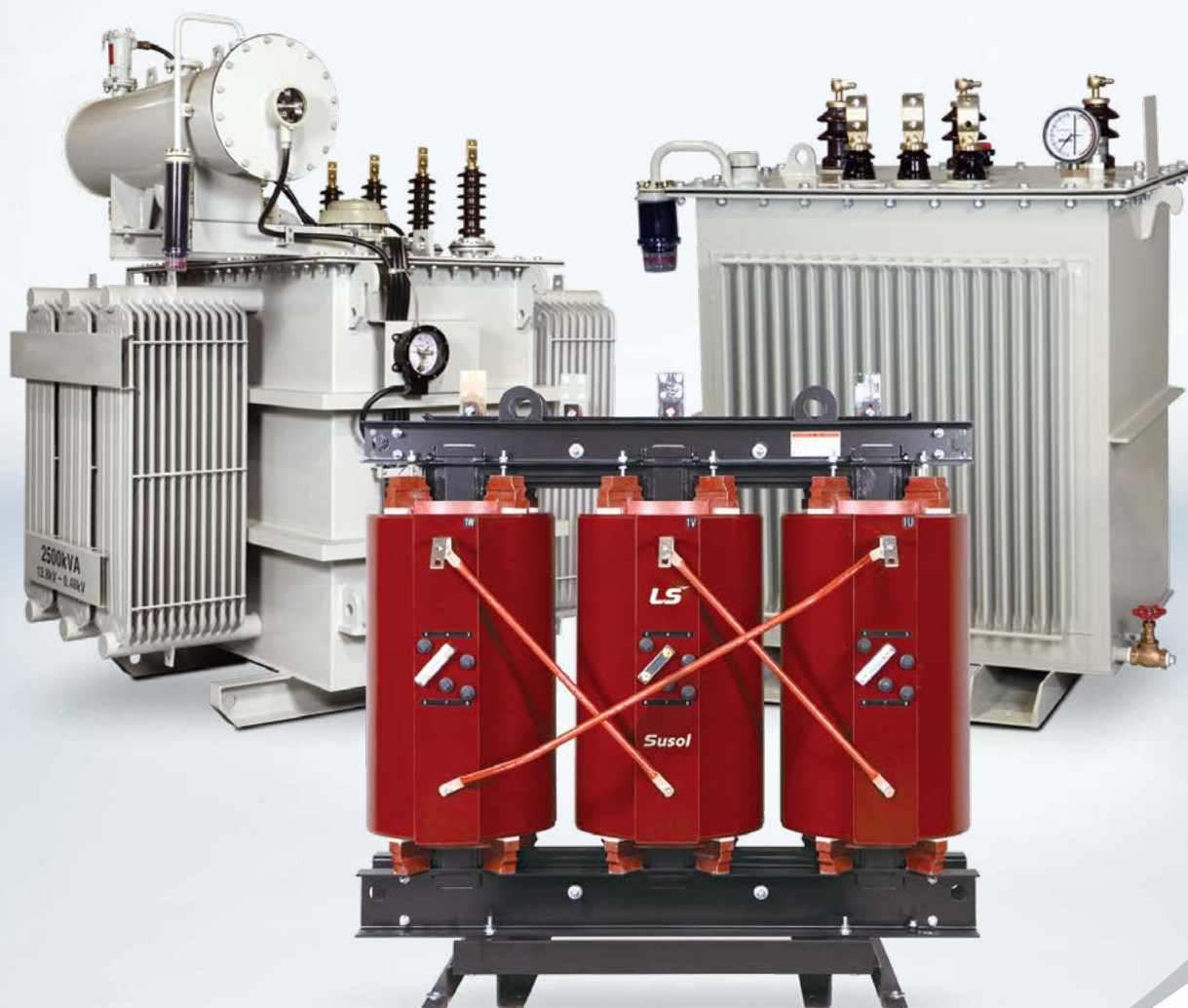


LS Transformer



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 LS behind.

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



High quality



High efficiency



Eco



Contents

- 04 Cast Resin Transformer
- 20 Oil-Immersed Transformer
- 28 Pad-Mounted Transformer



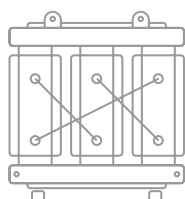




Cast Resin Transformer

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 contributed 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 excellent 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 prevent 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
4	5	6
7	8	9

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

Power supply for complex facilities

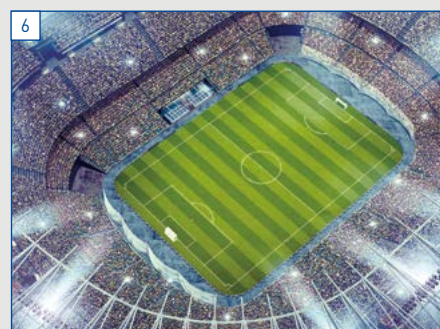
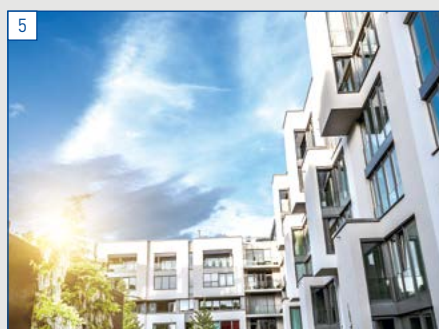
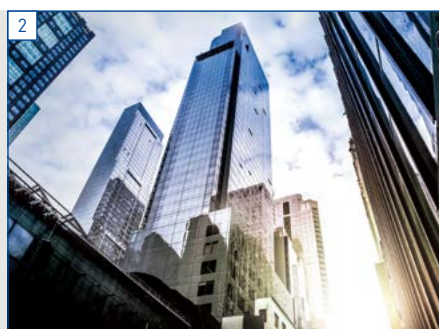
High-rise building, multipurpose building, apartment

Public places where fire prevention is important

Underground store, subway, hotel, hospital

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

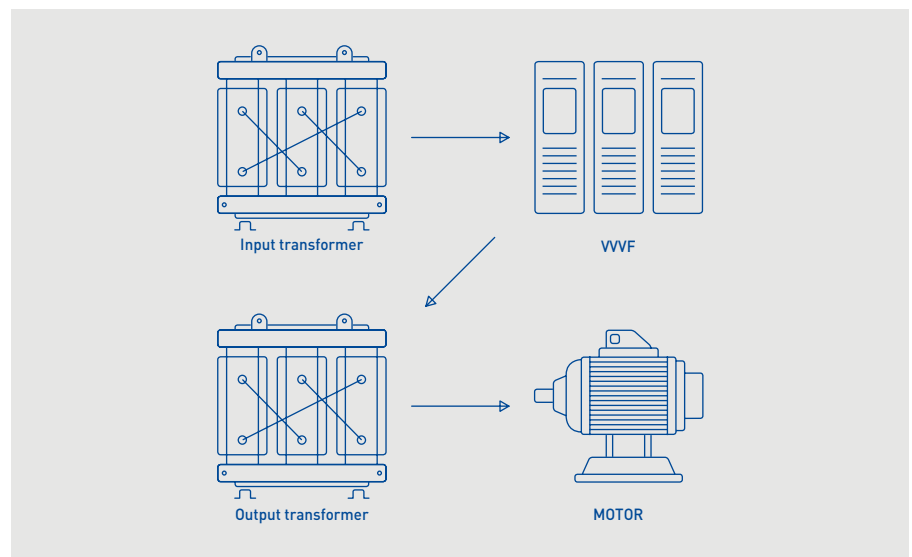
- This is used as an input/output transformer for 6Pulse, 12Pulse, 24Pulse.

