

Standard Transformers FC-82

Three-phase, Single-phase/3.3-77kV/750-5000kVA/
Oil-immersed, Self-cooled

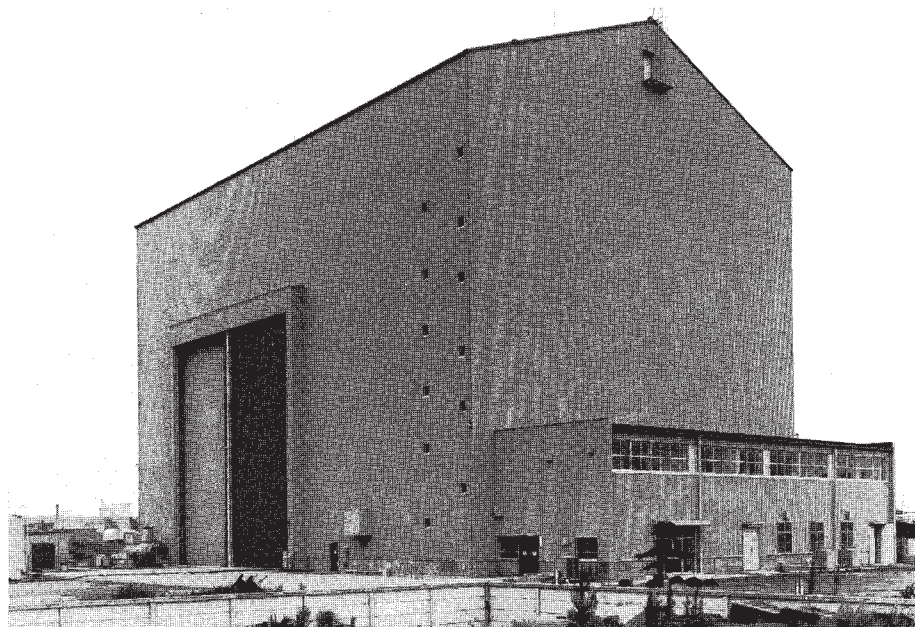


The transformers FC-82, designed and manufactured in Fuji's specialized transformer factory equipped with the latest machineries, are a result of our many years of successful experience and advanced technology. These high reliability transformers perfectly match the needs of today and are being used in a broad range of applications.



General view of Chiba specialized transformer factory

N89-3011-2



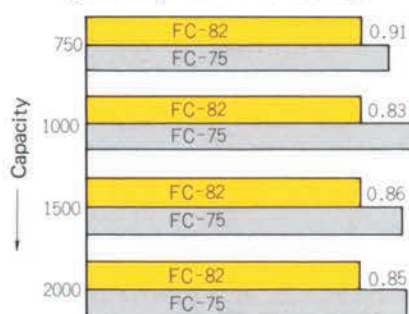
Ultra high voltage power laboratory

Features

■ Low-loss, energy-saving type

The transformers FC-82 are provided with the 45° lap joint core made up of the highest quality directional silicon steel plates having improved magnetic characteristics. This ideal core structure provides minimum no-load loss and substantial reduction of operating cost.

Fig. 1 Comparison of no-load loss

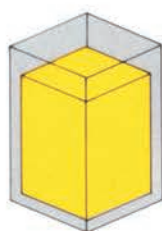


■ Compact and light-weight design

The transformers rated at 30 kV and below adopt an ideal octagonal winding structure having rectangular-section core. The transformers also feature a tank structure that matches the shapes of active part, reducing the cubic volume and weight by 30% and 20%, respectively, as compared with the conventional type FC-75 (see Fig. 2). This compact and light-weight design substantially reduces the space needed for installation.

Fig. 2 Cubic volume and weight (Fuji products)

Compact and light-weight design; the cubic volume and weight are reduced by 30% and 20%, respectively, as compared with the conventional type FC-75.



3φ-1500 kVA transformer	FC-82	FC-75
Floor space	0.7	1.0
Cubic volume	0.66	1.0
Mass	0.79	1.0
Oil quantity	0.69	1.0

■ High quality and reliability

Winding insulation, cooling efficiency, electromagnetic force due to external shorts, and tank structure are all determined by computers and verified by tests.

The transformers, composed of high quality materials, are manufactured under strict quality control standards to ensure reliable operation.

