TMEiC

We drive industry

Static Frequency Converter

TMP-TS250 Series

the Compact SFC

TOSHIBA MITSUBISHI-ELECTRIC INDUSTRIAL SYSTEMS CORPORATION

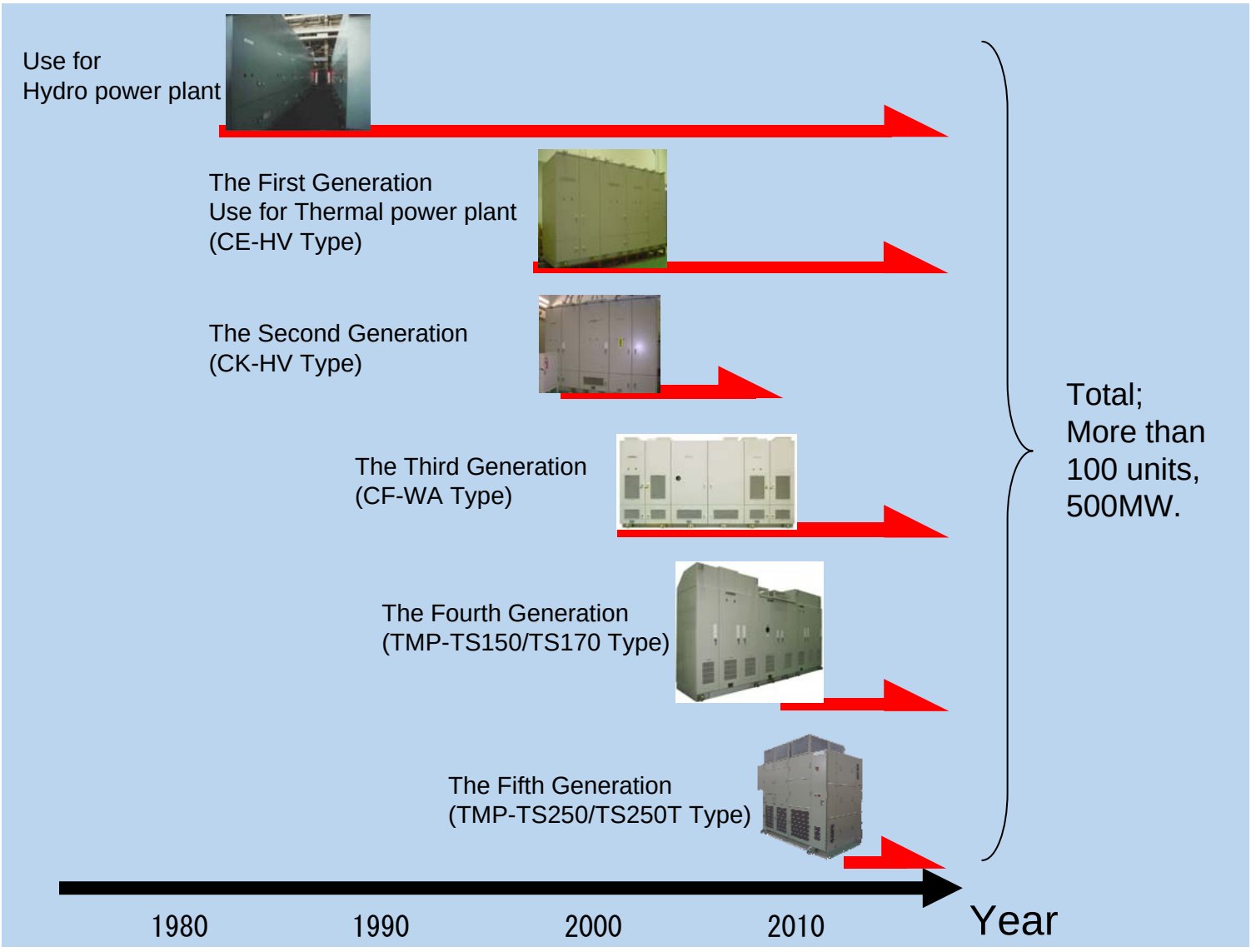
Preface

SFC is a load commutated inverter LCI, which drives a gas turbine generator like a synchronous motor, and accelerates up to the gas turbine's self-sustaining speed.
The TMP-TS Series SFCs are designed and built to best suit the standard series of the gas turbines offered by Mitsubishi Heavy Industries, Ltd. and turbine generators by Mitsubishi Electric Corporation and served as their starters.

