



2024

MELLOMSPENNINGS TRANSFORMATORER



POWER FOR YOUR SYSTEM



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KVALITET TIL MARKEDETS BESTE PRISER

Advantages of cast resin transformers

The manufacturing characteristics of cast resin transformers mean that they can be used for most installations. Their main advantages with respect to oil transformers can be expressed in three characteristics:

1. reduction of environmental impact
2. simplification of installation
3. flexibility in use

• Higher safety (low risk of fire)

Thanks to the use of high-quality epoxy resin, METH cast resin transformers reduce environmental impact to a minimum and conform to the international environmental standards IEC 60076-11.

The transformers are entirely manufactured with flame-retardant and self-extinguishing materials.

They therefore have reduced inflammability (self-extinguishing) and a minimum emission of toxic gases and opaque smokes (F1 fire resistance classification); they can work in damp, dusty, saline or polluted environments (E2 environmental test classification) and offer high resistance to thermal shocks (C2 climatic test classification).

• No cooling fluids

Because they have no cooling fluids cast resin transformers do not present risks of pollution and drastically reduce their contribution when there is a fire, as compared with transformers using insulating liquid.

• Reduction of building laying works

Cast resin transformers do not need the expensive civil works which are instead required for oil transformers, such as collection pits, extinguishing grids and fire-resistant separation barriers, to prevent the propagation of fire and the spreading of insulating liquids.

These cast resin transformers are class F1 no separation provision with fire barrier is needed.

• Installation inside buildings

Thanks to the reduction of expensive building works, the greater safety (low fire risk) and the absence of cooling fluids, cast resin transformers can be installed inside buildings, even near to rooms where people are present.

• Recovery of materials at the end of life

Cast resin transformers can be considered as the construction which more respects the environment.

This is particularly important when the machine has come to the end of its working life and must be disposed.

At the end of the disposal the resin is considered an inert material and the primary and secondary windings can easily be recycled.

• Low CO₂ emissions

Reducing the consumptions of a transformer also means decreasing CO₂ emissions, limiting the impact of the machine on the environment.

This extremely important environmental advantage also becomes an economical advantage in those countries where carbon emissions laws based on the quantity of CO₂ emitted has been introduced.

• Greater overloading capacity

As cast resin transformers use air cooling and take longer to reach operation temperature, they can be more overloaded than insulating liquid transformers and are thus particularly suitable to feed loads with frequent current breakaway starting current.

The transformers can be overloaded, as long as the temperature rise on the windings does not remain above the allowable value for long periods of time.

The power supplied can be temporarily increased by means of the application of ventilation systems, to be used to tackle particular operating situations (temporary overloads or high room temperature) or to make available a temporary reserve of power when there is an emergency (e.g. when a transformer is out of service).

• Reduction of maintenance

Cast resin transformers have lower maintenance costs because they need only be inspected regularly to check that there is no accumulation of dust and dirt. Oil transformers instead must be monitored to guarantee the level of insulating liquid and to check that its dielectric properties have not changed (e.g. the dielectric strength of mineral oils reduces considerably when there are small traces of humidity).

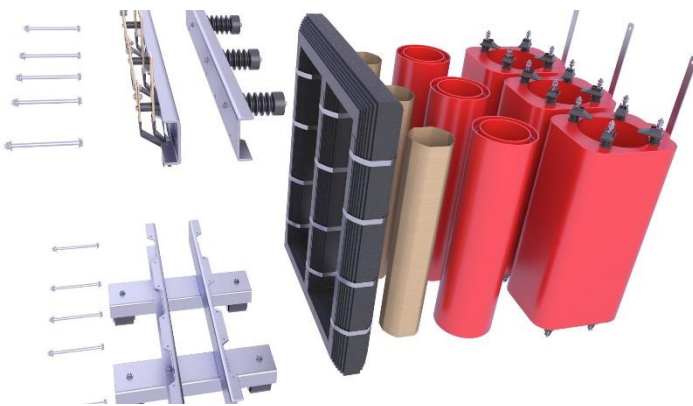
Cast Resin Transformers Range

Standard Solution

Distribution Transformers:
 Rated power: 100 – 3150 kVA
 Voltage: from 1 up to 36kV

