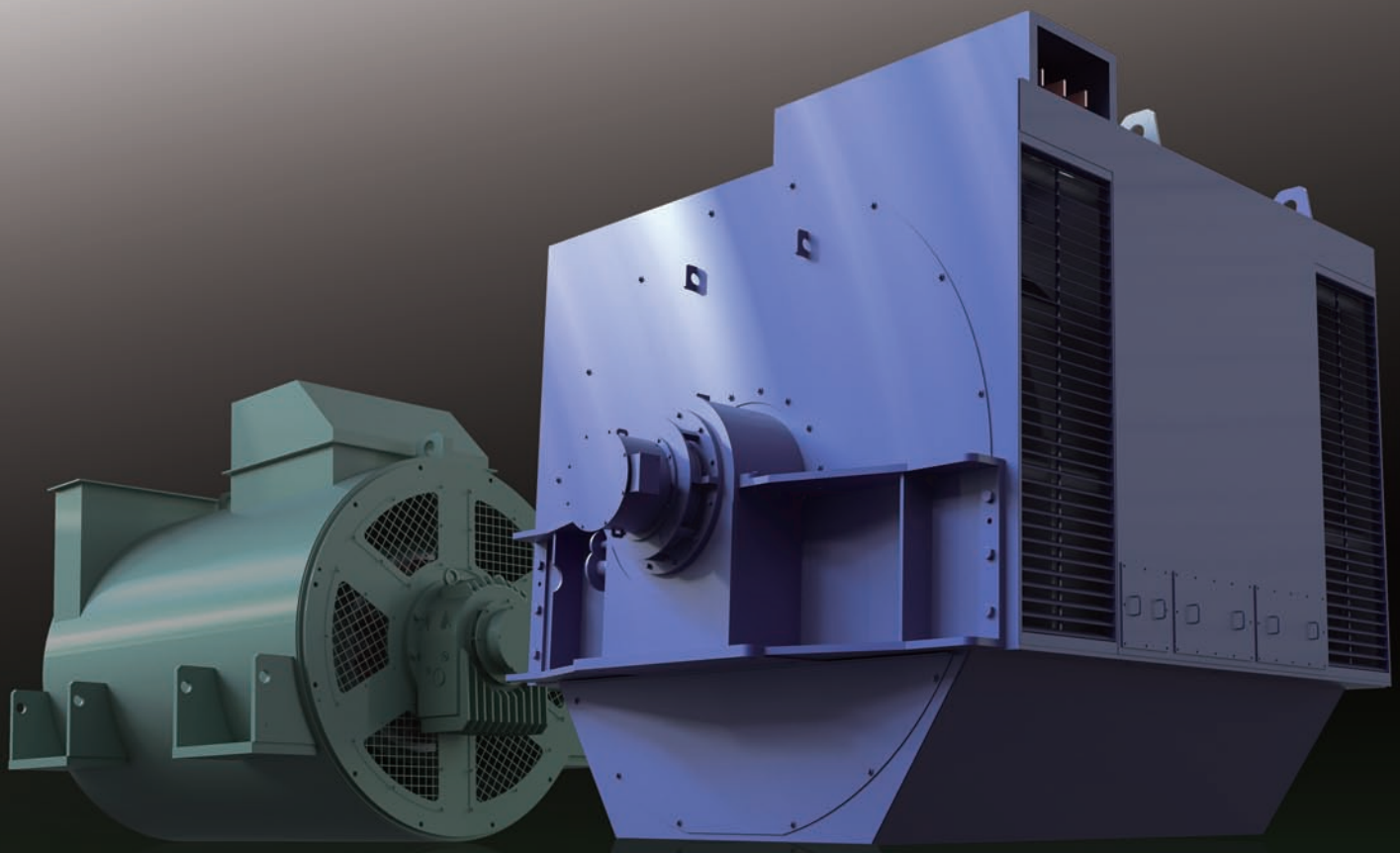
MEIDEN

Engine Driven Synchronous Generators

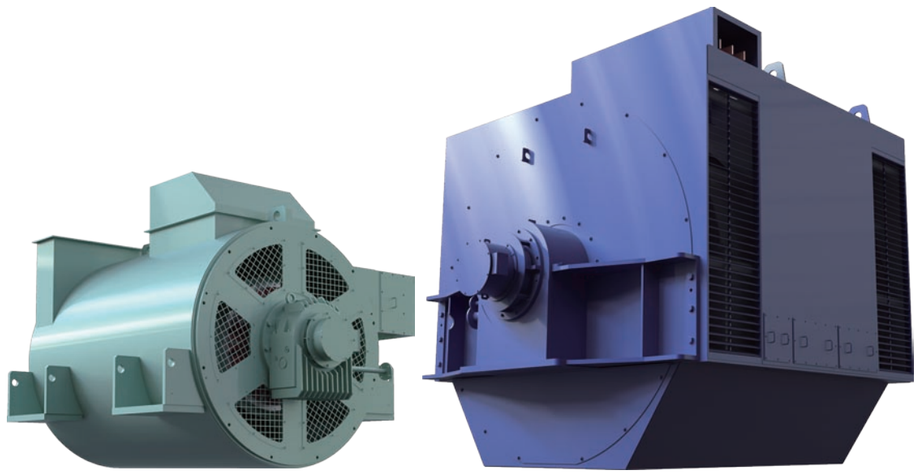


Ensure stable electrical power supply for all kinds of industries.

Empower for new days

Meidensha has always provided generators meeting the changing needs of society through continuous R&D since its foundation in 1897.
We offer high performance engine-driven generators under our corporate philosophy **“Illuminating a more affluent tomorrow” and “For customer peace of mind and satisfaction.”**

Features



- **High performance and high efficiency**
- **Compact and light weight**
- **High reliability and long operating time**
- **Flexible solutions**
- **Short delivery time**
- **Easy maintenance**

Manufacturing Range

Rotation speed (min^{-1})	Pole	Output (6 8 10 12 14 16 18 20 22 24 26 28)
429/514	14	
500/600	12	
600/720	10	
750/900	8	

Standard Ratings

Item		Standard	Variation
