Transformers & Power Distribution

Electrical Power & Distribution Transformers

Oil-immersed three-phase transformers, typically 25–2,500 kVA.

Rating band: Typically 25–2,500 kVA

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Invitrona manufactures three-phase, oil-immersed transformers with natural oil and air cooling for distribution and industrial power duties, typically from 25 to 2,500 kVA. The usual arrangement steps 11 kV down to 433 V with a Dyn11 vector group and off-circuit tapping; other voltage ratios and fittings are agreed per project. The principal electrical, loss and installation parameters are fixed together so that a project team can move from a requirement to a focused specification.

Class summary

Typical values for the class

Rating range
Typically 25–2,500 kVA

Voltage ratio
11 kV / 433 V (typical)

Cooling
ONAN (oil natural, air natural)

Vector group
Dyn11 (typical)

Typical specification

Parameter	Value or range	Conditions and basis
Rating range	Typically 25–2,500 kVA	Continuous duty, three phase
High-voltage winding	11 kV class (typical)	22 kV and 33 kV classes by assessment
Low-voltage winding	433 V, three phase with neutral	Other secondary voltages by assessment
Frequency	50 Hz	—
Vector group	Dyn11 (typical)	Other groups to suit parallel operation or the system
Tapping	Off-circuit, typically ±5% in 2.5% steps	On-load tap changer by assessment
Cooling	ONAN (oil natural, air natural)	Mineral insulating oil
Impedance	Typically 4.5–6.25%	Depends on rating; stated in the quotation
Efficiency	Typically 98–99%	At rated load and unity power factor; depends on rating and loss level
Windings and core	Copper or aluminium windings; CRGO steel core	Selected for the rating and loss requirement

Figures are typical values for the class and rating band; the quotation states the values for a specific unit.

Parameter	Value or range	Conditions and basis
Fittings	Conservator, oil level indicator, breather, thermometer pocket, pressure relief device	Buchholz relay and winding temperature indicator by rating or project
Ambient and altitude	Up to 50 °C ambient; up to 1,000 m altitude	Derating for higher altitude
Installation	Outdoor plinth mounted; pole mounted for small ratings	Cable boxes or bushings as agreed

Selection and application

Features

Feature	What it means in use
Agreed electrical schedule	Rating, voltage ratio, vector group, impedance and tapping are fixed together in one schedule for the project.
Off-circuit tapping	Taps allow the secondary voltage to be adjusted to the actual supply level after installation, with the transformer isolated.
Oil-immersed construction	Natural oil and air cooling suits outdoor installation without auxiliary fans or pumps.
Protection fittings	Oil level, temperature and pressure fittings give the site the indications its protection scheme needs.
Project terminations	Bushings or cable boxes are arranged to suit the incoming and outgoing connections.

Selection questions

Question	Answer
What decides the transformer rating?	The maximum demand of the connected load, its diversity, expected growth and the ambient conditions. Motor starting and harmonic-producing loads are reviewed separately because they can need a higher rating.
Which voltage ratio and vector group should I specify?	Most low-voltage distribution in India uses 11 kV to 433 V with Dyn11. Where a transformer will run in parallel with existing units, the vector group, ratio and impedance must match them.
Do I need on-load tap changing?	Off-circuit tapping suits supplies with a steady level. An on-load tap changer is considered where the supply varies during operation and the load cannot be interrupted for tap changes.
Which standards apply to distribution transformers?	In India the standard for oil-immersed distribution transformers is IS 1180, and IS 2026 covers power transformers. The standards and tests that apply to an order are stated in the quotation.
What site information is needed?	Supply voltage and fault level, load schedule, installation location, access for delivery and lifting, and the cable or busbar connection arrangement.

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Typical applications

Application context
Industrial plant power distribution
Commercial and institutional campuses
Residential developments and townships
Pumping stations and utilities
Dedicated supplies for large machinery

Where the class fits

	Duty or project context
01	Industrial transformation and distribution duties
02	Project electrical systems
03	Application-specific equipment integration

Documents for an agreed scope

	Document
01	Technical scope and electrical schedule
02	General arrangement and rating plate drawings
03	Operating and maintenance instructions
04	Inspection or test records when included in scope

Information needed for selection

	Input
01	System voltage, fault level, load schedule and connection requirements
02	Installation environment, cooling, access and enclosure constraints
03	Protection, termination, indication and interface expectations
04	Applicable project, inspection and documentation requirements

How a requirement is handled

	Activity
01	Review system duty and installation constraints
02	Prepare the electrical schedule with stated assumptions
03	Define fittings, terminations, interfaces and responsibilities
04	Agree inspection, testing witness points and handover requirements

Document control

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