



# LS Transformer



**LSIS**

# LS Transformer

## Closer than you imagine

Where there is light brightening the world, where there is light moving the world, from homes to offices, from factories to airports, everywhere power is supplied, there is LSIS behind.

Where closer than your thought, LSIS is together with you.



High quality



High efficiency



Eco



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# Cast Resin Transformer

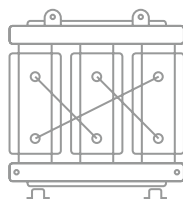
Great progress has been made in the development and improvement of distribution transformers over the last decades. The application of high quality insulation material and suitable selection of the coil structure for high stress have contribute to the development of LS Cast Resin Transformers.

The LS Cast Resin Transformer has succeeded in combining the advantage of oil-filled and conventional dry type transformers, which are fabricated with an epoxy resin.

The windings are completely embedded under vacuum conditions. This casting method makes it possible to assure void-free epoxy penetration of both the inner layer and turn to turn insulation.

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# Cast Resin Transformer

The LS Cast Resin Transformer satisfies both standard consumption efficiency and minimum consumption efficiency as a low-noise and high-efficiency transformer. It can improve use environments via low noises and reduce power costs according to reduction of loss by observing the efficiency control equipment operation regulation and by using oriented silicon iron sheets of good quality.

"We have an authorized power test technology center, operating ISO 9001-certified quality assurance system, and performing tests according to KSC 4311 and IEC 60076-11."



This is a compact and high-efficiency product made with cutting-edge technology that is easy to maintain, excellent in short circuit strength, humidity resistance and non-combustibility, and also suitable for equipment with severe load variations such as electric-train power supply systems, etc.

**Short circuit strength**

The coils are vacuum-cast with epoxy resin with excellent electrical and mechanical strength to be strong against short circuit accidents.

**Suitable for power supply to equipment with rapid changing loads**

This is suitable for power supply to equipment with rapid changing loads such as electric-train power supply equipment and rolling equipment.

**Impulse voltage strength**

This has excellent impulse voltage strength owing to the outstanding insulation performance of epoxy resin and the design of split winding type.

**Easy to maintain**

This doesn't need insulation oil exchange or separate fire-fighting equipment.

**Humidity resistance**

The high voltage coils are vacuum-molded to prevent moisture ingress from during long-term storage so that it is possible to input power without drying.

**Eco-friendliness test**

We obtained standard IEC60076-11 eco-friendliness tests(F1, E2, C1) from CESI(Italia) and C2 from FILK.

**Overload tolerance**

LS's Cast Resin Transformer has an excellent overload tolerance compared to the oil immersed type transformer to be used normally even at a temporary overload state.

**Non-combustibility**

LS's Cast Resin Transformer uses non-combustible epoxy resin to have no worry of fires due to electric arcs and have self-extinguishability.

**Flow suitable for renovation**

LS has a flow suitable for renovation as a heavy electric equipment maker that produces and sells compact transformers, switchboards, high/low voltage breakers, switches and contactors.

**Eco-friendly**

It doesn't use oil so you don't have to worry about environmental contamination due to oil spills

# Cast Resin Transformer Application fields

" LS Cast Resin Transformers can be used in various fields.  
Here are just a few possible applications."

1	2	3
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- 1. Semiconductor factory, LCD factory
- 2. High-rise building, Apartment
- 3. Subway, Express railway
- 4. Thermal power plant, Transformer station, Petrochemical plant
- 5. Hospital
- 6. Athletic stadium, Performance place
- 7. Car factory, Rolling factory
- 8. Airport, Port
- 9. Hydro-power plant, Water treatment facility

## Places requiring high reliability

Nuclear power plant, semiconductor factory, car factory, petrochemical factory, drilling ship, dock crane, Rolling factory, international airport, thermal power plant, transformer station, performance place

## Public places where fire prevention is important

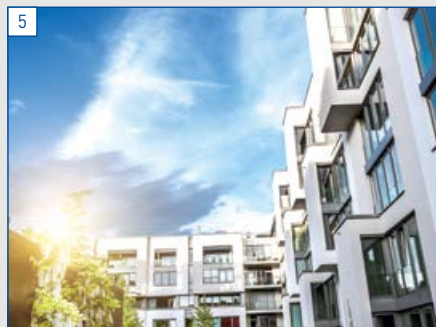
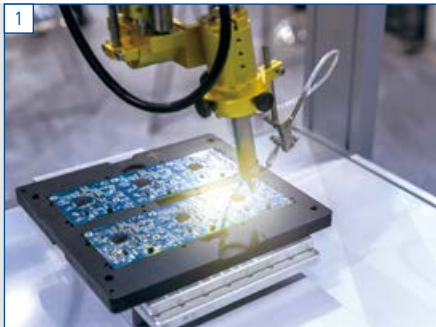
Underground store, subway, hotel, hospital

## Power supply for complex facilities

High-rise building, multipurpose building, apartment

## Places requiring resistance against environments such as water contamination, etc.

Water treatment facility, hydro-power plant





# Special-purpose Cast Resin Transformer

LS's Cast Resin Transformer is not only being widely used for general power distribution and power generation but is also made for special purposes according to customer's order specifications.

\* For special-purpose transformers, contact us separately

## Ground transformer

- This is a transformer installed to supply a neutral point for grounding in power systems where it is difficult to take a proper grounding method.
- This mainly uses Wye-Delta connection or Zig-Zag connection, and is made for short time rating.