Service Condition	Temperature range	-15～40°C	Negotiable
	Altitude (a.s.l)	1000m or below	
	Relative humidity	90% Max.	
Application		Continuous	Negotiable
Rated output		5～28MVA	
Voltage		3,300V・6,600V・11,000V・13,800V	
Power factor		90%（Lagging）・80% (Lagging)	
Frequency		50Hz・60Hz	
No. of poles		8～14	
Standard		JEC2130・IEC60034	
Protection degree		IP21	
Cooling		IC01	
Insulation class		155(F)	
Temperature rise limit		155(F)	130(B)
Type of rotor		Salient pole	
Lubrication system		Forced lubrication	Self-lubrication
No. of bearing		One(1) or Two(2)	
Excitation system		Brushless excitation with PMG	Excitation transformer instead of PMG

Experiences

- For private electric power company in Japan
- 8,667 kVA
- 11,000 V
- 8 poles
- 50 Hz
- 750min^{-1}

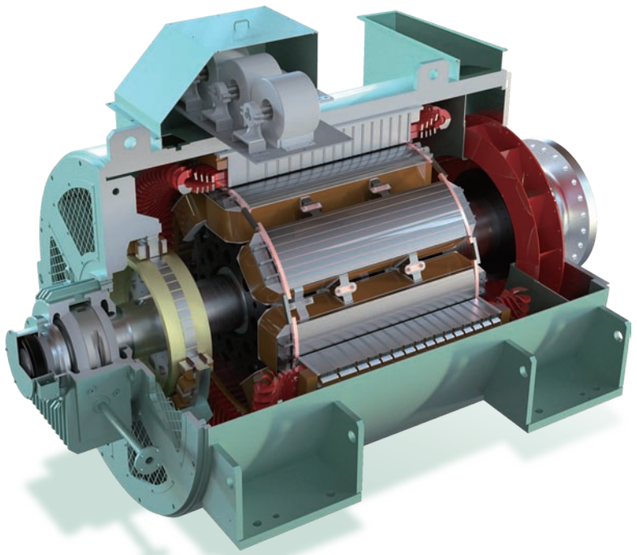
- For public electric power company in Middle East
- 18,750 kVA
- 6,600 V
- 12 poles
- 50 Hz
- 500min^{-1}

