

Cast Resin Transformers



Works

Fuji Electric Corporation has two cast resin transformer production bases: Chiba works in Japan, and Shanghai Fuji Electric Transformer Co., Ltd. in China.

Chiba works



Shanghai Fuji Electric Transformer Co.,Ltd.



Production records

Fuji Electric's cast resin transformer works in Chiba was established in 1974, which became the first cast resin transformer works in Japan. Chiba works has produced over 90,000 cast resin transformers of which 3,000 units were exported to 55 countries all over the world.

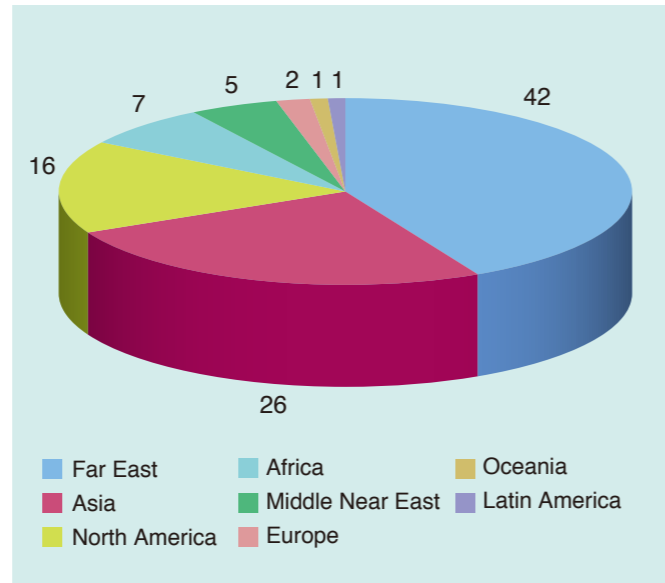
Since the beginning of operation in 1998, Shanghai Fuji Electric Transformer has been awarded various certifications including ISO 9001 and has produced over 10,000 cast resin transformers.

● Maximum rating

Primary voltage: 36 kV

Rated capacity: 24,000 kVA

Exported areas in percentage



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Fire resistant

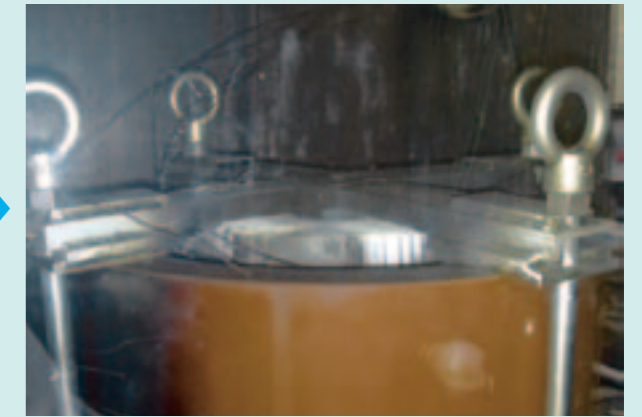
Epoxy resin is safe against fire since it has self-extinguishing properties and is fire resistant. Our cast resin transformer passed the all tests of IEC 60076-11 in 2006.

- Climatic class: C2
- Environmental class: E2
- Fire behavior class: F1

Start of fire-test



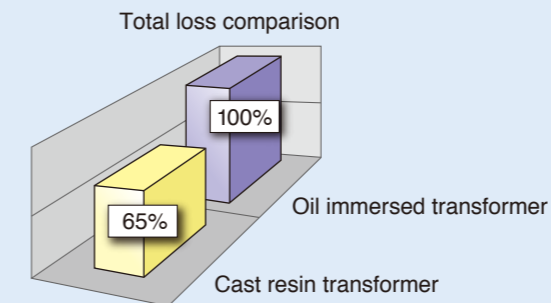
After test (completely extinguishing)



Energy saving effects

A sheet coil and wound core construction minimize total loss remarkably, thus reducing the electricity charges and saving energy.

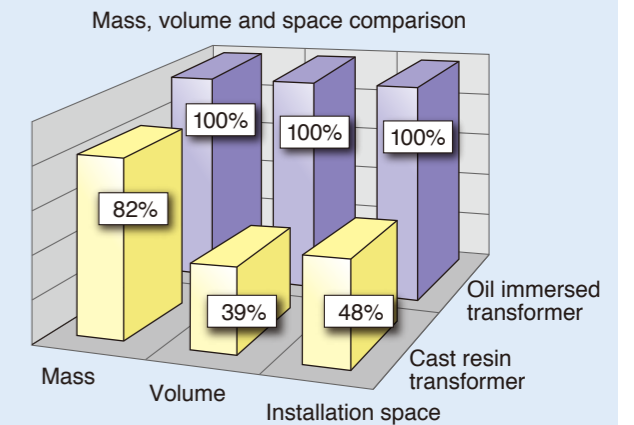
Three-phase 500 kVA



Compact and light

Cast resin transformer is made smaller and lighter comparing with oil-immersed transformer. Thus it can be installed in slim type cubicle, which minimizes the installation space.

Three-phase 500 kVA



Easy maintenance

No insulation oil is required, so maintenance and inspection are easy.

Features of Product

1. Vacuum-casting
2. Aluminum winding
3. Sheet-winding
4. Partial discharge free
5. Various product lineups
6. Swift delivery



Standard type
High efficiency type
Low-noise type
For rectifier

Vacuum-casting

Cast resin transformer is manufactured with vacuum casting method using metal pattern, its resin layer is thick and the surface is smooth. Thus it has following excellent characteristics.

Void-less

Vacuum-casting method realizes highly reliable, voidless molded winding with excellent partial discharge characteristics.

Fire prevention

Molded insulated parts are fire resistant since they have self-extinguishing properties.

Resistance to humidity and dust

All winding conductors are molded. They have remarkable humidity resistance which prevents insulation materials from deteriorating due to dust and dirt during operation.

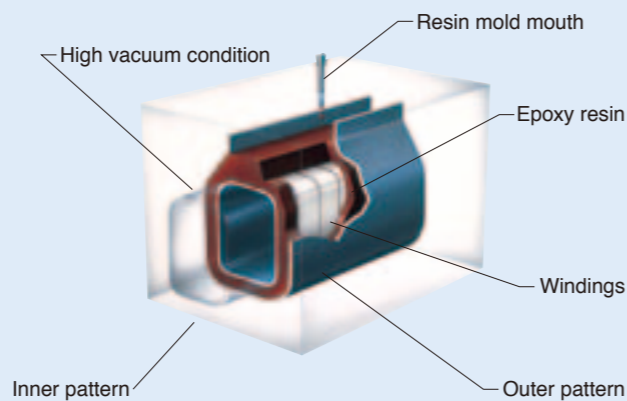
Robust construction

Molded winding is highly resistant to secondary short-circuit fault and surface cracking.

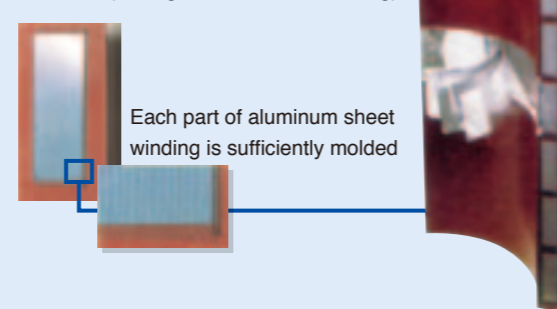
High reliability

Vacuum-casting process is carried out automatically with advanced customized facilities, to manufacture highly reliable molded winding.

Condition of molding epoxy resin



Cross section of molded winding
(Arrangement of sheet winding)



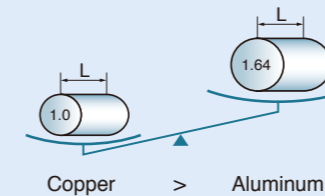
Aluminum winding

(1) Weight reduction

The aluminum winding weights approximately one half of the copper winding.