## Equipment test transformer

- This is a transformer used for short circuit tests, etc. for equipment, so it deals with large currents and requires special insulation design considering transient voltages due to frequent switching

## Subway power supply transformer

- This is a public facility used by many citizens to require high safety, and is made to be usable for overloads and severe load variations as well because of its load characteristics.

## Transformer for Nuclear power plant

- This is a transformer meeting the characteristics[seismic, environmental] of class 1 electric equipment required by nuclear power plants.
- It is required to have a quality assurance qualification certificate required by the Korea electric power industry criterion(KEPIC).

## Harmonic enduring transformer

- If we use a conventional transformer on a load that contains harmonic rather than a sine wave has problems such as overheating, noise increase, etc.
- This transformer is specially designed considering Harmonic component analysis data(K-Factor) You can apply on loads such as communication equipment, rectifier, inverter.

## Ship transformer

- This is a transformer meeting the severe environment of ships that requires high reliability such as vibration resistance, salt resistance, etc.
- An AFWF(forced water cooling type transformer technology is used considering the fact that the temperature in transformer stations is high due to the characteristics of ships.
- We have secured ship class certification such as ABS, BV, GL, DNV, KR, etc.

## VVVF transformer

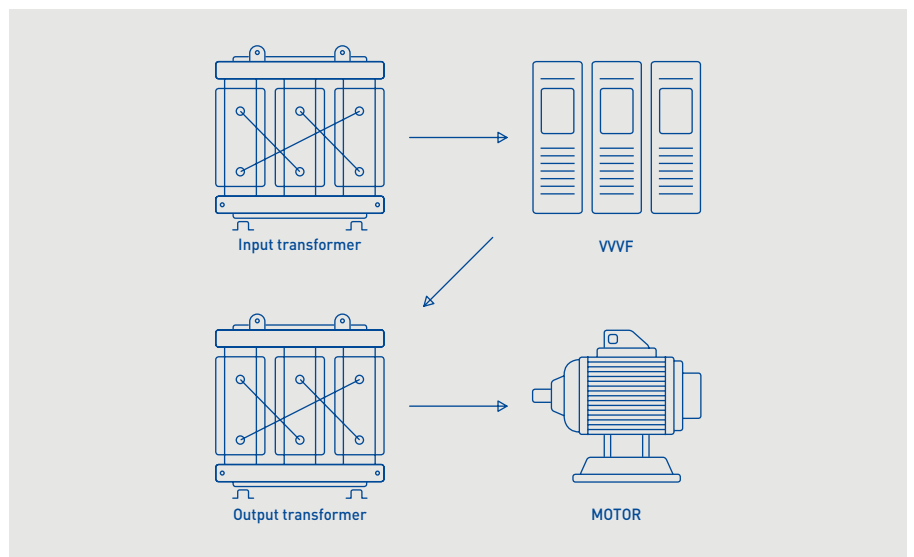
- This is used as an input/output transformer for 6Pulse, 12Pulse, 24Pulse.

### Input transformer

- This is used when the system voltage is different from the VVVF input voltage or when isolation is needed.
- The input transformer isolates VVVF from the system and reduces short circuit currents.
- Using an electro-magnetic shield specially designed between high and low voltage coils not only reduces harmonics generated from VVVF but also reduces transient voltages introduced from the system to protect VVVF.