- For public electric power company in Japan
- 17,647 kVA
- 6,600 V
- 18 poles
- 60 Hz
- 400min^{-1}

- For private factory in Japan
- 8,667 kVA
- 6,600 V
- 8 poles
- 50 Hz
- 750min^{-1}

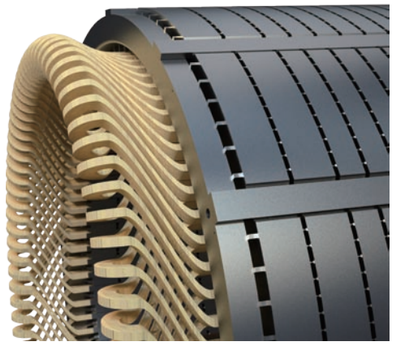
10MW Class

Construction of Engine Generator



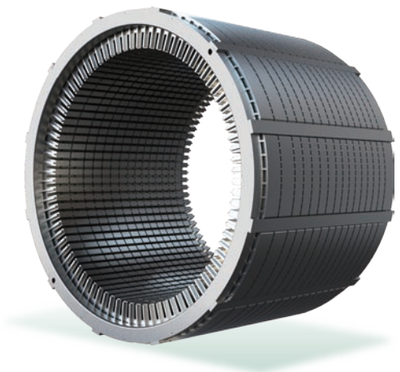
• Cross Sectional View

Stator



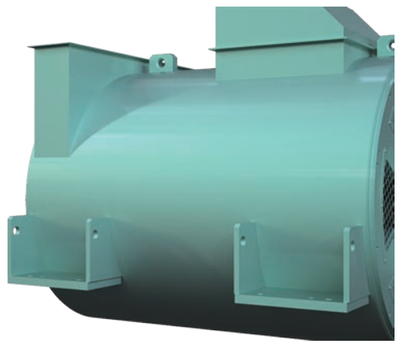
• Armature winding

Armature windings are insulated by Meiden's latest technology under strict quality control to be free from insulation deterioration during long-term use.
Insulated coils are placed into the stator core grooves and fixed with wedges. Coil ends are connected with each other and tightened rigidly with coil supports. The whole stator is treated by Vacuum Pressure Impregnation (VPI). VPI eliminates all voids in the windings and integrates the coils and core, implementing electrically and mechanically superior insulation characteristics.



• Stator Core

The stator core is made of high quality, cold-rolled, surface insulated, silicon steel laminations with minimal core loss. These laminations are accurately punched into round core stacks and segment core stacks with slot for stator windings. In order to cool the core and winding, ventilation ducts are provided at proper intervals. The core stacks are tightened from their both ends and are fixed with the frame.



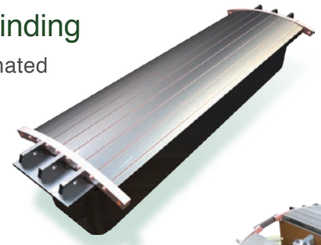
• Stator Frame

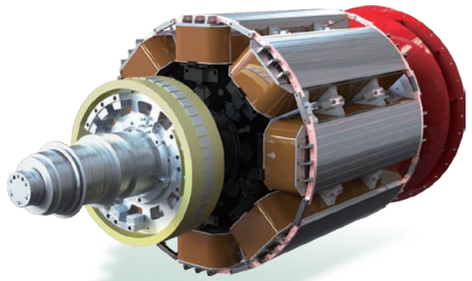
The stator frame is constructed of welded steel plate. This frame supports the stator core and also rotor by single bearing, so that the stator frame is designed to have sufficient strength and rigidity to withstand electromagnetic force in the event of short circuit fault in power supply.