	Copper : Aluminum
Conductivity [%]	100 : 61
Cross sectional area ratio	1 : 1.64
Gravity [g/cm ³]	8.9 : 2.7
Gravity ratio	3.3 : 1
Mass ratio	100 : 50

Comparison of the weight in the same resistance

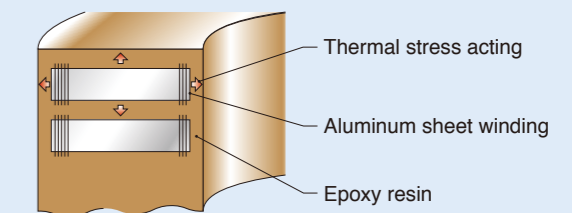


(2) Large mechanical strength

Aluminum's thermal expansion coefficient is close to resin, thus reducing thermal stress effectively.

Material	Thermal expansion coefficient [mm/mm.h.°C]
Aluminum	2.3×10^{-5}
Copper	1.6×10^{-5}
Epoxy resin	3.3×10^{-5}

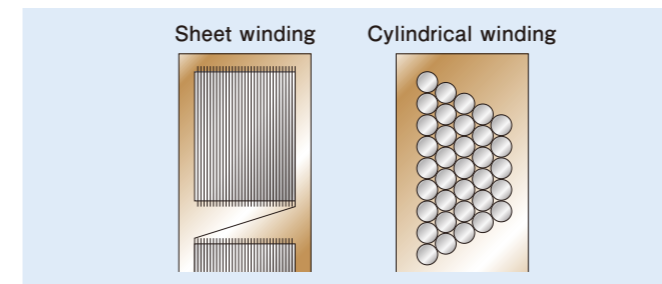
Thermal stress acting on winding



Sheet winding

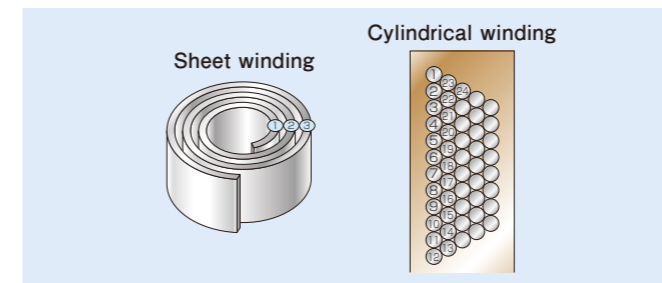
(3) Downsizing

Sheet winding has high lamination factor.



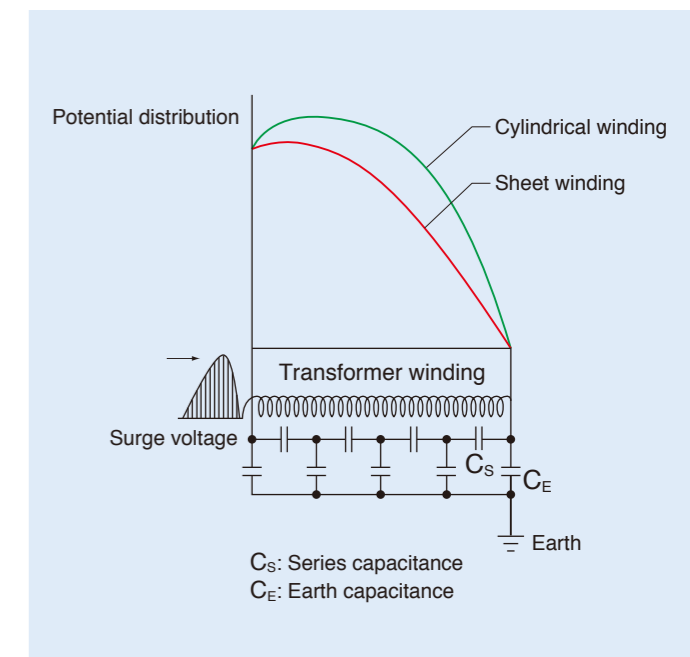
(4) High insulation reliability

In case of sheet winding, the voltage between turns is only for one turn.



(5) Surge stability

Sheet winding is effective to reduce potential oscillation caused by surge voltage.



Partial discharge free

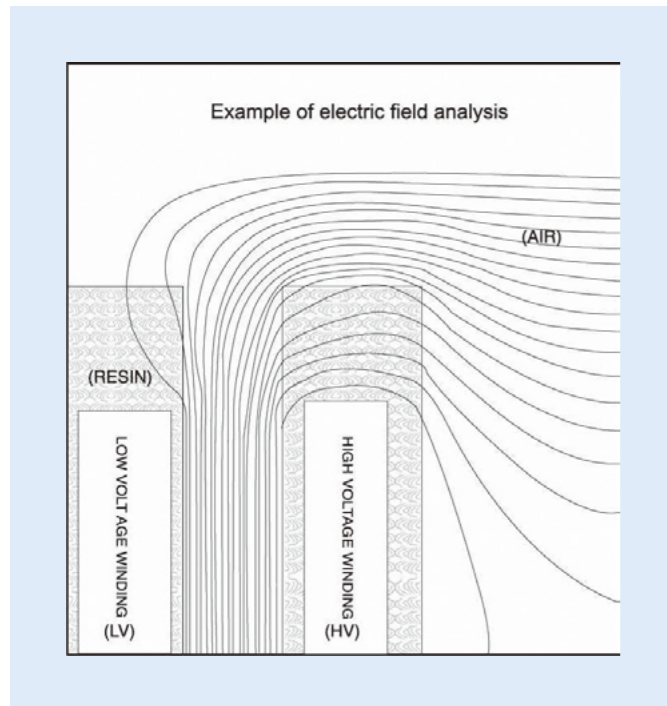
We have developed the materials, structures and manufacturing systems that realize excellent partial discharge characteristics. From the viewpoint of cast resin transformer's reliability, the excellent partial discharge characteristics is the most important. Thus we have adopted the following stricter standard than any other standards.

Company standard:

- All units are subject to partial discharge test.
- Applied voltage is twice the operating voltage.
- Partial discharge is less than 10 pC.

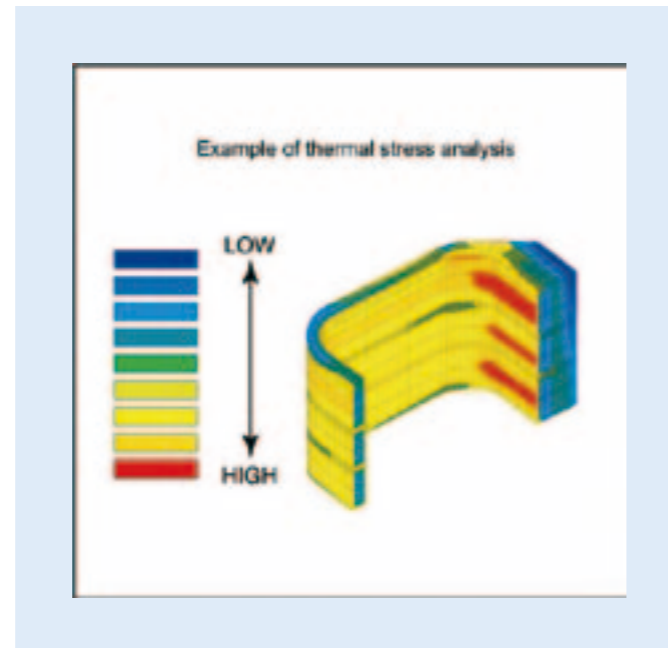
Electric field analysis

The insulation of cast resin transformer is composed of resin-air composite insulation.
The distributed voltages of individual transformer parts depend on their respective dimensions.
Thus, appropriate dimensions for insulation are designed with electric field analysis of the individual parts of the winding including air space.