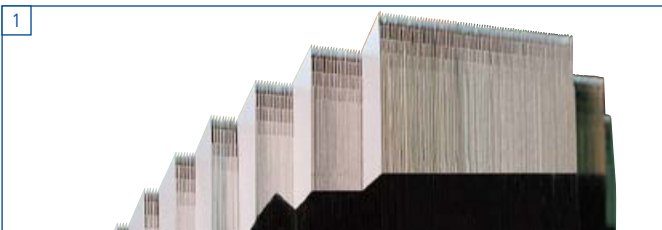
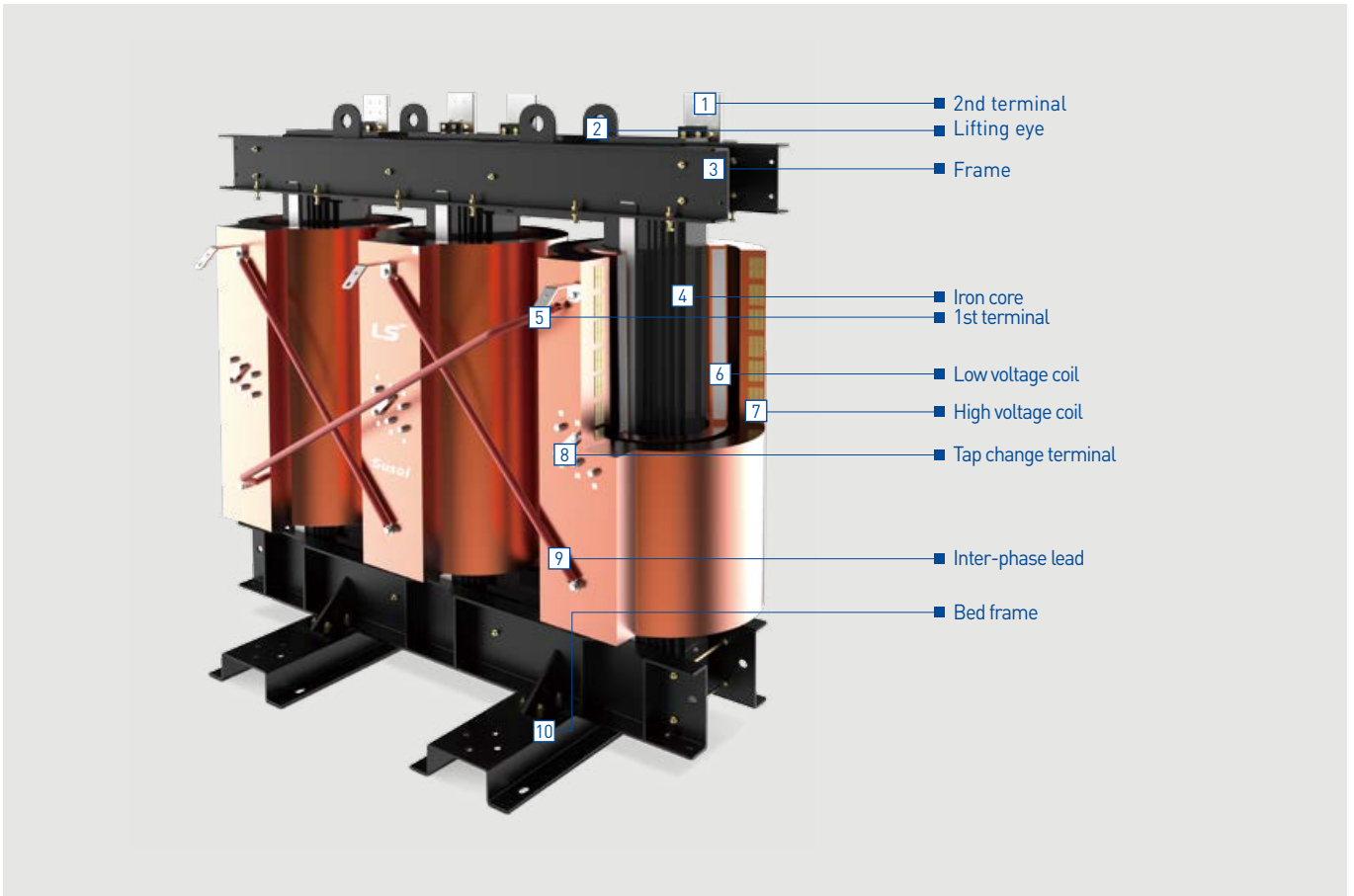
### Output transformer

- This is used when the VVVF output voltage is different from the motor voltage or when isolation is needed.
- This is made as a step-up transformer in general.
- This is designed and made based on the data from the rectifier maker because output voltages contain frequency variations, harmonic components and DC components transiently.



# Cast Resin Transformer

## Structure and name



### Iron core

The iron core uses cold-rolled oriented silicon steel plates of good quality and uses a step-lap method to conserve the characteristics of silicon steel plates to be good in no-load loss and exciting current characteristics. The surface of the iron core is protected by antirusting painting.



1. Step lap core
2. Core stacking
3. Core assembly



### High voltage coil

This is vacuum-cast with epoxy resin with excellent mechanical and electrical performances using conductors with excellent conductivity to be outstanding in short circuit strength and insulation performance.



### Low voltage coil

Using conductor and Prepreg insulating paper and it's casted in epoxy resin to be outstanding in short circuit strength and humidity resistance.



1. HV coil vacuum cast type
2. LV coil encapsulated cast type
3. LV coil vacuum cast type (optional)



## Standard components



### 1st terminal

This is connected to the inlet cable, so check the bolt tightening condition before inputting power.



### 2nd terminal

This is connected to the flexible bus and cable in the 2nd load side, so check the bolt tightening condition before inputting power.



### Grounding terminal

This is attached on the bottom frame, so check the grounding condition before inputting power.



### Tap change terminal

To change the 2nd voltage of the transformer, turn off the tap and adjust the tap terminal.



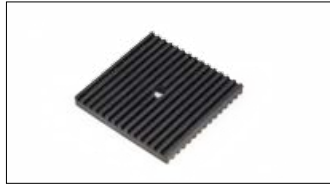
### Danger mark

Touching the coil surface during operation of the transformer can cause danger, so never touch it during operation



### Lifting eye

This is attached on the top of the top frame, so use it to lift the transformer.



### Cushion rubber

Insert cushion rubber between the transformer bed frame and the ground to prevent iron core vibrations from transferring to the floor during operation to reduce noises.



### Tap change terminal cover Insulate

the conductor part of the tap terminals to secure an insulation distance and improve safety.