Input transformer

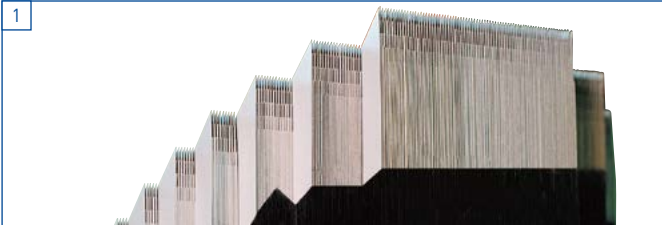
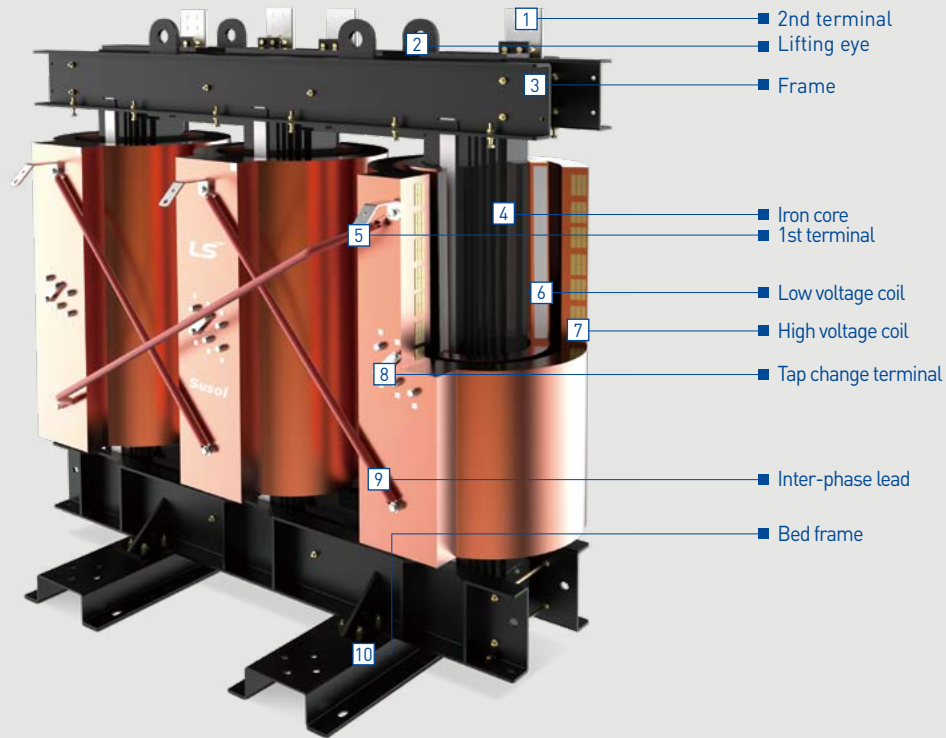
- This is used when the system voltage is different from the VVVF input voltage or when isolation is needed.
- The input transformer isolates VVVF from the system and reduces short circuit currents.
- Using an electro-magnetic shield specially designed between high and low voltage coils not only reduces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

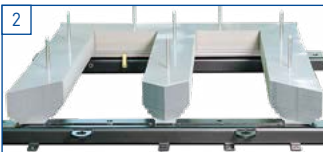


Cast Resin Transformer Components



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



P2-300M

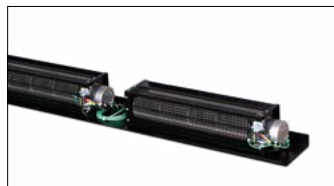
3 points temperature measurement



P2-400

3 or 4 points temperature measurement

Cooling fan



Low noise cooling fan



Large cooling fan

Other accessories



Wheel



Enclosure

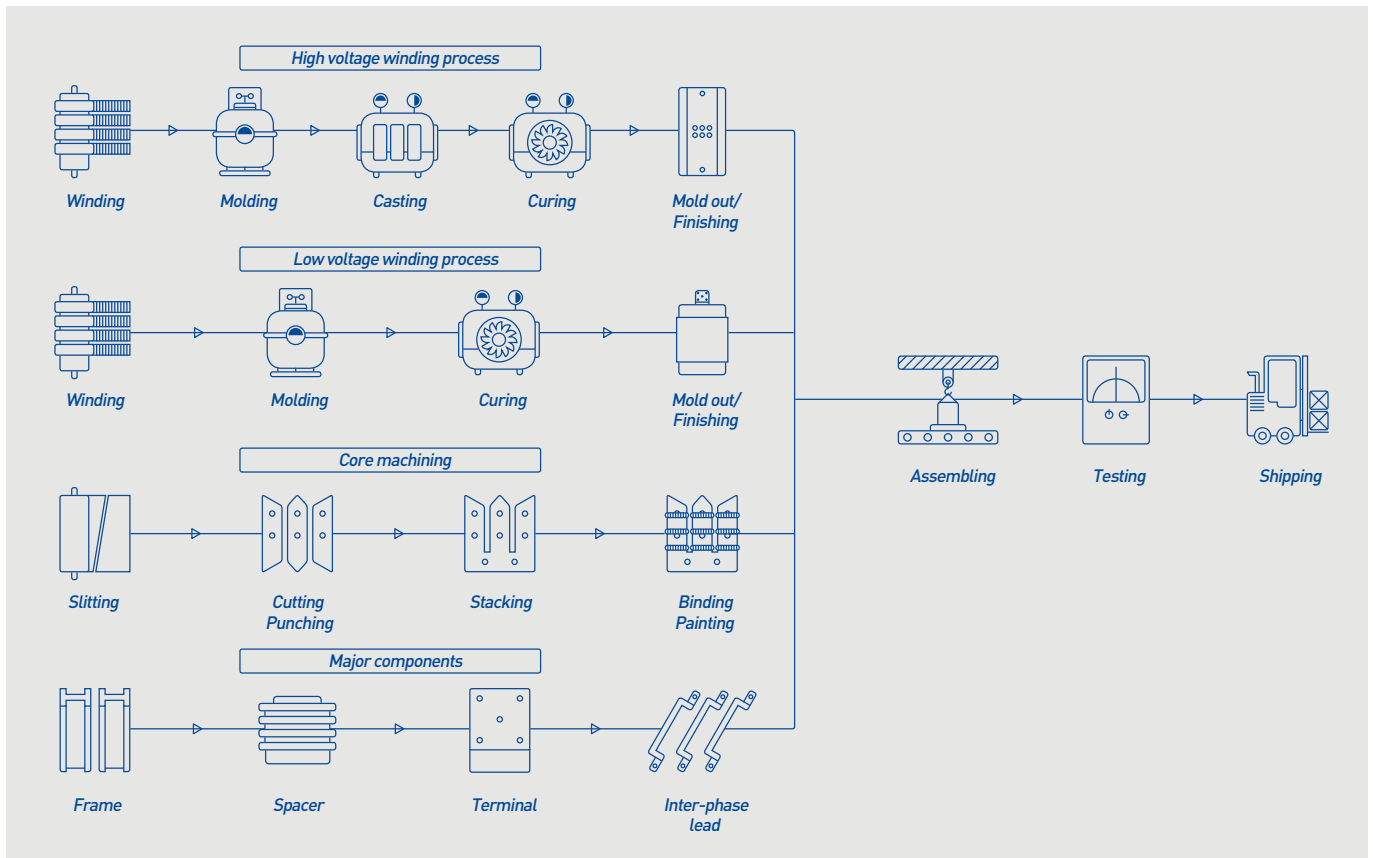


Extension busbar



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, 50			
Insulation kind	F type, H type			
Coil temperature rise	100K, 125K			
HV rated voltage(kv)	33	22	10	6
HV tap voltage(v)	5 Taps ($\pm 2 \times 2.5\%$)			
LV rated voltage	400V			
Angular displacement	Dyn11			
Impulse withstand voltage(kv) (HV/ LV)	145 / - 170 / -	95 / - 125 / -	60 / - 75 / -	40 / - 60 / -
Normal frequency withstand voltage(kv) (HV/ LV)	70 / 3	50 / 3	28 / 3	20 / 3
Rated capacity (kVA)	400	400	400	400
	630	630	630	630
	1000	1000	1000	1000
	1250	1250	1250	1250
	1600	1600	1600	1600
	2000	2000	2000	2000
	2500	2500	2500	2500
	3150	3150	3150	3150
Enclosure	IP 2X, IP 3X, IP 4X			