■ Easy maintenance and inspection

The enclosure of transformer FC-82 is of a completely-sealed type with an opening above the oil level. The adoption of an oil-level/temperature gauge (Fig. 3) provides easy maintenance and inspection.

■ Simple structure

The transformers FC-82 rated at 30 kV and below are provided with rectangular section core. The internal component parts and the external parts of the tank are ideally arranged to realize a simple structure, facilitated installation and easy maintenance (Fig. 4).

Fig. 3 Oil-level/temperature gauge

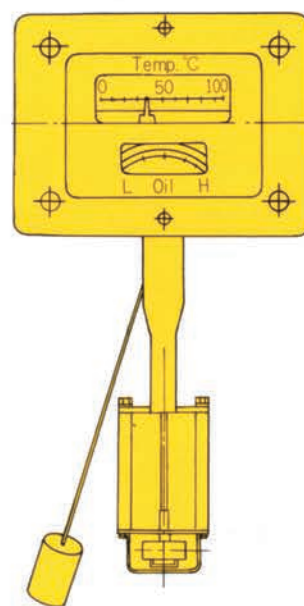
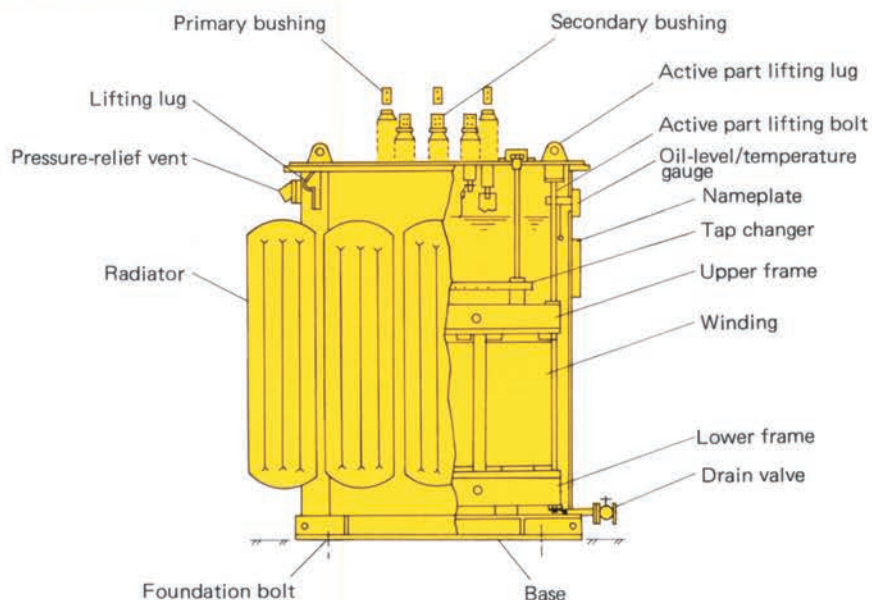


Fig. 4 Sectional diagram of structure



■ Assembly of core and winding

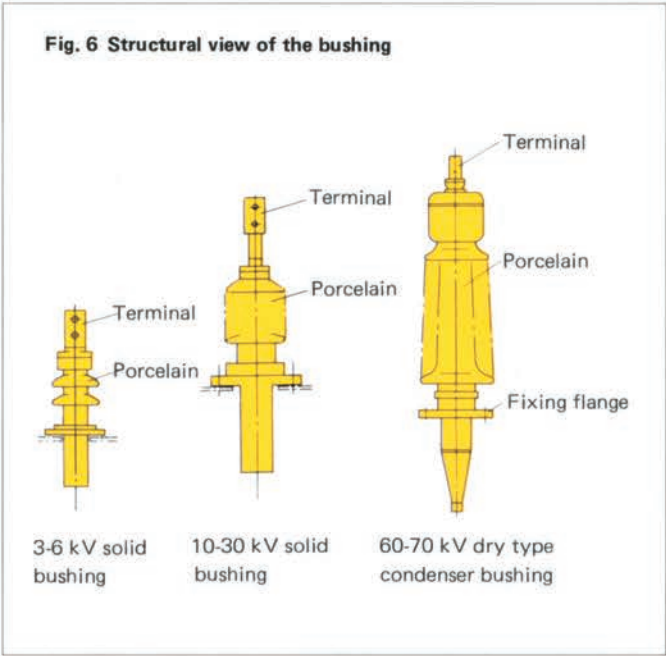
High and low voltage windings are suited with a rectangular core. These windings are concentric and tightly fit on a specially designed coil bobbin. Cooling duct is also arranged rationally to provide sufficient insulation, cooling efficiency and mechanical strength.