Rotor

• Magnetic Pole Core and Damper Winding

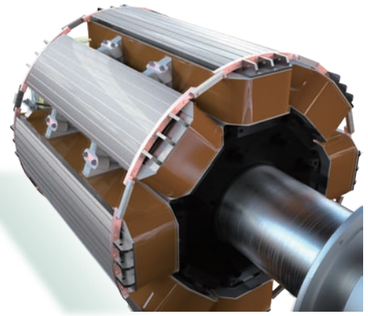
Magnetic pole core is made of steel sheets laminated and firmly fastened with clamps, reducing surface loss. Damper windings are embedded around the magnetic pole.





• Mechanical Balancing

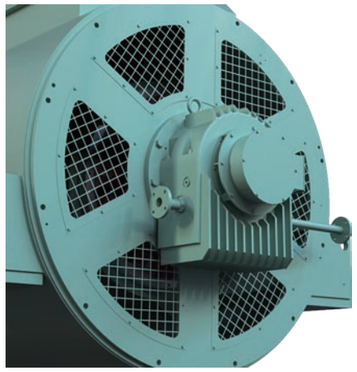
Generators are designed and manufactured with special attention to static and dynamic balancing. Mechanical balance is adjusted and verified during machining and assembly. This enables a long-term stable generator operation with proper mechanical balance.



• Field Winding

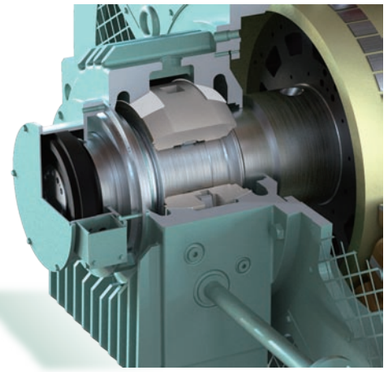
Coils are wound edgewise with flat type copper wire, subjected to layer and ground insulation treatment, heated and pressurized to be hardened, and then put into the core. The rotor will be completed to be durable enough for long-term use.

Bearing



• Bearing

Bearing is single and self-lubrication type as a normal specification. The bearing is made of cast iron shell lined with the best quality white metal.

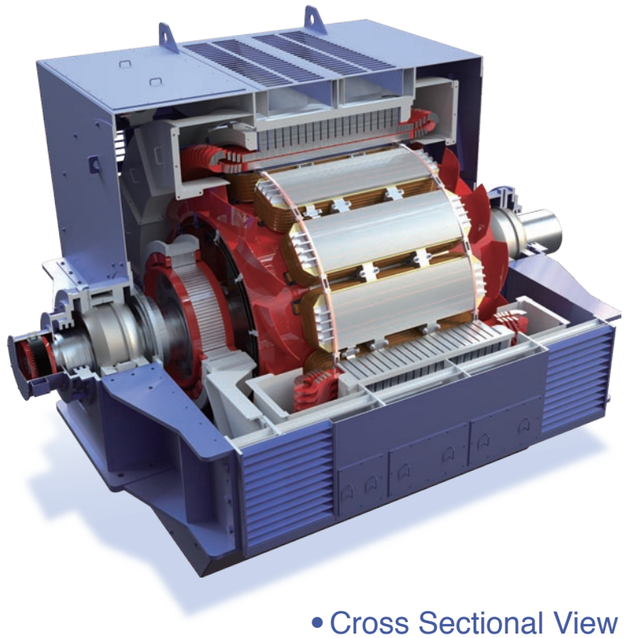


• Shaft Current Interrupter

The generator employs an insulation system for the prevention of shaft current because the shaft current must be interrupted for the safety of bearing. A measure for shaft current interruption is made inside the bearing so that it is high reliability.

