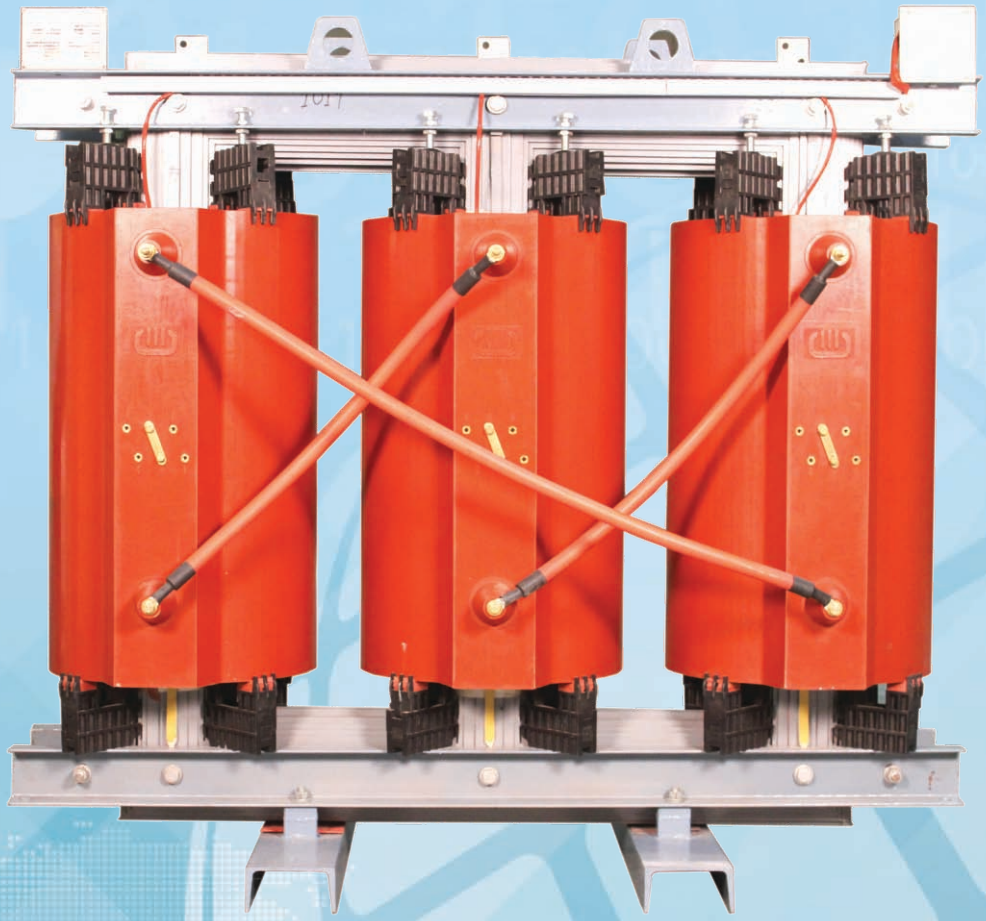
ELETTROMECCANICA
INDIA
An ISO 9001:2008 cert. co.

Majority owned subsidiary company of
ELETTROMECCANICA COLOMBO s.a.s., Italy

CAST RESIN DRY TRANSFORMER



Address:

Plant: EPIP, Kartholi, Bari Brahmana, Jammu, Jammu & Kashmir 181133, India
Tel/Fax: +91 1923 221183 • Email: info@elettroindia.com

Registered Office: 404, Chiranjiv Tower, 43, Nehru Place, New Delhi 110 019, India
Tel: +91 11 26280416 • Fax:+91 11 26225680

Sales Office: B-124, Sector-67, Noida 201310, India
Tel: +91 120 2593900 • Fax: +91 120 2484620

Elettromeccanica India

Elettromeccanica India Pvt Ltd (EIPL) is a Joint Venture Company of Elettromeccanica, Italy and Sharika Enterprises, India. Elettromeccanica Colombo, a Milan based leading manufacturer of transformer is held in high esteem for its high quality, operational reliability and long lasting products & has the confidence of an established clientele of end users across the globe.

In India we meet the growing demand of high quality cast resin type transformers with special foil type aluminum winding technology, maintaining the quality and standards set by the parent company In Italy.