Features

1.High Reliability

TMEIC has over 3 decades experience and more than 100 SFC units with a total capacity more than 500MW in all over the world. We are continually developing SFC based on well-proven technology. This increases the reliability, safety and efficiency.



2.High Efficiency : 98.5%

High efficiency approx.98.5% is achieved. This contributes the energy saving and reduces the demand on air conditioner.

Features (2)

3.Compact Footprint : 3.8m^2

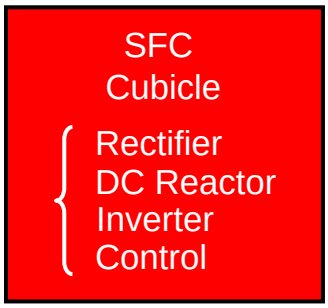
Space reduction to 47% of our conventional model achieved.

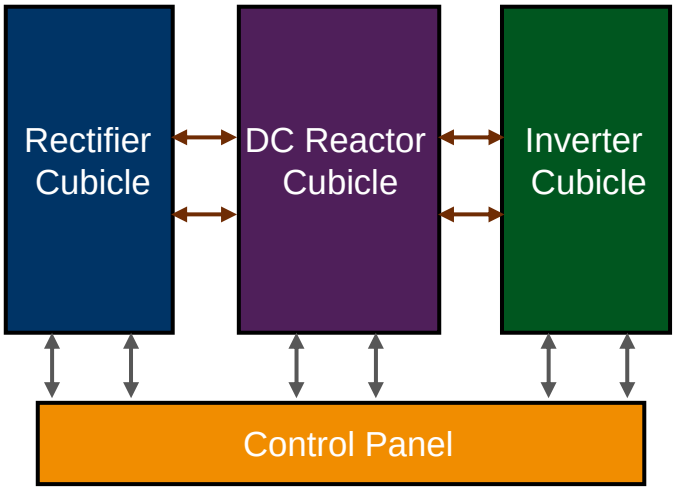
TMP-TS250

Conventional series
TMP-TS150

4.Easy Install

TMP-TS250 accommodates all circuits, including power converters, dc reactor and controls, in one package. No re-wiring work and no re-assembling work are required at site.





TMP-TS250
1 Cubicle structure.

TMP-TS150/170
Consisting of 4 cubicles.

5.12-pulsed Rectifier (Option)

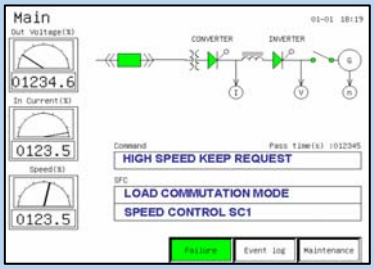
12-pulse rectifier can be chosen to suit the particular requirements. 12-pulse rectifier decreases the harmonic distortion on the supply line.

Features (3)

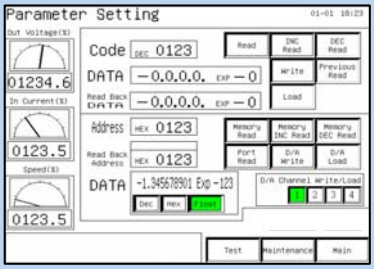
6.Man-machine interface

Large LCD touch panel provided for excellent operability and maintainability.