## Option components

### Digital thermometer/ Controller



P2-100  
1 point temperature measurement



P2-400  
3 or 4 point temperature measurement



P2-400CH  
3 or 4 point temperature measurement  
harmonics measurement

### Cooling fan



Low noise cooling fan



Large cooling fan



Sliding cooling fan uninterrupted

### Other accessories



Wheel



Enclosure

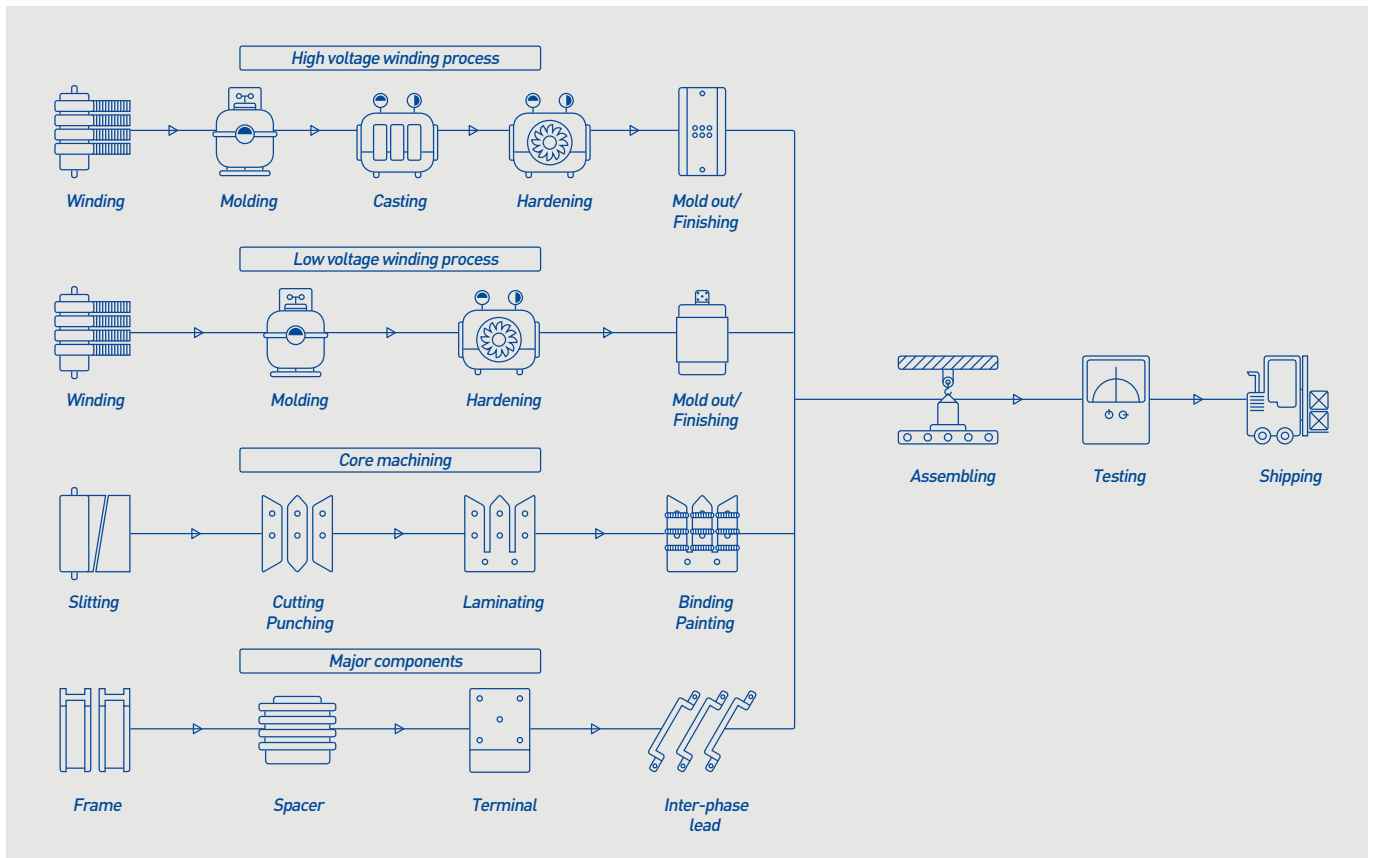


Extension Busbar



# Cast Resin Transformer

## Quality assurance



We have an authorized power test technology center, operating ISO 9001-certificates quality system and performing tests according to KSC 4311 and IEC 60076-11

### Routine Test

We manage the quality of all transformers produced by our factory according to the ISO 9001 system, and perform tests according to KSC 4311

- Structure inspection
- Coil resistance measurement
- Transformation ratio, polarity and angular displacement test
- No-load current and no-load loss test
- Load loss and impedance voltage test
- Normal frequency withstand voltage test
- Induction withstand voltage test
- Partial discharge test (10pC or less)

### Type Test

Perform the type test when there is a demand from customers or when changing the type of a transformer.

- Temperature rise test
- Lightning impulse withstand voltage test

### Special Test

LS's Cast Resin Transformer has completed the following tests during the product development step to exert the performance of products even in severe use environments.

- Short circuit test 3P 2,000kVA certified by KERI
- Noise test according to KS C IEC 60076-10-1, using a Pressure Level (Lp)

$$Lw(A) = Lp(A) + 10\log(S)$$

S = 1.25×H×P

H : Transformer height

P : Length of the ellipse connecting the measurement positions

LS's Cast Resin Transformer performed an environment resistance test according to the revised standard IEC 60076-11 at an international institution CESI(Italia) for the first time in Korea.

- Non-flam mability and toxic gas (Fire Behavior) test  
Test on self-extinguishability and whether toxic gases are generated in the case of fire
- Environmental and moisture-resistance test  
Test on whether the transformer works normally in moisture/water condensation or contamination conditions at the use place
- Thermal shock (Climatic) test  
Internal crack performance test depending on rapid temperature or load changes during transportation, storage and operation

# Standard specification

Division	Standard specification				
Installation place	Indoor(Enclosure needed for outdoor)				
Applicable standard	KS C 4311, IEC 60076-11, IEEE C57.12.01				
Frequency	60				
Insulation kind	F type, B type, H type				
Coil temperature rise	100K				
1st rated voltage(kv)	22.9kV			6.6 or 3.3kV	
1st tap voltage(v)	F23900-R22900-21900-20900-19900			F6900-R6600-6300-6000-5700 F3450-R3300-3150-3000-2850	
2nd rated voltage	6.6 or 3.3kV	380-220V	220-110V	380-220V	220-110V