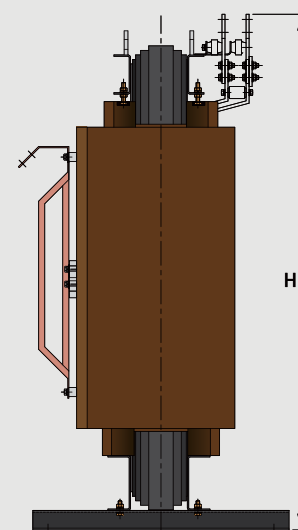
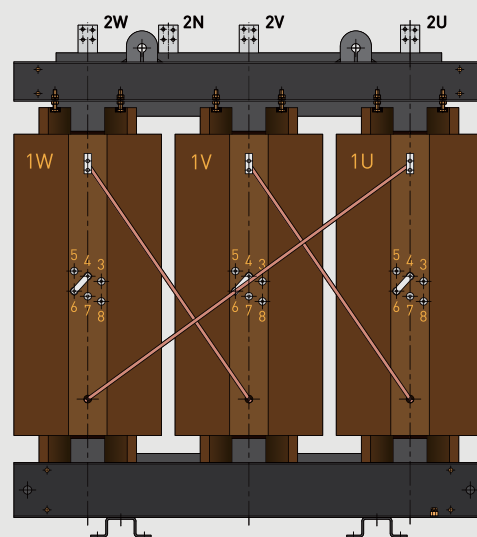
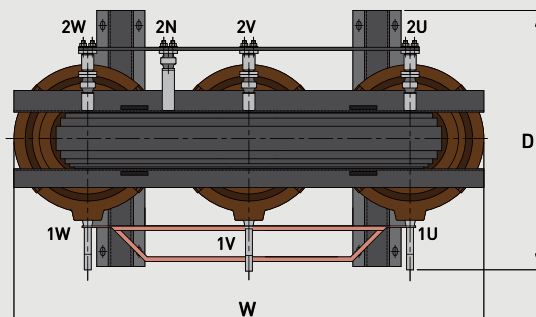
* The above descriptions are standard specifications, but other specifications are available according to orders. [-36kV, ~25MVA]

Cast Resin Transformer

Technical data

3P

6kV/400-231V Dyn11,
60kV BIL, AL/AL



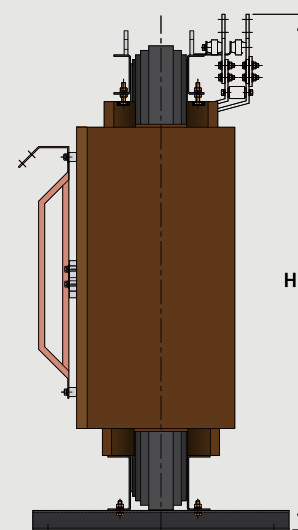
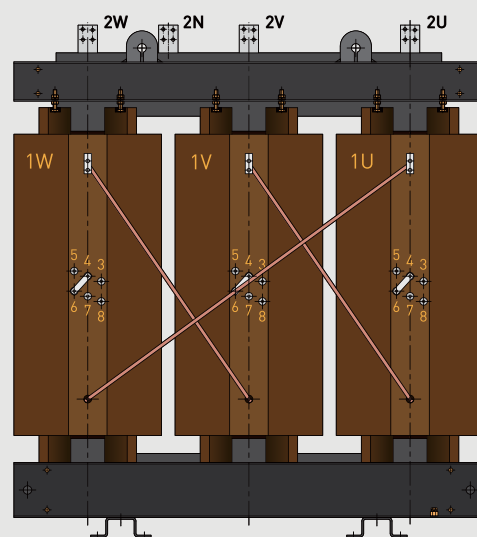
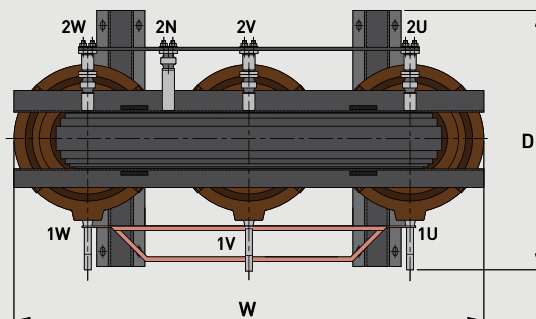
Standard : IEC 60076-11

Temperature Rise : 100K(F Class)

Rated power (kVA)	Impedance voltage (%)	No load loss (W)	Load loss(W)		Efficiency (%) at 75°C			Exciting current (%)	Voltage regulation (%)	Pressure sound level (dB)	Dimension (mm)				Weight (kg)
			At 75°C	At 120°C	100% load	75% load	50% load				Width (W)	Depth (D)	Height (H)	Height(H) +Wheels	
400	6.0	900	4,950	5,650	98.5	98.7	98.9	1.0	1.8	57	1,200	800	1,410	1,465	1,250
630	6.0	1,300	7,550	8,650	98.6	98.8	98.9	0.9	1.7	58	1,320	900	1,610	1,665	1,700
1,000	6.0	1,900	10,000	11,500	98.8	99.0	99.1	0.8	1.5	59	1,485	1,000	1,695	1,750	2,400
1,250	6.0	2,300	11,150	12,800	98.9	99.0	99.1	0.8	1.4	59	1,555	1,000	1,760	1,815	2,800
1,600	6.0	2,800	12,000	13,800	99.0	99.2	99.2	0.8	1.3	63	1,690	1,000	1,790	1,845	3,400
2,000	6.0	3,650	13,850	15,900	99.1	99.2	99.2	0.8	1.2	65	1,805	1,000	2,030	2,145	4,250
2,500	6.0	4,500	16,600	19,100	99.1	99.2	99.3	0.8	1.2	65	1,985	1,200	2,085	2,200	5,200
3,150	7.0	5,400	17,550	20,150	99.2	99.3	99.3	0.7	1.1	66	2,145	1,200	2,120	2,235	6,100

3P

10kV/400-231V Dyn11,
75kV BIL, AL/AL



Standard : IEC 60076-11

Temperature Rise : 100K(F Class)

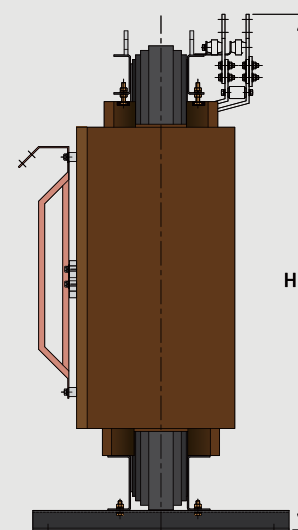
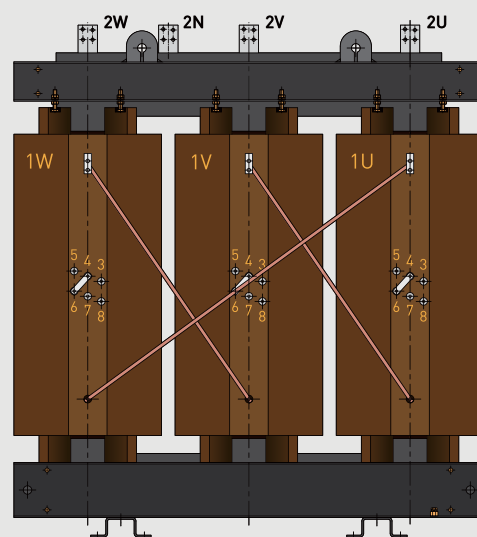
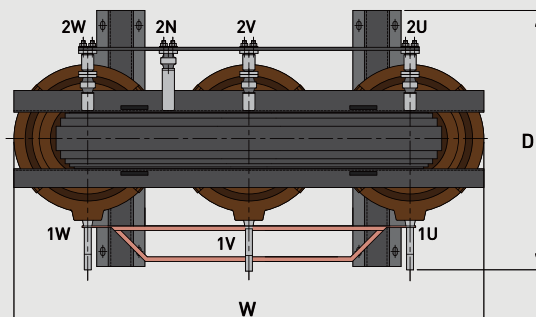
Rated power (kVA)	Impedance voltage (%)	No load loss (W)	Load loss(W)		Efficiency (%) at 75°C			Exciting current (%)	Voltage regulation (%)	Pressure sound level (dB)	Dimension (mm)				Weight (kg)
			At 75°C	At 120°C	100% load	75% load	50% load				Width (W)	Depth (D)	Height (H)	Height(H) +Wheels	
400	6.0	950	4,950	5,650	98.5	98.7	98.9	1.0	1.8	57	1,250	800	1,410	1,465	1,300
630	6.0	1,400	7,550	8,650	98.5	98.8	98.9	0.9	1.7	58	1,400	900	1,570	1,625	1,800
1,000	6.0	1,900	10,000	11,500	98.8	99.0	99.1	0.8	1.5	59	1,505	1,000	1,695	1,750	2,400
1,250	6.0	2,400	11,150	12,800	98.9	99.0	99.1	0.8	1.4	59	1,625	1,000	1,745	1,800	2,900
1,600	6.0	2,800	12,000	13,800	99.0	99.2	99.2	0.8	1.3	63	1,745	1,000	1,805	1,860	3,600
2,000	6.0	3,650	13,850	15,900	99.1	99.2	99.2	0.8	1.2	65	1,815	1,200	2,045	2,160	4,300
2,500	6.0	4,500	17,550	20,150	99.1	99.2	99.2	0.8	1.2	65	1,965	1,200	2,085	2,200	5,100
3,150	7.0	5,400	18,000	20,700	99.2	99.3	99.3	0.7	1.1	66	2,205	1,200	2,120	2,235	6,250