Fig. 5 Outer view of core and winding

■ Bushing

Solid bushing is used for basic insulation class 170 kV or below. For the basic insulation class 350 to 400 kV, dry type condenser bushings are used. Each of these bushings has a terminal for easy connection (Fig. 6).



■ Painting

Surface and anticorrosion treatments have been made before the final painting. Standard painting colors are as follows:

- For outdoor Munsell N7
- For indoor Munsell 7.5 BG6/1.5

Standard Specifications

■ General specifications

Type	Outdoor (or indoor) use, oil immersed, self cooled
No. of phases	Three-phase or single-phase
Frequency	50 or 60 Hz
Applied standard	JEC-204(1978)

■ Standard impedance

Standard capacity [kVA] Primary side insulation class [No.]	750	1000	1500	2000	3000	4000	5000
6	5.0	5.0	5.5	5.5	—	—	—
10 20	5.5	5.5	6	6	6.5	7	7
60 70	—	—	—	—	7.5	7.5	7.5

■ Standard voltage and connection

Item Primary side insulation class [No.]	Standard capacity range [kVA]	Primary tap voltage [kV] Note 2)	Secondary voltage [kV]	Connection (three-phase)
6 or 3	750 ~ 2000 (2500)	F6.75-R6.6-F6.45-F6.3-6.15 or F3.375-R3.3-F3.225-F3.15-3.075	0.21	△-△
			0.42 (50Hz) 0.46 (60Hz)	△-△
20	750 ~ 2000 (2500)	F23-R22-F21-F20	0.42 0.46	△-△
	More than 3000		6.6 3.3	△-△
60	More than 3000	F69-R66-F63-F60	6.6 3.3	△-△
70	More than 3000	F80.5-R77-F73.5-F70		

Note 1) Capacities shown in () are nonstandard but available optionally.

2) Description of symbols:

F: Full capacity tap voltage R: Rated tap voltage Blank: Reduced capacity

Accessories

■ Standard accessories

Description	750~2500kVA	2501~5000kVA	Remarks
Nameplate	●	●	} Combination type for 2500 kVA and below
Oil gauge	●	●	
Thermometer	●	●	
Pressure-relief vent	●	●	
Air vent plug	●	●	
Drain valve	●	●	
No-voltage tap-changer	●	●	
Foundation bolt	●	●	
Lifting lug for the whole unit	●	●	
Earth terminal	●	●	} * 3000 kVA (or above) only
Lifting lug for interior	●	●	
Jack boss	—	*	
Pulling lug	—	*	

■ Optional accessories

- Compound pressure gauge
- Nameplate of pressure curve
- Dial type thermometer
- Sudden pressure relay
- Sudden pressure-relief device
- Buchholtz relay (Open type conservator is attached.)
- Bushing CT
- Wheels
- Terminal box
- Other optional accessories

