Oil by Thermometer	deg. C	55
Winding by Resistance Measurement	deg. C	60
Maximum Hot Spot Temperature when Loaded in Accordance with IEC 354	deg. C	118
Core Loss at Rated Frequency and Rated Voltage at Nominal Tap	kW	As required
Copper Loss at Full Load, at Rated Frequency	kW	As required
Overall Dimension	mm	Based on design specification
Overall Weight	kg	Based on design specification
Transport Weight	kg	Based on design specification

Fig.: Selection table of power transformer up to 36kV, 2.5MVA - 47MVA

TECHNICAL DATA

POWER TRANSFORMERS

UP TO 400kV, 520MVA

** This is only exemplary; specifications will vary based on individual client requirements		
Applied Standard		IEC - 60076
Type		Outdoor
Rated Power	MVA	ONAN/ONAF, up to 520MVA
Number of Phases		3
Rated Voltage, Phase to Phase		
High Voltage Winding	kV	132 or 230 or 400kV
Low Voltage Winding	kV	12 or 36
Rated Frequency	Hz	50
Rated Insulation Level		
Impulse Withstand, Full Wave		
High Voltage Winding	kV	As per IEC 76-3
Low Voltage Winding	kV	As per IEC 76-3
Neutral Side		Full insulation
AC Withstand Voltage		
High Voltage Winding	kV	As per IEC 76-3
Low Voltage Winding	kV	As per IEC 76-3
Impedance Voltage at 75°C and at Nominal Ratio and 100% Rated Power	%	As per IEC 76-5/ as required
Vector Diagram (IEC 76-4)		Dyn1/Dyn11
Type of Cooling		ONAN/ONAF
On load Tap- changer		
Type		With oil/ vacuum switches
Rated Tap	kV	132 or 230 or 400kV
Tapping Range Capacity	%	(+10 to -10)% or as required
	Positions	17 or higher
Temperature Rise at Rated Power (Maximum Ambient Temperature: 40°C)		
Oil by Thermometer	deg. C	55
Winding by Resistance Measurement	deg. C	60
Maximum Hot Spot Temperature when Loaded in Accordance with IEC 354	deg. C	118
Core Loss at Rated Frequency and Rated Voltage at Nominal Tap	kW	As required
Copper Loss at Full Load, at Rated Frequency	kW	As required
Overall Dimension	mm	Based on design specification
Overall Weight	kg	Based on design specification
Transport Weight	kg	Based on design specification

Fig.: Selection table of power transformer up to 400kV, 520MVA

TECHNICAL DATA

GENERATOR STEP-UP (GSU) TRANSFORMERS

UP TO 400kV, 520MVA

** This is only exemplary; specifications will vary based on individual client requirements		
Applied Standard		IEC - 60076
Type		Outdoor
Rated Power	MVA	ONAN/ONAF, up to 520MVA
Number of Phases		3
Rated Voltage, Phase to Phase		
High Voltage Winding	kV	132 or 230 or 400kV
Low Voltage Winding	kV	12 or 36
Rated Frequency	Hz	50
Rated Insulation Level		
Impulse Withstand, Full Wave		
High Voltage Winding	kV	As per IEC 76-3
Low Voltage Winding	kV	As per IEC 76-3
Neutral Side		Graded insulation
AC Withstand Voltage		
High Voltage Winding	kV	As per IEC 76-3
Low Voltage Winding	kV	As per IEC 76-3
Impedance Voltage at 75°C and at Nominal Ratio and 100% Rated Power	%	As per IEC 76-5/ as required
Vector Diagram (IEC 76-4)		YNd1
Type of Cooling		ONAN/ONAF
On load Tap- changer		
Type		With oil/ vacuum switches
Rated Tap	kV	132 or 230 or 400kV
Tapping Range Capacity	%	(+10 to -10)% or as required
	Positions	17 or higher
Temperature Rise at Rated Power (Maximum Ambient Temperature: 40°C)		
Oil by Thermometer	deg. C	55
Winding by Resistance Measurement	deg. C	60
Maximum Hot Spot Temperature when Loaded in Accordance with IEC 354	deg. C	118
Core Loss at Rated Frequency and Rated Voltage at Nominal Tap	kW	As required
Copper Loss at Full Load, at Rated Frequency	kW	As required
Overall Dimension	mm	Based on design specification
Overall Weight	kg	Based on design specification
Transport Weight	kg	Based on design specification