Cast Resin Transformer

Technical data

3P

22kV/400-231V Dyn11,
125kV BIL, AL/AL



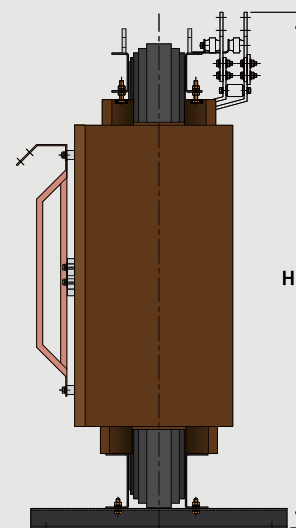
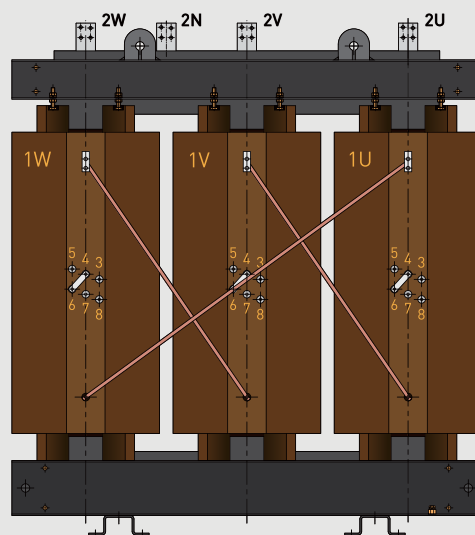
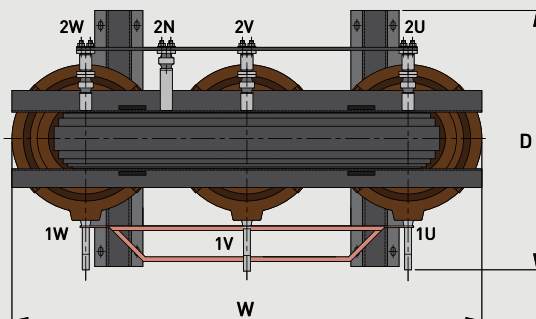
Standard : IEC 60076-11

Temperature Rise : 100K(F Class)

Rated power (kVA)	Impedance voltage (%)	No load loss (W)	Load loss(W)		Efficiency (%) at 75°C			Exciting current (%)	Voltage regulation (%)	Pressure sound level (dB)	Dimension (mm)				Weight (kg)
			At 75°C	At 120°C	100% load	75% load	50% load				Width (W)	Depth (D)	Height (H)	Height(H) +Wheels	
400	6.0	1,200	4,500	5,200	98.4	98.6	98.7	1.0	1.5	57	1,370	900	1,480	1,535	1,500
630	6.0	1,500	6,100	7,050	98.6	98.8	98.9	0.9	1.5	58	1,485	920	1,640	1,695	2,000
1,000	6.0	2,200	9,000	10,350	98.7	98.9	99.0	0.8	1.2	59	1,640	1,005	1,750	1,805	2,700
1,250	6.0	2,550	10,000	11,500	98.9	99.0	99.1	0.7	1.1	59	1,740	1,010	1,810	1,865	3,200
1,600	6.0	3,000	12,000	13,800	98.9	99.1	99.1	0.6	1.0	61	1,845	1,200	1,845	1,900	3,900
2,000	6.5	3,700	14,500	16,700	99.0	99.1	99.2	0.5	1.0	63	1,875	1,200	2,100	2,215	4,300
2,500	6.5	4,900	16,000	18,400	99.0	99.1	99.2	0.5	0.9	63	2,015	1,200	2,120	2,235	5,250
3,150	7.0	5,500	18,500	21,300	99.1	99.2	99.2	0.5	0.9	65	2,295	1,400	2,170	2,285	6,700

3P

33kV/400-231V Dyn11,
170kV BIL, AL/AL



Standard : IEC 60076-11

Temperature Rise : 100K(F Class)

Rated power (kVA)	Impedance voltage (%)	No load loss (W)	Load loss(W)		Efficiency (%) at 75°C			Exciting current (%)	Voltage regulation (%)	Pressure sound level (dB)	Dimension (mm)				Weight (kg)
			At 75°C	At 120°C	100% load	75% load	50% load				Width (W)	Depth (D)	Height (H)	Height(H) +Wheels	
400	6.0	1,650	5,750	6,600	98.1	98.3	98.4	1.2	2.0	57	1,580	1,080	1,825	1,880	2,000
630	6.0	2,100	7,250	8,300	98.5	98.7	98.7	1.2	1.9	58	1,690	1,105	1,930	1,985	2,550
1,000	6.0	3,100	8,550	9,800	98.8	98.9	98.9	1.2	1.4	59	1,835	1,225	1,955	2,030	3,400
1,250	6.0	3,700	10,550	12,100	98.8	98.9	98.9	1.2	1.4	59	1,895	1,230	2,215	2,290	4,000
1,600	6.0	4,200	13,150	15,100	98.9	99.0	99.0	1.2	1.3	61	2,015	1,245	2,245	2,320	4,700
2,000	7.0	5,000	15,250	17,500	98.9	99.1	99.1	1.1	1.3	63	2,150	1,275	2,330	2,405	5,400
2,500	8.0	5,800	17,000	19,550	99.0	99.1	99.2	1.0	1.3	63	2,360	1,315	2,360	2,435	6,300
3,150	9.0	6,600	18,000	20,700	99.2	99.2	99.3	0.9	1.3	65	2,540	1,355	2,190	2,265	7,100

Installation and operation conditions

"Pre-inspection and maintenance are essential to increase the lifespan and efficiency of the product."

"Maintenance of cast resin transformer is very simple, so please follow the recommended instruction."

Checkpoints when installing cast resin transformers

Installation condition

- The installation place shall be clean, free from flooding and falling water 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 trans-formers, 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 values for connecting with low voltage terminals

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

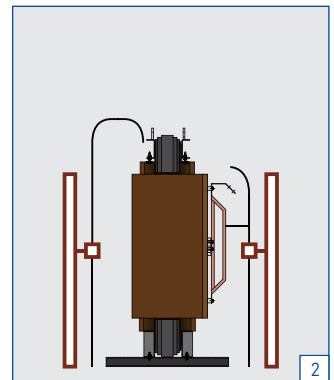
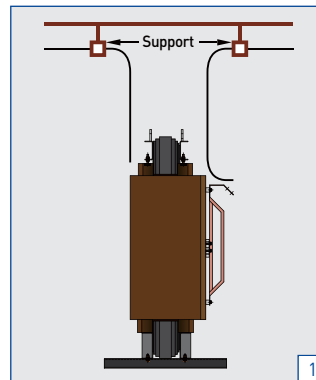
Unit : kgf-cm

Caution when connecting the terminals

When connecting cables or bus-bars to the HV, LV terminals, avoid mechanical stresses to the HV, LV terminals, and especially when connecting bus-bars, use flexible bus-bars by all means to reduce mechanical stresses due to transformer vibrations.

Connecting bus-bars directly to the HV, LV 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.