Thermal stress analysis

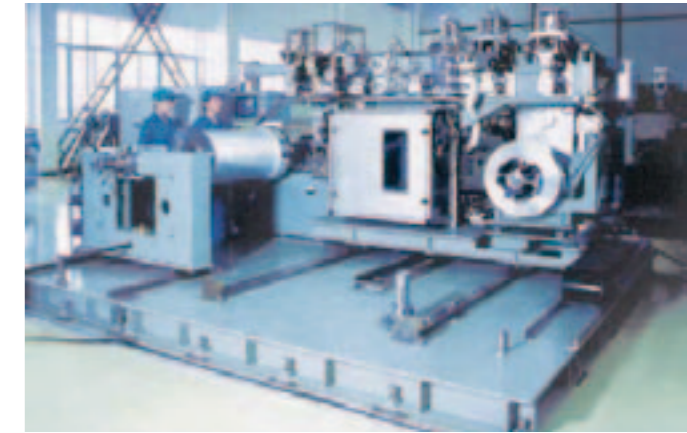
Molded winding composed of conductor and insulating material (e.g resin) is subjected to thermal stresses due to the difference in the thermal expansion coefficient between conductor and resin, and the thermal distribution in the winding block, where the winding temperature varies with the load fluctuation of the transformer.
The stress value obtained in thermal stress analysis is used to design optimum winding structure for high crack-resistance of winding.



Vacuum-casting plant



High voltage foil winding machine



Core cutting machine



Partial discharge measurement



The test items:

a) Routine tests:

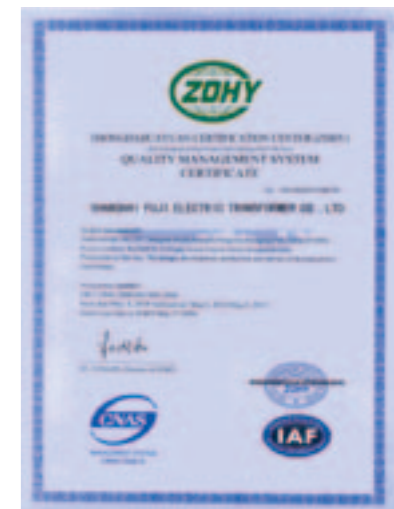
- Measurement of insulation resistance
- Measurement of winding resistance
- Measurement of voltage ratio and check of phase displacement
- Measurement of short-circuit impedance and load loss
- Measurement of no-load loss and current
- Separate-source AC withstand voltage test
- Induced AC withstand voltage test
- Partial discharge measurement

b) Type tests:

- Lightning impulse test
- Temperature-rise test
- Measurement of sound level



ISO14001
Original registration: 24th March 1996
Registration date: 24th March 2007
ISO certifications of Chiba works



ISO certification of Shanghai Fuji Electric Transformer Co., Ltd.

Applications

- Multistory buildings
- Hospitals
- Hotels
- Laboratories
- Shopping centers
- Building complexes
- Schools
- Art galleries
- Theaters
- Underground shopping centers
- Petrochemical plants
- Industrial complexes
- Underground railways
- Railway substations
- Tunnels
- Cranes
- Water and sewerage plants
- Power supply for construction sites
- Ships
- Refuse disposal plants
- Wind power sites



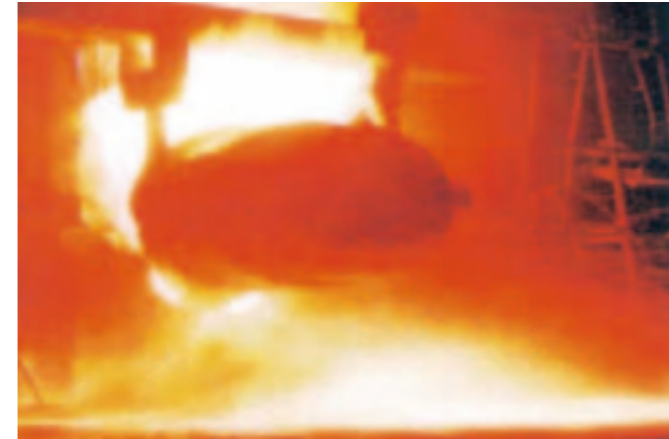
Sites where compact size and light weight are required (Urban multistory buildings, etc.)



Sites where high reliability is required (Public facilities, etc.)



Sites where fire prevention is the highest priority (Stadiums, hospitals, underground shopping centers, hotels, etc.)



Sites where there are airborne contaminants and extremely severe environments (Chemicals, steels, automobiles, underground construction sites etc.)



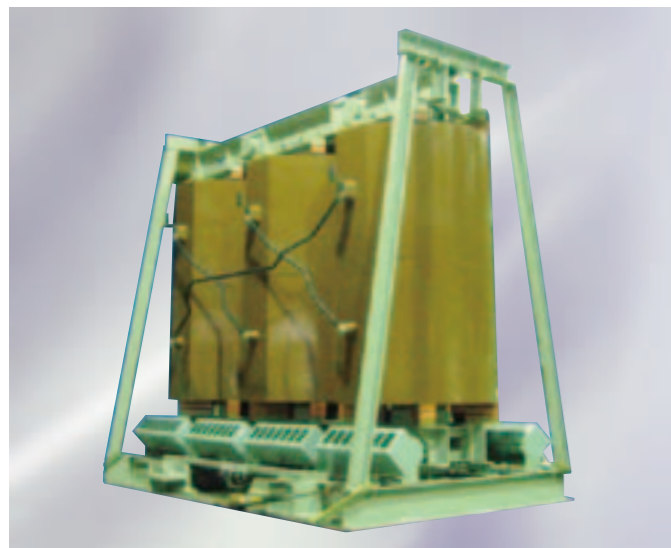
Transformer cubicle for substation in building (5000 kVA)



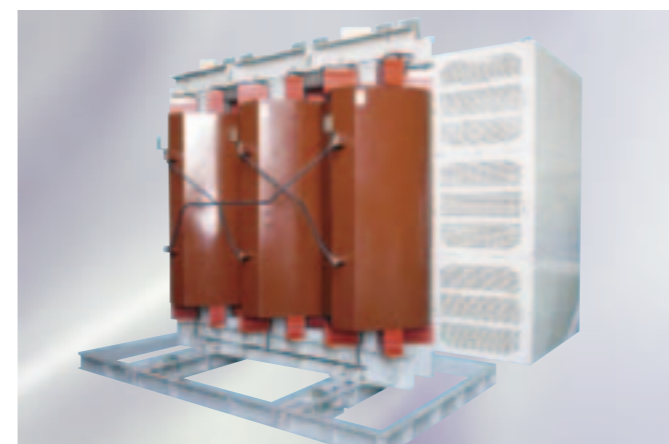
Sites where easy maintenance is required (Power stations, industrial complexes, buildings, underground railways, etc.)



Sites where high reliability and easy maintenance are required (Public facilities such as museums, airports, etc.)



The exterior appearance of transformer (17000 kVA, 22/6.6 kV)



The exterior appearance of transformer (2700 kVA, 33/0.59 kV)



Wind power site

Standard		IEC 60076-11: 2004			IEEE Std C57.12.01-1998			
Normal service condition	Highest	[°C]	40			40		
	Average	[°C]	30/day, 20/year			30/day		
	Lowest	[°C]	-25 (Outdoor), -5 (Indoor)			-30		
Altitude	[m]	Not more than 1000			Not more than 1000			
Number of phases		3			3			
Frequency	[Hz]	50, 60			60			
Highest voltage	[kV]	12	24	36	15	25	34.5	
Separate-source voltage withstand	Standard (Option)	[kV]	28	50	70	31 (34, 37)	37 (40, 50)	50 (70)
			Lightning impulse insulation class	Standard (Option)	[kV]	75	95 (125)	145 (170)
Insulation class		F			-			
Insulation system temp.	[°C]	155			150			
Average temp. rise limit	[K]	100			90			
Rated capacity	[kVA]	30			15			
		50			30			
		80			45			
		100			75			
		125			112.5			
		160			150			
		200						
		250			225			
		315			300			
		400						
		500			500			
		630						
		800			750			
		1000			1000			
		1250						
		1600			1500			
		2000			2000			
		2500			2500			
		3150						
		4000			3750			
5000			5000					
6300								
8000			7500					
10000			10000					
12500			12500					
16000			15000					
20000			20000					

※: Contact us for any other requests.