Fig.: Selection table of generator step-up (GSU) transformer up to 400kV, 520MVA

TECHNICAL DATA

AUTO TRANSFORMER/ GRID CONNECTED TRANSFORMER UP TO 400kV, 520MVA

** This is only exemplary; specifications will vary based on individual client requirements		
Applied Standard		IEC - 60076
Type		Outdoor
Rated Power	MVA	ONAN/ONAF, up to 520MVA
Number of Phases		3
Rated Voltage, Phase to Phase		
High Voltage Winding	kV	132 or 230 or 400kV
Low Voltage Winding	kV	36 or 132 or 230kV
Tertiary Winding	kV	12 or 36
Rated Frequency	Hz	50
Rated Insulation Level		
Impulse Withstand, Full Wave		
High Voltage Winding	kV	As per IEC 76-3
Low Voltage Winding	kV	As per IEC 76-3
Neutral Side		Graded insulation
AC Withstand Voltage		
High Voltage Winding	kV	As per IEC 76-3
Low Voltage Winding	kV	As per IEC 76-3
Impedance Voltage b/n MV-HV at 75°C and at Nominal Ratio and 100% Rated Power	%	As per IEC 76-5/ as required
Vector Diagram (IEC 76-4)		YNa0d1
Type of Cooling		ONAN/ONAF
On load Tap- changer		
Type		With oil/ vacuum switches
Rated Tap	kV	170
Tapping Range Capacity	%	(+10 to -10)% or as required
	Positions	17 or higher
Temperature Rise at Rated Power (Maximum Ambient Temperature: 40°C)		
Oil by Thermometer	deg. C	50
Winding by Resistance Measurement	deg. C	55
Maximum Hot Spot Temperature when Loaded in Accordance with IEC 354	deg. C	118
Core Loss at Rated Frequency and Rated Voltage at Nominal Tap	kW	As required
Copper Loss at Full Load, at Rated Frequency	kW	As required
Overall Dimension	mm	Based on design specification
Overall Weight	kg	Based on design specification
Transport Weight	kg	Based on design specification

Fig.: Selection table of auto transformer / grid connected up to 400kV, 520MVA

SINGLE PHASE TRANSFORMER



POLE MOUNTED SINGLE PHASE TRANSFORMER

Application

Energypac overhead transformer may be used alone for the supply of a single phase load or as one of three units in a bank for the supply of a three phase load. The unit may be direct-mounted to a steel or concrete pole, or cluster mounted on a pole for three phase use. Energypac transformers are designed for servicing residential overhead distribution loads. They are also suitable for light commercial loads, industrial lighting and diversified power applications.

Standards

All units are built in accordance with IEEE C57.12.

Features

- Core and coils designed for an optimum Total Ownership Cost (TOC)
- Wound core with step-lap joints for increased efficiency and lower noise levels
- “Low-high-low” windings for increased short circuit strength, efficiency and thermal strength
- Computer aided design for mechanical & electrical calculations (C.A.D.)
- Dual voltage designed to meet BIL and short circuit requirements on both connections
- Low voltage leads with embossed markings on all units with 3
- LV bushings for easy reading and permanent identification on selected ratings
- Paint system meeting or exceeding the performance of the IEEE C57.12.28 Standard including the salt spray test
- Cover or sidewall mounted high voltage bushing(s) as required
- Low voltage spade or clamp type (basket) terminals as required
- Provision for surge arrester bracket, bracket available as an option

Dual voltage transformers and taps

Dual voltage transformers have proven to be very useful for their versatility which allows lower inventories for the electric utilities and saves on change out costs in the event of upgrading to higher system voltage. Because taps are also in common use, it is appropriate that dual voltage transformers with taps be considered. As the transformer reliability is adversely affected by the increased number of HV leads introduced by dual voltage designs.