Material of windings

- Aluminium (Al)
- at request special version Copper (Cu)



Equipment

- HV terminals (n°3 pieces)
- LV bar terminals (n°4 pieces)
- Off load tapping links (n°3 pieces)
- Rating plate (n°1 pieces)
- Lifting lugs (n°4 pieces)
- Earth terminals (n°2 pieces)
- Orientable rollers (n°4 pieces)

Accessories (on request)

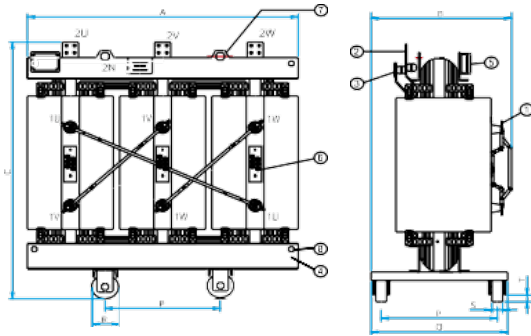
- Pt100 thermosensors with connection box
- PTC thermistors (as an alternative to the Pt100 thermosensors)
- Electronic unit for thermal control, with inputs for Pt100 and temperature display
- Electronic unit for thermal control, with inputs for PTC, without temperature display
- Forced ventilation systems (for temporary power increase)
- Electronic unit for ventilation system
- Transformer protective enclosure (degree protection IP23 & IP31)
- Surge arresters kit
- Antivibration pads
- HV terminals for plug-in connections (Elastimold)
- Antiseismic frame (in base of level of earthquake)
- OLTC (On-Load Tap-Changers)
- CT and VT instrument transformer

Special Solution (Available) : Rated power: up to 20 MVA , Primary insulation level: up to 36kV , Secondary insulation level: on request