20MW Class

Construction of Engine Generator



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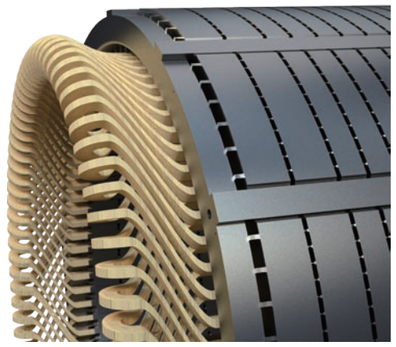

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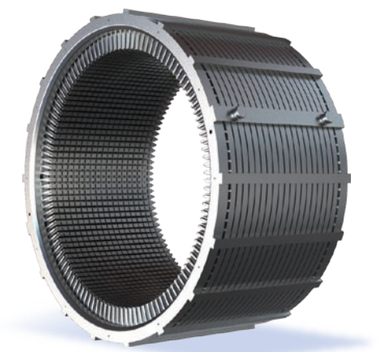

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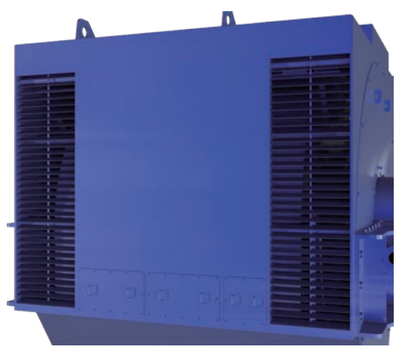

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The stator frame is constructed of welded steel plate. This frame supports the stator core and also rotor by double bearings, so that the stator frame is designed to have sufficient strength and rigidity to withstand electromagnetic force in the event of short circuit fault in power supply.

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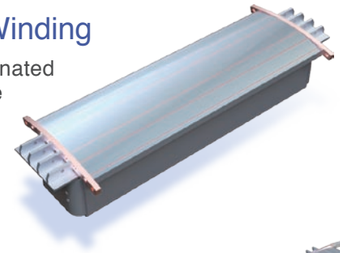

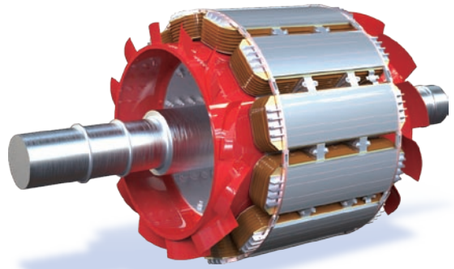

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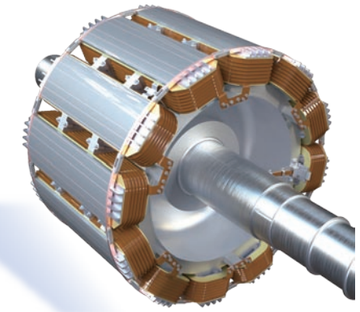

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Coils are wound edgewise with flat type copper wire, subjected to layer and ground insulation treatment, heated and pressurized to be hardened, and then put into the core. The rotor will be completed to be durable enough for long-term use.

Bearing

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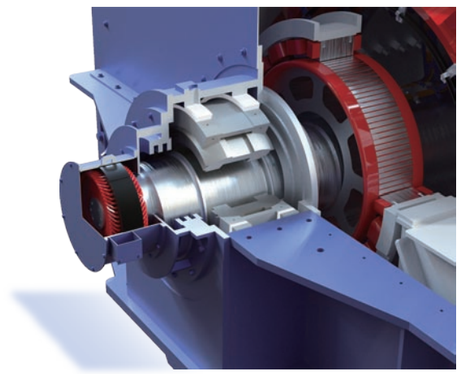
Bearing is double and forced-lubrication type as a normal specification. The bearing is made of cast iron shell lined with the best quality white metal.



