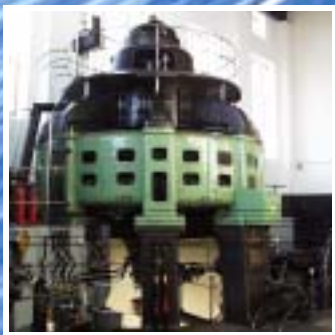


# ANDRITZ HYDRO POWER AUTOMATION



*Generator and  
Excitation Systems*



Generator with turbine

## Well proven system

The purpose of the synchronous generator is to convey the mechanical power absorbed at the shaft to the power mains in the form of active power.

The latest governing and limitation functions contained in the excitation system comply with the most stringent operating requirements in terms of safety, governing quality, and availability

The primary task of the governing device in the synchronous machine is to maintain the terminal voltage of the generator at a constant level and guarantee reliable machine operations in all operating points. In addition to the control loop, superimposed limitations also intervene.

## Governing functions:

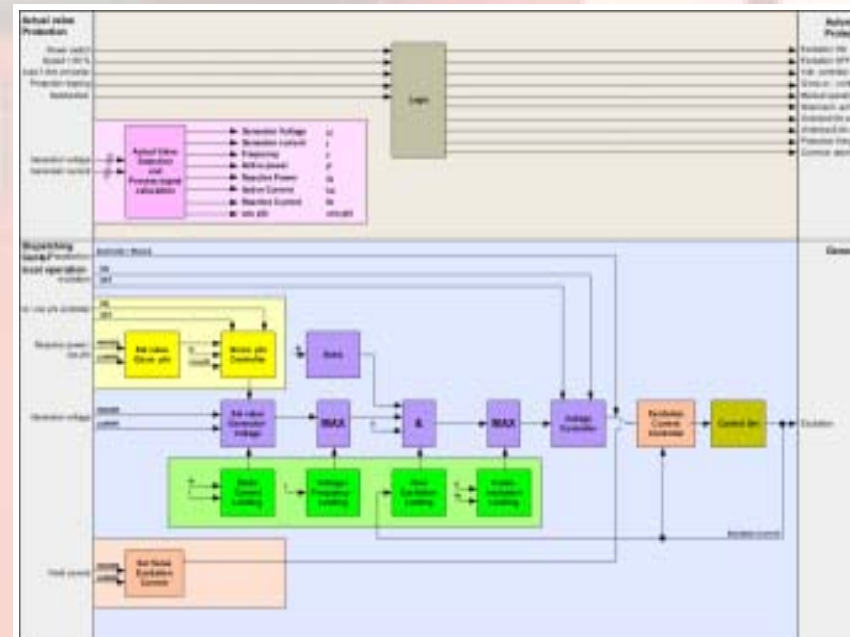
- voltage control
- reactive power control
- power factor control

## Controlling functions linked to governor:

- excitation current limitation
- stator current limitation
- rotor displacement angle limitation

## Variants for generating excitation current

- Auxiliary exciters  
The field current for the exciter is generated by an auxiliary exciter (self-excitation), which has a rigid connection to the shaft of the main machine.
- Permanent-magnet generator  
The field current for the exciter is generated by a permanent-magnet generator, which has a rigid connection to the shaft of the main machine.
- Field-circuit transformer  
The excitation power is supplied from the main machine (self-excitation) or from the station auxiliaries system (separate excitation).
- Auxiliary winding in the main machine  
The excitation power is supplied from an auxiliary winding in the stator of the main machine.



Block diagram for static excitation

## Intelligent software tools

We have latest state-of-the-art tools for configuring, programming, operation and maintenance. These tools permit easy handling, as well as providing rapid diagnostic and monitoring functions for maintenance and service assignments. These tools are available for local and remote access.



Generator with turbine

## Various types of excitation

- Direct-current exciter  
The exciter has a rigid connection to the shaft of the main machine. The armature circuit is connected to the slip-ring of the main machine.
- Three-phase AC exciter  
The exciter has a rigid connection to the shaft of the main machine. The current from the rotor three-phase winding of the exciter is supplied to the main machine via rotary power converters.
- Static excitation  
The excitation power from one transformer is supplied to the main machine via slip-rings by a controlled power converter.



Slip-rings for transfer of excitation power

## The main strengths of our systems

- use of the generator and excitation systems available on the market to meet the individual process requirements
- minimum of maintenance work at the governor and rotary exciters
- great flexibility in system configuration allows perfect adaptation to customer and plant requirements
- reliable system management thanks to simple handling and operations; improved overview and graphic visualisation facilities enhance operating convenience
- latest governing and limiting functions guarantee good economic efficiency
- fulfils the most stringent demands in terms of safety reliability and availability
- integrated analysis tools provide support in effective duty and minimise the amount of service work required
- uses standardised and modular components
- self-monitoring system software



Auxiliary exciter

## Andritz, a pioneer in the turbine sector

A competent team with decades of experience, drawn from the departments for "Hydraulic Governors for Water Turbines" and "Andritz Automation and Industrial IT Solutions", develops the best solution for each individual need. With the complete engineering, use of high-quality materials, in-house manufacture, function testing of hardware and software before each delivery, installation, start-up, customer training, and services, we have a wide range of resources available. A strict quality control system, and regular research and development work on the basis of the latest technology available on the market make a substantial contribution towards guaranteeing excellent profitability for the hydropower plants.

**Contact us, and you too can profit from our competence.**

Andritz AG  
Hydraulic Machines Business Area  
Statteggerstrasse 18, A-8045 Graz, Austria  
Tel. +43 316 6902-0, Fax +43 316 6902-406  
E-mail: [hydro@andritz.com](mailto:hydro@andritz.com)  
Internet: <http://www.andritz.com>

**ANDRITZ**