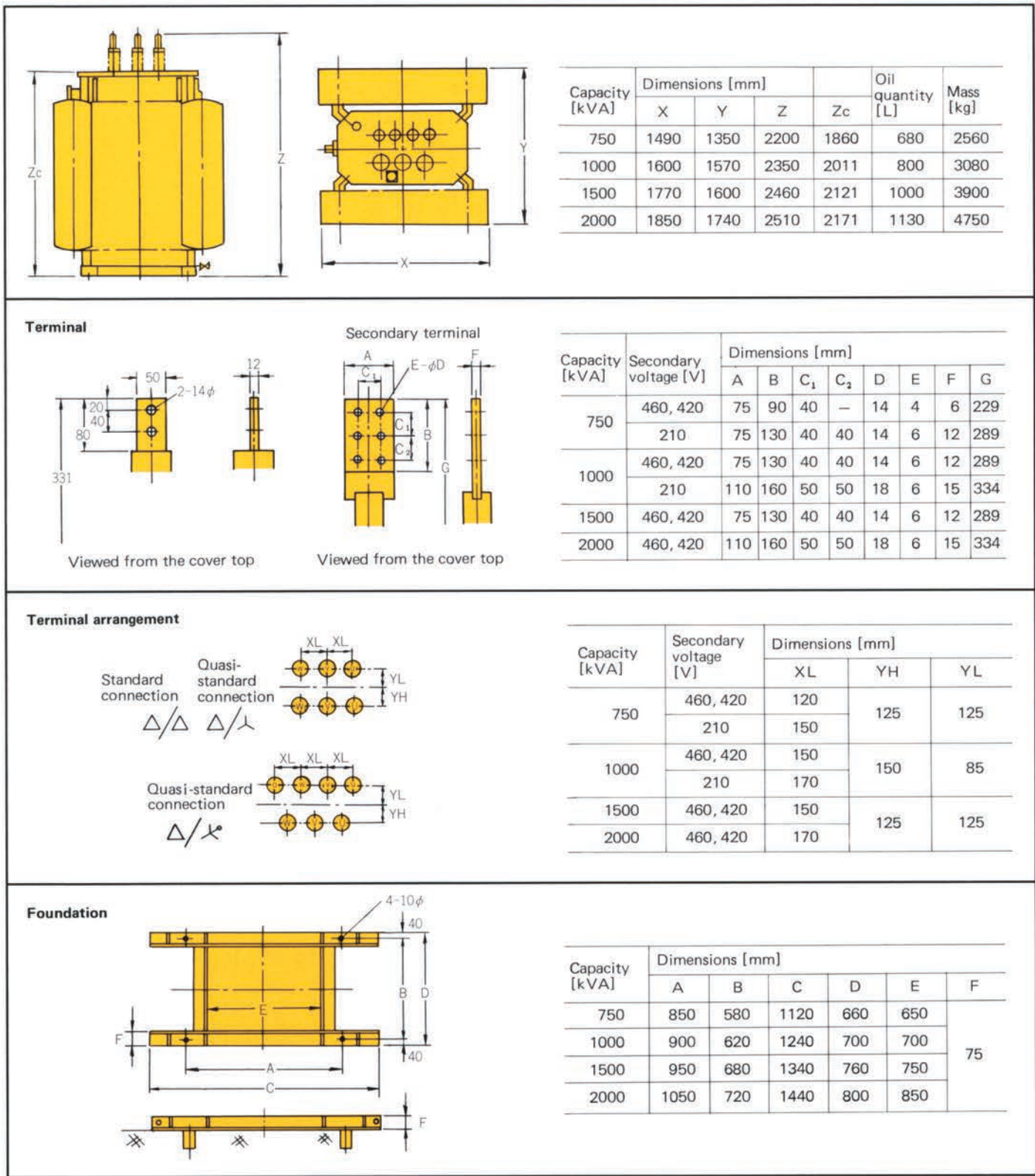
■ Optional accessories

When ordering optional accessories, designate special specifications.
(Optional accessories of special specifications are available at extra cost.)

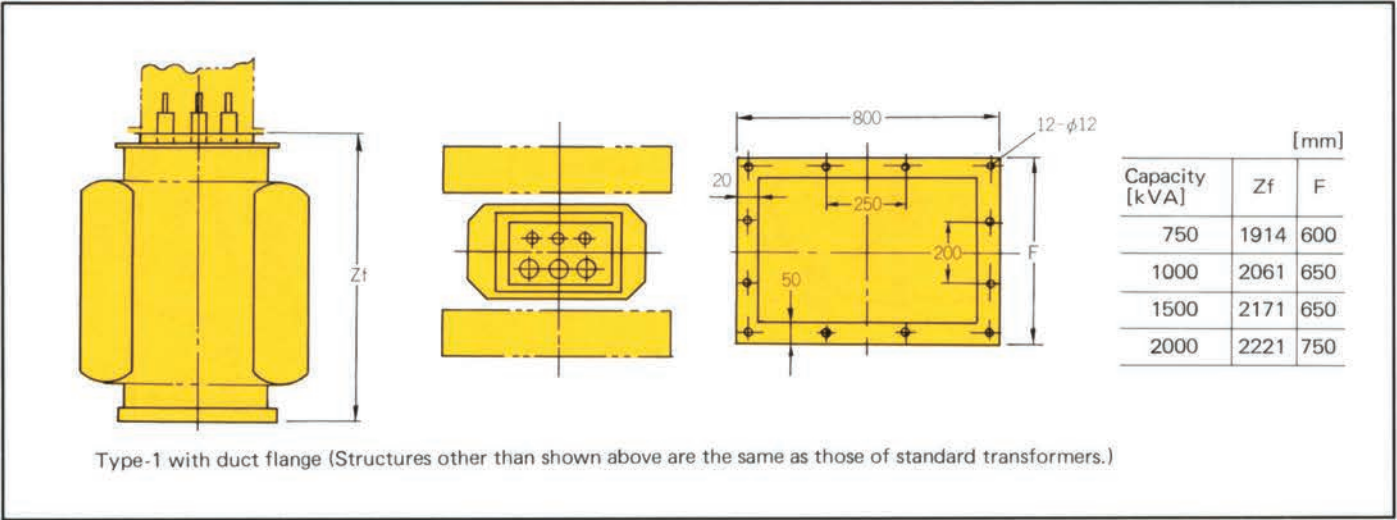
Electrical specifications	Structural specifications	Optional accessories
Non-standard impedance	Bus duct flange	Compound pressure gauge
Secondary neutral point drawout	Cable duct or bus duct	Nameplate of pressure curve
Primary series/parallel change	Bushing position	Dial thermometer
Secondary series/parallel change	Salt-resistant bushing	Sudden gas pressure relay
Other special specifications	Anti-vibration rubber	Sudden pressure-relief device
	Special painting	Buchholtz relay (Open type conservator is attached.)
	Other special specifications	Bushing CT
		Wheels
		Terminal box
		Resistance bulb
		Dial type oil-level indicator
		Other optional accessories