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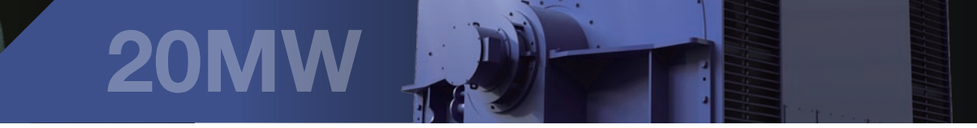
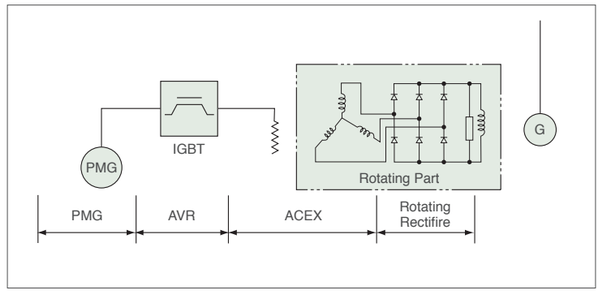
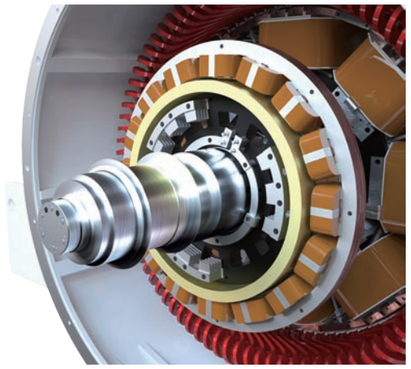


Brushless Excitation System

• Diagram of Brushless Excitation System



The standard brushless exciting device consists of an AC exciter (ACEX), a rotating rectifier, and a permanent magnet generator (PMG).

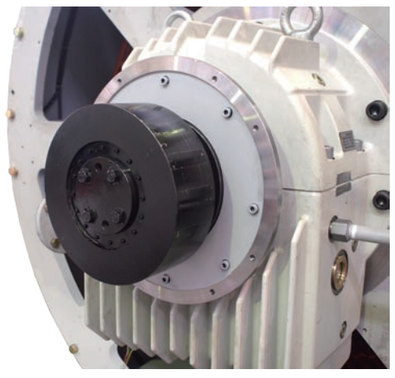


• AC Exciter (ACEX)

The AC exciter comprises the stator for the field and the rotor for the armature, similar to the rotary-armature-type generator. The AC exciter is installed inside of a bearing. The pole is of salient type and made of layers of steel sheets. Rhe rotor core is made of layers of steel sheets. All the windings are insulated with class “F” insulating materials.

• Rotating Rectifier

The rotating rectifier is installed inside of a diodes. The silicon diodes are connected to form a 3-phase full-wave rectifier circuit.



• Permanent Magnet Generator (PMG)

PMG is used as a sub-exciter, requiring no initial exciting device. It can supply a sustained short circuit current to trip the circuit breaker in accordance with associated protective devices.

Protection・Cooling System

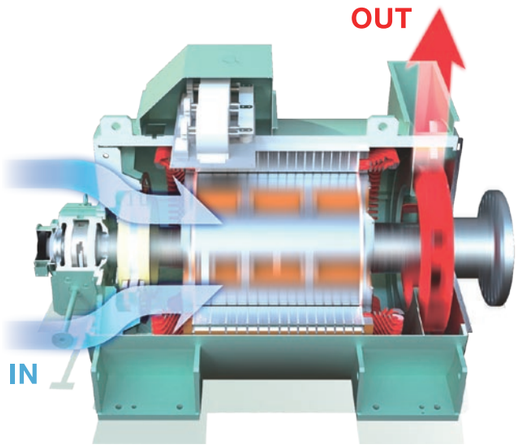
• Protection System

The standard protection system is drip proof protection type（IP21）.
Totally enclosed system is also applicable due to the environment condition.