Vectorial Groups

	Dd0		Dd6
	Yy0		Yy6
	Dz0		Dz6
	Dy11		Dy5
	Yd11		Yd5
	Yz11		Yz5

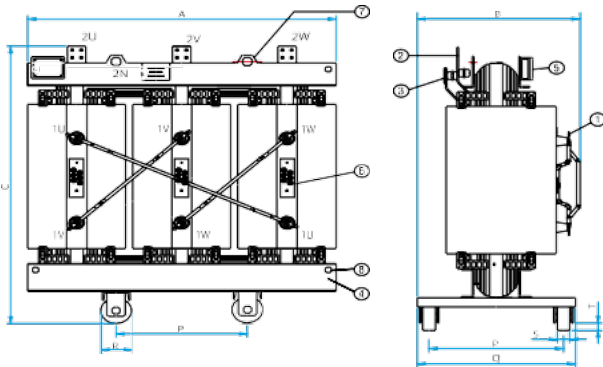
Cast Resin Transformers Data



Insulation class 24 kV

Rated Power	Series	Po	Pcc 75°C		Vcc 75°C	Io	Efficiency		Voltage Drop		LpA	LwA	A	B	C	P	Q	R	S	T	Weight
			W	W			W	%	%	load 100%											
100	Advanced	480	1700	1955	6	2,3	97,82	97,94	2,13	4,48	48	61	1200	760	1240	520	620	125	40	35	580
	Ecodesign	280	1850	2050	6	2,3	97,72	98,12	2,23	4,56	39	51	1130	750	1250	520	620	125	40	35	650
	Basic	700	4000	4600	6	2,0	96,79	97,33	3,05	5,29	54	67	1100	710	1240	520	620	125	40	35	700
160	Advanced	650	2500	2850	6	2,0	97,86	98,16	1,96	4,33	51	64	1240	750	1250	520	620	125	40	35	800
	Ecodesign	400	2600	2900	6	2,0	97,98	98,34	1,99	4,35	42	54	1270	770	1250	520	620	125	40	35	850
	Basic	960	4400	5060	6	1,8	97,65	98,01	2,20	4,54	54	67	1240	755	1310	520	620	125	40	35	950
250	Advanced	880	3300	3800	6	1,8	98,16	98,42	1,70	4,10	54	67	1290	775	1410	520	620	125	40	35	1050
	Ecodesign	520	3400	3800	6	1,8	98,30	98,60	1,70	4,10	45	57	1270	790	1420	520	620	125	40	35	1150
	Basic	1100	4700	5405	6	1,7	97,98	98,28	1,90	4,27	56	70	1290	775	1325	520	620	125	40	35	1200
315	Advanced	1030	4000	4600	6	1,7	98,24	98,49	1,64	4,04	56	70	1290	770	1525	520	620	125	40	35	1200
	Ecodesign	630	3950	4400	6	1,7	98,43	98,70	1,58	3,99	46	59	1340	790	1530	520	620	125	40	35	1300
	Basic	1350	5400	6210	6	1,5	98,15	98,41	1,73	4,12	57	71	1320	850	1405	670	770	125	40	35	1250
400	Advanced	1200	4800	5500	6	1,5	98,35	98,59	1,55	3,97	57	71	1320	845	1565	670	770	125	40	35	1300
	Ecodesign	750	4950	5500	6	1,5	98,46	98,73	1,55	3,97	47	60	1340	860	1630	670	770	125	40	35	1450
	Basic	1600	6600	7600	6	1,4	98,19	98,46	1,70	4,10	57	71	1320	850	1505	670	770	125	40	35	1400
500	Advanced	1400	5900	6780	6	1,4	98,39	98,63	1,54	3,95	57	71	1430	850	1620	670	770	125	40	35	1550
	Ecodesign	900	5750	6400	6	1,4	98,56	98,81	1,46	3,88	48	61	1400	880	1640	670	770	125	40	35	1650
	Basic	1900	7900	9085	6	1,3	98,29	98,54	1,62	4,03	58	72	1430	870	1600	670	770	125	40	35	1650
630	Advanced	1650	6800	7800	6	1,3	98,52	98,74	1,42	3,85	58	72	1430	885	1760	670	770	125	40	35	1800
	Ecodesign	1100	6850	7600	6	1,3	98,64	98,88	1,39	3,82	49	62	1400	880	1780	670	770	125	40	35	1850
	Basic	2300	9600	10925	6	1,1	98,37	98,61	1,55	3,96	59	73	1430	870	1765	670	770	125	40	35	1900
800	Advanced	2000	8000	9200	6	1,1	98,62	98,82	1,33	3,77	59	73	1500	890	1810	670	770	125	40	35	2150
	Ecodesign	1300	7200	8000	6	1,1	98,85	99,04	1,18	3,64	50	64	1490	890	1880	670	770	125	40	35	2400
	Basic	2600	11000	12650	6	1,0	98,50	98,72	1,44	3,67	60	74	1500	1000	1960	820	1000	125	40	35	2300
1000	Advanced	2300	9400	10800	6	1,0	98,71	98,90	1,26	3,71	60	74	1500	1000	1960	820	1000	125	40	35	2500
	Ecodesign	1550	8100	9000	6	1,0	98,96	99,13	1,08	3,55	51	65	1630	1020	1950	820	1000	125	40	35	3050
	Basic	2900	13000	14950	6	0,9	98,59	98,81	1,38	3,81	62	76	1500	1000	1975	820	1000	125	40	35	2650
1250	Advanced	2700	11500	13100	6	0,9	98,75	98,94	1,23	3,68	62	76	1600	1000	1975	820	1000	125	40	35	2850
	Ecodesign	1800	9900	11000	6	0,9	98,99	99,16	1,06	3,53	53	67	1670	1040	2060	820	1000	125	40	35	3500
	Basic	3500	16500	18975	6	0,9	98,61	98,83	1,37	3,80	62	76	1680	1030	2210	820	1000	200	70	50	3300
1600	Advanced	3100	14000	15800	6	0,9	98,83	99,01	1,17	3,63	62	76	1680	1025	2285	820	1000	200	70	50	3450
	Ecodesign	2200	11700	13000	6	0,9	99,06	99,21	0,99	3,47	54	68	1700	1040	2380	820	1000	200	70	50	4150
	Basic	4100	20500	23575	6	0,8	98,64	98,86	1,36	3,80	63	78	1770	1135	2370	1070	1200	200	70	50	4100
2000	Advanced	4000	16000	18000	6	0,8	98,91	99,07	1,08	3,55	63	78	1830	1140	2420	1070	1200	200	70	50	4250
	Ecodesign	2600	14400	16000	6	0,8	99,08	99,23	0,98	3,46	55	70	1840	1200	2420	1070	1200	200	70	50	4850