Dimensions

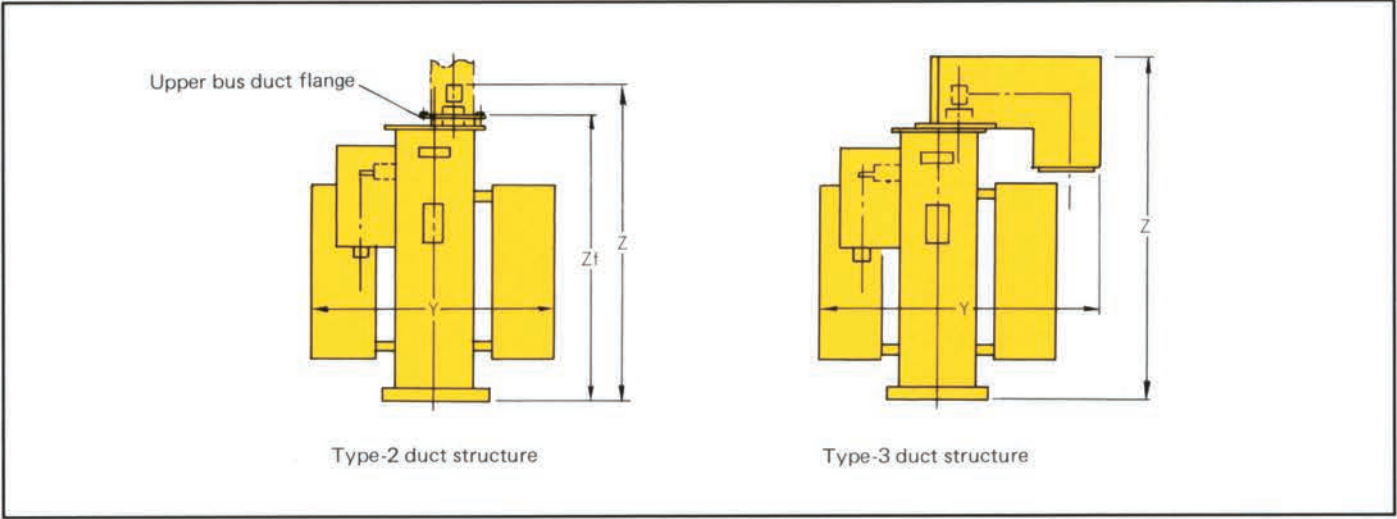
Three-phase, 3·6kV, 50/60Hz, 750-2000kVA, sealed type (standard)



Three-phase, 3-6kV, 50/60Hz, 750-2000kVA, with flange type (quasi-standard)