Standard specifications

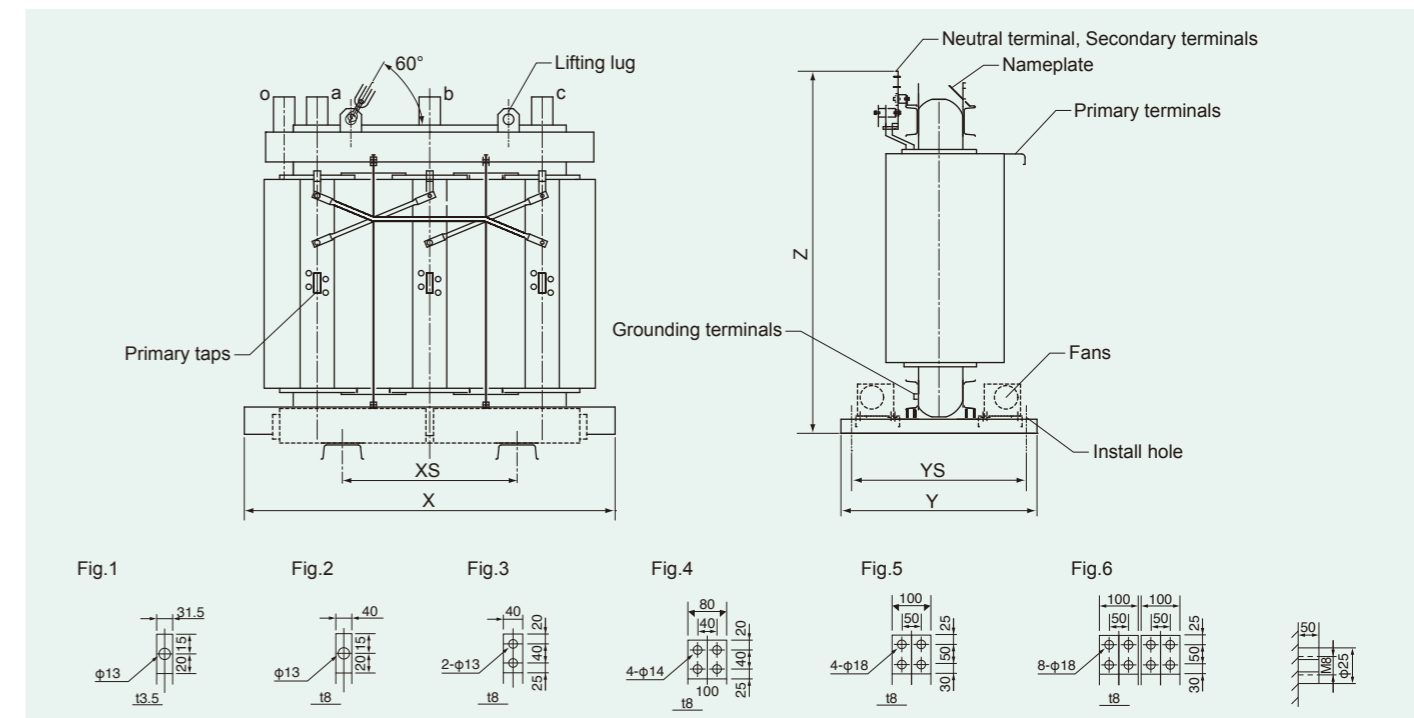
Standard		IEC 60076-11: 2004	
Number of phases		3	
Frequency	[Hz]	50	
Rated primary voltage and tap voltage	[kV]	F10.50-F10.25-R10.00-F9.75-F9.50	
Rated secondary voltage	[kV]	0.4	
Rated capacity	[kVA]	30, 50, 80, 100, 125, 160, 200, 250, 315, 400, 500	630, 800, 1000, 1250, 1600, 2000, 2500
		Connection symbol	Yyn0 (Dyn11) Dyn11 (Yyn0)
Insulation class		F	
Insulation levels [kV]		Separate-source voltage withstand	Primary 28
			Secondary 3
		Lightning impulse	Primary 75

Technical data

Rated capacity [kVA]	No-load loss [W]	Load loss [W]	No-load current [%]	Impedance voltage [%]
300	880	3600	0.7	3.6~4.4
400	1100	4200	0.7	
500	1200	5000	0.5	
630	1300	6400	0.5	5.4~6.6
800	1500	7600	0.5	
1000	1800	8900	0.5	
1250	2000	9900	0.5	
1600	2500	11700	0.5	
2000	3200	15600	0.5	
2500	3900	17000	0.5	

Dimensions and masses (without protection enclosure)

Rated capacity [kVA]	Dimensions [mm]					Total mass [kg]	Hole[φ]	Terminals	
	X	Y	Z	XS	YS			P	S
300	1190	920	1239	660	840	1080	15	Fig-1	Fig-3
400	1268	920	1299	660	820	1300			
500	1500	920	1379	820	820	1600	20	Fig-2	Fig-4
630	1600	920	1400	820	820	1800			
800	1670	920	1450	820	820	2100			
1000	1690	920	1654	820	820	2500			
1250	1740	920	1700	820	820	2800			
1600	1840	1170	1854	1070	1070	3500			
2000	2050	1170	1900	1070	1070	4200			
2500	2050	1170	2010	1070	1070	5100			



Standard specifications

Standard	IEC 60076-11: 2004		
Number of phases	3		
Frequency [Hz]	50		
Rated primary voltage and tap voltage [kV]	F10.50-F10.25-R10.00-F9.75-F9.50		
Rated secondary voltage [kV]	0.4		
Rated capacity [kVA]	30, 50, 80, 100, 125, 160, 200, 250, 315, 400, 500	630, 800, 1000, 1250, 1600, 2000, 2500	
Connection symbol	Yyn0 (Dyn11)	Dyn11 (Yyn0)	
Insulation class	F		
Insulation levels[kV]	Separate-source voltage withstand	Primary	28
		Secondary	3
	Lightning impulse	Primary	75

Technical data

Rated capacity [kVA]	No-load loss [W]	Load loss [W]	No-load current [%]	Impedance voltage [%]
300	880	3600	0.7	3.6~4.4
400	1100	4200	0.7	
500	1200	5000	0.5	
630	1300	6400	0.5	5.4~6.6
800	1500	7600	0.5	
1000	1800	8900	0.5	
1250	2000	9900	0.5	
1600	2500	11700	0.5	
2000	3200	15600	0.5	
2500	3900	17000	0.5	

Standard specifications

Standard	IEC 60076-11: 2004		
Number of phases	3		
Frequency [Hz]	50		
Rated primary voltage and tap voltage [kV]	F21.0-F20.5-R20.0-F19.5-F19.0		
Rated secondary voltage [kV]	0.4		
Rated capacity [kVA]	315-2500		
Connection symbol	Dyn11		
Insulation class	F		
Insulation levels[kV]	Separate-source voltage withstand	Primary	50
		Secondary	3
	Lightning impulse	Primary	125

