

SIEMENS

Ingenuity for life



Convincing technology
creates compact
performance

GEAFOLE Neo / CARECO:
the optimum foundation for
power distribution

[siemens.com/transformers](https://www.siemens.com/transformers)

The safe technology

GEAFOL / CARECO cast-resin transformers

Wherever distribution transformers have to assure the utmost safety in areas frequented by people, GEAFOL Neo / CARECO® cast-resin transformers are the ideal solution.

With GEAFOL Neo / CARECO, the limitations of liquid-filled transformers are avoided, but the proven characteristics such as operating safety and service life are retained.

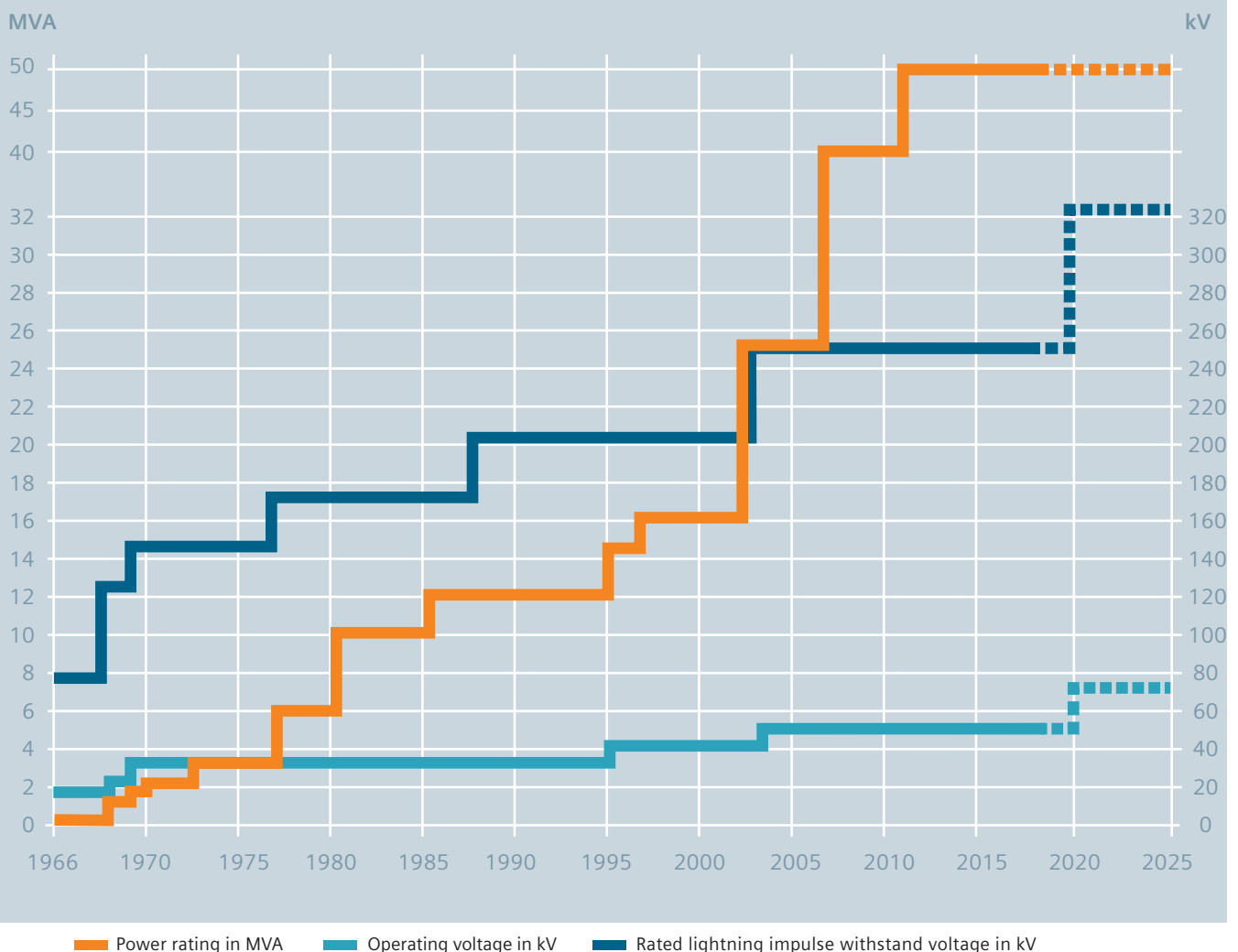
GEAFOL Neo / CARECO cast-resin transformers comply with IEC 60076-11 or DIN/EN 60076-11 as well as. However, they can also be designed to meet special national regulations or customer wishes. We offer tailored solutions that meet all requirements when it comes to operating mode, low noise and loss levels, connection technology, type of cooling, as well as transport and installation.