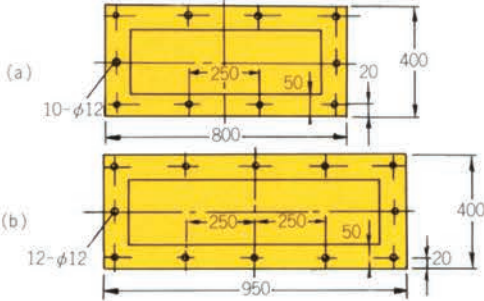


Three-phase, 3-6kV, 50/60Hz, 750-2000kVA, with duct (quasi-standard)

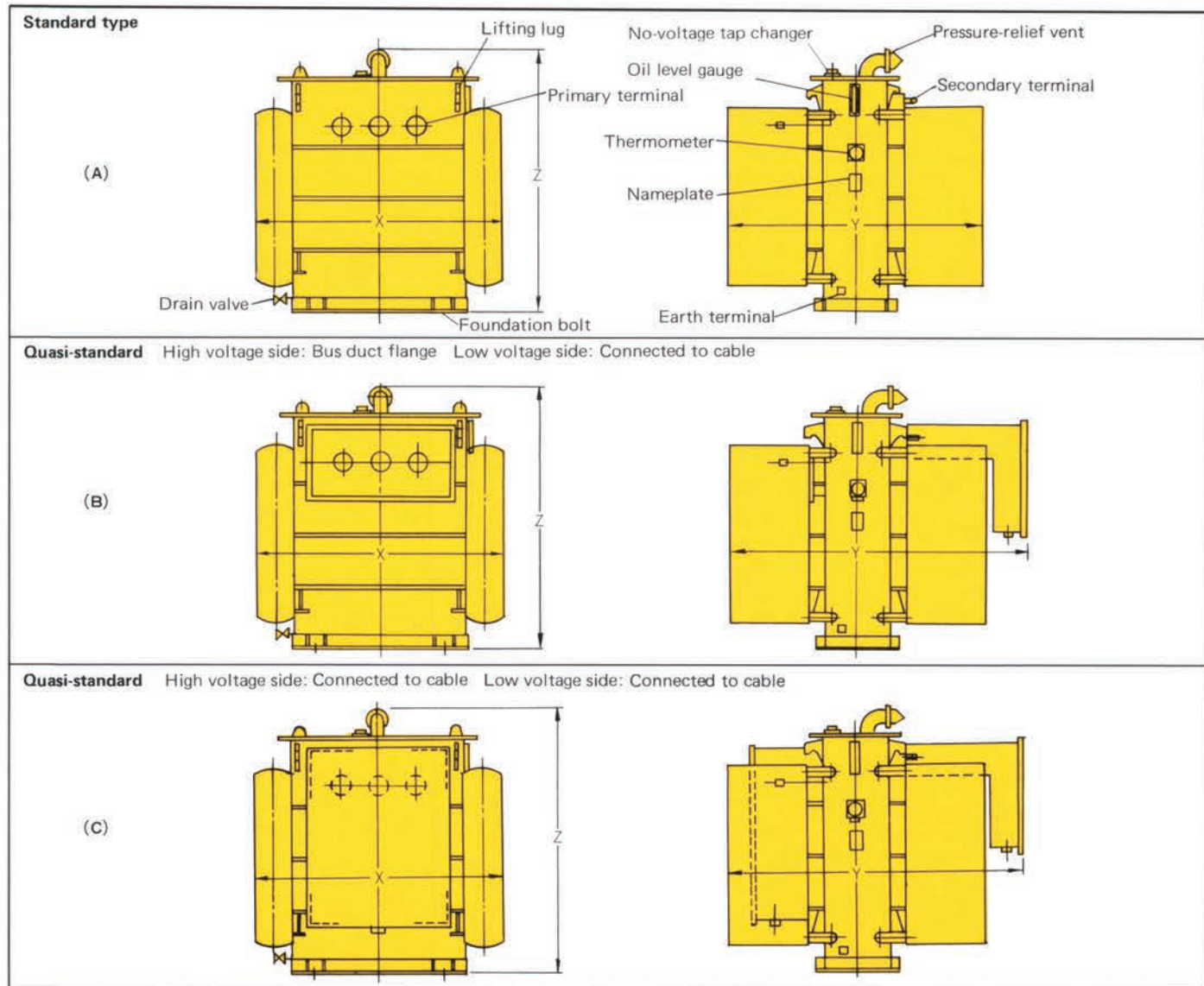


Capacity [kVA]	Type-2 duct structure						Type-3 duct structure				
	Dimensions [mm]				Oil quantity [L]	Mass [kg]	Dimensions [mm]			Oil quantity [L]	Mass [kg]
	X	Y	Z	Zf			X	Y	Z		
750	1660	1610	2200	1914	680	2610	1660	1960	2400	680	1690
1000	1780	1830	2350	2061	800	3130	1780	2180	2550	800	3220
1500	1850	1890	2450	2171	1000	3950	1850	2240	2650	1000	4040
2000	1920	2030	2510	2221	1130	4800	1920	2380	2710	1130	4900