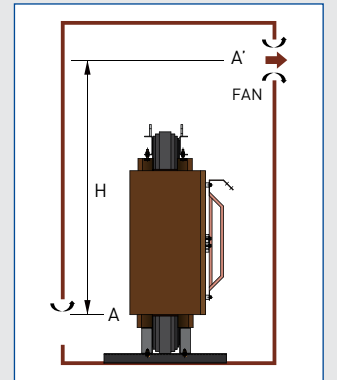
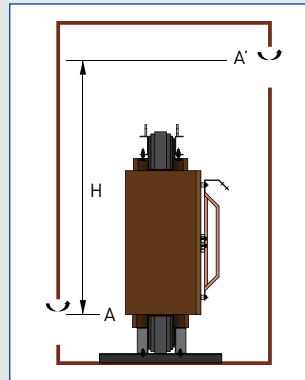
$$A = \frac{HL}{0.1 \sqrt{H \Delta \theta a^3}} \quad (\text{m}^2)$$

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

A : Required inlet area (m²)
 A' : Required outlet area (m²)
 $\Delta \theta a$: 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 insulation distance

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

Highest voltage (kV)	BIL (kV)	Minimum Clearance (mm)	
		Active – Earthed	Surface of Epoxy Resin– Earthed
≤1.1	-	-	10
3.6	40	60	50
7.2	60	90	50
12	75	120	75
17.5	95	160	100
24	125	250	150
36	170	350	200

Checkpoints before receiving power

- Remove the packing vinyl cover and check the wiring condition, isolation distance, foreign substance residuals, component breakage, bolt torque, etc.
- Compare the connecting inter-phase leads of cast resin transformer with vector diagram on name plate.
- 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.



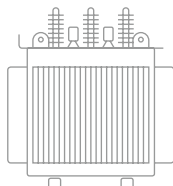


Oil-Immersed Transformer

At LS, we are constantly striving to introduce new innovations to the transformer industry, bringing you the highest quality, most reliable transformers. LS's Cooper Power series transformer products are ISO 9001 compliant, emphasizing process improvement in all phases of design, manufacture, and testing. In order to drive this innovation, we have invested both time and money.

In order to drive this innovation, we have invested both and money to satisfy our customers. we put our products into various tests to increase the quality of transformer.

Also we are applying diagnostic system on our products. This can help customers to monitor and analysis their Electrical assets.



Contents

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Oil-Immersed Transformer

LS transformer adopts a structure that can reduce the loss, and it ensures the electrical stability of the transformer by selecting the high efficiency and the optimum insulation structure. Also, it realizes the optimum cooling system, seismic condition considering the short-circuit mechanical power and external shock occurred in the transformer in case of system failure. And strong design of structure that can endure the impact during transportation.

“Leading transformer manufacturer that has provided total solution for power generation system. There is nothing like LS for Oil-Immersed Transformer as well.”



Applicable specifications

Applicable standard	IEC 60076 / ANSI(IEEE) C57
Installation location	Outdoor/Indoor
Frequency	50 / 60Hz
Thermal class	A type 105°C
Winding temp. rising	65K
Oil Temp. rising	60K
Cooling method	Internal
	External
Voltage	Up to 69kV
Capacity (MVA)	Up to 80MVA
Conductor	Al or Cu

Connections and neutral configurations

- Delta - Wye: Low voltage neutral shall be a fully insulated X0 bushing with removable ground strap.
- Grounded Wye-Wye: High voltage neutral shall be internally tied to the low voltage neutral and brought out as the H0X0 bushing in the secondary compartment with a removable ground strap.
- Delta-Delta: Transformer shall be provided without a neutral bushing.
- Wye-Wye: High voltage neutral shall be brought out as the H0 bushing in the primary compartment and the low voltage neutral shall be brought as the X0- bushing in the secondary compartment.
- Wye-Delta: High voltage neutral shall be brought out as the H0 bushing in the primary compartment. No ground strap shall be provided (line to line rated fusing is required).

Tank/cabinet features

- Bolted cover for tank access (45~2,500 kVA)
- Welded cover with hand hole (>2,500 kVA)
- Three-point latching door for security
- Removable sill for easy installation
- Lifting lugs (4)
- Stainless steel cabinet hinges and mounting studs
- Steel divider between HV and LV compartment
- 20" Deep cabinet (45~1,000 kVA)
- 24" Deep cabinet (1,500~7,500 kVA)
- 30" Deep cabinet (34.5/19.92 kV)
- Pentahead captive bolt
- Stainless steel 1-hole ground pads (45~500 kVA)
- Stainless steel 2-hole ground pads (750~10,000 kVA)
- Parking Stands (dead-front)

Connections and neutral configurations

- 200 A bushing wells (15, 25, and 35 kV)
- 200 A, 35 kV Large Interface
- 600 A (15, 25, and 35 kV) Integral bushings (dead-front)
- Electrical-grade wet-process porcelain bushings (live-front)

Connections and neutral configurations

- One-inch upper filling plug
- One-inch drain plug (45~500 kVA)
- One-inch combination drain valve with sampling device in low voltage compartment (750~10,000 kVA)
- Automatic pressure relief valve

Nameplate

- Laser-scribed anodized aluminum nameplate

Optional features

High and low voltage bushings

- 200 A (15, 25 kV) bushing inserts
- 200 A (15, 25 kV) feed thru inserts
- 200 A (15, 25 kV) (HTN) bushing wells with removable studs
- High-voltage 600 A (15, 25, 35 kV) deadbreak one-piece bushings
- Low voltage 6-, 8-holes spade
- Low voltage 12-, 16-, 20-holes spade (750-2,500 kVA)
- Low voltage bushing supports

Switches

- One, two, or three On/Off loadbreak switches
- 4-position loadbreak V-blade switch or T-blade switch
- Delta-wye switch
- 3-position V-blade selector switch
- 100 A, 150 A, 300 A tap changers
- Dual voltage switch
- Visible break with VFI interrupter interlock
- External visible break (15, 25, and 35 kV, up to 3 MVA)
- External visible break with gauges (15, 25, and 35 kV, up to 3 MVA)

Valves/plugs

- Drain/sampling valve in high-voltage compartment
- Globe type upper fill valve

Nameplate

- Stainless steel nameplate

Coatings (paint)

- ANSI® bell green
- ANSI® #61 light gray
- ANSI® #70 sky gray
- Special paint available per request

Tank/cabinet features

- Stainless steel tank base and cabinet
- Stainless steel tank base, cabinet sides and sill
- 100% stainless steel unit
- Service entrance (2 inch) in sill or cabinet side
- Touch-up paint (domestic)
- Copper ground bus bar
- Kirk-Key provisions
- Nitrogen blanket
- Bus duct cutout

Gauges and devices

- Liquid level gauge (optional contacts)
- Pressure vacuum gauge (optional contacts and bleeder)
- Dial-type thermometer (optional alarm contacts)
- Cover mounted pressure relief device (optional alarm contacts)
- Ground connectors
- Hexhead captive bolt
- Molded case circuit breaker mounting provisions
- External gauges in padlockable box

Testing

- Customer test witness
- Customer final inspection
- Zero Sequence impedance test
- Heat run test
- ANSI® impulse test
- Audible sound level test
- RIV (Corona) test
- Dissolved gas analysis (DGA) test
- 8- or 24-hour leak test

Decals and labels

- High voltage warning signs
- Mr. ouch
- Bi-lingual warning
- DOE compliant
- Customer stock code
- Customer stenciling
- Shock and arc flash warning decal
- Non-PCB decal

Special designs

- Factory mutual (FM)
- UL® classified
- Triplex
- High altitude
- K-factors
- Step-up
- Critical application
- Modulation transformers
- Seismic applications (including OSHPD)

Overcurrent protection

- Bay-0-net fusing (Current sensing, dual sensing, dual element, high amperage overload)
- Bay-0-net expulsion fuse in series with a partial range under-oil ELSP current limiting fuse (below 23 kV)
- Cartridge fusing in series with a partial range under-oil ELSP current limiting fuse (above 23 kV)
- MagneX™ interrupter with ELSP current-limiting fuse
- Vacuum fault Interrupter (VFI)
- Visible break window
- Fuse/switch interlock