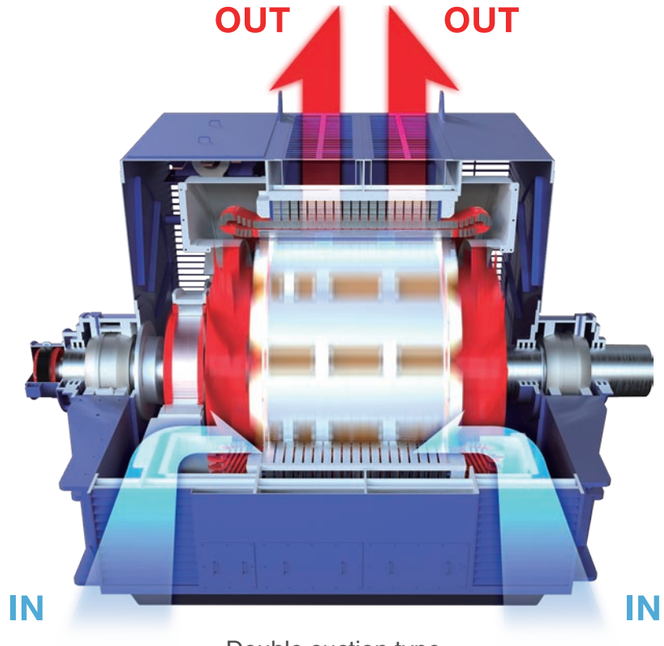
• Cooling System

The standard cooling system is free ventilation type (IC01).
With this type, external air is circulated by axial fans installed at the rotor end and exhausted to the outside of the casing.

According to the generator construction, single suction type with one way suction from the casing or double suction type from both side of the casing is applicable.



Single suction type



Double suction type

Totally enclosed type (IC44) is also applicable to inner air circulated with water-air heat exchanger mounted on the upper of the generator casing.

Digital Type Automatic Voltage Regulator (AVR) TYPE YNEX06D

• Abstract

The Meiden AVR [YNEX06D] is adopted as a standard AVR unit. The digital automatic voltage regulator (AVR) [YNEX06D] covers the functions of conventional analog automatic voltage regulators. If two units of this type are used, the functions of a dual system become available. Since a variety of options are used, space saving is possible for switchboards.

• Ratings

Item		Specifications
Main circuit element		IGBT
Control system		PID control
Mass		7.8 kg
Control source voltage (Dual source)	DC source	Input: DC24V 3A Max.
	AC source	Input: AC110V 40～240Hz 0.7A Max.
Output contact capacity of power source fault		Load current 150mA Max., AC6～240V DC5～125V
Rated input voltage		AC110V or AC220V 40～240Hz
Rated output current		DC20A
Bus VT		AC110V 0.5VA Max.
Generator VT		AC110V 0.5VA Max.
Generator CT		AC5A 0.5VA Max.
Operating temperature		-20～60°C (Hot start)
Relative humidity		95%RH Max. with no dew condition
Storage temperature		-20～70°C
Altitude		1000m or below
Cooling system		Natural air cooling