Note 1) Fig. (a) shows the standard dimensions of upper bus duct flange. Only in the case of 3 ϕ 2000 kVA, secondary voltage 0.4 kV connection \times , are the dimensions altered as shown in Fig. (b).

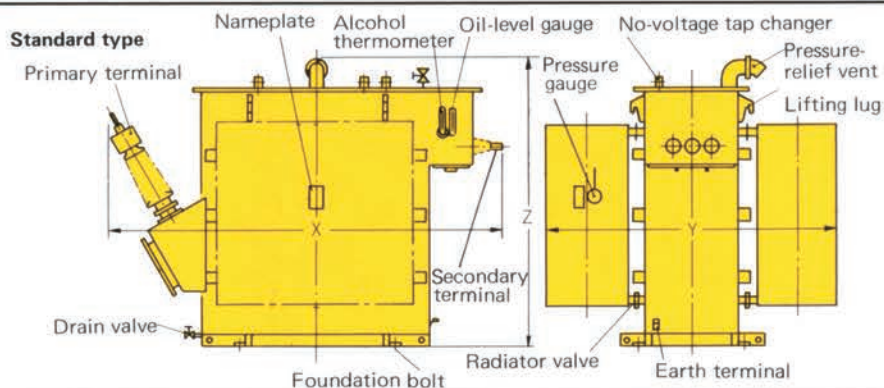


Three-phase, 20kV, 3000-5000kVA



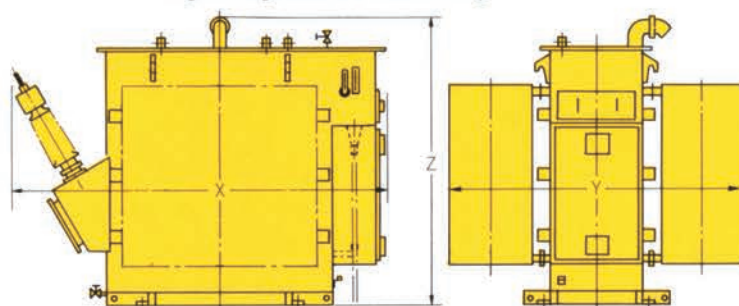
Capacity [kVA]	Dimensions [mm]			Oil quantity [L]	Mass [kg]	Outline diagram (Figs. above)
	X	Y	Z			
3000	2650	2300	2530	1850	8350	(A)
		2700			8470	(B)
		2700			8650	(C)
4000	2650	2450	2840	2300	9500	(A)
		2850			9620	(B)
		2850			9800	(C)
5000	2650	2750	2840	2500	11100	(A)
		3150			11220	(B)
		3150			11400	(C)

Three-phase, 60/70kV, 3000-5000kVA



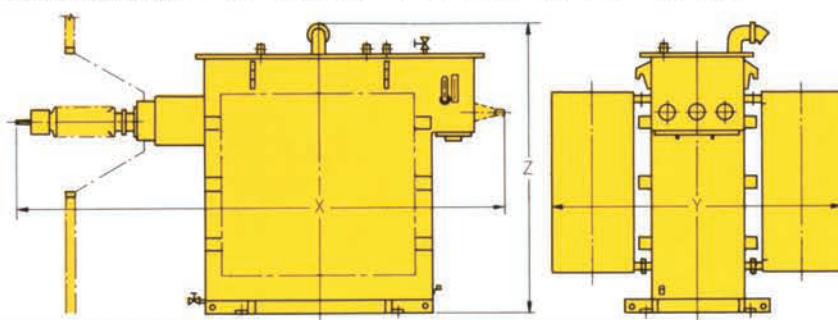
Capacity [kVA]	Dimensions [mm]			Total mass [kg]	Oil quantity [L]
	X	Y	Z		
3000	4000	2800	3000	11000	3300
4000	4100	2800	3100	13000	3700
5000	4200	3050	3300	15000	4500