Safety proven 150,000 times over

There are good reasons why GEAFOL Neo / CARECO cast-resin transformers are used wherever absolute safety is required. They can be found in high-rise buildings, hospitals, road and underground railway shafts, offshore installations, mines, wind turbines, nuclear power plants, and many other similar safety-critical environments. It is not surprising that the superior GEAFOL Neo / CARECO technology is produced under license by many transformer manufacturers all over the world.

Over 150,000 GEAFOL Neo / CARECO cast-resin transformers have proven themselves in power distribution all round the globe. The diagram below shows the power rating and voltage range developments achieved since 1966 as a result of continuous innovation.

Development of voltage and power ratings





Thanks to its technical characteristics, the GEAFOLE Neo/CARECO is well suited to a large number of applications. And you don't have to take the limitations of classic transformer technology into account when planning. Use in a load center allows optimum network designs to be realized – with corresponding advantages in terms of cost and efficiency.

In addition, the GEAFOLE Neo/CARECO makes it possible to dispense with special safety precautions, such as coolant collecting troughs. And with its small dimensions, the GEAFOLE Neo/CARECO permits more power to be installed in the same space. On request, GEAFOLE Neo/CARECO transformers can also be designed for converter loads and specific mechanical stresses (GEAFOLE Neo/CARECO).

Everything that's needed for the future

The GEAFOLE Neo/CARECO is also setting new standards when it comes to being prepared for the future. Even though the end of its service life is still a long way off, the GEAFOLE Neo/CARECO already has the perfect answer to the question of recycling. All metal parts as well as the cast resin can be recycled in an environmentally friendly way.

Universal use

The highest safety requirements must be met whenever distribution transformers are operated in the direct vicinity of humans.

GEAFOLE Neo /CARECO distribution transformers are the perfect solution in this case, because their proven GEAFOLE Neo /CARECO design is coupled with proven operational reliability and a long service life. What's more, they've got the seal of approval because all GEAFOLE Neo /CARECO distribution transformers meet the specification of IEC 60076-11. Other standards, such as GOST, GB, or ANSI/ IEEE, can also be taken into account on request. They meet the highest requirements for safe installation in residential and work environments with Climatic Class C2, Environmental Class E2/ E3, and Fire Classification F1.



Regardless of the application: The GEAFOLE Neo/CARECO's low weight, small dimensions, and high operational reliability with the lowest possible maintenance make it the first choice.

Built-in safety

The coils of the GEAFOL Neo/CARECO's high-voltage winding are manufactured from aluminum/copper foil. This foil winding combines simple winding techniques with high electrical safety, because its insulation is subject to less electrical stress than other types of windings. In the case of a conventional round-wire winding, the turn-to-turn voltages amount to double the voltage between layers. In the case of a foil winding, however, no more than the simple turn-to-turn voltage occurs because each layer consists of one turn. The result is great power frequency voltage strength and impulse strength. In addition, the epoxy-resin vacuum casting of the high-voltage windings is performed at a high temperature, which avoids hazardous entrapped gas and allows for a high level of freedom from partial discharges up to twice the rated voltage. A high level of process expertise guarantees excellent product quality as reflected in, among other things, an excellent MTBF (mean time between failure) Index.

