ANDRITZ Hydro

Excitation

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Excitation

3 x 150 MW, Kopswerke II, Austria

Dynamics with brain power

The excitation system of a synchronous generator makes it possible to supply the energy generated by an engine (turbine) to the power grid. As a result, high priority is assigned to the reliability and availability of excitation equipment when choosing systems. This applies particularly to:

- providing an independent supply of controlled direct current for the rotor
- enabling synchronizing by means of precise voltage control
- supporting grid operations by means of reactive power control
- increasing block and grid availability by means of intelligent limiters and additional automatic controllers

Nowadays, rotating exciter machines are being replaced more and more by thyristor excitation systems.

If maintenance of exciters is still economically justifiable and no great demands are made on the control dynamics and on improvement in efficiency, enhanced operations can be achieved by replacing an existing voltage regulator with a modern, digital multi-function controller.

Your goal

- Reduce maintenance work on the controller and exciter machines
- Minimize spare parts inventory
- Optimize present operating and control behavior
- Increase plant availability

Guri Runner, Venezuela

1 x 910 MVA, Bexbach,Germany

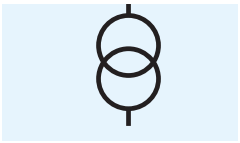
Strategic products

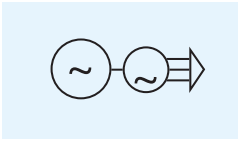
THYNE system overview

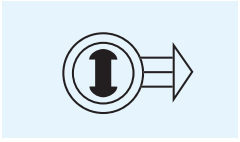
Supply variants

Via excitation transformer: Preferably as shunt connection or by external excitation.

High or low voltage excitation transformer, in dry or cast resin design, with temperature monitoring.





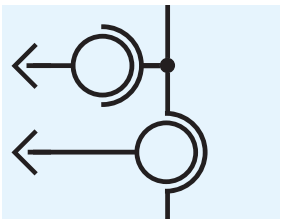


Via pilot generator on the same shaft: Independent of grid influences, thus with full excitation system, even in the event of generator terminal short-circuit. Pilot generator with separate excitation equipment.

Via permanent magnet generator (PMG) on the same shaft: Independent of grid influences, thus with full excitation system, even in the event of generator terminal short-circuit.

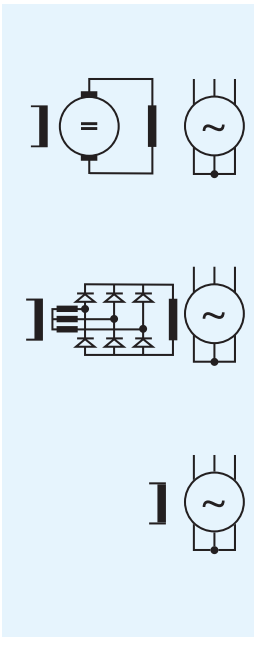
MACHINE TYPES SUPPORTED	THYNE 1	THYNE 4	THYNE 5	THYNE 6
DC exciter	•	•	–	–
AC exciter	•	•	–	–
Static exciter (without excitation machine)	–	–	•	•
DESIGN FEATURES				
Compact design	•	–	–	–
Modular controller structure	–	•	•	•
Digital voltage regulator	•	•	•	•
Digital control	•	•	•	•
Nominal frequency / Hz	0-400	16,7-400	16,7-400	16,7-400
Max. exciter current / A (continuous)	25	200	2000	10000
Redundant power converter	–	◦	◦	◦
MANUAL EXCITATION OR 2nd CHANNEL				
Manual excitation integrated into voltage regulator	•	•	•	•
2 identical regulating channels	–	◦	◦	◦
Automatic tracking and change-over	•	•	•	•
POWER SUPPLY				
Permanent pole generator single-phase	•	•	–	–
Permanent pole generator three-phase	•	•	–	–
Pilot generator (50/60Hz)	•	•	•	•
Generator terminals (via excitation transformer)	•	•	•	•
LIMITERS AND ADDITIONAL FEATURES AVAILABLE				
Minimum field current	•	•	•	•
Maximum field current	•	•	•	•
Stator current limiter	•	•	•	•
Minimum excitation limiter	◦	◦	◦	◦
Saturation limiter	•	◦	◦	◦
Power system stabilizer (PSS)	◦	◦	◦	◦
cos-phi controller	•	◦	◦	◦
Reactive power controller	•	◦	◦	◦
Preliminary voltage adjustment	◦	◦	◦	◦
Diode failure detection	◦	•	–	–
WINOPER software package	◦	•	•	•
OPTIONAL EXTRAS				
Current booster	◦	◦	◦	◦
Electro-dynamic brake	◦	◦	◦	◦

• Standard ◦ Optional – not provided



Actual value measurement

Single or three-phase voltage measurement, with drooping characteristic dependent on active and reactive current for high control dynamics and stability in no-load, isolated and mains operation.

