

SYSTEM DESCRIPTION MBJ Starting system	Respons. dept GRPD	Date 2004-02-10	Reg. M DB 101
	Prepared B. Wassberg		YAMAMA CEMENT

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Purpose of the system

The Electrical starting system accelerates the gas generator to purging/ignition speed. After ignition, the gas generator is accelerated to self-sustaining speed.
During shut down, that is after the combustion is shut off, the system keeps the gas generator running at barring speed for cooling down purposes.

General description of the system

Refer to P&ID 2046 019

The starting system is a fully automatic system. It comprises an electrical AC variable speed starting motor connected to the gas generator rotor via a flexible coupling and a SSS-clutch (Sinclair Self Synchronizing).

The motor is during normal operation powered from a static frequency converter fed by AC power.

The function of the SSS-clutch is to automatically connect the starting motor to the gas generator so that the GG may be accelerated to self-sustaining speed. The clutch will automatically disengage as the GG accelerates away, allowing the starting motor to be shut down independently. When the GG is coasting down (e.g. after shut down) the clutch will automatically engage the moment the speed of the starting motor tends to exceed that of the GG.

The starting system is provided with a manually operated extensible crankshaft. The crankshaft can be used to exactly position the rotor, for example during a boroscope inspection. A limit switch prevents that the GT can be started with the crankshaft left in position.

Main components

- Electrical AC motor
MBJ10AE005
The motor is of 2 pole design and mounted on a pedestal in front of the gas generator.
The motor is controlled by a Static Frequency Converter (SFC).
- Thermistors
MBJ10AE005-KA01
The stator winding of the motor is temperature monitored by three thermistors.
- Limit switch
MBJ10CG005
The limit switch prevents that the GT can be started with the barring tool left in position.

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Function

Start up

At a GT start the starting system is given a predetermined speed reference. This speed reference corresponds to the purging speed of the gas turbine, which is approx. 2300 rpm. The purging continues for a time sufficient to ventilate the gas turbine and the complete exhaust system. When the purging time has elapsed fuel is injected and the gas turbine is ignited. The starting motor helps the GT accelerate beyond the self-sustaining speed, approx. 5400 rpm. The SSS clutch will then disengage and the motor is switched off.

Continuous operation

The system is not active during continuous gas turbine operation.

Shut down

When the GT is stopped or at shutdown, the starting system is engaged and given a speed reference equal to the barring speed of the gas generator, which is approx. 200 rpm. When the gas generator rotor speed comes down to the set speed reference of the SFC, the SSS clutch will engage and thereby the gas generator rotor will be driven by the starting system for cooling down.

Stand still

The system is kept inactive during stand still.

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Disturbances

Gas turbine trip

Gas turbine trip affects the system in the same way as described under heading “Shut down”, see above.

Generator breaker trip

Generator breaker trip does not affect the system.

Loss of power supply

The starting system is not available for operation, that means barring or starting is impossible. If barring is lost for more than 10 minutes, the turbine will be start interlocked for the rest of the cooling down period. The time to next start is then 10 hours.

System faults

Starting motor or clutch break down, before or during shut down, means that barring or starting is impossible.

Other faults

The starting system is not available for operation when certain faults occur in the gas generator or in the other systems.

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Technical specification

Design criteria and standards

Direction of shaft rotation Anti-clockwise looking in the reverse direction of flow.

Dimensioning data

- Drive torque requirements 700 Nm at 2300 rpm
- Nominal speed range 0 - 5000 rpm.
- Max. speed 5800 rpm during one minute.

Installation

The starting system is installed in front of the gas generator.

Materials

N/A

Component data

See the system lists.

Testing and service

Testing during normal operation

N/A

Accessibility during normal operation

N/A

Index of components

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