Pole mounted transformers rating details

General technical information is given below. Information on other requirements can be obtained from an Energypac Sales representative:

- kVA – 5 up to 100
- Voltage – up to 36kV
- IEEE C57.12.28



Options

- Four HV winding taps complete with an externally operated tap switch
- Dual voltage primary complete with externally operated voltage switch
- Extra creep bushing
- Surge arrester bracket
- Internal Fault Detector (IFD)
- Nonconductive transformer
- Stainless steel tank and cover

TECHNICAL DATA

POLE MOUNTED SINGLE PHASE TRANSFORMERS

UP TO 36kV, 75kVA

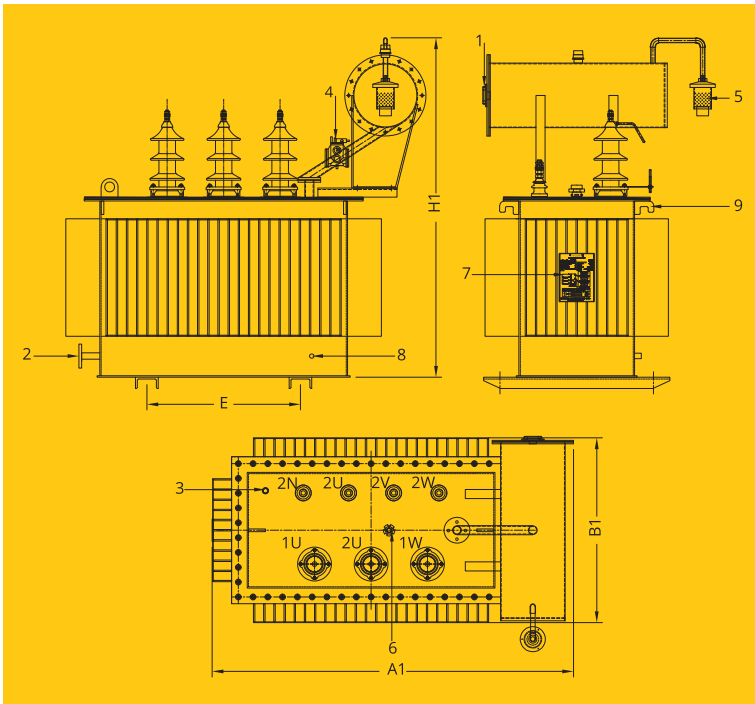
Design Standard		ANSI C57.12.00 & C57.12.20										
Type		Single-phase wound core										
Winding Type Material		High Conductivity Cu										
Core Type and material		Wound Core, CRGO Silicon Steel										
Nominal Voltage		HT = 6350 V										
		LT = 240 V										
BIL		HT Winding = 95 KV										
		LT Winding = 30 KV										
Max % Impedance at rated KVA		a) For 5-37.5 KVA 2.5+10% max										
		b) For 50-75 KVA 3.00+10 % max										
Polarity		Additive										
Cooling Method		Class- OA (Self-cooled)										
a. Winding		Shall not exceed 65°C (Resistance Method)										
b. Insulation Liquid		Shall not exceed 65°C										
Bushing												
a) Type & Material		Outdoor type, Porcelain										
b) Connectors		Bolted ring type										
c) Quantity		HT = 1, LT = 2										
d) Mounting Position		HT - on tank top cover, LT- on the tank side										
Tank												
a) Design		Sealed type complete with cover & gasket										
b) Ground provision		With bolted ring type connector										
c) LV ground provision		With removable Cu strap										
d) Lifting facilities		Facilities for lifting the core & coil										
e) Support Lug		Shall have support lugs										
f) Pressure relief device		Self sealing relief device										
g) Painting		Light Gray, ANSI Color #70										
Insulating oil		New, Unused mineral oil as per ASTM standard										
Rating (KVA)	Rated Voltage (V)		Frequency (HZ)	Impedance (Max) %	Full Load Current (Amps)		Dimensions		Weight (KG)		No Load Loss (W)	Full Load Loss (W)
	High	Low			High	Low	Diameter	Height	Total	Oil		
5	6350	240	50	2.5 +10 %	0.787	20.83	310	560	90	23	19	120
10	6350	240	50	2.5 +10 %	1.575	41.67	340	610	110	27	25	190
15	6350	240	50	2.5 +10 %	2.362	62.5	381	660	140	32	35	250
25	6350	240	50	2.5 +10 %	3.937	104.17	410	740	170	45	46	380
37.5	6350	240	50	2.5 +10 %	5.906	156.25	460	815	260	65	65	480
50	6350	240	50	3.0 + 10 %	7.874	208.33	510	915	310	70	75	600
75	6350	240	50	3.0 + 10 %	11.811	312.5	570	965	435	113	115	860