Reliable design

The conductive material for the low-voltage strip winding is also made of aluminum/copper, with the width of the aluminum strip practically equivalent to the length of the coil in order to considerably reduce the axial short-circuit forces in the transformer. It's these characteristics that make the design of the GEAFOL Neo/CARECO possible. The conductive and insulating materials are bonded to each other by heat treatment and form a compact unit that also reliably handles radial forces.

The ends of the windings are encapsulated in resin.

Using vacuum switches with GEAFOL Neo/CARECO transformers

Transformers are the key operating elements at hubs in the distribution system. Switches must control the switching of distribution transformers reliably and safely, with no need for overvoltage protection.

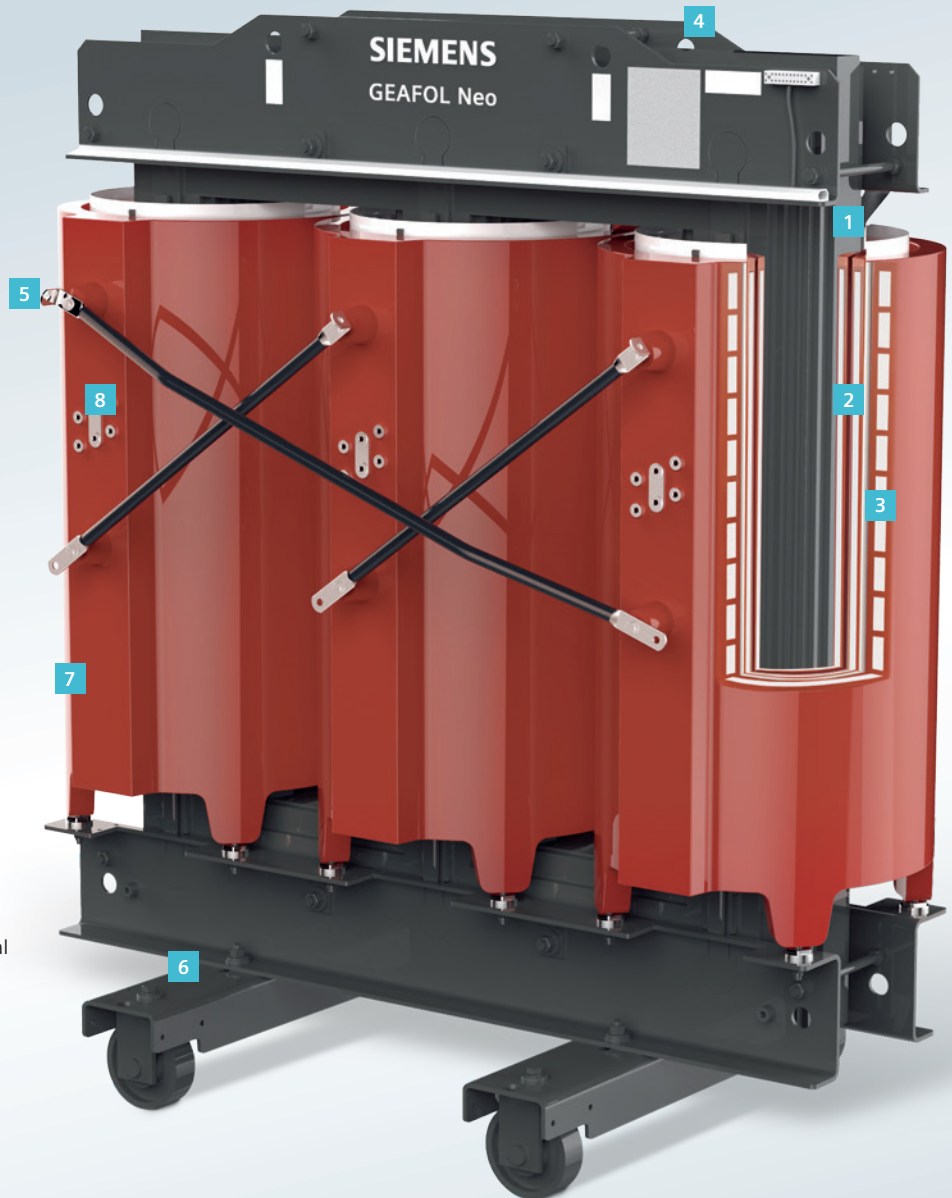
An important parameter in transformers is the magnetization current, one of the "small inductive currents." Interrupting these currents naturally creates marked transients but no unacceptably high switching overvoltages that would pose a threat to connected distribution transformers are permitted.

