Building a better future
Global Leader

Hyundai Cast-Resin Transformer

HYUNDAI
HEAVY INDUSTRIES CO.,LTD.

Hyundai Heavy Industries, Global Leader
We Are Your Best Business Partner

Hyundai Heavy Industries has solidified its presence on the global market through its strong enterprise spirit and technological innovation.

Hyundai Heavy Industries' achievements promise a better future and makes your dream come true.

HYUNDAI
CAST-RESIN TRANSFORMER

Contents

Features

Hyundai cast-resin transformers are designed for easy installation and maintenance.
They are also designed to withstand the highest mechanical short circuit stress that may occur in service.

By undergoing strict quality control during manufacturing and an entire series of tests at our laboratories,
Hyundai cast-resin transformers have been proven to be of high quality by international inspection agencies.

- Self-extinguishing and environmentally friendly
- Low loss, low maintenance cost
- Space saving compact design
- Excellent short - circuit strength
- High overload capacity
- Perfect isolation, high resistance against over voltage
- Free from partial discharge
- Crack resistant
- Moisture proof
- Virtually maintenance free
- Easy installation and connection

Applications

Hyundai cast-resin transformers are particularly suitable for applications where fire or groundwater regulations would result in additional expenses when oil-immersed transformers are used, like warehouses, underground railways, sports stadiums, and water retaining areas.

They are also being used more frequently in industrial applications for load center substations and supply feeder stations because there are no extra civil engineering costs for oil catch pits and fire protection.

Features	Applications
Nonflammable High insulation level	High-rise buildings, Hospitals, Underground markets, Theaters, Substations, Power plants and other plants
Maintenance free	Damp and /or dusty locations, Water purification plants, Petrochemical plants, and other plants
High crack resistance Short-circuit strength	
Compact Lightweight Low loss & noise	Cranes, Rolling mills, Welders, Equipment under sharply changing loads, Subways and others




Product Range

Manufacturing Scope

Classification				Cast-Resin Transformer									
Installation				Indoor or Housing in Outdoor Cubicle									
Frequency[Hz]				50 or 60									
Primary Voltage				36kV Class		24kV Class		12kV Class		3.6 to 7.2kV Class		Below 1.1kV	
Phase				3		3		3		3	1	3	1
Phase \ Secondary Voltage				3 to 10kV Class	400V Class	3 to 10kV Class	400V Class	3 to 10kV Class	400V Class	200 to 400V Class		Below 1.1kV Class	
AN	IEC	ANSI	KSC										
		30			■		■		■	■	■	■	■
	31.5				■		■		■	■	■	■	■
	40	45			■		■		■	■	■	■	■
	50				■		■		■	■	■	■	■
	63	75			■		■		■	■	■	■	■
	80				■		■		■	■	■	■	■
	100		100		■		■		■	■	■	■	■
		112.5			■		■		■	■	■	■	■
	125				■		■		■	■	■	■	■
		150	150		■		■		■	■	■	■	■
	160				■		■		■	■	■	■	■
	200		200		■		■		■	■	■	■	■
		225			■		■		■	■	■	■	■
	250		250		■		■		■	■	■	■	■
		300	300		■		■		■	■	■	■	■
	315				■		■		■	■	■	■	■
	400		400	■	■	■	■	■	■	■	■	■	■
	500	500	500	■	■	■	■	■	■	■	■	■	■
			600	■	■	■	■	■	■	■	■	■	■
	630			■	■	■	■	■	■	■	■	■	■
		750	750	■	■	■	■	■	■	■	■	■	■
	800			■	■	■	■	■	■	■	■	■	■
	1000	1000	1000	■	■	■	■	■	■	■		■	
	1250		1250	■	■	■	■	■	■	■		■	
		1500	1500	■	■	■	■	■	■	■			
	1600			■	■	■	■	■	■	■			
			1750	■	■	■	■	■	■	■			
	2000	2000	2000	■	■	■	■	■	■	■			
	2500	2500	2500	■	■	■	■	■	■	■			
AF			3000	■	■	■	■	■	■	■			
	3150			■		■		■					
		3750		■		■		■					
	4000			■		■		■					
	5000	5000		■		■		■					
	6300			■		■		■					
		7500		■		■		■					
	8000			■		■		■					