DISTRIBUTION TRANSFORMERS OIL FILLED



TECHNICAL DATA

DISTRIBUTION TRANSFORMERS, OIL FILLED



- 01. Oil level gauge
- 02. Oil drain plug
- 03. Thermometer pocket
- 04. Buchholz relay (optional)
- 05. Dehydrating breather (optional)
- 06. Adjustment for off-load tap
- 07. Rating plate (relocatable) changer
- 08. Grounding terminals
- 09. Lifting lug

Notes: Tank with strong corrugated walls shown in illustration is the preferred design for HV ratings up to 33/11kV and related power up to 6.25MVA and HV ratings > 11/0.415kV and related power up to 2500kVA. The conservator is fitted on the long side just above the LV bushings.

Fig.: Details of corrugated fin tank.

Oil-immersed three-phase distribution transformers

- ◆ Standard: DIN 42500
- ◆ Rated power: 50–2500 kVA
- ◆ Rated frequency: 50 Hz
- ◆ HV rating: up to 36 kV
- ◆ Taps on HV side: $\pm 2.5\%$ or $\pm 2 \times 2.5\%$
- ◆ LV rating: 400–720 V (special designs for up to 12 kV can be built)
- ◆ Connection: HV winding: delta
LV winding: star (up to 100 kVA: zigzag)
- ◆ Impedance voltage at rated current: 4% (only up to HV rating 24 kV and £ 630 kVA) or 6% (with rated power \geq 630 kVA or with HV rating > 24 kV)
- ◆ Cooling: ONAN
- ◆ Protection class: IP00
- ◆ Final coating: RAL 7033 (other colors are available)

U_m [kV]	LI [kV]	AC [kV]
1.1	–	3
12	75	28
24	125	50
36	170	70

LI Lightning-impulse test voltage
AC Power-frequency test voltage

Losses

The standard IS-1180 (= DIN 42500 Part 1) applies to three-phase oil-immersed distribution transformers 50 Hz, from 50kVA to 2500 kVA, up to 36kV. For total load losses (P_k), three different listings, level - I, II and III are specified. Transformers of this kind with additionally reduced losses are especially economical with energy (maximum efficiency > 99%). The higher costs of these transformers are counteracted by the energy savings which they make.

TECHNICAL DATA

DISTRIBUTION TRANSFORMERS, OIL FILLED

UP TO 36kV

Rated power [kVA]	Max. rated volt. HV side [kV]	Impedance voltage [%]	50% Load [W]	100% Load [W]	Material
100	12	4.5	435	1500	Copper
		4.5	475	1650	Copper
		4.5	520	1800	Copper
	24	4.5	455	1575	Copper
		4.5	500	1730	Copper
		4.5	545	1890	Copper
	36	4.5	470	1610	Copper
		4.5	510	1770	Copper
		4.5	560	1940	Copper
160	12	4.5	570	1700	Copper
		4.5	670	1950	Copper
		4.5	770	2200	Copper
	24	4.5	600	1790	Copper
		4.5	700	2050	Copper
		4.5	810	2300	Copper
	36	4.5	610	1830	Copper
		4.5	720	2100	Copper
		4.5	827	2370	Copper
200	12	4.5	670	2100	Copper
		4.5	780	2300	Copper
		4.5	890	2700	Copper
	24	4.5	705	2200	Copper
		4.5	820	2410	Copper
		4.5	935	2830	Copper
	36	4.5	720	2260	Copper
		4.5	840	2470	Copper
		4.5	955	2900	Copper

Fig.: Selection table of distribution transformer, oil filled 100 to 200kVA

*Available in aluminium windings on request.

TECHNICAL DATA

DISTRIBUTION TRANSFORMERS, OIL FILLED

UP TO 36kV

Rated power [kVA]	Max. rated volt. HV side [kV]	Impedance voltage [%]	50% Load [W]	100% Load [W]	Material
250	12	4.5	920	2700	Copper
		4.5	980	2930	Copper
		4.5	1050	3150	Copper
	24	4.5	966	2835	Copper
		4.5	1030	3075	Copper
		4.5	1100	3310	Copper
	36	4.5	990	2900	Copper
		4.5	1055	3150	Copper
		4.5	1130	3385	Copper
315	12	4.5	955	2750	Copper
		4.5	1025	3100	Copper
		4.5	1100	3275	Copper
	24	4.5	1000	2890	Copper
		4.5	1075	3255	Copper
		4.5	1155	3440	Copper
	36	4.5	1025	2960	Copper
		4.5	1100	3335	Copper
		4.5	1180	3520	Copper
400	12	4.5	1150	3330	Copper
		4.5	1225	3450	Copper
		4.5	1300	3875	Copper
	24	4.5	1205	3500	Copper
		4.5	1285	3620	Copper
		4.5	1365	4070	Copper
	36	4.5	1235	3580	Copper
		4.5	1315	3710	Copper
		4.5	1400	4170	Copper