Extensive trials using a combination of Siemens GEAFOL Neo/CARECO transformers and vacuum switches have proven that the GEAFOL Neo/CARECO medium-voltage windings can handle switching overvoltages with no difficulty – providing further proof of their high product quality and operational safety.

The GEAFOL Neo/CARECO – overview of features and advantages

- Innovative clean design
- Low loss and low noise level
- Variants available for converter operation (on request)
- Mechanically reinforced designs available (on request)
- Up to approx. 40% increase in power possible through forced-air cooling
- Optimal combination between size and power
- Certified in accordance with 60076-11
- Climatic Class C2, Environmental Class E2/E3, and Fire Classification F1
- Maintenance-free windings embedded in moisture-proof, fire-resistant, self-extinguishing insulating material that is suitable for the tropics
- High electrical safety thanks to foil winding
- HV winding free of partial discharges (< ambient noise level) up to twice the rated voltage

Construction and features



A new design for your success –
the reliable, space-saving GEAFOLE Neo/
CARECO

- 1 Three-limb core** made of grain-oriented, low-loss electric sheet steel insulated on both sides
- 2 Low-voltage winding** made of aluminum/copper strip; turns are permanently bonded with insulating sheet (Prepreg)
- 3 High-voltage winding** made of individual aluminum/copper coils using foil technology and vacuum casting
- 4 Lifting eyes integrated into the upper core frame for simple transport**
- 5 Delta connection tubes with HV terminals**
- 6 Clamping frame and truck**
Convertible rollers for longitudinal and transverse travel
- 7 Insulation made of an epoxy-resin/quartz powder mixture** makes the transformer extensively maintenance-free, moisture-proof and suitable for the tropics, fire-resistant, and self-extinguishing
- 8 High-voltage tappings $\pm 2 \times 2.5\%$ (on the HV terminal side) to adapt to the particular network conditions; reconnectable in de-energized condition**

Temperature monitoring with PTC thermistor detector in the high-voltage windings (alternatively: Pt100 sensors)

Painting of steel parts
Two component coating, RAL 7016, on request: special two-component coating for particularly aggressive environments

Structure made of individual components
For example, windings can be individually assembled and replaced on site

Climatic Class C2

Environmental class E2/E3

Fire classification F1

Selection of ordering data for Standard 10kV/11kV

A. Electrical data

Rated Power	Frequency	Winding Material	Insulation level HV (AC/LI)	Rated primary voltage	Tapping of HV	Rated secondary voltage	Insulation level LV (AC/LI)	Vector group	No-load Loss	On-load Loss 120°C	Short Circuit Impedance	Noise (Lpa-1)	No-load Current
kVA			kV	kV		kV	kV		kW	kW	%	dB	%
100	50/60 Hz	Copper or Aluminum	28/75 or 20/60	6	± 5% ± 2x2.5%	0.4	3/-	Dyn11 Yyn0 Dyn5	0.4	1.57	4	47	0.8
125									0.47	1.85		48	0.8
160									0.54	2.13		49	0.8
200									0.62	2.53		50	0.8
250									0.72	2.76		50	0.8
315									0.88	3.47		50	0.8
400									0.98	3.99		50	0.8
500									1.16	4.88		50	0.8
630									1.34	5.96		50	0.6
800									1.52	6.96		51	0.6
1000									1.77	8.13		52	0.6
1250									2.09	9.69		54	0.5
1600									2.45	11.73		54	0.5
2000									3.05	14.45		56	0.5
2500									3.6	17.17		60	0.5
3150									4.52	21.16		62	0.4