The shadowed portion shows our standard manufacturing range. For ranges and ratings other than those listed above, Hyundai offers consulting services

Dielectric Strength

System Voltage [kV]	AC Withstand Voltage [kV]			Basic Lightning Impulse Insulation Level [kV]		
	IEC	IEEE(Standard)	KSC	IEC(LIST2)	IEEE(Standard)	KSC
1.2	3	4	3	-	10	-
2.5	10	10	10	40	20	40
3.6	10	12	10	40	30	40
5.0	20	12	20	60	30	60
7.2	20	19	20	60	45	60
8.7	28	19	-	75	45	-
12.0	28	31	-	75	60	-
15.0	38	31	-	95	60	-
17.5	38	37	-	95	110	-
24.0	50	37	50	125	110	125
25.0	70	37	-	170	110	-
34.5	70	50	-	170	150	-
36.0	70	-	-	170	-	-

Permissible Temperature Rise

IEC, KSC	Insulation System Temperature [°C]	Average Winding Temperature Rise [K]
B Class	130	80
F Class	155	100

IEEE	Insulation System Temperature [°C]	Average Winding Temperature Rise [K]
B Class	130	75
F Class	150	90

Applicable Standards

IEEE Std C57.12.01 (Institute of Electrical and Electronics Engineers)
IEC 60076-11 (International Electrotechnical Commission)
KS C4311 (Korea Industrial Standards)

Manufacturing Scope

The standard manufacturing range is up to 36kV in primary voltage and up to 12MVA in capacity.
Although this is indoor equipment, it can be housed in outdoor cubicles. If any special specifications are required, please notify Hyundai.

Construction

Spacers

Spacers insulate the core and windings from mechanical vibrations, bringing about low emissions.

Low-voltage Terminals

Normal arrangement : Top / Special version : Bottom

Low-voltage Windings

Aluminium or copper is used for the conductor material in low-voltage windings.
The width of conductor strip is equal to the total coil height(width).
This considerably reduces the axial short-circuit forces.
The conductor and insulating materials are bonded together with heat treatments and form a compact unit, which is sealed against moisture and can safely withstand radial forces.

High-voltage Windings

The high-voltage coils are wound together with a high-grade insulating sheet from aluminium or copper strips and potted under vacuum up to the terminals.
The external insulation is composed of a mixture of epoxy resin and quartz powder.
This environmentally friendly material makes windings maintenance-free, moisture-proof and suitable for service in the tropics.
Furthermore, electrical tests prove that the cast resin material of Hyundai transformers stops burning when the energy source is removed.
Apart from the CO gas generated in any incomplete combustion process, no toxic or explosive gases are generated in case of fire.
Reconnectable tapping links in the high-voltage windings permit the adjusting of system conditions.
They are mounted on the low-voltage side of the transformer.

Clamp

A clamping frame holds the iron core and coils together. The coils are supported by resilient spacing blocks, which provide effective coil to coil and core to coil damping.
This results in low transformer noise.
Lifting eyes and earthing bolts are fitted to the top and bottom clamping frame members.

High-voltage Terminals

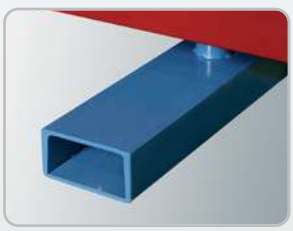
Variable arrangements for optimal station design

Tap Links

Tapping links on high voltage side can be adjusted according to system conditions, and are reconnectable in deenergized state.
Tap-changing terminals are fitted with insulating caps to prevent bare live parts from being exposed.

Base Frame and Truck

Roller can be rotated around for lengthways or sideways mobilization.



Core

The three limbs of the iron core are arranged on the same plane and interconnected by yokes.
The core, requiring little, consists of grain-oriented laminations, which are insulated on both sides and effect low-losses.
The core-limb laminations are mitered at the joints with the yoke.
The limb and yoke have the same cross section, which is nearly circular.
An adequate number of core bandages ensure uniform compression of the limbs.
Several coats of paint protect the core against corrosion.