Technical data

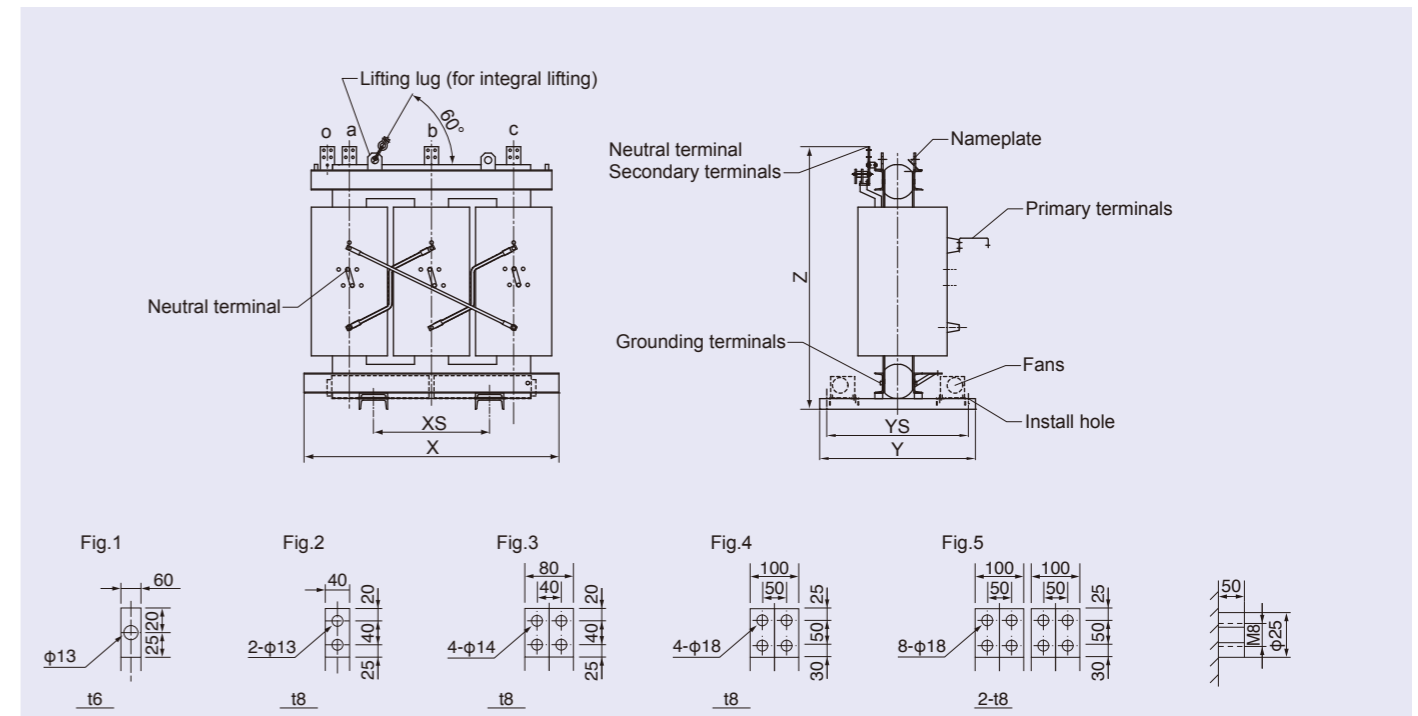
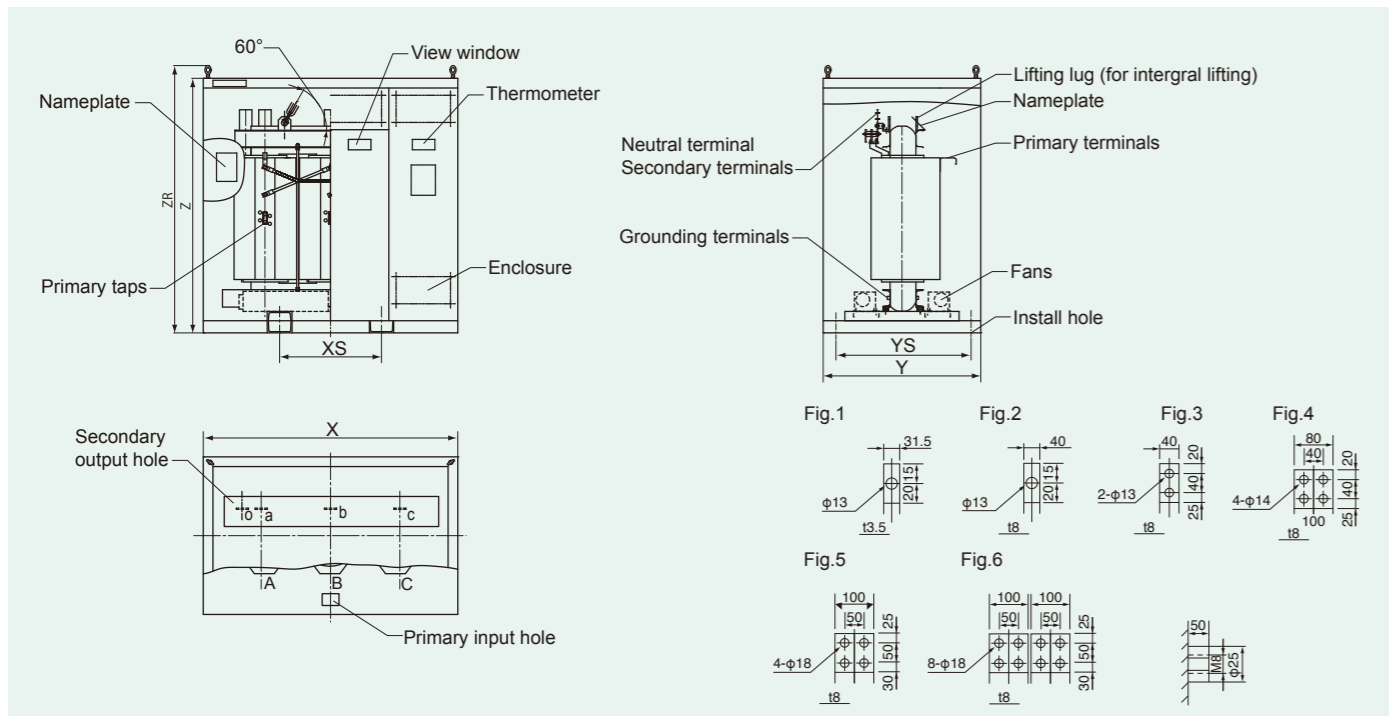
Rated capacity [kVA]	No-load loss [W]	Load loss [W]	No-load current [%]	Impedance voltage [%]
300	1200	3700	0.7	5.4~6.6
500	1400	6600	0.5	
800	1900	8600		
1000	2100	10300	7.2~8.8	
1500	3000	12300		
2000	3500	17600		
2500	4300	20300		

Dimensions and masses (with protection enclosure)

Rated capacity [kVA]	Dimensions [mm]						Total mass [kg]	Hole[φ]	Terminals	
	X	Y	Z	ZR	XS	YS			P	S
300	1450	1250	1450	1505	660	1130	1400	22	Fig-1	Fig-3
400	1900	1250	2200	2255	660	1130	1600		Fig-2	Fig-4
500	1900	1250	2200	2255	820	1130	2000			
630	1900	1250	2200	2255	820	1130	2200		Fig-5	Fig-6
800	2000	1300	2200	2255	820	1180	2500			
1000	2000	1300	2200	2255	820	1180	3000			
1250	2000	1300	2200	2255	820	1180	3300	Fig-6		
1600	2200	1600	2200	2255	1070	1480	4000			
2000	2500	1600	2200	2255	1070	1480	4900			
2500	2500	1600	2450	2505	1070	1480	5800			

Dimensions and masses (Without protection enclosure)