Fig.: Selection table of distribution transformer, oil filled 250 to 400kVA

*Available in aluminium windings on request.

TECHNICAL DATA

DISTRIBUTION TRANSFORMERS, OIL FILLED

UP TO 36kV

Rated power [kVA]	Max. rated volt. HV side [kV]	Impedance voltage [%]	50% Load [W]	100% Load [W]	Material
500	12	4.5	1430	4100	Copper
		4.5	1510	4300	Copper
		4.5	1600	4750	Copper
	24	4.5	1500	4300	Copper
		4.5	1585	4515	Copper
		4.5	1680	4990	Copper
	36	4.5	1535	4405	Copper
		4.5	1625	4620	Copper
		4.5	1720	5110	Copper
630	12	4.5	1745	4850	Copper
		4.5	1860	5300	Copper
		4.5	2000	5855	Copper
	24	4.5	1835	5090	Copper
		4.5	1355	5565	Copper
		4.5	2100	6145	Copper
	36	4.5	1875	5210	Copper
		4.5	2000	5700	Copper
		4.5	2150	6290	Copper
800	12	4.5	1510	6050	Copper
		4.5	1600	6400	Copper
		4.5	1710	6855	Copper
	24	4.5	1585	6355	Copper
		4.5	1680	6720	Copper
		4.5	1795	7200	Copper
	36	4.5	1625	6500	Copper
		4.5	1720	6880	Copper
		4.5	1840	7370	Copper

Fig.: Selection table of distribution transformer, oil filled 500 to 800kVA

*Available in aluminium windings on request.

TECHNICAL DATA

DISTRIBUTION TRANSFORMERS, OIL FILLED

UP TO 36kV

Rated power	Max. rated volt. HV side	Impedance voltage	No-load losses	Load losses	Material	
[kVA]	[kV]	[%]	[W]	[W]		
1000	12	5	2620	7000	Copper	
		5	2790	7700	Copper	
		5	3000	9000	Copper	
		5	2800	10200	Copper	
	24	5	2750	7350	Copper	
		5	2930	8085	Copper	
		5	3150	9450	Copper	
	36	5	2815	7525	Copper	
		5	3000	8280	Copper	
		5	3225	9675	Copper	
	1250	12	5	3220	8400	Copper
			5	3300	9200	Copper
5			3600	10750	Copper	
24		5	3380	8820	Copper	
		5	3465	9660	Copper	
		5	3780	11290	Copper	
36		5	3460	6500	Copper	
		5	3550	6880	Copper	
		5	3870	7370	Copper	
1600		12	6.25	3970	11300	Copper
			6.25	4200	11800	Copper
			6.25	4500	13500	Copper
	24	6.25	4170	11865	Copper	
		6.25	4410	12390	Copper	
		6.25	4725	14175	Copper	
	36	6.25	4270	12150	Copper	
		6.25	4515	12685	Copper	
		6.25	4840	14515	Copper	

Fig.: Selection table of distribution transformer, oil filled 1000 to 1600kVA

*Available in aluminium windings on request.

TECHNICAL DATA

DISTRIBUTION TRANSFORMERS, OIL FILLED UP TO 36kV

Rated power [kVA]	Max. rated volt. HV side [kV]	Impedance voltage [%]	No-load losses [W]	Load losses [W]	Material
2000	12	6.25	4790	14100	Copper
		6.25	5050	15000	Copper
		6.25	5400	17000	Copper
	24	6.25	5030	14800	Copper
		6.25	2300	15750	Copper
		6.25	5670	17850	Copper
	36	6.25	5150	15160	Copper
		6.25	5430	16130	Copper
		6.25	5805	18280	Copper
2500	12	6.25	5900	17500	Copper
		6.25	6150	18500	Copper
		6.25	6500	20000	Copper
	24	6.25	6195	18380	Copper
		6.25	6455	19430	Copper
		6.25	6825	21000	Copper
	36	6.25	6340	18810	Copper
		6.25	6610	19890	Copper
		6.25	6990	21500	Copper
3000	12	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
	24	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
	36	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper

Fig.: Selection table of distribution transformer, oil filled 2000 to 3000kVA

*Available in aluminium windings on request.