Accessories

The following standard and special accessories are available

Standard Accessories

→ Name Plate / Digital Temperature Controller / Caution Plate

Name Plate

The transformer is provided with a stainless steel name plate

Digital Temperature Controller

Platinum Resistance Protection(PT100Ω) can be incorporated into the transformer as a standard option.
The thermostat system consists of a single sensor in each low-voltage winding, and a digital monitor that contains an alarm and trip relays.
The settings for both relays are independently adjustable on the monitor.
The resistance of the PT100Ω sensor increases proportionally with the rising temperature.
This resistance value is converted into a temperature equivalent and continuously displayed on the digital monitor.
The system is compatible with a supply voltage of 1PH AC220V, 50/60Hz.
In addition to the separate alarm and trip relays, an extra set of contacts are supplied with the cooling fans which can provide higher ratings for future use.
The monitor can be to the transformer enclosure a tour factory, or fitted by the client in their own control cubicle.

Special Accessories

→ Wheel / Dial Type Thermometer / Cooling Fan / Enclosure

Wheel

Hyundai cast-resin transformers are equipped with wheels for traveling lengthways or sideways.
The wheels are normally fitted for travel lengthways, but can be repositioned by loosening the mounting bolts.
The base is bolted to the lower clamping frame member and has four pulling eyes.

Dial Type Thermometer

Dial type thermometer devices are of the liquid expansion type, with a brass bulb and flexible capillary.
The bulb is located on the upper part between the low-voltage winding and the High-voltage winding.
The temperature indicator is composed of a temperature needle, an upper-limit setting needle and adjustable bar.
The upper-limit setting needle has an electrical contact and the electrical circuit is configured when temperature needle reaches the location of upper- limit setting needle.

Cooling Fan

To increase power reserves, Hyundai cast-resin transformers can be equipped with auxiliary ventilation permitting 30~40% power increase.
The ventilation systems of the transformer room must be capable of handling added power loss.
Short-circuit losses of twice the rated value are normally expected where the power is increased by 30~40%. Depending on the power rating of the transformer, either two or three radial fans must be mounted alongside the frame. Because of space limit, low-voltage terminals should be put on top. Single-phase A.C. motors drive the radial fans. These motors are the external-rotor type with the degree of protection IP10 casing.
These motors are in perforated sheets to prevent accidental contact (indoor model).
The overall length of the transformer is slightly increased by the motor overhang.

Enclosure

The standard models of Hyundai cast-resin transformers have the degree of protection IP00. When added protection against accidental contact or water is required, the transformer can be placed in protective housing.

Hyundai cast-resin transformers can be put in protective housings with the protection degrees of :

IP20 : Protection against the ingress of foreign bodies → 12mm diameter
IP23 : IP20 Protection with added drip-protection
(More elaborate protection available on request)

Protective IP20 Housing

This housing has plain sheet steel walls. The top and floor are of perforated sheet steel.
The connecting cables are inserted through cut-outs in the floor. Hand hole covers in the sides of the housing enable the cables to be connected and the tappings to be changed.

Protective IP23 Housing

This housing is similar to IP20 housing, but is covered at the top by a plain sheet steel and has prod-proof cooling slots in the upper part of the walls.
The color of the protective housing will be munsell No. N7, unless otherwise specified.

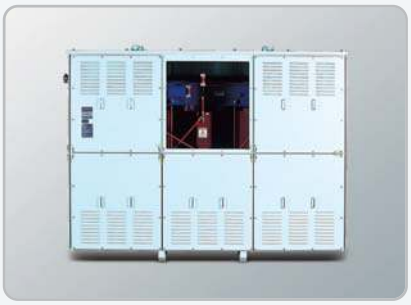
Outdoor Installation

Cast-resin transformers with IP44 protection can also be installed outdoors because their housings protect them from rain and direct sunlight.
The iron parts are also given additional surface treatments for added weather protection.