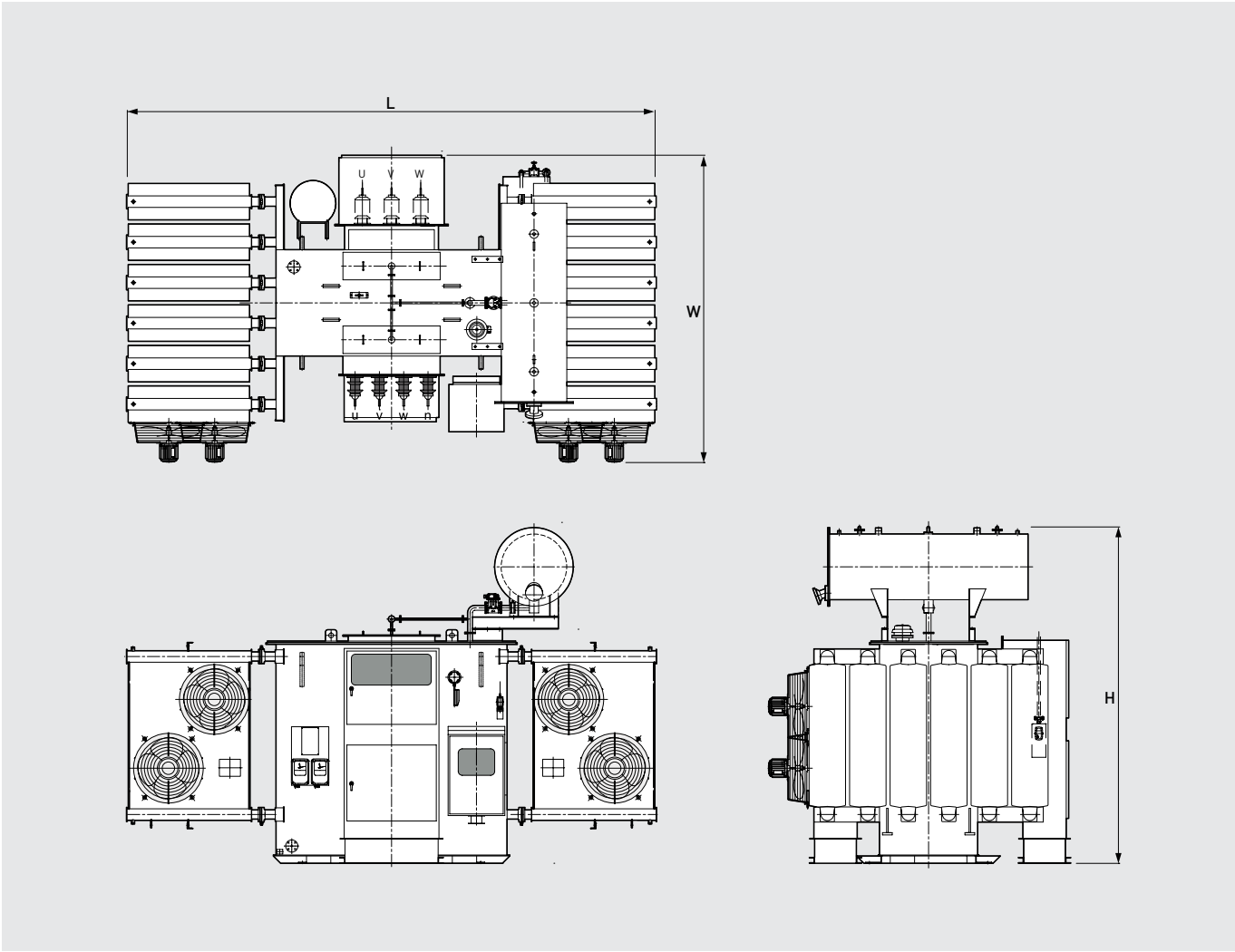
Metering/fan/control

- Full metering package
- Current Transformers (CTs)
- Metering Socket
- NEMA® 4 control box (optional stainless steel)
- NEMA® 7 control box (explosion proof)
- Fan Packages

Overvoltage protection

- Distribution-, intermediate-, or station-class surge arresters
- Elbow arresters (for dead-front connections)

Technical data



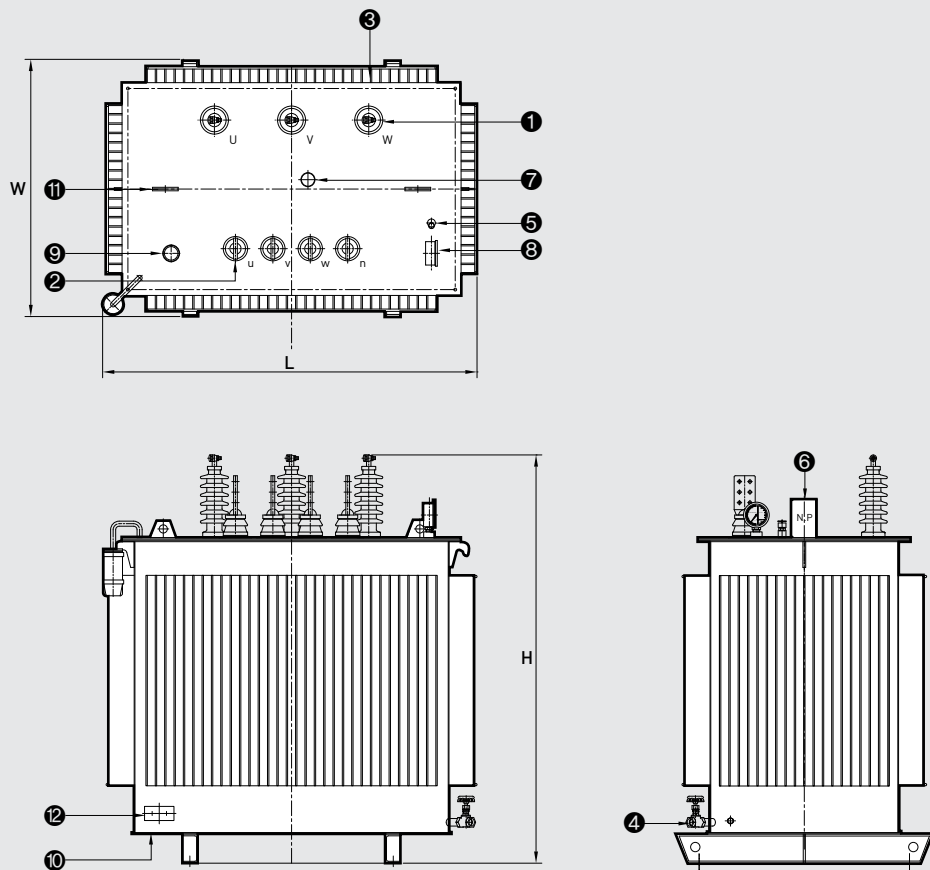
3P 60Hz 22.9kV/3.3 or 6.6kV

Capacity		Size			Specification						
(kVA)	L (mm)	W (mm)	H (mm)	Weight (kg)	Voltage Fluctuation Rate ε (%)	No-Load Current I_0 (%)	Impedance $\%Z$ (%)	Efficiency (100%) η (%)	Efficiency (50%) η (%)	Radiator Type	Conservator
3,000	3,500	2,580	2,850	9,000	1.2	2.5	7.0	99.0	99.3	Radiator Type	o
4,000	3,700	2,600	2,900	10,500	1.1	2.0	6.0	99.0	99.3	Radiator Type	o
5,000	4,100	2,650	2,950	11,750	1.1	2.0	7.0	99.1	99.4	Radiator Type	o
6,000	4,000	3,400	3,100	13,650	1.2	1.0	9.0	99.1	99.4	Radiator Type	o
7,500	4,400	2,900	3,350	15,600	1.2	3.0	8.3	99.1	99.35	Radiator Type	o
10,000	4,300	2,700	3,750	16,050	1.0	1.0	7.5	99.3	99.45	Radiator Type	o
20,000	5,950	3,250	4,150	21,300	1.0	1.0	8.0	99.3	99.5	Radiator Type	o
30,000	6,350	3,700	4,350	42,700	1.0	1.0	13.0	99.3	99.5	Radiator Type	o
50,000	7,000	4,000	5,000	61,500	1.0	1.0	10.0	99.4	99.6	Radiator Type	o

* LS ELECTRIC standard specification is applied to the above data
[The size and features can be changed according to the customer specification]

Oil Immersed Transformer

Technical data



Nº.	Description
1	Primary bushing
2	Secondary bushing
3	Call gate radiator
4	Sample valve
5	Pressure relief device
6	Nameplate

Nº.	Description
7	Tap changer
8	Oil gauge
9	Thermometer
10	Base
11	Upper plate ring
12	Earth pad