Key highlights

- Majority owned subsidiary of Elettromeccanica Colombo, Italy with Sharika Enterprise as equity based joint-venture partner providing plant management and looking after marketing activities.
- Elettromeccanica Italy, established in 1901, has been manufacturing Cast Resin Transformers since 1983. The company has 30,000 MVA in 50 different countries, including 350-400 transformers to India with 33/0.415KV 200 - 3150 kVA ratings for the Delhi Metro Project.
- The Elettromeccanica India Pvt Ltd plant, located at Bari Brahmana near Jammu, was commissioned in January 2011. ISO 9001:2008 certified, it is equipped with state-of-the-art testing facilities for complete type testing as per Indian Standards (IS) as well as International Standards (IEC).
- First order received for Delhi Metro for 15 numbers 33 / 0.415kV 630 / 1600 / 2500kVA Cast Resin Transformers.
- EIPL has since then steadily progressed on the path of success by bagging and executing prestigious orders from EPC giants like ABB (for Jaipur Metro Project) Siemens (for DMRC-Ph-3 project & Chennai Metro), Larsen & Toubro (for Jaipur Metro , DMRC-Ph-3 project, Hyderabad Metro project) , IRCON (for DMRC-Ph-3 project).
- Apart from the above, EIPL has bagged direct orders from NHPC , NTPC, COFMOW (Indian Railways) , Ordnance Factories (Ministry of Defence),NPC, UJVNL, SJVNL, NASL (NTPC-Alstom JV), Isolux Ingenieria S.A , Andritz Hydro etc. to name a few.
- With a supply base of over 250 Transformers and installed capacity of around 200 MVA across India, Elettromeccanica India has truly established its market value pan India.
- Elettromeccanica India is also amongst the very few manufacturers in India having wide range of type tested products (200 KVA to 2500 KVA, 33/0.415 KV class).These tests were conducted at our in-house testing facility as well as through ERDA, Baroda.
- Elettromeccanica India is amongst the elite group of Indian manufactures having successfully conducted short circuit tests on its 1500 KVA, 33/0.415 KV Cast Resin Transformer from CPRI, Bhopal.

Factory at Bari Brahmana, Jammu

Elettromeccanica Colombo, Italy

Elettromeccanica Colombo s.a.s. is a leading manufacturer of transformers, established in 1901 in Milan, Italy. The company began manufacturing cast resin transformers in early 1980's and the range currently includes windings in copper and aluminum with natural or forced cooling up to a maximum capacity of 10 MVA at 36 kV.

Elettromeccanica Colombo has customers in over fifty countries across the globe with an installed capacity of more than 30.000 MVA. In India, the company has supplied around 350-400 numbers of 33/0.415 kV cast resin transformers with 200 - 3150 kVA capacity to the prestigious Delhi Metro Project, which has been under successful operation since 2001. In view of its uncompromising quality and unblemished field record, the company has also executed another repeat order from DMRC (through L&T) for supply of around 30 nos. of 3150 kVA ,33/0.415 kV Cast Resin Transformers.

Manufacturing processes under ISO-9001:2008 quality assurance system comply with leading international specifications and standards including IEC-60076. VDE-0532, BS-7806, ANSI-C57-12, IS-2026, IS-11171. All special and type testing is carried out in-house testing laboratory except short circuit test which is conducted at CESI, Italy

Power transformers can be equipped with on-load tap changer. Besides the standard types, the production range includes, auto-transformers and transformers for starting, insulation, traction and earthing for converters-rectifiers Special transformers are also designed and manufactured upon customer request.

The Indian flag flies at the Milan factory

Product Range

EIPL manufactures all kinds of cast resin transformers for power, distribution, rectifier, Auto, Excitation application, etc. These transformers can be manufactured with copper or aluminum winding or both, as per customer requirements. The transformer range includes:

Low voltage transformers LV/LV	Rating up to 2500 kVA nominal voltage up to 1.1 kV
Distribution transformers MV/LV	Rating up to 5000 kVA and nominal voltage up to 36 kV

Part/accessories of cast resin transfomers

Core

The core is built up of cold rolled grain oriented steel sheet with low specific losses, insulated on both sides by a thin inorganic coating (Carlyte). The sheets composing the core are cut as step lap (at 45°). Uniform pressing, stiffness and solidity of the columns assure a low noise level.