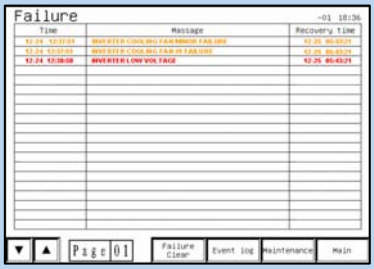
Sample images of LCD touch panel



Main screen



Parameter setting



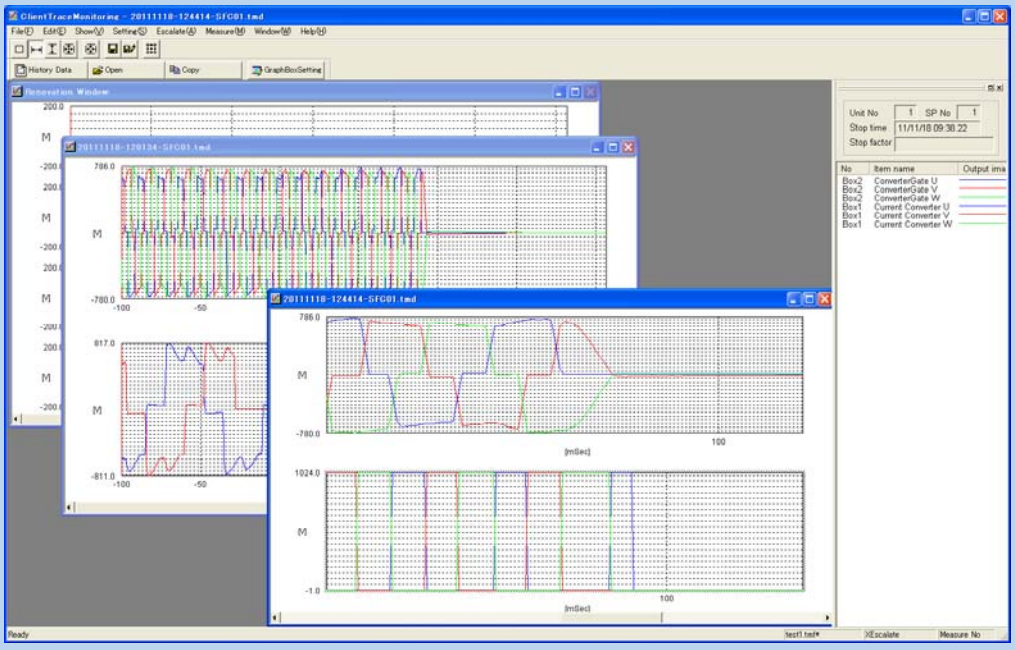
Failure indication

Event log

7.Trace Monitoring (Option)

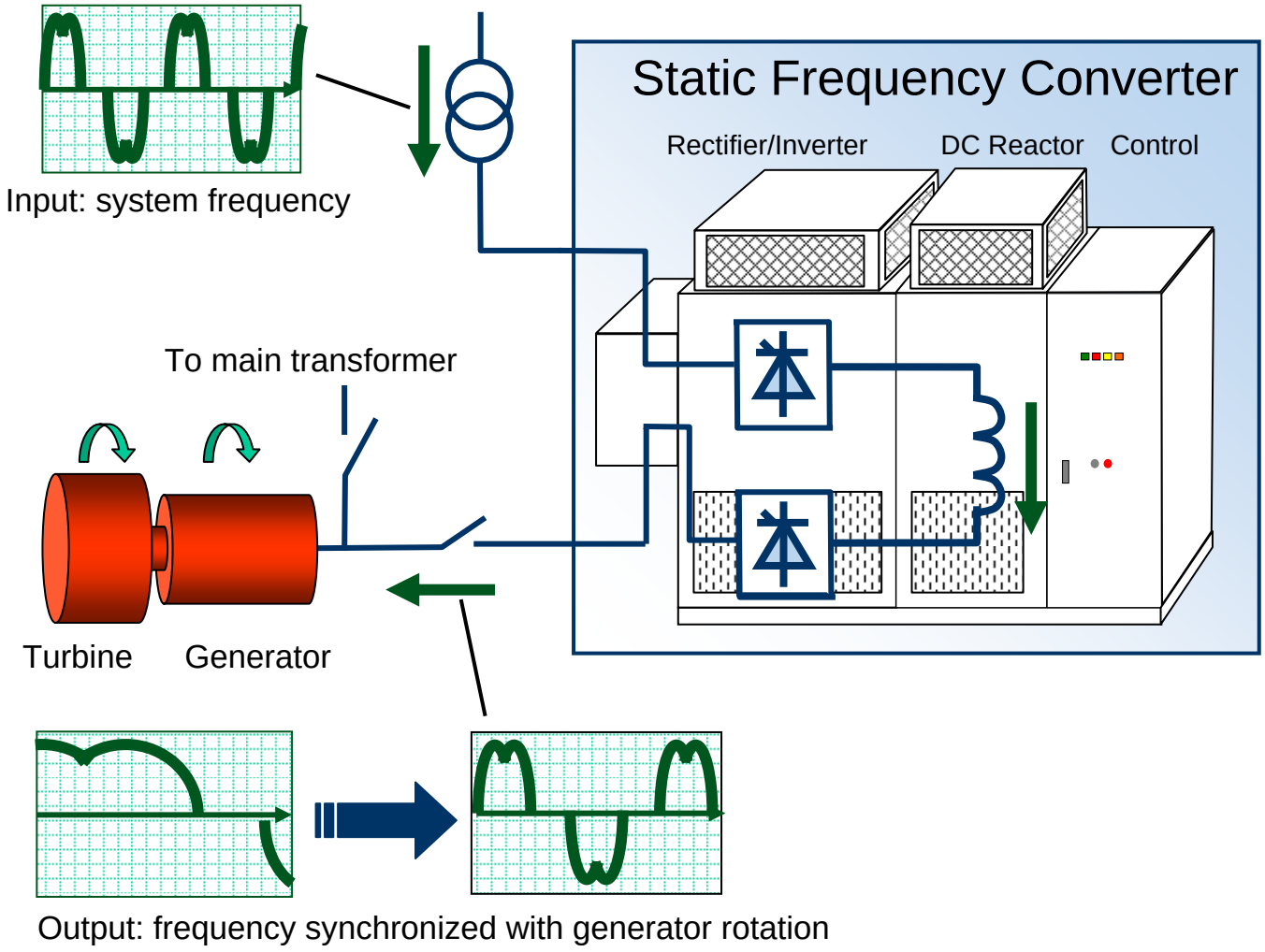
“SFC Trace Monitoring” software indicates some useful wave data memorized just before and just after the failure on the PC screen.
This contributes the trouble shooting, and increase the reliability.