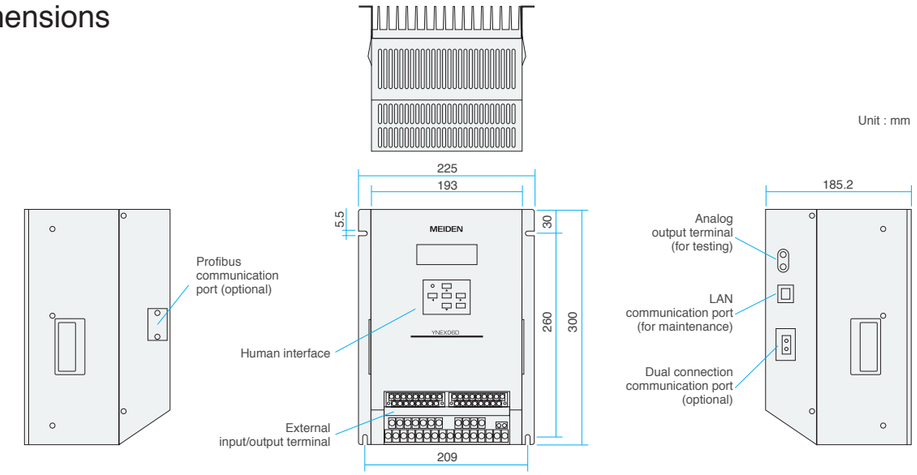
• Functions

Item	Specifications	
Automatic voltage control (AVR)	Voltage control range (90R)	90～110%
	Voltage control accuracy	Within±0.5%
	Full stroke time	60 seconds
Automatic field current control (AIFR)	Field current control range (70E)	0～130%
	Field current control accuracy	Within±0.5%
	Field stroke time	60 seconds
Voltage establishment control function	Smooth start method	0～100 seconds
	Step start method	-
Cross-current compensation function	Setting range	0～10%
V/Hz function	Voltage droop method set value (setting of droop point)	70～100% default 85%
Field overcurrent function (76E)	Operating value	105～130%
Power factor & reactive power control functions (APFR, AQR) Q=A+BP method	A-item setting range	-1.0～1.0PU
	B-item setting range	-0.7～0.7 cosφ
	Reactive power control accuracy	Within±2%
	Power factor control accuracy	Within±2°
Reactive power limitation functions (VARL)	Overcurrent limiter(OCL), Over excitation limiter(OEL),Under excitation limiter(UEL)	
	OCL boundary setting	0～100%
	Setting on lag side	10 points Max.
	Setting on lead side	10 points Max.
Optional functions	Excitation diode failure detection function(DFDR)	
	Line drop compensation function(LDC)	
	Power system stabilizer(PSS), 3lead-lag/4 step lead-lag (Default 3 lead-lag)	
	Automatic synchronized closing function	
	Synchronism detection function	
	Dual function (Serial connection, 480.6kB fixed)	
	Communication (PROFIBUS DP)*	

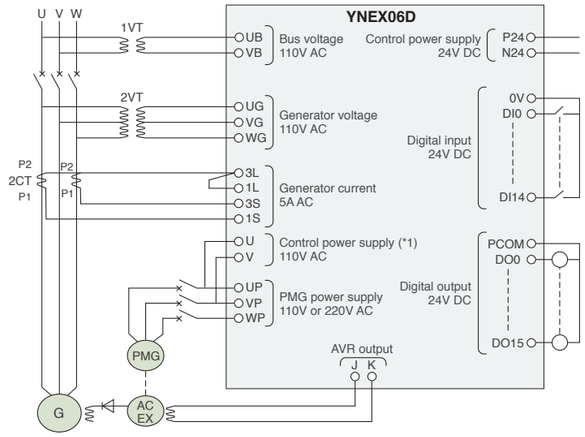
*PROFIBUS DP is a registered trademark of PROFIBUS user organization

• Dimensions

Unit : mm

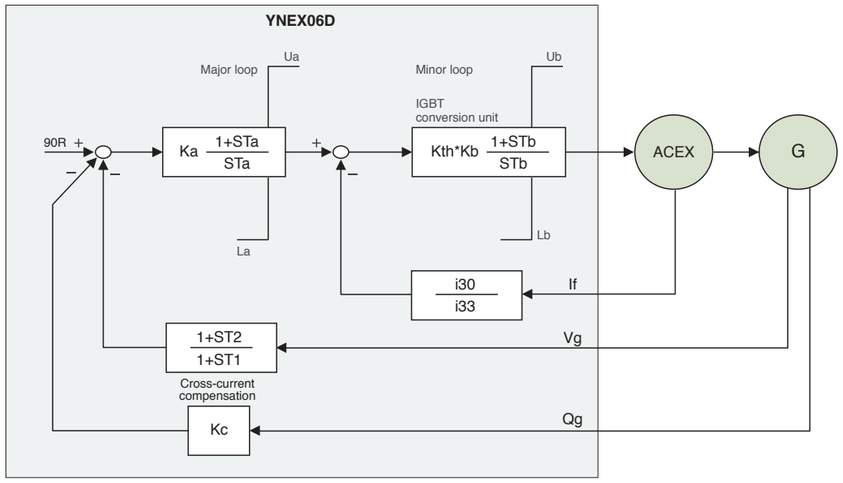


• Connection Diagram



(*1) Use an auxiliary transformer, if the PMG voltage is 220V

• Block Diagram



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MEIDENSHA CORPORATION

ThinkPark Tower, 2-1-1, Osaki, Shinagawa-ku, Tokyo, 141-6029 Japan

www.meidensha.co.jp

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