Cast Resin Transformers Data



Insulation class 36 kV

Rated Power	Series	Po	Pcc 75°C	Pcc 120°C	Vcc 75°C	Io	Efficiency		Voltage Drop		LpA	LwA	A	B	C	P	Q	R	S	T	Weight	
							cosφ 1 load 100%	cosφ 1 load 75%	cosφ 1 load 100%	cosφ 0,9 load 100%												
kVA		W	W	W	%	%	%	%	%	%	dB	dB	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
160	Advanced	1000	2900	3340	6	2	97,36	97,66	2,27	4,59	51	64	1500	800	1550	520	620	125	40	35	1120	
	Ecodesign	460	2880	3190	6	2	97,77	98,16	2,17	4,51	42	54	1600	850	1600	520	620	125	40	35	2900	
250	Advanced	1300	4000	4600	6	1,8	97,69	97,97	2,02	4,38	54	67	1550	850	1600	520	620	125	40	35	1350	
	Ecodesign	600	3770	4180	6	1,8	98,12	98,45	1,85	4,23	45	57	1625	900	1750	520	620	125	40	35	3050	
315	Advanced	1500	4800	5290	6	1,7	97,89	98,14	1,86	4,24	56	70	1600	850	1700	520	620	125	40	35	1600	
	Ecodesign	730	4370	4840	6	1,7	98,26	98,56	1,72	4,11	46	59	1650	900	1850	520	620	125	40	35	3150	
400	Advanced	1650	5000	5750	6	1,5	98,18	98,40	1,62	4,02	57	71	1650	900	1820	670	770	125	40	35	1900	
	Ecodesign	870	5460	6050	6	1,5	98,30	98,60	1,69	4,09	47	60	1700	950	1950	670	770	125	40	35	3300	
500	Advanced	1950	6000	6900	6	1,4	98,26	98,47	1,56	3,97	57	71	1700	900	1850	670	770	125	40	35	2100	
	Ecodesign	1040	6350	7040	6	1,4	98,41	98,68	1,59	4,00	48	61	1725	975	2100	670	770	125	40	35	3450	
630	Advanced	2200	7000	8050	6	1,3	98,40	98,60	1,46	3,88	58	72	1730	950	2000	670	770	125	40	35	2450	
	Ecodesign	1270	7540	8360	6	1,3	98,49	98,75	1,51	3,93	49	62	1750	1000	2150	670	770	125	40	35	3650	
800	Advanced	2700	8200	9430	6	1,1	98,51	98,68	1,36	3,80	59	73	1750	1000	2100	670	770	125	40	35	2850	
	Ecodesign	1500	7930	8800	6	1,1	98,73	98,94	1,28	3,73	50	64	1875	1050	2300	670	770	125	40	35	3800	
1000	Advanced	3300	10500	12075	7	1	98,49	98,67	1,45	4,30	60	74	1800	1100	2350	820	1000	125	40	35	3200	
	Ecodesign	1790	8920	9900	7	1	98,84	99,03	1,23	4,11	51	65	1950	1050	2450	820	1000	200	70	50	4350	
1250	Advanced	3700	13000	14950	8	1	98,53	98,72	1,52	4,79	62	76	1850	1100	2400	820	1000	125	40	35	3400	
	Ecodesign	2070	10910	12100	8	0,9	98,88	99,06	1,29	4,59	53	67	2000	1100	2600	820	1000	200	70	50	5000	
1600	Advanced	4200	15000	17250	8	0,9	98,68	98,85	1,40	4,68	62	76	2000	1100	2450	820	1000	200	70	50	4450	
	Ecodesign	2530	12890	14300	8	0,9	98,96	99,13	1,21	4,52	54	68	2050	1100	2650	820	1000	200	70	50	5450	
2000	Advanced	5000	18500	21275	8	0,8	98,70	98,88	1,38	4,67	63	78	2150	1250	2600	1070	1200	200	70	50	5400	
	Ecodesign	2990	15860	17600	8	0,8	98,98	99,15	1,20	4,51	55	70	2200	1200	2650	1070	1200	200	70	50	6250	
2500	Advanced	5800	22000	25300	8	0,7	98,77	98,94	1,33	4,63	65	80	2200	1250	2700	1070	1200	200	70	50	6300	
	Ecodesign	3570	18830	20900	8	0,7	99,03	99,19	1,16	4,47	56	71	2300	1200	2750	1070	1200	200	70	50	6500	
3150	Advanced	6800	24000	27600	8	0,6	98,92	99,06	1,20	4,51	66	81	2450	1250	2700	1070	1200	200	70	50	7650	
	Ecodesign	4370	21810	24200	8	0,6	99,10	99,24	1,09	4,41	58	74	2350	1200	2800	1070	1200	200	70	50	7400	