Sample images of “SFC Trace Monitoring” software



System configuration

SFC consists of four main components, and they all are accommodated in one package.



Rectifier
Converts the AC power to DC and controls the DC current by phase control of thyristors.

DC Reactor
Smoothes the DC current.

Inverter
Converts the DC to AC synchronizing with generator motor rotation by phase control of thyristors.

Control
Controls and monitors the devices.

Operation patterns

SFC is started, stopped, and operated by external requests as follows.

(1) GT/SFC SELECTED REQUEST

Activates the cooling fan for ready to start-up.

(2) SFC START REQUEST

Starts in the constant current control and the pulse mode. Then, SFC operation mode switches to the load commutation mode when the rotational speed and the generator voltage is increased enough.

(3) SFC HIGH SPEED KEEP REQUEST

Switches to the speed control and maintains the rotational speed of the gas turbine in constant (at the purge speed).

(4) SFC HIGH SPEED SPIN REQUEST OFF

Gradually reduces the rotational speed of the gas turbine.

(5) SFC LOW SPEED KEEP REQUEST

Maintains the rotational speed of the gas turbine in constant (at firing speed).

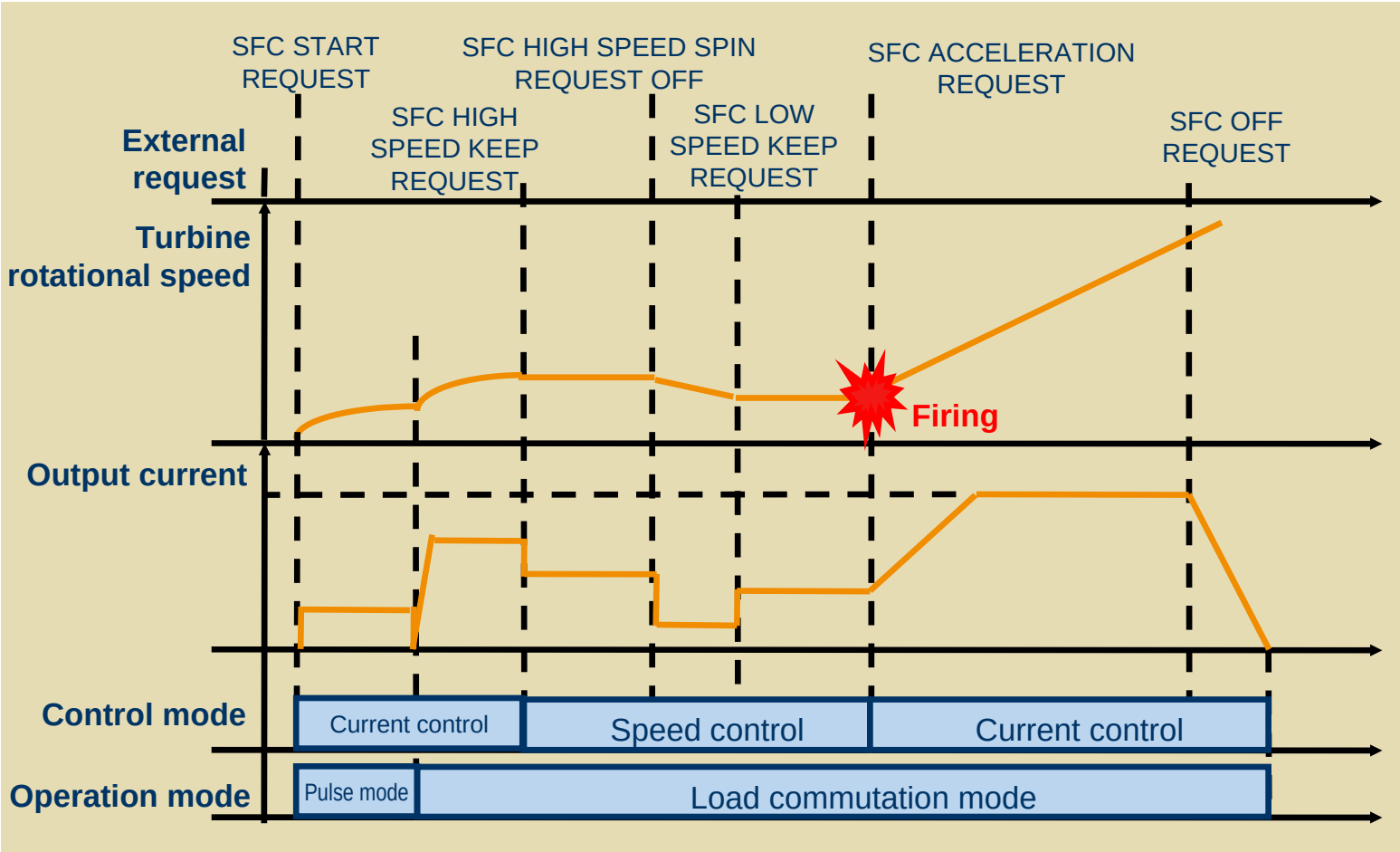
Firing

(6) SFC ACCELERATION REQUEST

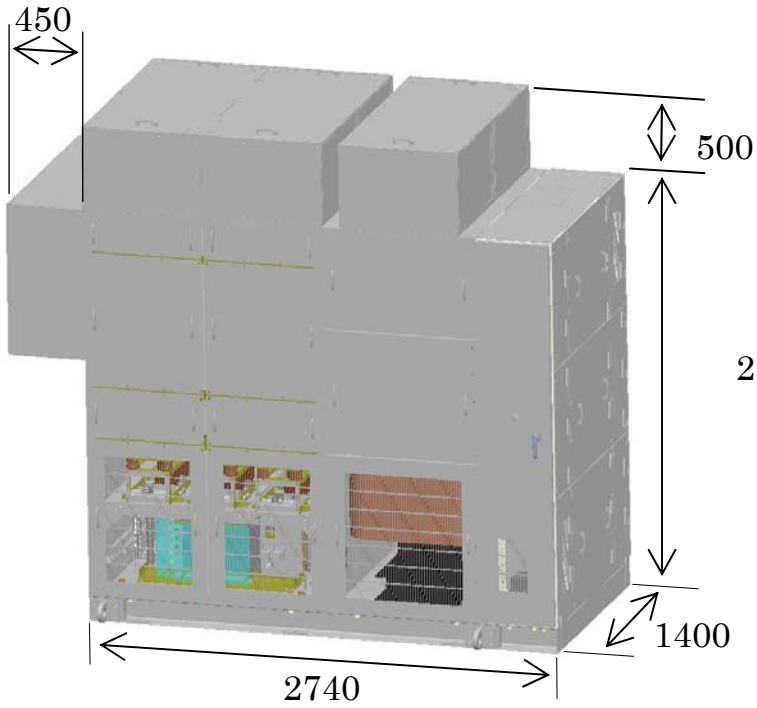
Reaccelerates the gas turbine when firing is completed. SFC increases the output current to the current set value.