Medium Voltage Winding

High voltage windings are made of electrolytic aluminum conductors (wire or foil strip, depending upon power and voltage requirements). It is possible to produce copper windings as well. The windings are inglobed under vacuum in class F epoxy resin (class H is also possible on specific demand). The accuracy of execution of these processes ensure windings free from partial discharges.

Low Voltage Winding

Low voltage windings are made of strip or foil (copper or aluminum conductor, depending upon power and voltage requirements). Class F/H insulating material is used.

Standard Accessories

Skid under base or truck with bidirectional wheels, lifting lugs, earthing terminal.

Temperature Monitoring Unit

Temperature monitoring is essentially used for safe operation of cast resin/dry type transformers. It is suitable for control room as well as marshalling box installations and is built for long and trouble-free operation under extreme conditions of service.

Force Ventilation System

This is an optional accessory and is used where ventilation is either not sufficient or to increase temporarily rated power of the transformer.

Enclosure

The kind of enclosure is decided as per transformer size and the place where the transformer is to be installed. Frame for door thickness: 2mm/1.6mm. Side, front back panels and top sheet thickness: 1.6mm thick. Castle lock, looking glass and other accessories are provided as per client requirements.

Our USP

A) Aluminum winding

The thermal expansion coefficients of aluminum and the resin are so similar that thermal stresses due to load changes are kept to a minimum thus reducing chances of formations of cracks and voids in the casted coils.

Parameters	Copper	Aluminium	Additional Information/ Calculation
Coefficient of linear expansion	17×10^{-6}/K	24×10^{-6}/K	30×10^{-6}/K (Resin)

The difference between the relative linear expansion of aluminium and resin is quite close while that of copper and resin is quite high. Thus, the chances of void creation or cracks in insulation are higher in copper winding as compared to aluminum winding.

Conductivity (σ)	56×10^{6} S/m	35×10^{6} S/m	$1.6\times35\times10^{6}$ = 56×10^{6} S/m

A higher cross-section area of Al conductor (1.6xCu conductor) is provided to maintain same conductivity and resultant load losses.

Thermal Storage capacity	0.092 cal/g/°C	0.214 cal/g/°C	
	8.9 gm/cm^3	2.7 gm/cm^3	Density
	1	1.6	CS Area Factor
	8.9×0.092 = 0.8188	0.214×2.7×1.6 = 0.9248	Comparative Capa

Aluminium can withstand greater surge and overload current than equivalent copper.

Considering the facts stated above, the weight of a cast resin transformer and resultant cost gets reduced with aluminium winding as compared to copper winding. This results in lower prices for a technically superior product with better reliability and uninterrupted life cycle.

B) Foil winding

The benefits of Foil winding over conventional round winding is underlined below :

Conventional Round Windings

- Inter-turn voltage is variable and, at times, can exceed substantially
- Higher chances of inter-turn insulation failure due to voltage breakdown.

Foil Windings

- Inter-turn voltage is always constant as each layer consists of only one winding turn.
- Minimal failure chances of inter-turn layers.

Test Facilities at Plant

Elettromeccanica India has a world class in-house testing facility for carrying out Routine Tests , Type Tests and Special Tests (except Short Circuit Test) as per client's requirement and in accordance to the latest Indian and International standards. The test equipments majorly sourced from our parent company in Italy, makes our test bench truly international.

TEST

All transformers are singularly tested with routine test, according to International and Indian standards namely IEC 60076-Part-11 & equivalent IS-11171, respectively that are as following:

a. Measurement of winding resistance.
b. Measurement of voltage ratio.
c. Check of voltage vector relationship.
d. Measurement of short circuit impedance and load loss.
e. Measurement of no-load loss and no-load curret.
f. Separate-source voltage withstand test.
g. Induced overvoltage withstand test.

In addition to above we are able to conduct following Special and Type Tests at extra cost:

a. Temperature rise test (Type Test).
b. Lightning impulse test (Type Test).
c. Partial Discharge Measurement. (Special Test)
d. Measurement of Acoustic sound level. (Special Test)
e. Measurement of Zero-sequence impedance (Special Test)
f. Measurement of Harmonics of no-load current (Special Test)
g. Magnetic balance test

ASSISTANCE

a. Checking "on site" problems / damages on transformers.
b. Measure of the electric parameters of the transformers at site
c. Carrying out Erection, Testing and Commissioning of transformers
d. Providing supervision services for transformers
e. Sale of transformers accessories.