Different design (i.e. ambient temperatures and different conducting material) are available on request.

We reserve the right to change the technical data without advising.

IEC 60076-1

GENERAL STANDARD OF POWER TRANSFORMERS

Specific Standards related to transformers

- **IEC 60076-1** : Power transformers - Part 1: General;
- **IEC 60076-3** : Power transformers - Part 3: Insulation levels, dielectric tests and external clearances in air;
- **IEC 60076-5** : Power transformers - Part 5: Ability to withstand short circuit;
- **IEC 60076-6** : Power transformers - Part 6: Reactors;
- **IEC 60076-8** : Power transformers - Part 8: Application guide;
- **IEC 60076-10-1** : Power transformers - Part 10-1: Determination of sound levels - Application guide;
- **IEC 60076-11** : Power transformers - Part 11: Dry-type transformers;
- **IEC 60076-12** : Power transformers - Part 12: Loading guide for dry-type power transformers ;
- **IEC TS 60076-19** : Power transformers - Part 19: Rules for the determination of uncertainties in the measurement of the losses on power transformers and reactors ;
- **IEC TR 60616** : Terminal and tapping markings for power transformers;
- **IEC 61378-1** : Converter transformers - Part 1: Transformers for industrial applications;
- **IEC 61378-3** : Converter transformers - Part 3: Application guide;
- **IEC 62032** : Guide for the Application, Specification and Testing of Phase-Shifting Transformers;
- **IEC 60529** : Degrees of protection provided by enclosures (IP Code);
- **IEC 60068-3-3** : Environmental testing - Part 3-3: Guidance - Seismic test methods for equipments;
- **EN 50588-1:2015** : Medium power transformers 50 Hz, with highest voltage for equipment not exceeding 36 kV - Part 1: General requirements;

MAIN TESTS (Acceptance, Type and Special)

ACCEPTANCE TESTS

■ Measurement of winding resistance	IEC 60076-11 (clause 15)
■ Measurement of voltage ratio and check of phase displacement	IEC 60076-11 (clause 16)
■ Measurement of short-circuit impedance and load loss	IEC 60076-11 (clause 17)
■ Measurement of no-load loss and current	IEC 60076-11 (clause 18)
■ Separate-source AC withstand voltage test	IEC 60076-11 (clause 19)
■ Induced AC withstand voltage test	IEC 60076-11 (clause 20)
■ Partial discharges measurement	IEC 60076-11 (clause 22)

TYPE TESTS (on request)

■ Lightning impulse test	IEC 60076-11 (clause 21)
■ Temperature-rise test	IEC 60076-11 (clause 23)

SPECIAL TESTS (on request)

■ Measurement of sound level	IEC 60076-11 (clause 24)
■ Short-circuit test	IEC 60076-11 (clause 25)



FOCUS ON METH CERTIFICATIONS



Meth operates with a quality system in compliance with ISO 9001:2008 standards.

This means that all production processes follow different quality standards to improve efficiency and effectiveness in products development and manufacturing in order to have the highest customer satisfaction.



CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EC directives. The CE marking is a symbol of free marketability in the European Economic Area (Internal Market)



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