(7) SFC OFF REQUEST

Gradually reduces the output current to zero. SFC stops after the output current gets down to zero.



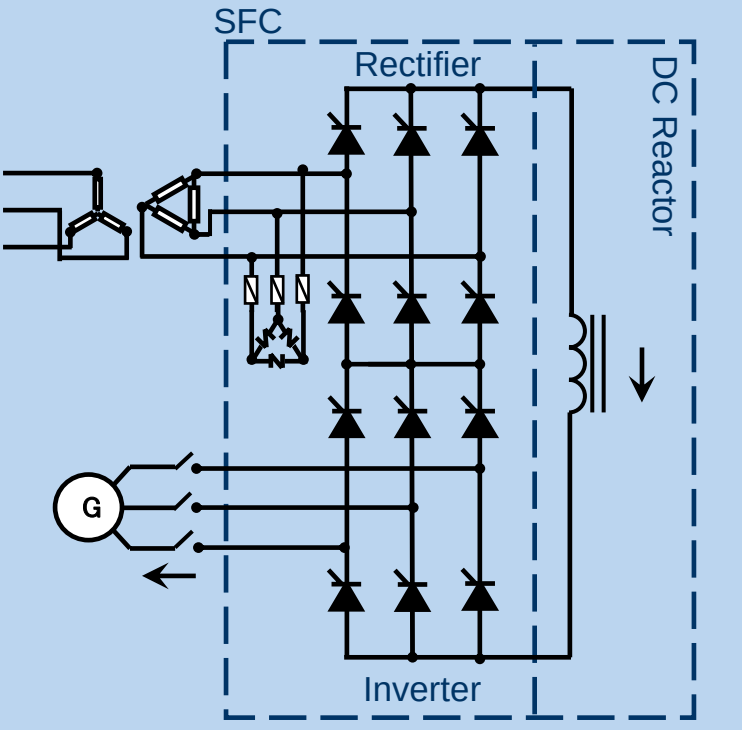
Dimensions



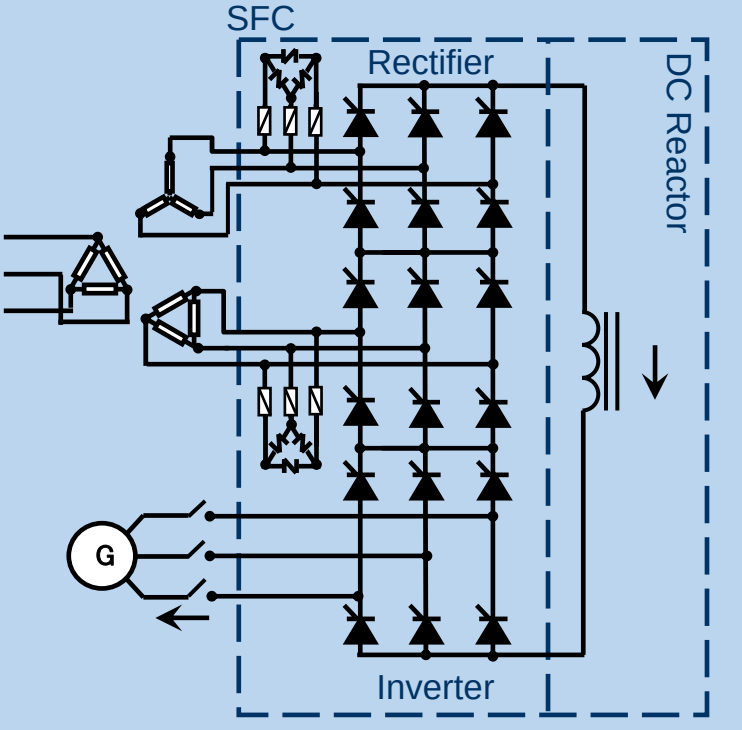
Unit : mm

Weight: 6300kg TS250 (6pulse) type
6600kg TS250T (12pulse) type

Circuit configurations



TMP-TS250 (6pulse) type

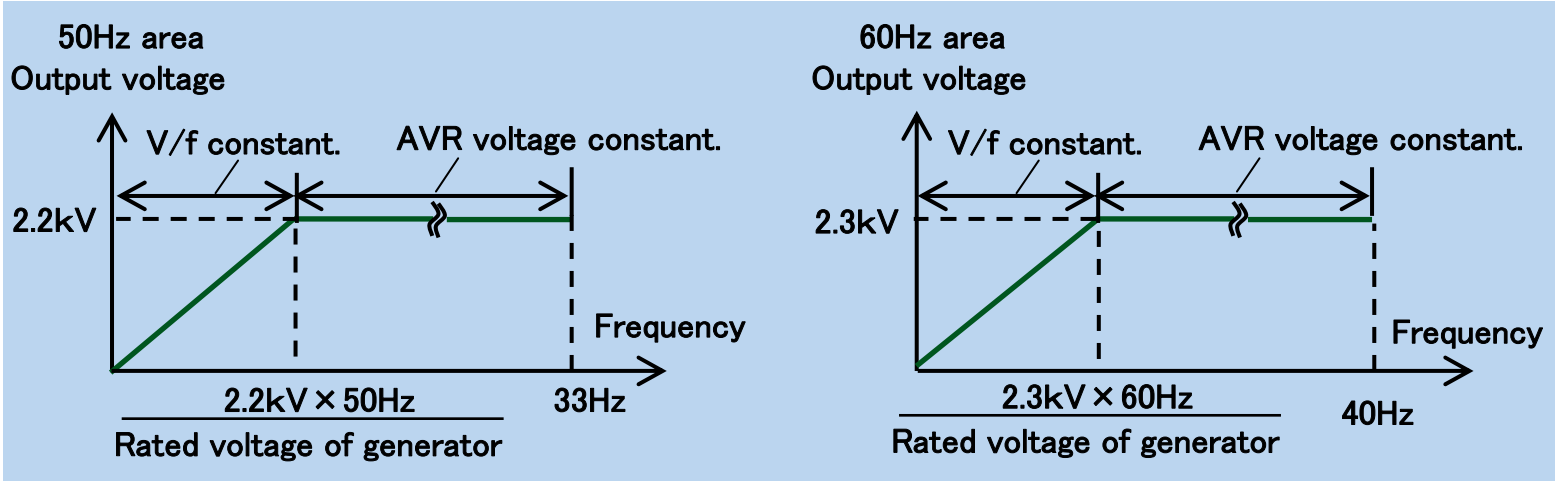


TMP-TS250T (12pulse) type

Specifications

Standard Model		TMP-TS250-35	TMP-TS250T-35	TMP-TS250-40	TMP-TS250T-40	TMP-TS250-50	TMP-TS250T-50
System Rating							
Output power (MW)		3.5		4		5	
DC voltage (kV)		2.5					
DC current (A)		1,400		1,600		2,000	
Output voltage (kV)		2.2 (50 Hz area) / 2.3（60 Hz area)					
Output voltage variation (%)		+/–4					
Output current (Arms)		1,143		1,306		1,633	
Output frequency (Hz)		0.05 to 33 (50 Hz area) / 0.05 to 40（60 Hz area)					
Input voltage (kV)		2.5	1.25×2	2.5	1.25×2	2.55	1.275×2
Input capacity (kVA)		5000	2500×2	5700	2850×2	7300	3650×2
Input frequency (Hz)		50 / 60					
Incoming voltage variation (%)		+/–10					
Rectifier/Inverter							
Thyristor configuration	Rectifier	1S1P6A	1S1P6A2G	1S1P6A	1S1P6A2G	1S1P6A	1S1P6A2G
	Inverter		1S1P6A		1S1P6A		1S1P6A
Pulse number	Rectifier	6	12	6	12	6	12
	Inverter		6		6		6
DC Reactor							
Inductance (mH)		4.5		4		3	
Insulation class		Class H					
Temperature rise class		Class H					
Core		Silicon steel sheet					
Type		Dry					
Other							
Total loss (kW)		50		60		80	
Cooling method		Forced air cooling					
Protection class		IP31					
Time rating		100% continuous					
Conforming standard		IEC-60146-1-1					
Installation location		Indoors, altitude 1,000 m max.					
Ambient temperature (℃)		0 to 40					

Output voltage characteristics (Controlled by excitation system)



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