B. Mechanical data

Rated Power	Winding Material	Truck dimension (Length×Width)	Weight	Outline Dimensionmm (Length×Width×Height)	Enclosure Dimension (IP20) (Length×Width×Height)
kVA			kg	mm	mm
200	Copper	520×520	1040	1310×765×955	1600×1100×1500
250		520×520	1280	1310×760×975	1600×1100×1500
315		670×660	1320	1380×820×1060	1700×1300×1500
400		670×660	1450	1410×820×1120	1700×1300×1500
500		670×660	1690	1460×820×1210	1800×1300×1500
630		670×660	1890	1480×820×1210	1800×1300×1500
800		670×660	2260	1570×850×1350	1900×1300×1700
1000		820×820	2700	1650×990×1400	1900×1400×1700
1250		820×820	3180	1730×990×1430	2100×1400×1700
1600		820×820	3830	1780×990×1500	2100×1400×1900
2000		1070×1070	4810	1910×1280×1630	2200×1650×2100
2500		1070×1070	5760	2020×1280×1750	2400×1650×2200
3150		1070×1070	7220	2180×1280×1840	2500×1650×2200

100	Aluminum	520×520	770	1290×760×940	1600×1100×1500
125		520×520	780	1270×755×945	1600×1100×1500
160		520×520	870	1310×760×960	1600×1100×1500
200		520×520	950	1310×710×1045	1600×1100×1500
250		520×520	1030	1320×660×1090	1600×1100×1500
315		670×660	1180	1360×820×1195	1700×1300×1500
400		670×660	1360	1410×820×1225	1700×1300×1500
500		670×660	1590	1490×835×1260	1740×1300×1500
630		670×660	1900	1510×830×1450	1800×1300×1700
800		670×660	2060	1580×850×1650	1900×1300×1900
1000		820×820	2460	1620×990×1700	2000×1400×2100
1250		820×820	2870	1730×990×1725	2000×1400×2100
1600		820×820	3650	1890×990×1650	2300×1400×2100
2000		1070×1070	4330	2000×1280×1870	2400×1600×2200
2500		1070×1070	5020	2150×1280×2000	2500×1650×2300
3150		1070×1070	6220	2330×1280×2280	2700×1650×2600

Selection of ordering data for Standard 20kV/22kV/24kV

A. Electrical data

Rated Power	Frequency	Winding Material	Insulation level HV (AC/LI)	Rated primary voltage	Tapping of HV	Rated secondary voltage	Insulation level LV (AC/LI)	Vector group	No-load Loss	On-load Loss 120°C	Short Circuit Impedance	Noise (Lpa-1)	No-load Current	
kVA			kV	kV		kV	kV		kW	kW	%	dB	%	
200	50/60 Hz	Copper or Aluminum	50/125	20	± 5% ± 2x2.5%	0.4	3/-	Dyn11 Yyn0 Dyn5	0.74	2.95	6	50	0.8	
250									0.85	3.84		52	0.8	
315									0.97	4.09		52	0.8	
400									1.16	4.85		52	0.8	
500									1.35	5.79		52	0.8	
630									1.53	6.84		53	0.6	
800									1.76	8.2		53	0.6	
1000									2.07	9.8		53	0.6	
1250									2.38	11.5		54	0.6	
1600									2.79	13.87		56	0.6	
2000									3.24	16.4		58	0.5	
2500									3.87	19.4		59	0.5	
3150									4.88	22.4		8	62	0.4