Rated capacity [kVA]	Dimensions [mm]					Total mass [kg]	Hole[φ]	Terminals		
	X	Y	Z	XS	YS			P	S	
300	1600	920	1600	820	820	1500	20	Fig-1	Fig-2	
500	1600	920	1650	820	820	1800			Fig-3	
800	1700	920	1800	820	820	2400				
1000	1800	1100	1850	820	1000	2800			Fig-4	Fig-5
1500	2000	1170	2100	1070	1070	4100				
2000	2100	1170	2200	1070	1070	5100				
2500	2200	1170	2300	1070	1070	6500				



Standard specifications

Standard	IEC 60076-11: 2004		
Number of phases	3		
Frequency [Hz]	50		
Rated primary voltage and tap voltage [kV]	F21.0-F20.5-R20.0-F19.5-F19.0		
Rated secondary voltage [kV]	0.4		
Rated capacity [kVA]	315-2500		
Connection symbol	Dyn11		
Insulation class	F		
Insulation levels[kV]	Separate-source voltage withstand	Primary	50
		Secondary	3
	Lightning impulse	Primary	125

Technical data

Rated capacity [kVA]	No-load loss [W]	Load loss [W]	No-load current [%]	Impedance voltage [%]
300	1200	3700	0.7	5.4~6.6
500	1400	6600	0.5	
800	1900	8600	7.2~8.8	
1000	2100	10300		
1500	3000	12300		
2000	3500	17600		
2500	4300	20300		

Standard specifications

Standard	IEC 60076-11: 2004		
Number of phases	3		
Frequency [Hz]	50		
Rated primary voltage and tap voltage [kV]	F21.0-F20.5-R20.0-F19.5-F19.0		
Rated secondary voltage [kV]	0.4		
Rated capacity [kVA]	315-2500		
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Insulation levels[kV]	Separate-source voltage withstand	Primary	50
		Secondary	3
	Lightning impulse	Primary	125

Technical data

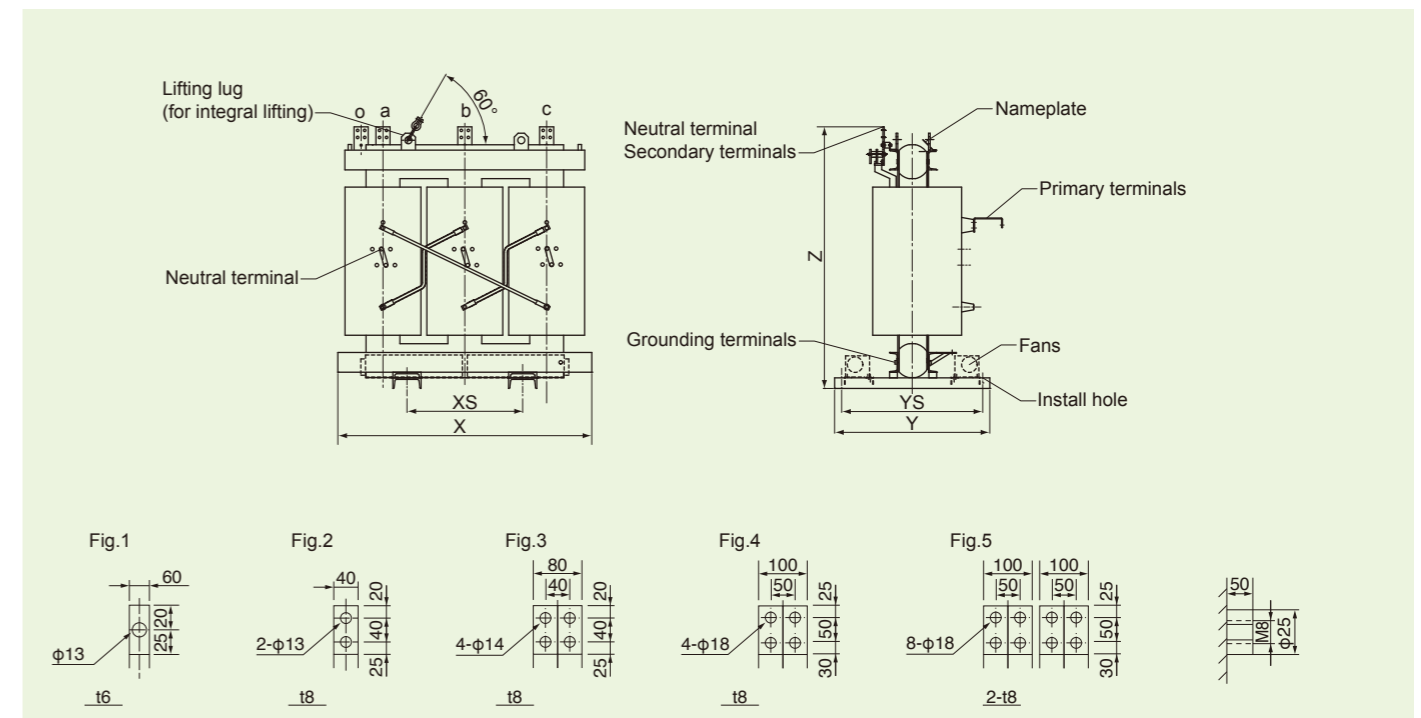
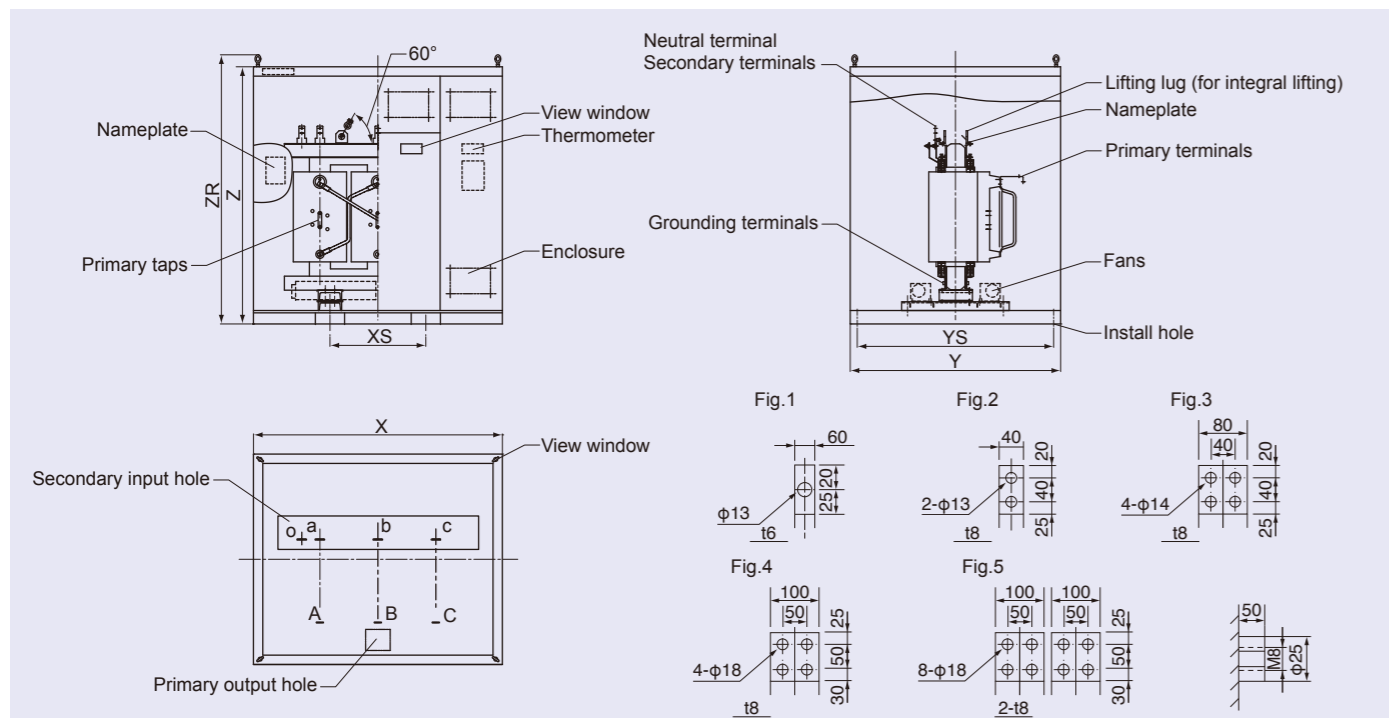
Rated capacity [kVA]	No-load loss [W]	Load loss [W]	No-load current [%]	Impedance voltage [%]
300	1200	3600	0.7	5.4~6.6
500	1400	6300	0.5	
800	1900	8300	7.2~8.8	
1000	2100	10000		
1500	3000	12000		
2000	3500	17200		
2500	4300	20200		