Phase	3P	3P	1P	3P	1P
Angular displacement	Dd0	Dyn11	-	Dyn11	-
Impulse withstand voltage(kv) (1st/ 2nd)	95 / 40(20) 125 / 40(20)	95 / - 125 / -	95 / - 125 / -	40(20) / -	40(20) / -
Normal frequency withstand voltage(kv) (1st/ 2nd)	50 / 20(10)	50 / 3	50 / 3	20(10) / 3	20(10) / 3

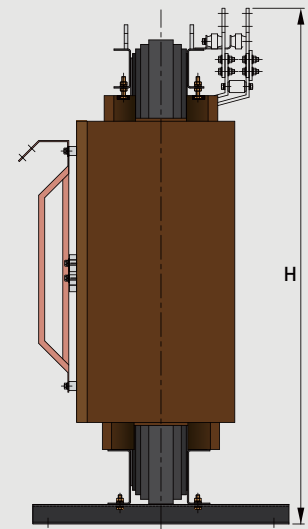
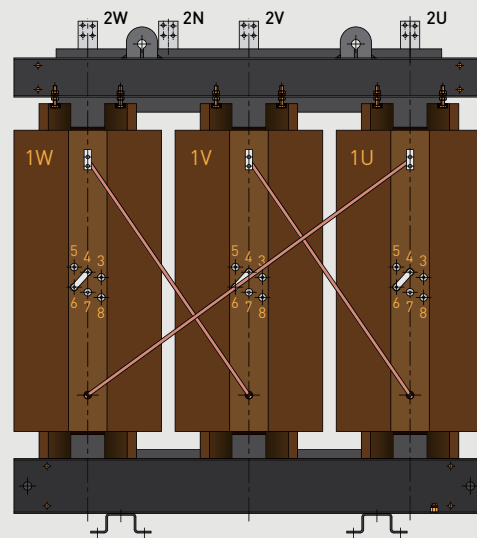
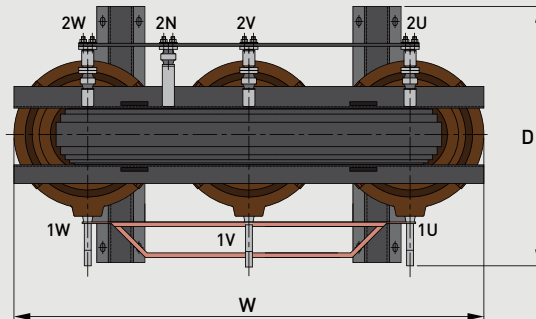
Rated capacity (kVA)					
	3P	3P	1P	3P	1P
		100	100	100 100	1P
		200	200	200	200
		300	300	300	300
		400	400	400	400
	500	500	500	500	500
	600	600	600	600	600
	750	750	750	750	750
	1,000	1,000	1,000	1,000	1,000
	1,250	1,250		1,250	
	1,500	1,500		1,500	
	2,000	2,000		2,000	
	2,500	2,500		2,500	
	3,000	3,000		3,000	
	4,000				
	5,000				
	6,000				
	7,500				
	8,500				
	10,000				

\* The above descriptions are standard specifications, but other specifications are available according to orders. [-36kV, -25MVA]  
 \* The ( ) in the impulse withstand voltage and the normal frequency withstand voltage is insulation classes for 3.6kV.

# Technical Data - Standard consumption efficiency

## 3P

22.9kV/380-220V  
 6.6(3.3)kV/380-220V  
 22.9kV/6.6(3.3)kV



### 3P 22.9kV/380-220V DY

Capacity (kVA)	% IZ (%)	No-load current (%)	Voltage variation ratio	Efficiency (%)		Outer dimension (mm)			Weight (kg)	Noise (dB)
				100% load	50% load	W	D	H		
100	5.5	1.0	1.5	98.80	98.90	1,265	825	1,445	1,050	58
200	6.0	1.0	1.4	98.80	99.00	1,290	825	1,450	1,150	58
300	6.0	0.8	1.3	98.80	99.10	1,340	835	1,475	1,350	58
400	6.0	0.8	1.2	99.00	99.20	1,490	910	1,495	1,700	58
500	6.0	0.8	1.2	99.00	99.20	1,490	910	1,525	1,800	60
600	6.0	0.6	1.1	99.10	99.30	1,575	1,000	1,665	2,250	60
750	6.0	0.6	1.1	99.10	99.30	1,575	1,000	1,695	2,350	62
1,000	7.0	0.6	1.1	99.20	99.40	1,725	1,000	1,820	3,000	62
1,250	7.0	0.5	1.1	99.20	99.40	1,725	1,000	1,850	3,150	63
1,500	7.0	0.5	1.0	99.30	99.50	2,030	1,200	2,120	4,950	64
2,000	7.5	0.5	1.0	99.30	99.50	2,165	1,200	2,150	5,750	65
2,500	7.5	0.5	1.0	99.30	99.50	2,165	1,200	2,180	5,950	66
3,000	7.0	0.5	1.0	99.30	99.50	2,375	1,225	2,240	7,300	66