B. Mechanical data

Rated Power	Winding Material	Truck dimension (Length×Width)	Weight	Outline Dimensionmm (Length×Width×Height)	Enclosure Dimension (IP20) (Length×Width×Height)	
kVA			kg	mm	mm	
200	Copper	670×660	1370	1420×875×1220	2000×1400×1600	
250		670×660	1380	1400×870×1230	2000×1400×1600	
315		670×660	1480	1430×910×1295	2000×1400×1600	
400		670×660	1660	1480×910×1355	2000×1400×1700	
500		670×660	1820	1490×860×1405	2000×1400×1700	
630		670×660	2030	1540×870×1430	2040×1400×1700	
800		670×660	2380	1590×880×1550	2090×1400×1900	
1000		820×820	2740	1620×990×1570	2120×1500×1900	
1250		820×820	3330	1710×990×1615	2210×1500×1900	
1600		820×820	4070	1810×1010×1680	2310×1550×2100	
2000		1070×1070	5130	1940×1280×1765	2530×1780×2100	
2500		1070×1070	6070	2030×1280×1885	2530×1780×2200	
3150		1070×1070	7350	2180×1280×1975	2600×1750×2300	
200		Aluminum	820×820	1210	1450×990×1340	1950×1500×1700
250			820×820	1250	1420×990×1340	1950×1500×1700
315	820×820		1310	1440×990×1395	1950×1500×1700	
400	820×820		1470	1490×990×1470	1990×1500×1800	
500	820×820		1640	1530×990×1480	2030×1500×1800	
630	820×820		1890	1580×990×1525	2080×1500×1800	
800	820×820		2170	1630×890×1570	2130×1500×1900	
1000	820×820		2680	1720×995×1640	2220×1500×1900	
1250	820×820		3040	1810×1005×1735	2310×1550×2000	
1600	820×820		3810	1870×1015×1955	2370×1550×2200	
2000	1070×1070		4440	2000×1280×2045	2500×1780×2400	
2500	1070×1070		5510	2190×1280×2075	2690×1780×2400	
3150	1070×1070		6560	2430×1280×2155	2900×1750×2500	

Selection of ordering data for Standard 33kV/34.5kV/35kV

A. Electrical data

Rated Power	Frequency	Winding Material	Insulation level HV (AC/LI)	Rated primary voltage	Tapping of HV	Rated secondary voltage	Insulation level LV (AC/LI)	Vector group	No-load Loss	On-load Loss 120°C	Short Circuit Impedance	Noise (Lpa-1)	No-load Current
kVA			kV	kV		kV	kV		kW	kW	%	dB	%
200	50/60 Hz	Copper or Aluminum	70/170	35~38.5	± 5% ± 2x2.5%	0.4	3/-	Dyn11 Yyn0 Dyn5	0.88	3.33	6	56	1.2
250									0.99	3.8		56	1.2
315									1.18	4.51		57	1.2
400									1.38	5.42		57	1.1
500									1.62	6.65		58	1.1
630									1.87	7.65		58	1
800									2.16	9.11	60	1	
1000									2.43	10.45	60	1	
1250									2.84	12.73	61	0.9	
1600									3.15	15.45	61	0.9	
2000									3.83	18.24	62	0.9	
2500									4.46	21.85	62	0.9	
3150									5.62	25.53	64	0.7	

B. Mechanical data

Rated Power	Winding Material	Truck dimension (Length×Width)	Weight	Outline Dimensionmm (Length×Width×Height)	Enclosure Dimension (IP20) (Length×Width×Height)	
kVA			kg	mm	mm	
200	Copper	670×660	2380	1830×1025×1405	2500×1800×1800	
250		670×660	2440	1840×1025×1420	2500×1800×1800	
315		670×660	2480	1800×1090×1550	2500×1800×2000	
400		820×820	2900	1850×1095×1660	2500×1800×2000	
500		820×820	3000	1800×1090×1710	2500×1800×2100	
630		820×820	3510	1860×1100×1800	2600×1800×2100	
800		1070×1070	3760	1890×1100×1820	2600×1800×2100	
1000		1070×1070	4440	1890×1100×1820	2700×1900×2100	
1250		1070×1070	4650	1980×1210×1900	2700×1900×2300	
1600		1070×1070	6120	2160×1230×1970	2800×1900×2300	
2000		1070×1070	6720	2160×1380×2027	2800×2000×2300	
2500		1070×1070	8170	2310×1300×2140	3100×2000×2500	
3150		1070×1070	8990	2410×1320×2195	3100×2000×2500	
200		Aluminum	670×660	1920	1840×1065×1365	2600×1800×1800
250			670×660	2140	1860×1030×1430	2600×1800×1800
315	670×660		2300	1840×1095×1610	2600×1800×2000	
400	820×820		2570	1870×1100×1675	2600×1800×2000	
500	820×820		2820	1870×1100×1780	2600×1800×2100	
630	820×820		3080	1880×1100×1790	2600×1800×2100	
800	820×820		3430	1940×1110×1830	2700×1800×2100	
1000	820×820		4060	2010×1160×1890	2800×1900×2300	
1250	820×820		4480	2040×1120×1980	2800×1900×2300	
1600	820×820		5690	2150×1130×2190	2900×1900×2500	
2000	1070×1070		6170	2200×1290×2290	2900×2000×2600	
2500	1070×1070		7820	2400×1310×2440	3100×2000×2800	
3150	1070×1070		8810	2620×1345×2395	3300×2000×2800	