Dimensions and masses (With protection enclosure)

Rated capacity [kVA]	Dimensions [mm]						Total mass [kg]	Hole[φ]	Terminals	
	X	Y	Z	ZR	XS	YS			P	S
300	1900	1500	2200	2255	820	1380	2000	22	Fig-1	Fig-2
500	1900	1500	2200	2255	820	1380	2300			
800	2100	1800	2200	2255	820	1680	2400			
1000	2100	1800	2200	2255	820	1680	3300			
1500	2400	1900	2400	2455	1070	1780	4800			
2000	2500	1900	2500	2555	1070	1780	5800	Fig-4	Fig-5	
2500	2600	2000	2600	2655	1070	1880	7200			

Dimensions and masses (Without protection enclosure)

Rated capacity [kVA]	Dimensions [mm]					Total mass [kg]	Hole[φ]	Terminals	
	X	Y	Z	XS	YS			P	S
300	1600	920	1600	820	820	1500	20	Fig-1	Fig-2
500	1600	920	1650	820	820	1800			
800	1700	920	1800	820	820	2400			
1000	1800	1100	1850	820	1000	2800			
1500	2000	1170	2100	1070	1070	4100			
2000	2100	1170	2200	1070	1070	5100	Fig-4	Fig-5	
2500	2200	1170	2300	1070	1070	6500			



Standard specifications

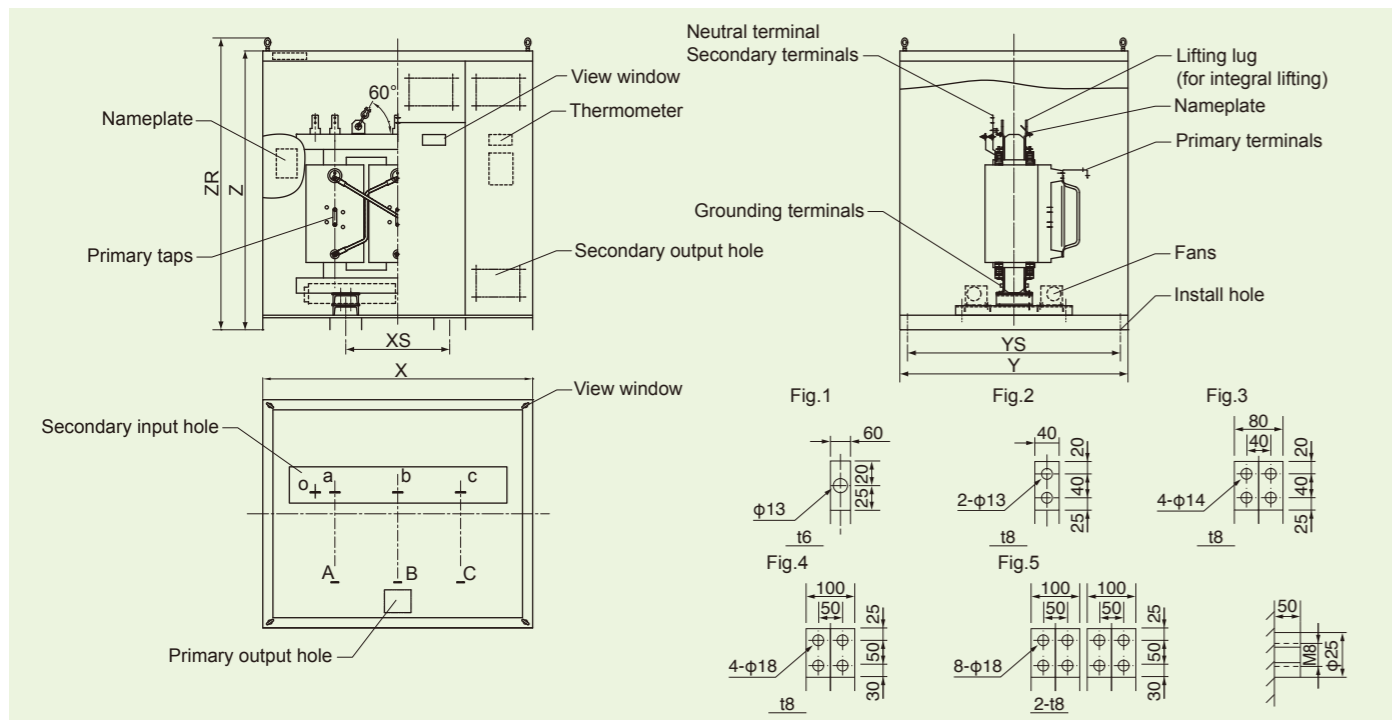
Standard	IEC 60076-11: 2004		
Number of phases	3		
Frequency [Hz]	50		
Rated primary voltage and tap voltage [kV]	F21.0-F20.5-R20.0-F19.5-F19.0		
Rated secondary voltage [kV]	0.4		
Rated capacity [kVA]	315-2500		
Connection symbol	Dyn11		
Insulation class	F		
Insulation levels[kV]	Separate-source voltage withstand	Primary	50
		Secondary	3
	Lightning impulse	Primary	125

Technical data

Rated capacity [kVA]	No-load loss [W]	Load loss [W]	No-load current [%]	Impedance voltage [%]
300	1200	3600	0.7	5.4~6.6
500	1400	6300	0.5	
800	1900	8300		7.2~8.8
1000	2100	10000		
1500	3000	12000		
2000	3500	17200		
2500	4300	20200		

Dimensions and masses (With protection enclosure)

Rated capacity [kVA]	Dimensions [mm]						Total mass [kg]	Hole[φ]	Terminals	
	X	Y	Z	ZR	XS	YS			P	S
300	1900	1500	2200	2255	820	1380	2000	22	Fig-1	Fig-2
500	1900	1500	2200	2255	820	1380	2300			Fig-3
800	2100	1800	2200	2255	820	1680	2400			Fig-4
1000	2100	1800	2200	2255	820	1680	3300			Fig-5
1500	2400	1900	2400	2455	1070	1780	4800			
2000	2500	1900	2500	2555	1070	1780	5800			
2500	2600	2000	2600	2655	1070	1880	7200			



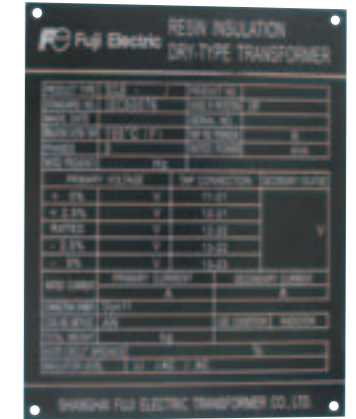
Lifting lugs

Four lifting lugs are provided as standard fixtures on the transformer body.



Nameplate

The nameplate is easy to read with white letters on a black background.



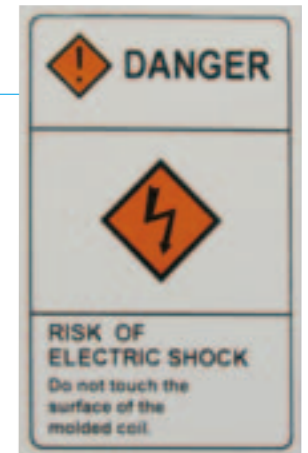
No-voltage tap changing terminals

The tap voltage can be changed by switching the shorting bar connector.