### 3P 6.6(3.3)kV/380-220V DY

Capacity (kVA)	% IZ (%)	No-load current (%)	Voltage variation ratio	Efficiency (%)		Outer dimension (mm)			Weight (kg)	Noise (dB)
				100% load	50% load	W	D	H		
100	5.0	1.0	1.8	98.60	98.90	1,050	800	1,150	700	58
200	5.0	1.0	1.6	98.70	99.00	1,125	800	1,155	850	58
300	5.0	0.8	1.5	98.80	99.10	1,155	800	1,250	1,050	58
400	5.0	0.8	1.4	98.90	99.20	1,215	800	1,445	1,350	60
500	5.0	0.8	1.3	99.00	99.30	1,320	800	1,470	1,600	60
600	6.0	0.6	1.3	99.00	99.30	1,395	900	1,470	1,800	60
750	6.0	0.6	1.3	99.00	99.30	1,335	900	1,600	1,850	62
1,000	6.0	0.6	1.1	99.20	99.40	1,510	1,000	1,740	2,550	62
1,250	7.0	0.5	1.1	99.30	99.50	1,830	1,000	1,830	4,100	63
1,500	7.0	0.5	1.0	99.30	99.50	1,795	1,200	2,040	4,350	64
2,000	7.0	0.5	1.0	99.30	99.50	1,955	1,200	2,100	5,050	65
2,500	7.0	0.5	1.0	99.30	99.50	2,060 (2,125)	1,200 (1,200)	2,130 (2,160)	5,700 (5,750)	66
3,000	7.0 (7.5)	0.5	1.0	99.30	99.50	2,195 (2,300)	1,200	2,160	6,350 (6,750)	66

\* The dimensions in ( ) are for 1st voltage 3.3KV.

### 3P 22.9kV/6.6(3.3)kV DD

Capacity (kVA)	% IZ (%)	No-load current (%)	Voltage variation ratio	Efficiency (%)		Outer dimension (mm)			Weight (kg)	Noise (dB)
				100% load	50% load	W	D	H		
500	6.0	1.0	6.0	99.10	99.25	1,695 (1,575)	1,000 (930)	1,705 (1,625)	700	58
750	6.0	1.0	6.0	99.10	99.30	1,775 (1,640)	1,010 (1,000)	1,795 (1,765)	850	58
1,000	7.0	0.8	7.0	99.30	99.40	1,980 (1,820)	1,045 (1,020)	1,825 (1,765)	1,050	58
1,250	7.0	0.8	7.0	99.30	99.40	1,980 (1,820)	1,045 (1,020)	1,825 (1,795)	1,350	60
1,500	7.5	0.8	7.5	99.40	99.50	2,145 (1,980)	1,200 (1,200)	2,035 (2,005)	1,600	60
2,000	7.5	0.6	7.5	99.40	99.50	2,190 (2,015)	1,200 (1,200)	2,035 (2,005)	1,800	60
2,500	7.5	0.6	7.5	99.40	99.50	2,190 (2,190)	1,200 (1,200)	2,035 (2,035)	1,850	62
3,000	8.0	0.6	8.0	99.40	99.50	2,295 (2,295)	1,200 (1,200)	2,095 (2,095)	2,550	62

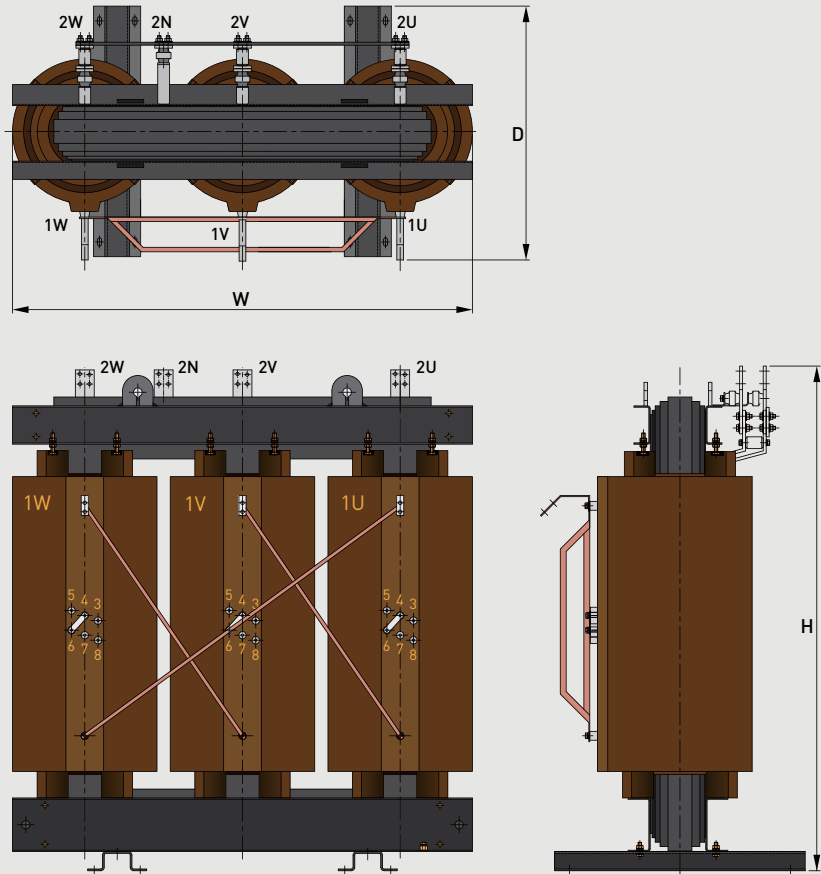
\* The dimensions in ( ) are for 2nd voltage 3.3KV.