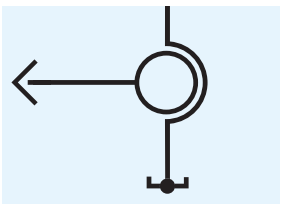


Machine configuration

With DC exciter: Low exciter output, positive and negative field and rotor voltages possible.

With AC exciter: Low exciter output, only positive rotor voltage possible, no contamination from carbon brushes.

Static excitation: Positive and negative rotor voltages guarantee high control dynamics due to direct rotor access, electro-dynamic braking possible with same thyristor set.



Current booster

As an option, used to maintain the generator current in the event of sustained terminal short-circuit.

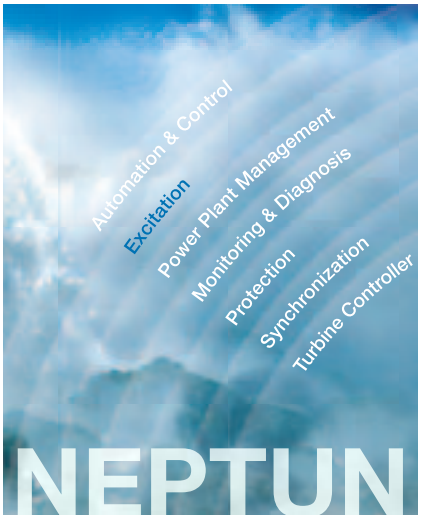
The comprehensive solution

Renovation of the excitation system yields many advantages for plant operations:

- Improved efficiency
- Greater plant availability as a result of:
  - fewer outages
  - faster troubleshooting thanks to diagnostic facilities
  - better regulating features
  - intelligent limiting controllers (generator remains within its limit values)
  - reduced maintenance effort
- More operator-friendly due to
  - better overview during local operation
  - graphical visualization on PC
  - range of logic functions can be extended
  - improved inspection and checking facilities
  - communication via Ethernet
- less dirt, dust and fewer mechanical problems as there is no exciter convertor or DC exciter
- modern design

In new plants, you can benefit from all these advantages right from the start.

System examples



Your benefit

Optimal use:

- **with standardized, modular system concept**
- **through flexible adjustment to customer's and plant requirements**
- **using ergonomic and self-monitoring standard software**
- **through system software featuring integrated self-diagnostics**
- **with the option of redundant models (power circuit n+1, 2-channel controller ...)**

Reduced costs:

- **through energy saving because no exciter machine is needed**
- **with less contamination (abrasion from brushes)**
- **using remote diagnostics and self-monitoring**
- **through smaller spare parts inventory**
- **with brief job training**

Increased earnings:

- **through greater plant availability (intelligent control algorithms)**
- **with improved efficiency**
- **through reduced downtimes**
- **with longer maintenance intervals**

NEPTUN – the comprehensive solution for secondary systems can offer additional notable advantages in step-by-step expansion of your plant.
This gives you integrated advantages in addition to the current benefits of your excitation system if additional components are used (for example synchronization, protection, automation & control).

- Efficient communication standard (IEC 60870-5-104)
- Comprehensive system concepts for remote functions
- Central engineering toolkit
- Simplified plant configuration
- Less engineering and documentation required
- Minimum of additional infrastructure for signal communication
- Minimum of spare parts required
- Liquidation of previously tied capital
- Fewer maintenance and service assignments on site

NEPTUN






www.andritz.com/NEPTUN

ANDRITZ HYDRO GmbH
Penzinger Strasse 76
1141 Vienna, P.O.B. 5, Austria
Phone: +43 (1) 89100
Fax: +43 (1) 8946046
e-mail: contact-hydro@andritz.com

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