3P 60Hz 22.9kV/LV

Capacity		Size			Specification						
(kVA)	L (mm)	W (mm)	H (mm)	Weight (kg)	Voltage Fluctuation Rate ϵ (%)	No-Load Current I_0 (%)	Impedance $\%dZ$ (%)	Efficiency (100%) η (%)	Efficiency (50%) η (%)	Radiator type	Conservator
100	980	640	1,280	910	1.2	3.0	3.0	98.79	99.00	Corrugate type	×
150	980	630	1,300	1,030	1.2	3.0	3.0	98.72	99.05	Corrugate type	×
200	1,080	730	1,320	1,210	1.2	3.0	4.0	98.76	99.10	Corrugate type	×
250	1,140	750	1,380	1,540	1.2	3.0	4.0	98.93	99.20	Corrugate type	×
300	1,210	820	1,380	1,610	1.2	3.0	4.0	98.90	99.20	Corrugate type	×
400	1,350	900	1,380	1,920	1.2	3.0	5.0	98.94	99.25	Corrugate type	×
500	1,400	930	1,470	2,340	1.2	3.0	5.0	98.93	99.25	Corrugate type	×
600	1,440	930	1,470	2,630	1.2	3.0	5.0	99.06	99.30	Corrugate type	×
750	1,460	1,000	1,570	2,930	1.2	3.0	5.0	98.99	99.30	Corrugate type	×
1,000	1,580	1,070	1,620	3,340	1.2	3.0	5.0	99.06	99.35	Corrugate type	×
1,250	1,610	1,080	1,700	3,940	1.2	3.0	5.0	99.14	99.40	Corrugate type	×
1,500	1,810	1,140	1,750	4,850	1.2	3.0	6.0	99.24	99.45	Corrugate type	×
2,000	1,840	1,840	2,530	6,400	1.2	3.0	6.0	99.22	99.45	Radiator type	o
2,500	1,920	2,180	2,740	8,300	1.2	3.0	6.0	99.25	99.50	Radiator type	o
3,000	1,970	2,290	2,760	8,800	1.2	3.0	6.0	99.29	99.50	Radiator type	o

*LS ELECTRIC standard specification is applied to the above data (The size and features can be changed according to the customer specification)

3P 60Hz 6.6~3.3kV/LV

Capacity		Size			Specification						
(kVA)	L (mm)	W (mm)	H (mm)	Weight (kg)	Voltage Fluctuation Rate ϵ (%)	No-Load Current I_0 (%)	Impedance $\%dZ$ (%)	Efficiency (100%) η (%)	Efficiency (50%) η (%)	Radiator type	Conservator
100	1,000	660	1,520	1,050	1.3	3.0	4.0	98.78	99.00	Corrugate type	×
150	1,020	660	1,550	1,180	1.3	3.0	4.0	98.69	99.05	Corrugate type	×
200	1,100	720	1,520	1,360	1.3	3.0	4.5	98.72	99.10	Corrugate type	×
250	1,240	800	1,520	1,750	1.3	3.0	5.0	98.90	99.20	Corrugate type	×
300	1,220	780	1,570	1,760	1.3	3.0	5.0	98.90	99.20	Corrugate type	×
400	1,330	890	1,570	2,140	1.2	3.0	5.0	98.97	99.25	Corrugate type	×
500	1,320	850	1,590	2,050	1.2	3.0	5.0	98.94	99.25	Corrugate type	×
600	1,490	950	1,700	2,780	1.2	3.0	6.0	98.98	99.30	Corrugate type	×
750	1,570	1,080	1,700	2,910	1.2	3.0	6.0	98.96	99.30	Corrugate type	×
1,000	1,580	1,040	1,770	3,520	1.2	3.0	6.0	99.02	99.35	Corrugate type	×
1,250	1,700	1,110	1,820	4,060	1.2	3.0	6.0	99.14	99.40	Corrugate type	×
1,500	1,750	1,130	1,910	4,660	1.2	3.0	6.0	99.24	99.45	Corrugate type	×
2,000	2,040	1,680	2,630	7,200	1.2	3.0	6.0	99.29	99.45	Radiator type	o
2,500	2,250	1,500	2,750	7,600	1.2	3.0	6.0	99.33	99.50	Radiator type	o
3,000	2,080	1,930	2,790	8,600	1.2	3.0	6.0	99.29	99.50	Radiator type	o





Pad-Mounted Transformer

LS three-phase pad-mounted transformer is designed to protect environmental hazards. All transformers are developed and produced especially to satisfy exacting customer's exact specification. The latest applicable standards (ANSI, NEMA, IEEE) have been applied to all of LS transformers.

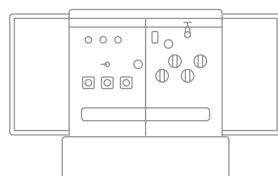
Three-phase pad-mounted transformers are available in live-front or dead-front designs. Both radial and loop feed configurations are built based on ANSI standards.

The dead-front bushing configurations are in accordance with ANSI C57.12.26, livefront per ANSI C57.12.22.

This establish to underground supply of electric power system burying processing distribution line in land as suitable transformer at beauty of city environment.

The quality of corrugated style radiator is superior to panel style radiator which is mainly used in existing. LS manufacture to have excellent cooling effect by corrugate cooling way and external appearance is beautiful. LS proven design offers excellent mechanical strength that has been proven through years of service and special testing. We are constantly trying our best to introduce innovative product to the transformer industry, bringing you the high quality transformer with competitive cost.

Contents



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Pad-Mounted Transformer

LS are able to achieve compact design with 3D Modeling and high efficiency substation power transformer with high grade silicon steel and special type design that is to be easy transportation and installation.



Applicable specifications

Applicable standard	ANSI, IEEE, NEMA and IEC
Voltage	Up to 138kV
Capacity	Up to 50MVA
Available fluids	Mineral oil, silicon oil and FR3[Vegetable oil]
Tap changer type	DETC and OLTC

65 average winding rise

Unique step-stacked core and rectangular wound core

60Hz standard, optional 50Hz

Mineral oil, optional FR3

Operating voltages for 300kVA through 1,500kVA rating:

Operating voltages for 2,000kVA through 7,500kVA rating:

Impedance guidelines:

300kVA~500kVA : 2.8-5.0% nominal
750kVA~2,500kVA :5.75% nominal
3,000kVA~7,500kVA :consult LS Transformers.

High voltages(HV):

- 4,160Grd Y/2,400 V through 34,500 Grd Y/19,920V
- 2,400 through 34,500V Delta
- Various Dual high voltages

High voltages(HV):

- 12,470Grd Y/7,200V through 34,500 Grd Y/19,920V
- 4,160V through 34,500V delta
- Various dual high voltages

High voltage taps:

- All Voltages are available with 5 or 7 step taps
- Dual Voltage taps provided only on the higher voltage

Voltage taps:

- All voltages are available with 5 or 7 step taps
- Dual voltage taps provided only on the higher voltage

Low voltage (LV):

- 208Y/120V, 480Y/277V, 480V, 240V and 240V, with 120V mid-tap in one phase
- 4,160Y/2,400V, 4,160V, 2,400V

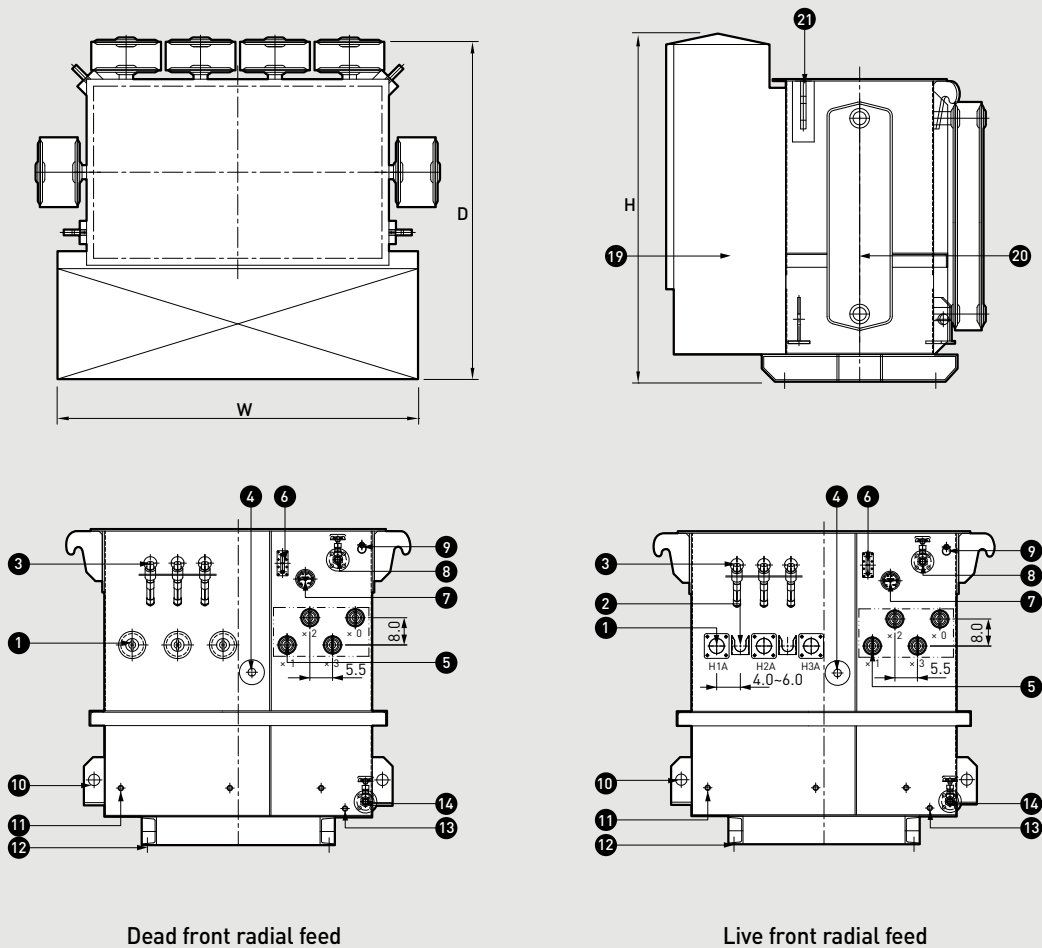
Low voltages (LV):