# Cast Resin Transformer

## Technical Data - Minimum consumption efficiency

### 3P

22.9kV/380-220V  
 6.6(3.3)kV/380-220V  
 22.9kV/6.6(3.3)kV



### 3P 22.9kV/380-220V DY

Capacity (kVA)	% IZ (%)	No-load current (%)	Voltage variation ratio	Efficiency (%)		Outer dimension (mm)			Weight (kg)	Noise (dB)
				100% load	50% load	W	D	H		
100	6.0	2.0	2.0	97.70	98.00	1,175	800	1,260	700	65
200	6.0	1.5	1.9	97.90	98.30	1,175	800	1,285	800	65
300	6.0	1.2	1.7	98.10	98.50	1,200	815	1,445	990	66
400	6.0	1.1	1.6	98.30	98.60	1,265	825	1,490	1,180	66
500	6.0	1.0	1.5	98.40	98.80	1,340	835	1,500	1,360	67
600	6.0	1.0	1.4	98.50	98.80	1,355	900	1,640	1,560	68
750	6.0	1.0	1.4	98.50	98.90	1,485	910	1,665	1,860	68
1,000	6.0	1.0	1.3	98.70	99.00	1,560	1,000	1,775	2,280	68
1,250	6.5	1.0	1.2	98.80	99.00	1,655	1,000	1,825	2,700	68
1,500	7.0	1.0	1.2	98.90	99.10	1,740	1,010	1,855	3,050	70
2,000	7.0	1.0	1.1	98.90	99.10	1,800	1,200	2,090	3,720	72
2,500	7.0	1.0	1.1	99.00	99.20	1,980	1,200	2,150	4,570	72
3,000	7.5	1.0	1.0	99.00	99.20	2,145	1,200	2,180	5,510	74



### 3P 6.6(3.3)kV/380-220V DY

Capacity (kVA)	% IZ (%)	No-load current (%)	Voltage variation ratio	Efficiency (%)		Outer dimension (mm)			Weight (kg)	Noise (dB)
				100% load	50% load	W	D	H		
100	3.5	2.1	2.2	97.30	98.10	925	800	1,150	550	65
200	4.5	1.3	1.8	98.00	98.50	975	800	1,165	650	65
300	4.0	1.1	1.7	98.20	98.60	990	800	1,405	860	66
400	5.0	1.0	1.5	98.40	98.70	1,110	800	1,435	1,030	66
500	5.0	1.0	1.5	98.40	98.80	1,200	800	1,460	1,230	67
600	5.0	1.0	1.4	98.70	98.80	1,305	900	1,600	1,590	68
750	6.0	1.0	1.4	98.60	98.90	1,305	900	1,600	1,580	68
1,000	6.0	1.0	1.3	98.70	99.00	1,410	900	1,630	1,950	68
1,250	6.0	1.0	1.2	98.80	99.10	1,485	1,000	1,760	2,400	68
1,500	6.0	1.0	1.1	98.90	99.10	1,600	1,000	1,790	2,820	70
2,000	6.0	1.0	1.1	98.90	99.20	1,760	1,200	2,040	3,730	72
2,500	7.0	1.0	1.0	99.00	99.20	1,905	1,200	2,070	4,550	72
3,000	7.0	1.0	1.0	99.10	99.30	2,025	1,200	2,130	5,500	72

\* The dimensions in [ ] are for 1st voltage 3.3KV.

### 3P 22.9kV/6.6(3.3)kV DD

Capacity (kVA)	% IZ (%)	No-load current (%)	Voltage variation ratio	Efficiency (%)		Outer dimension (mm)			Weight (kg)	Noise (dB)
				100% load	50% load	W	D	H		
500	6.0	1.0	1.5	98.40	98.70	1,440	900	1,630	1,750	65
750	6.0	0.9	1.3	98.60	98.80	1,575	1,000	1,660	2,200	65
1,000	6.0	0.8	1.2	98.80	98.90	1,640	1,000	1,770	2,440	68
1,250	6.5	0.8	1.2	98.80	98.90	1,695	1,010	1,770	2,850	69
1,500	7.0	0.8	1.2	98.80	99.00	1,755	1,005	1,920	3,200	69
2,000	7.0	0.8	1.1	98.90	99.20	1,845	1,200	1,980	3,850	69
2,500	7.0	0.8	1.0	99.00	99.30	1,920	1,200	2,040	4,450	69
3,000	7.0	0.8	0.9	99.20	99.30	2,100	1,200	2,040	5,600	70
4,000	7.0	0.8	0.9	99.20	99.30	2,350	1,215	2,170	6,950	72
5,000	8.0	0.8	0.9	99.30	99.30	2,470	1,500	2,355	8,100	74
6,000	8.0	0.8	0.9	99.30	99.40	2,635	1,500	2,415	9,800	74
7,500	9.5	0.8	1.0	99.30	99.40	2,905	1,500	2,475	12,000	76
8,500	10.0	0.8	1.0	99.40	99.40	3,025	1,500	2,475	13,000	76
10,000	10.0	0.8	1.0	99.40	99.50	3,190	1,505	2,630	15,000	78

\* The dimensions in [ ] are for 2nd voltage 3.3KV.

## Cast Resin Transformer

# Installation and operation conditions

Pre-checking and maintenance are essential to increase the lifespan and efficiency of the product. Maintaining by all means because the maintenance of cast resin transformers is simple compared to other kinds.