Quasi-standard type Low voltage side: Connected to cable
High voltage side: Vertical bushing



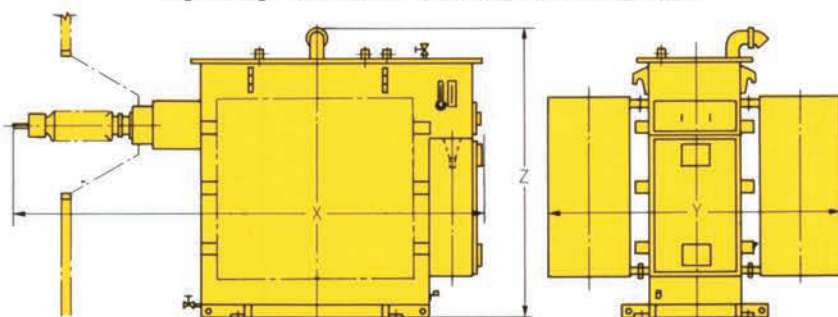
Capacity [kVA]	Dimensions [mm]			Total mass [kg]	Oil quantity [L]
	X	Y	Z		
3000	3800	2800	3000	11500	3300
4000	3900	2800	3100	13500	3700
5000	4000	3050	3300	15500	4500

Quasi-standard type High voltage side: Horizontal bushing (wall-through type)



Capacity [kVA]	Dimensions [mm]			Total mass [kg]	Oil quantity [L]
	X	Y	Z		
3000	5000	2800	3000	11200	3500
4000	5100	2800	3100	13200	3900
5000	5200	3050	3300	15200	4700

Quasi-standard Low voltage side: Connected to cable
High voltage side: Horizontal bushing (wall-through type)



Capacity [kVA]	Dimensions [mm]			Total mass [kg]	Oil quantity [L]
	X	Y	Z		
3000	4800	2800	3000	11700	3500
4000	4900	2800	3100	13700	3900
5000	5000	3050	3300	15700	4700

Standard and Quasi-standard

■ Standard

The following shows Japanese and foreign standards for transformers. Fuji's transformers FC-82 are manufactured in accordance with Japanese standards.

Japanese standards		
JEC-204 (1978)	Transformer	
JEC-183 (1871)	Bushing	
JEM 1118 (1969)	Transformer noise level	
JEM 1226 (1969)	Transformer air insulation	

Foreign standards		
International standard	IEC 76 (1976)	Power Transformers
British	BS 171 (1978)	Power Transformers
U.S.A.	ANSI C57.12.00 (1968)	Distribution Power and Regulating Transformers and Shunt Reactors
Australia	AS C61 (1970)	Power Transformers
Germany	VDE 0532 (Teil 1/11.71)	Bestimmungen für Transformatoren und Drosselspulen

Ordering Information

When placing orders for or making inquiries on the Fuji standard transformers FC-82, specify the following items:

Number of units	
Location of installation	Indoor-use, outdoor-use; Specify if the unit is to be installed at a location subject to briny air, dust, poisonous gases, vibration or shocks.
Oil deterioration preventing system	Specify the standard system such as open type, nitrogen sealed type, etc.
No. of phases	3 ϕ , 1 ϕ
Frequency	50 Hz, 60 Hz
Applied standard	JEC-204, IEC 76, ANSI C57 12.00, BS 171, AS C61, VDE 0532
Rated capacity	Specify the standard capacity within the range of 750-5000 kVA.
Nominal voltage and tap voltage	Specify the primary nominal voltage, tap voltage, and secondary voltage by the standard value according to this booklet. Specify the full capacity tap voltage and reduced capacity tap voltage.
Connection	In the case of three-phase type unit, specify delta or star standard connection.
Type of rating	Continuous rating; if short time overload is expected, inform us of the overload ratio and overload time.
State of use	Normal operating state (Ambient temperature: Below 40°C; Altitude: Up to 1000 m above sea level)
Parallel operation	If parallel operation with existing units is desired, inform us of the specifications of the existing units and the impedance voltage.
Shipping condition	Inform us in advance if dimensions and/or weight is limited in transportation.
Condition for installation	Inform us in advance if dimensions and/or weight is limited in installation of transformer.
Other conditions	Specify the structure of bus duct, cable duct, or others, or standards to be observed, if any.

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