REPAIR

a. Repairs in our Plant.

MAINTENANCE

a. Maintenance operations in our Plant.
b. Undertake AMC and after sales service.

Functional Characteristics

- **High Short Circuit Strength**
- **High Overload Capacity**
- **Fire Resistance**
- **Compact Size**
- **Environment Safe**
- **Maintenance-Free**

TECHNICAL DATA

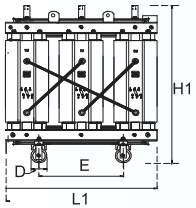
Cast Resin Transformers

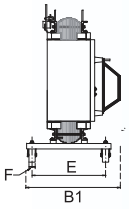
Insulation Class 12 kV, Ambient Temperature : 50°C - Temp. Rise : 90°C

kVA	Po	Pcc (75°C)	Pcc (120°C)	η4/4 cos ϕ1	η4/4 cos ϕ0.9	η3/4 cos ϕ1	η3/4 cos ϕ0.9	Zl	Io	Icc	In-rush	Lpa	windings in aluminium				windings in copper				E	D	F	enclosure*		
													L1	B1	H1	Weight	L1	B1	H1	Weight				L	B	H
	(W)	(W)	(W)	(%)	(%)	(%)	(%)	(%)	(%)	(kA)	(Ir/In)	(dB)	(mm)	(mm)	(mm)	(kg)	(mm)	(mm)	(mm)	(kg)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
100	500	1900	2170	97.66	97.40	97.95	97.73		1.50	3.3		48	1035	650	1075	600	1005	650	1030	600				1400	1100	1500
160	650	2500	2860	98.07	97.86	98.32	98.13		1.30	5.3		51	1140	650	1180	850	1095	650	1085	850				1500	1100	1500
200	750	3000	3430	98.16	97.96	98.40	98.23		1.00	6.7	10.0	53	1140	650	1320	950	1110	650	1150	950	520	100	35	1500	1100	1950
250	900	3500	4000	98.27	98.08	98.49	98.33		0.95	8.3		54	1170	650	1320	1000	1155	650	1155	1030				1500	1100	1950
315	1050	3800	4350	98.48	98.32	98.67	98.52	4.00	0.90	10.5		56	1275	650	1340	1200	1200	650	1295	1300				1600	1100	1950
400	1250	4300	4900	98.63	98.48	98.79	98.66		0.85	13.3		57	1320	800	1480	1350	1245	800	1430	1400				1600	1150	1950
500	1500	4950	5650	98.72	98.59	98.87	98.75		0.80	16.7		57	1395	800	1570	1700	1320	800	1470	1800	670			1700	1150	1950
630	1700	6100	6980	98.77	98.64	98.93	98.81		0.75	21.0	9.5	58	1395	800	1680	1900	1395	800	1590	2150				1800	1150	1950
800	2100	6600	7550	98.92	98.81	99.04	98.94		0.70	21.3		59	1590	800	1750	2350	1515	800	1650	2600		150	60	1900	1150	2250
1000	2450	7600	8700	99.00	98.90	99.11	99.01	5.00	0.65	26.7		60	1650	950	1850	2650	1560	950	1700	2850				2000	1500	2250
1250	2850	9300	10600	99.04	98.93	99.15	99.05		0.60	33.3		62	1680	950	2020	3200	1650	950	1880	3650	820			2000	1500	2250
1600	3100	11800	13500	99.07	98.98	99.20	99.11		0.55	34.1	9.0	62	1770	950	2050	3600	1650	950	2050	4000				2000	1500	2500
2000	3700	14800	16900	99.08	98.99	99.21	99.12	6.25	0.50	42.7		63	1875	1200	2330	4400	1800	1200	2150	5000				2200	2000	2500
2500	4450	17500	20000	99.12	99.03	99.24	99.16		0.45	53.3	8.5	65	1980	1200	2400	5250	1860	1200	2200	5550	1070	200	70	2200	2000	2500
3150	5000	22500	25700	99.13	99.04	99.26	99.18		0.40	67.2	8.0	66	2040	1200	2450	5800	1950	1200	2450	6950				2500	2000	2800