TECHNICAL DATA

DISTRIBUTION TRANSFORMERS, OIL FILLED UP TO 36kV

Rated power [kVA]	Max. rated volt. HV side [kV]	Impedance voltage [%]	No-load losses [W]	Load losses [W]	Material
4000	12	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
	24	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
	36	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
5000	12	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
	24	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
	36	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
6250	12	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
	24	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
	36	As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper
		As per client request	As per client request	As per client request	Copper

Fig.: Selection table of distribution transformer, oil filled 4000 to 6250kVA

*Available in aluminium windings on request.

DISTRIBUTION TRANSFORMERS CAST RESIN



DISTRIBUTION TRANSFORMERS

CAST RESIN

Energypac offers a full range of dry-type transformers up to 10MVA, with 36kV on the high voltage side and 12kV on the low voltage side. These are built according to all major standards including IEC, IS and ANSI and when required as per the loss directives of ECBC-2018. To minimize environmental contamination and fire hazard, customers are specifying dry-type transformers more frequently. These transformers meet strict parameters with respect to electrical system demands and functioning in areas with extreme climatic conditions. Energypac's cast resin transformers are virtually maintenance free and are manufactured in accordance with industry and international standards including ISO 9001.

Features

- ❑ Self extinguishing material
- ❑ Compact footprint
- ❑ Easy installation
- ❑ Maintenance free
- ❑ Environment friendly
- ❑ Apart from toxic or generated gases, if fired
- ❑ Design to withstand the highest mechanical short circuit stress that may occur in service
- ❑ High voltage coil windings are cast to prevent humidity
- ❑ High resistance against overvoltage
- ❑ Low decibel
- ❑ High capacity
- ❑ High performance
- ❑ Low partial discharge



DISTRIBUTION TRANSFORMERS

CAST RESIN

Standard encloser

- ❑ Free-standing or installed on carriage
- ❑ For indoor and outdoor installation IP 20 to IP 45 outdoors.

For installation in enclosed electrical operating areas, enclosures are to be provided with type of protection IP 20 and IP 23 respectively. Enclosure IP 33 is required when installing in fabrication halls. Customer specifications can be met using modular systems.

IP 45 also available on request.



TECHNICAL DATA

DISTRIBUTION TRANSFORMERS, CAST RESIN

UP TO 36kV, [AS PER ECBC, 2009, INDIA]

Standard: IEC 60076-13
 Rated power: 100–20000kVA*
 Rated frequency: 50 Hz
 HV rating: up to 36kV
 LV rating: up to 3.3kV; special designs for up to 12kV are possible
 Tappings on HV side: $\pm 2.5\%$ or $\pm 2 \times 2.5\%$ (also available with on-load tap changers on request.)

Connection: HV winding: delta
 LV winding: star
 Insulation class: HV/LV = B, F and H
 Temperature rise: HV/LV = 100/100 K (F)
 HV/LV=120/120 K (H)
 Color of metal parts: RAL 9005 (other colors are available)

Climatic class: C2
 Environmental class: E2
 Fire behaviour class: F1

Rated power	Rated voltage	Impedance	Loss at 50% load	Loss at 100% load	Material	Remarks
[kVA]	[kV]	[%]	[W]	[W]		
100	12	4	940	2400	Copper	
	24		940	2400	Copper	
	36		1120	2400	Copper	On request
160	12	4	1290	3300	Copper	
	24		1290	3300	Copper	
	36		1420	3300	Copper	On request
200	12	5	1500	3800	Copper	
	24		1500	3800	Copper	
	36		1750	4000	Copper	On request
250	12	5	1700	4320	Copper	
	24		1700	4320	Copper	
	36		1970	4600	Copper	On request
315	12	5	2000	5040	Copper	
	24		2000	5040	Copper	
	36		2400	5400	Copper	On request
400	12	5	2380	6040	Copper	
	24		2380	6040	Copper	
	36		2900	6800	Copper	On request

Fig.: Distribution transformers, cast resin 100 to 400kVA

*Standard range for Indian market only. Available for Bangladesh on request.