### Checkpoints when installing cast resin transformers

#### Installation condition

- The installation place shall be clean, have no worry of flooding, and have no danger of water falling from the ceiling.
- The installation place shall have a ventilation structure to ventilate the heat generated from the transformer enough.

#### Checking of cast resin transformers that are in a long-term storage condition

- If dust is accumulated after long-term storage of cast resin transformers, then remove dust using a vacuum cleaner or blow out dust using a compressor and wipe out dust using a dry cloth.

The vinyl packing for prevention of foreign substances such as dust, screws, nuts and washers from invading shall be maintained until power is inputted after installation.

#### Torque management when connecting the low voltage terminal

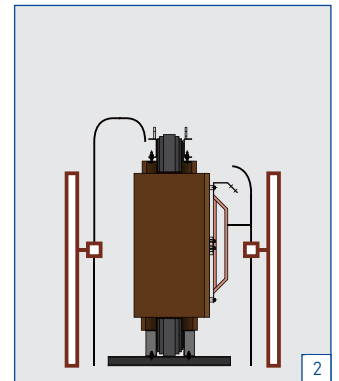
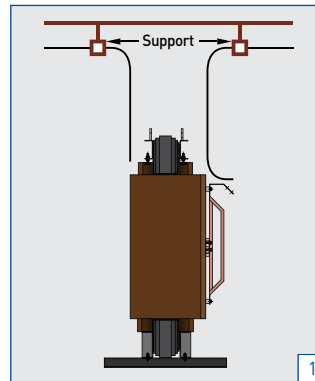
Bolt	M8	M10	M12	M16
Torque	125	250	405	1,500

Unit : kgf-cm

### Caution when connecting the terminals

When connecting cables or busbars to the 1st, 2nd terminals, avoid mechanical stresses to the 1st, 2nd terminals, and especially when connecting busbars, use flexible busbars by all means to reduce mechanical stresses due to transformer vibrations. Connecting busbars directly to the 1st, 2nd terminals can loosen the connection parts or cause abnormal noises due to transformer vibrations during operation.

1. Top cabling (Cable)
2. Bottom cabling (Cable)



### How to minimize transformer noises when installing transformers

- Install cushion rubber beneath the bed frame.
- When installing transformers, separate them mechanically from their enclosures to prevent vibrations of the enclosures.
- When connecting terminals, use flexible busbars.
- The transformer installation places shall be rigid and maintain horizons well.
- Large-capacity transformers shall be installed near pillars of the building to reduce vibrations.
- Avoid corners of the wall for installation.
- Install non-flammable sound-absorbing materials inside the panels if necessary.

## Considerations for ventilation

### Vent height and vent area

- In the case of natural cooling, ventilation of the enclosure shall discharge the heat generated from total heat loss of the transformer enough via natural convection.
- Proper ventilation is realized by the inflow of cold air from the inlet A and the outflow of hot air through the outlet A' located at a height H.

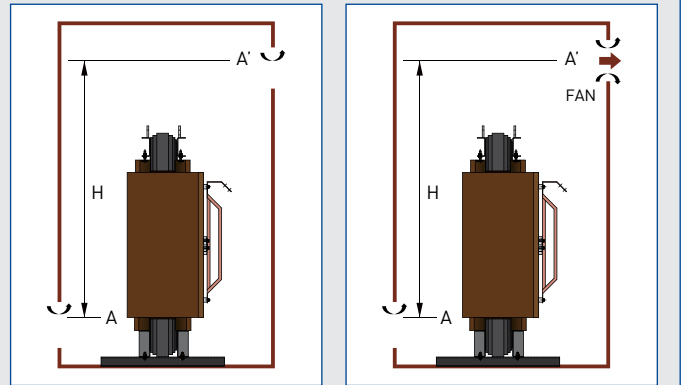
$$A = \frac{HL}{0.1 \sqrt{H \Delta \theta a^3}} \quad (\text{m}^2)$$

$$A' > A 110\% \text{ (min.)}$$

A : Required inlet area (m<sup>2</sup>)  
 A' : Required outlet area (m<sup>2</sup>)  
 $\Delta \theta a$  : Air temperature rise (K) = 15K (Approximate value)  
 HL : Heat loss (kW)  
 H : Distance from the center of the outlet and the center of the TR (m)

### Forced ventilation

- When the average ambient temperature is higher than 20°C or the transformer is operated often in an overload condition, forced ventilation using fans is necessary if the vent area is less than the standard.



## Minimum isolation distance

- Epoxy resin surface - Ground
- Insulation-reinforced inter-phase lead surface - Insulation cable

Voltage	Withstand voltage(kV)	Impulse voltage(kV)	Isolation distance(mm)
1.1kV or less	3	-	10
6.6kV or less	20	60	50
15kV or less	38	75	70
22.9kV or less	50	95	100
		125	150

## Checkpoints before receiving power

- Remove the packing vinyl cover and check the wiring condition, isolation distance, foreign substance residuals, component breakage, bolt torque, etc.
- Check if the wiring was realized according to the nameplate.
- Measure the insulation resistance using a DC1000V insulation tester(Megger).

## Maintenance / Repair

### • General use environment

Remove dust using a vacuum cleaner and blow out the over-accumulated dust using a dry compressor every year. the cleaning period can differ depending on the use environment. during maintenance work, check the bolt mounting conditions using a torque wrench.

### • A/S requesting method

If transformer-related A/S is necessary, tell the serial number on the nameplate of the cast resin transformer and the phenomenon exactly for quick and exact A/S.