Enclosure Protection Degree

IP20

IP23

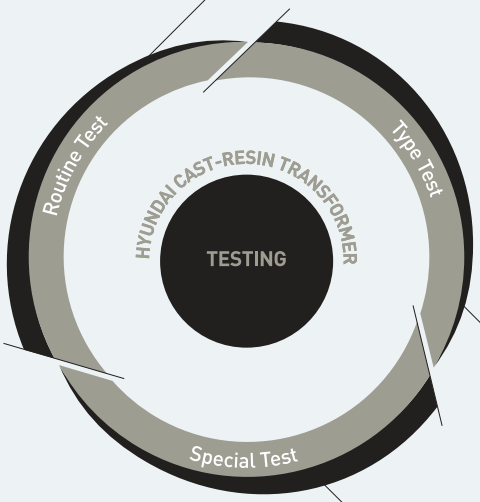


IP44

Outdoor

Air Cooler

Testing



Routine Test

1. Construction & dimension check
2. Measurement of winding resistance
3. Measurement of voltage ratio and check of phase displacement
4. Measurement of short-circuit impedance and load loss
5. Measurement of no-load loss and current
6. Separate-source AC withstand voltage test
7. Induced AC withstand voltage test
8. Measurement of insulation resistance

Type Test

1. Lightning impulse test
2. Temperature-rise test

Special Test

1. Partial discharge measurement
2. Measurement of sound level


HYUNDAI

HHIS-WC-GE-B01-05, 2010.12 Designed by JC Communication

www.hyundai-elec.com

We build a better future
HYUNDAI HEAVY INDUSTRIES CO.,LTD.

ELECTRO ELECTRIC SYSTEMS

Head Office	1, Jeonha-dong, Dong-gu, Ulsan, Korea Tel: 82-52-202-8101~8	Fax: 82-52-202-8100
Seoul (Sales & Marketing)	140-2, Gye-dong, Jongno-gu, Seoul, Korea Tel: 82-2-746-7652, 7623, 7896, 7555, 8568	Fax: 82-2-746-7648, 7679
Orlando	4700 Millenia Blvd, Suite 370, Orlando, Florida 32839, U.S.A. Tel: 1-407-249-7350	Fax: 1-407-275-4940
New Jersey	300 Sylvan Avenue, Englewood Cliffs, NJ, 07632, U.S.A. Tel: 1-201-816-0286, 8028	Fax: 1-201-816-4083
Chicago	1090 Fargo Avenue Elk Grove Village, IL60007, U.S.A. Tel: 1-847-228-8845	Fax: 1-847-437-3574
London	2nd Floor, The Triangle, 5-17 Hammersmith Grove, London, W6 0LG, UK Tel: 44-20-8741-0501	Fax: 44-20-8741-5620
Tokyo	8th Fl., Yurakucho Denki Bldg.1-7-1, Yuraku-cho, Chiyoda-gu, Tokyo, 100-0006, Japan Tel: 81-3-3212-2076, 3215-7159	Fax: 81-3-3211-2093
Osaka	I-Room 5th Fl. Nagahori-Plaza Bldg. 2-4-8, Minami Senba, Chuo-Ku, Osaka, 542-0081, Japan Tel: 81-6-6261-5766, 5767	Fax: 81-6-6261-5818
Dubai	205, Building 4, Emaar Square, Sheikh Zayed Road, Pobox 252458, Dubai, UAE Tel: 971-4-425-7995	Fax: 971-4-425-7996
Moscow	World Trade Center, Ent. 3, #1902, Krasnopresnenskaya Nab. 12, Moscow, 123610, Russia Tel: 7-495-258-1381	Fax: 7-495-258-1382
Sofia	1271, Sofia 41, Rojen Blvd., Bulgaria Tel: 359-2-803-3200, 3220	Fax: 359-2-803-3203
Montgomery	600 South Court Street, Suite 316 Montgomery, AL36104, U.S.A. Tel: 1-334-230-9921	Fax: 1-334-240-6869
Yangzhong	No.9 Xiandai Road, Xinba Scientific and Technologic Zone, Yangzhong, Jiangsu, P.R.C. Zip: 212212, China Tel: 86-511-8842-0666, 0212	Fax: 86-511-8842-0668, 0231