Product Application



8 units SIEMENS rectified transformer used on the luxury cruise ship "Grand princess"



SIEMENS transformer on top of the Alps Mountain.



SIEMENS transformer in deepwater drilling platform.



SIEMENS transformer in wind power.



SIEMENS transformers in several large data centers all over the world.



SIEMENS transformer used in Ataturk airport.



SIEMENS transformer in the subway.



SIEMENS transformers used in semi-conductor industry.



SIEMENS transformers in cranes at the harbour.



SIEMENS transformer in MGM hotel in Macau.

Order instruction

Type				
Quantity				
Rated power	KVA			
Rated voltage (Primary/Secondary)	/ kV			
Frequency	<input type="checkbox"/> 50Hz	<input type="checkbox"/> 60Hz		
Vector group	<input type="checkbox"/> Dyn11	<input type="checkbox"/> Yyn0	<input type="checkbox"/> Other	
Short-circuit impedance	<input type="checkbox"/> Standard value	<input type="checkbox"/> Other		
No-load/On-load losses (120°C)	<input type="checkbox"/> Standard value	<input type="checkbox"/> Other		
Tap range	<input type="checkbox"/> ±5	<input type="checkbox"/> ±2 x2.5%	<input type="checkbox"/> Other	
MAX./MIN. ambient temperature	<input type="checkbox"/> 40/-5°C	<input type="checkbox"/> 40/-25°C	<input type="checkbox"/> Other	
Annual average temperature	<input type="checkbox"/> 20°C	<input type="checkbox"/> Other		
Monthly average, of the hottest month	<input type="checkbox"/> 30°C	<input type="checkbox"/> Other		
Altitude	<input type="checkbox"/> ≤1000 m	<input type="checkbox"/> Other		
Installation	<input type="checkbox"/> Indoor	<input type="checkbox"/> outdoor		
Cooling method	<input type="checkbox"/> AN	<input type="checkbox"/> AN/AF	<input type="checkbox"/> AFWF	
Tap changer	<input type="checkbox"/> Off-load	<input type="checkbox"/> On-load		
Winding material	<input type="checkbox"/> Copper foil	<input type="checkbox"/> Aluminum foil		
Insulation level	<input type="checkbox"/> Standard value	<input type="checkbox"/> Other HV: LI/AC ____ / ____ kV LV: LI/AC ____ / ____ kV		
IP of enclosure	<input type="checkbox"/> IP00	<input type="checkbox"/> IP20	<input type="checkbox"/> Other	
Material of enclosure	<input type="checkbox"/> Painted steel	<input type="checkbox"/> Stainless steel	<input type="checkbox"/> Aluminum alloy	
Color of enclosure	<input type="checkbox"/> RAL7032	<input type="checkbox"/> RAL7035	<input type="checkbox"/> Other	
Incoming and outgoing connection	<input type="checkbox"/> Top/Top	<input type="checkbox"/> Bottom/Bottom	<input type="checkbox"/> Side/Side	<input type="checkbox"/> Other
Bus bar	<input type="checkbox"/> No	<input type="checkbox"/> Yes		
Other requirements				

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