TECHNICAL DATA

DISTRIBUTION TRANSFORMERS, CAST RESIN

UP TO 36kV, [AS PER ECBC, 2009, INDIA]

Rated power	Rated voltage	Impedance	Loss at 50% load	Loss at 100% load	Material	Remarks
[kVA]	[kV]	[%]	[W]	[W]		
500	12	5	2800	7250	Copper	
	24		2800	7250	Copper	
	36		3300	7800	Copper	On request
630	12	5	3340	8820	Copper	
	24		3340	8820	Copper	
	36		3950	9200	Copper	On request
800	12	5	3880	10240	Copper	
	24		3880	10240	Copper	
	36		4650	11400	Copper	On request
1000	12	5	4500	12000	Copper	
	24		4500	12000	Copper	
	36		5300	12800	Copper	On request
1250	12	6.25	5190	13870	Copper	
	24		5190	13870	Copper	
	36		6250	14500	Copper	On request
1600	12	6.25	6320	16800	Copper	
	24		6320	16800	Copper	
	36		7500	18000	Copper	On request
2000	12	6.25	7500	20000	Copper	
	24		7500	20000	Copper	
	36		8880	21400	Copper	On request
2500	12	6.25	9250	24750	Copper	
	24		9250	24750	Copper	
	36		10750	26500	Copper	On request

Fig.: Distribution transformers, cast resin 500 to 2500kVA

*Standard range for Indian market only. Available for Bangladesh on request.

TECHNICAL DATA

DISTRIBUTION TRANSFORMERS, CAST RESIN

UP TO 36kV

Rated power	Rated voltage	Impedance	Loss at 50% load	Loss at 100% load	Material	Remarks
[kVA]	[kV]	[%]	[W]	[W]		
100	12	4	910	2370	Aluminium	
	36	6	980	2460	Aluminium	On request
160	12	5	1180	2900	Aluminium	
	36	6	1350	3420	Aluminium	On request
200	12	5	1350	3450	Aluminium	
	36	6	1610	3900	Aluminium	On request
250	12	5	1700	4550	Aluminium	
	36	6	1890	4680	Aluminium	On request
315	12	5	1980	5350	Aluminium	
	36	6	2170	5500	Aluminium	On request
400	12	5	2280	6180	Aluminium	
	36	6	2630	6540	Aluminium	On request
500	12	5	2650	7000	Aluminium	
	36	6	3130	7800	Aluminium	On request
630	12	5	3050	8150	Aluminium	
	36	6	3650	9180	Aluminium	On request
800	12	5	3600	9300	Aluminium	
	36	6	4440	11100	Aluminium	On request
1000	12	5	4180	10700	Aluminium	
	36	6	5200	13020	Aluminium	On request
1250	12	5	4930	12800	Aluminium	
	36	6	6000	14580	Aluminium	On request
1600	12	6	6180	16300	Aluminium	
	36	6	7200	18120	Aluminium	On request
2000	12	6	7500	19500	Aluminium	
	36	6	8650	21950	Aluminium	On request
2500	12	6	8475	23100	Aluminium	
	36	6	10380	26800	Aluminium	On request
3150	12	7	10500	28800	Aluminium	
	36	8	12060	31680	Aluminium	On request

Fig.: Distribution transformers, cast resin 100 to 3150kVA

*Available in aluminium and copper windings on request

*Standard range for Bangladesh and global market (except India). Varied specifications can be accommodated on client request.

EXPORT LEADER

IN RECOGNITION OF



GOLD MEDAL

NATIONAL EXPORT TROPHY FOR FISCAL YEARS
2016-17, 2017-18, 2018-19, 2019-20

ENERGYPAC ENGINEERING LIMITED IS PROUD TO BE AWARDED ITS FOURTH GOLD, NATIONAL EXPORT TROPHY FOR THE FISCAL YEAR 2019-2020 IN RECOGNITION OF ITS OUTSTANDING CONTRIBUTION IN THE HIGHEST EXPORT OF ELECTRIC AND ELECTRONIC PRODUCTS.

Energypac exports
70 transformers
to Indian electrical giant,

adani | Electricity





Hotline Number
01777 781188

Energypac[®]

Engineering



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