Warning label

A danger label is attached to warn against contacting the surface of the high-potential winding.



Earthing terminals with clamping bolts

Two ground terminals are provided at the lower frame ends: one on the primary side and one on the secondary side. (One of these ground terminals is in use.)



Protection enclosure

An optional simplified protective enclosure can be installed.



Thermometer

An optional Thermometer can be installed.



Inquiry Specification Sheet for Cast Resin Transformer

Your Ref. No. : _____ Date : _____

To. : Shanghai Fuji Electric Transformer Co., Ltd	Client requesting a quote
Attn : _____	company name : _____
mail : _____	person in charge _____
Tel. : _____ (English, Chinese, Japanese)	e-mail : _____
	Tel. : + _____

Request for Quotation (Cast Resin Transformer)

This request for quotation consists of followings ;

Item A. General Specification

Item B. Technical Specification (If there are several type/specifications of cast resin transformers, Please add the sheets B)

A. General Specification			
A.1.0 User information			
A.1.1 Project Name			
A.1.2 Name of end user			
Country			
A.1.3 Name of Distributor/Sler/General Contractor (if any)			
Country			
A.1.4 Name of competitors (if any)			
A.1.5 Application Area (if any) (will be selected one or more for market survey and analysis.)		<input type="checkbox"/> Utilities/Public Works <input type="checkbox"/> Office Buildings <input type="checkbox"/> Shopping malls <input type="checkbox"/> Colleges and universities <input type="checkbox"/> Hospitals/medical center <input type="checkbox"/> Telecommunications <input type="checkbox"/> Data center <input type="checkbox"/> Banks <input type="checkbox"/> Railways & Metroway <input type="checkbox"/> Airports <input type="checkbox"/> Steel & Iron <input type="checkbox"/> Oil & Gas	<input type="checkbox"/> Chemicals <input type="checkbox"/> Wind power plants <input type="checkbox"/> Solar Power <input type="checkbox"/> Automotive <input type="checkbox"/> Glass industry <input type="checkbox"/> Paper industry <input type="checkbox"/> Mining industry <input type="checkbox"/> Application with rectifiers <input type="checkbox"/> Variable speed drives <input type="checkbox"/> Marine/Ships/off-shore <input type="checkbox"/> Port/Industrial cranes <input type="checkbox"/> Other
A.1.6 Purpose to use (if any) (will be selected one or more for market survey and analysis.)		<input type="checkbox"/> Fire-risk areas <input type="checkbox"/> Urban substation <input type="checkbox"/> Indoor and underground substations	<input type="checkbox"/> Environmentally sensitive areas <input type="checkbox"/> Nearly maintenance free <input type="checkbox"/> Other
A.2.0 Delivery & Transportation			
A.2.1 Required delivery time(FOB Shanghai)		Day	Month
A.2.2 Trade Terms as per "Incoterms 2012"		<input type="radio"/> FOB Shanghai <input type="radio"/> Other	
A.2.3 Transportation & Packing		<input type="radio"/> For export (By sea) <input type="radio"/> Other	
A.3.0 Warranty Period		18 months from the date of shipment from Shanghai port or 12 months from the date of starting commercial operation, whichever comes earlier	
A.4.0 Currency:		US\$	
A.5.0 Payment Terms		100% by T.T. remittance within 30 days after shipment of equipment with final drawings and factory test report.	
A.6.0 Validity		30 days	

B. Technical Specification		Tr-1	Tr-2	Tr-3	Tr-4	Tr-5
1.0	Number of units (Q'ty)					
2.0	Rated voltage Primary [V] Secondary [V]					
3.0	Rated capacity [KVA]					
4.0	Number of phases					
5.0	Vector group (*) (Dyn11 or Yyn0 will be checked. Others will be specified.)	<input type="radio"/> Dyn11	<input type="radio"/> Dyn11	<input type="radio"/> Dyn11	<input type="radio"/> Dyn11	<input type="radio"/> Dyn11
		<input type="radio"/> Yyn0	<input type="radio"/> Yyn0	<input type="radio"/> Yyn01	<input type="radio"/> Yyn0	<input type="radio"/> Yyn0
		<input type="radio"/> Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.0	Impedance voltage[%] Manufacturer Standard Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.0	K-Rating (if any)					
8.0	Cooling method (**)	<input type="radio"/> AN	<input type="radio"/> AN	<input type="radio"/> AN	<input type="radio"/> AN	<input type="radio"/> AN
		<input type="radio"/> AF	<input type="radio"/> AF	<input type="radio"/> AF	<input type="radio"/> AF	<input type="radio"/> AF
		<input type="radio"/> ANAF	<input type="radio"/> ANAF	<input type="radio"/> ANAF	<input type="radio"/> ANAF	<input type="radio"/> ANAF
2.0	Insulation class Manufacturer Standard Other	<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.0	Standards	<input type="radio"/> IEC60076-11		<input type="radio"/> Other		
10.0	Ambient temperature	<input type="radio"/> Standard -5~40°C		<input type="radio"/> Other		
11.0	Altitude	<input type="radio"/> Standard 0~1000m		<input type="radio"/> Other		
12.0	Frequency	<input type="radio"/> 50Hz	<input type="radio"/> 60Hz	<input type="radio"/> Other		
13.0	Tapping range of primary voltage	<input type="radio"/> ±2.5%×2 (Manufacturer Standard)				<input type="radio"/> Other
14.0	Overload	<input type="radio"/> Continuous 100%		<input type="radio"/> 120%, 1min		<input type="radio"/> Other

<Option>

20.0 Optional accessories		
20.1 Thermometer	<input type="radio"/> No <input type="radio"/> Yes	
20.2 Cooling fan	<input type="radio"/> No <input type="radio"/> Yes	
20.3 Wheels	<input type="radio"/> No <input type="radio"/> Yes	
20.4 Resistance thermometer bulb(Pt 100Ω)	<input type="radio"/> No <input type="radio"/> Yes	
20.5 Anti-vibration pads	<input type="radio"/> No <input type="radio"/> Yes	
20.6 Protection enclosure	<input type="radio"/> No <input type="radio"/> Yes	
	if Yes, Degree of Protection will be selected	<input type="checkbox"/> IP20 <input type="checkbox"/> IP23 <input type="checkbox"/> Other
	if Yes, cable entry will be selected	<input type="checkbox"/> Bottom Cable <input type="checkbox"/> Top Cable <input type="checkbox"/> Bus Duct
30.0 Special test		
30.1 Temperature rise test	<input type="radio"/> No <input type="radio"/> Yes	
30.2 Lightning impulse test	<input type="radio"/> No <input type="radio"/> Yes	
30.3 Measurement of sound level	<input type="radio"/> No <input type="radio"/> Yes	
30.4 Witness testl	<input type="radio"/> No <input type="radio"/> Yes	
40.0 Other request item		

Remarks) (*) Dyn11=Δ(Delta)/Y(Star) with the neutral brought out.
Yyn0=Y(Star)/Y(Star) with the neutral brought out.

(**) AN; Naturally-air-cooled type
AF; Forced-air-cooled type with cooling fan
ANAF; Naturally-air-cooled/Forced-air-cooled type with cooling fan
ANAF; Naturally-air-cooled/Forced-air-cooled type with cooling fan



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 Fuji Electric Co., Ltd.

Gate City Ohsaki, East Tower, 11-2, Osaki 1-chome,
Shinagawa-ku, Tokyo 141-0032, Japan
Phone : (03)5435-7111

 Shanghai Fuji Electric Transformer Co., Ltd.

1557 Hangnan Rd., Nanqiao Fengxian, Shanghai,
THE PEOPLE'S REPUBLIC OF CHINA
Phone : Tel +86-21-5718-7705