Insulation Class 36 kV, Ambient Temperature : 50°C - Temp. Rise : 90°C

kVA	Po	Pcc (75°C)	Pcc (120°C)	η4/4 cos ϕ1	η4/4 cos ϕ0.9	η3/4 cos ϕ1	η3/4 cos ϕ0.9	Zl	Io	Icc	In-rush	Lpa	windings in aluminium				windings in copper				E	D	F	enclosure*		
													L1	B1	H1	Weight	L1	B1	H1	Weight				L	B	H
	(W)	(W)	(W)	(%)	(%)	(%)	(%)	(%)	(%)	(kA)	(Ir/In)	(dB)	(mm)	(mm)	(mm)	(kg)	(mm)	(mm)	(mm)	(kg)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
100	700	1850	2100	97.51	97.24	97.73	97.48		1.50	3.3		52	1320	680	1260	830	1290	670	1240	810				1800	1100	1950
160	860	2650	3000	97.85	97.62	98.07	97.87		1.30	5.3		54	1365	685	1330	1050	1365	685	1330	1080				1900	1100	1950
200	1100	2950	3350	98.01	97.79	98.19	97.99		1.00	6.7		54	1440	695	1350	1250	1410	690	1350	1250	520	100	35	2000	1100	1950
250	1300	3700	4200	98.04	98.82	98.23	98.03		0.95	8.3	9.5	54	1590	720	1430	1510	1515	710	1360	1550				2100	1100	1950
315	1500	3950	4500	98.29	98.11	98.45	98.28	4.00	0.90	10.5		55	1635	730	1500	1700	1560	715	1430	1750				2200	1100	1950
400	1650	4200	4800	98.55	98.40	98.68	98.53		0.85	13.3		56	1650	805	1620	1870	1590	800	1560	1960				2200	1150	1950
500	1900	4600	5250	98.71	98.57	98.81	98.68		0.80	16.7		56	1710	820	1710	2300	1680	800	1710	2450				2300	1150	2250
630	2100	5300	6050	98.83	98.71	98.93	98.82		0.75	21.0		57	1740	820	1830	2650	1680	810	1730	2600	670			2300	1150	2250
800	2600	6300	7200	98.89	98.78	98.98	98.87		0.70	21.3		58	1920	850	1920	3050	1845	840	1800	3150		150	60	2400	1150	2250
1000	2850	8000	9150	98.92	98.81	99.03	98.92	5.00	0.65	26.7	9.0	59	1980	950	1970	3550	1875	950	1820	3500				2500	1500	2250
1250	3000	9000	10300	99.04	98.94	99.14	99.05		0.60	33.3		60	1965	950	2120	3950	1935	950	2010	4350	820			2600	1500	2500
1600	3500	12000	13700	99.04	98.94	99.15	99.05		0.55	34.1		61	2040	950	2160	4300	1965	950	2230	4860				2600	1500	2500
2000	3950	14900	17050	99.07	98.96	99.18	99.09	6.25	0.50	42.7	8.5	62	2130	1200	2450	5100	2070	1200	2350	5720				2700	2000	2800
2500	4750	17000	19450	99.13	99.04	99.24	99.16		0.45	53.3	7.5	63	2310	1200	2550	6700	2220	1200	2440	6820	1070	200	70	2800	2000	2800
3150	5850	21000	24050	99.15	99.06	99.26	99.18		0.40	67.2	7.0	65	2475	1350	2650	8000	2400	1200	2600	8520				3000	2000	3000





Note: We reserve the right to modify the data anytime

*Recommended minimum size

ELETTROMECCANICA INDIA

Inside the plant at Jammu

Our Clientele:

CHENNAI METRO

STERLING AND WILSON

LARSEN & TOUBRO
It's all about Imagineering

ABB

UJVN Limited
(A Govt. of Uttarakhand Enterprise)

SIEMENS

VOLTAS LIMITED

DELHI METRO

ISOLUX CORSÁN

SAMSUNG
SAMSUNG C&T

ICON

एनएचपीसी
NHPC

JAIPUR METRO

ANDRITZ Hydro

National Productivity Council

एसजेवीएन
SJVN

एनटीपीसी
NTPC

ALSTOM

Ordnance Factory

AAPT INDIA

INDIAN RAILWAYS

HYDERABAD METRO RAIL