- 480Y/277V, 480V, 240V
- 4,160Y/2,400V, 4,160V, 2,400V

Primary insulation classes :35 kV, 200 kV BIL and below

Pad-Mounted Transformer

Technical data



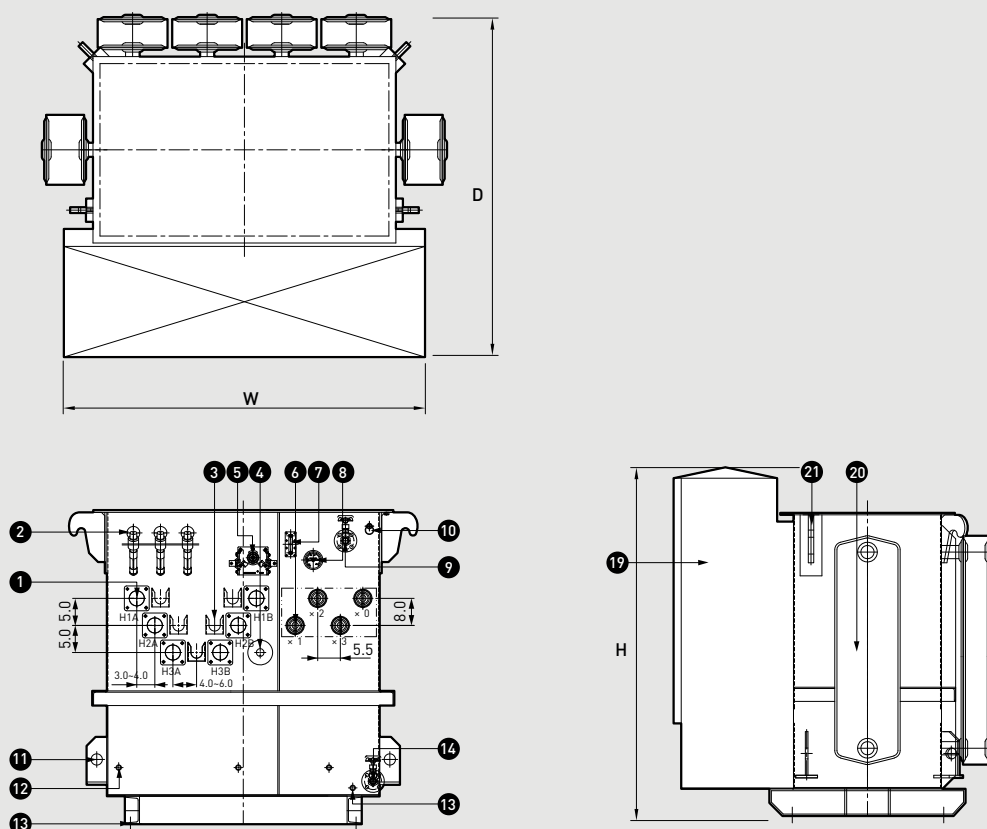
Dead front radial feed

Live front radial feed

NO.	Description	NO.	Description
1	Primary bushing	12	Skid base
2	Parking stand	13	Oil sampling cork
3	Bay-O-Net fuse	14	Oil drain valve
4	OFF-circuit tap changer	15	Document packing stand
5	Secondary bushing	16	Fuse name plate
6	Oil level gauge	17	Door handle
7	Oil thermometer	18	Name plate
8	Oil filtering valve	19	Cable box
9	Pressure relife valve	20	Radiator
10	Jacking pad	21	Lifting lug
11	Earthing terminal		

H.V	12470V, 13200V, 13800V, 24940V				
L.V	480/277V, 208/120V				
Rating kVA	W	D	H	Oil Volume Gallons	Total Weight Lbs.
500	54	55	62	180	4,600
750	57	62	65	230	5,850
1,000	57	75	69	280	6,800
1,500	60	84	70	360	9,400
2,000	63	86	71	400	11,100
2,500	64	90	74	460	13,000
3,000	70	108	80	480	14,100
3,750	73	127	81	520	15,700

* UNIT : INCH



NO.	Description	NO.	Description
1	Primary bushing well	12	Earthing terminal
2	Bay-O-net fuse	13	Skid base
3	Parking stand	14	Oil sampling cork
4	OFF-circuit tap changer	15	Oil drain valve
5	Load break switch	16	Document packing stand
6	Secondary bushing	17	Fuse name plate
7	Oil level gauge	18	Door handle
8	Oil thermometer	19	Name plate
9	Oil filtering valve	20	Cable box
10	Pressure relife valve	21	Radiator
11	Jacking pad	22	Lifting lug

H.V	12470V, 13200V, 13800V, 24940V				
L.V	480/277V, 208/120V				
Rating kVA	W	D	H	Oil Volume Gallons	Total Weight Lbs.
500	56	55	64	210	4,900
750	59	62	67	250	6,000
1,000	60	75	71	310	7,010
1,500	62	84	72	390	9,850
2,000	64	86	73	430	11,200
2,500	66	90	76	490	13,200
3,000	72	108	82	510	14,400
3,750	75	127	83	550	16,000

Global Network

LS is engaged in business all over the world.

LS global network includes 7 overseas corporations, 12 overseas branches, and 224 clients in 77 countries.



► R&D



R&D campus

Focuses on gaining competitive advantages through development of next generation platforms



Power device R&D center

Leading technology in electric industry and continuously developing future-growth dynamic engines



Automation R&D Center

Serves as the main research institute for LS



PT&T (Testing laboratory)

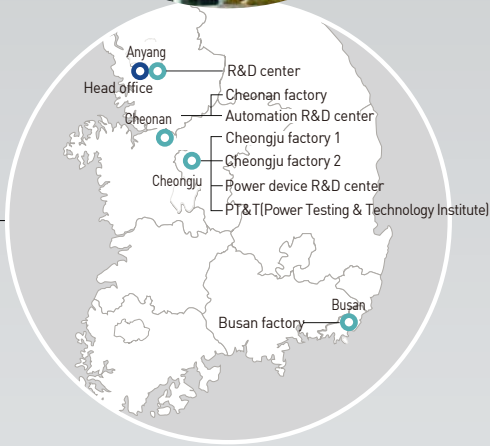
Internationally-renowned testing center that has formed partnerships with the UL, CE, KEMA and CESI

► Factory



Cheongju factory (Korea)

Electric products, mold TR, MV/LV switchgear, HV GIS



Cheonan factory (Korea)

PLC, AC drive, HMI, DCS, PV module



Busan factory (Korea)

HV TR, HVDC, FACTS



Wuxi factory (China)

Electric products



Dalian factory (China)

MV/LV switchgear, MV contactor



Hanoi factory (Vietnam)

MV/LV switchgear, Mold TR



Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact qualified service technician when you need maintenance.
Do not disassemble or repair by yourself!
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.



- According to The WEEE Directive, please do not discard the device with your household waste.



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