HYDRO

ANDRITZ

HIPASE
SIMPLIFY YOUR SOLUTION

ANDRITZ

ENGINEERED SUCCESS

The new generation of integration

ANDRITZ has extensive long-term experience in the areas of excitation, electrical protection, synchronization, and automation of hydropower plants. This has laid the groundwork for development of the new HIPASE platform. HIPASE integrates the specific requirements of various applications in a single unit in powerful fashion so that they are perfectly attuned to one another.

The innovative HIPASE product platform was developed especially for use in hydropower plants and includes the following applications:

- Excitation (HIPASE-E)
- Electrical protection (HIPASE-P)
- Turbine governor (HIPASE-T)
- Synchronization (HIPASE-S)

All applications are based on identical hardware and use the same HIPASE Engineering Tool. There are additional application components available for specific requirements.

HARDWARE
The HIPASE base unit has a half 19" housing with up to 32 digital inputs and outputs, as well as 12 current transformer and 8 potential transformer inputs. For applications with a more extensive signal requirement, there is a standard 19" housing.

A HIPASE unit consists essentially of four components (processor component including communication interfaces; analog components; digital components including power supply; application component), which can be combined individually depending on the application case.

ENGINEERING
Thanks to the HIPASE units' pre-defined functions, it is easy to make the necessary adjustments to the components in question and plant-specific parameters. State-of-the-art functions, such as an innovative, fully graphic color touch panel, open multifaceted communication possibilities, and simple plant-specific configuration of the units round out the functional scope of the HIPASE platform.

SECURITY
"Cybersecurity" is increasingly important on the modern energy market. Thanks to a comprehensive, consistently hardware-supported security architecture, HIPASE provides optimal protection against unauthorized external and internal access. The core elements are the device-internal firewall and strict separation of application processing from the communication interfaces. In the HIPASE unit, these tasks are handled by two processors that are independent of one another.

Integrated engineering

The uniform HIPASE Engineering Tool is the optimal tool for easy, efficient configuration of the entire HIPASE platform. It is used for all applications, including excitation, protection, turbine governor, and synchronization.

The HIPASE Engineering Tool distinguishes itself through its future-oriented user interface and work-oriented menu structure, providing exceptionally user-friendly operation. It is optimally attuned to users' requirements and needs. All engineering phases of a project can be managed with this tool. In particular, these are:

- Parameterization
- System test
- Commissioning
- Process monitoring
- System maintenance

FUNCTIONS
In addition to the typical standard functions, there are specific application templates available for different applications for protection, excitation, synchronization, and turbine governor, which enable quick, efficient engineering.

DEVICE CONFIGURATION
Device configuration enables assembly of components and the adjustment of various parameters (e.g.: the definition of switching thresholds). Device configuration also provides online visualization of input and output signals.

IEC 61131-3 FUNCTION DIAGRAM
The completely graphic function plan fulfills IEC 61131-3 requirements. Additional application-specific function modules are made available in an extensive library. An integrated online test assists the user with system test and commissioning. Additional functions include the simulation of process data through "forcing" and individual blocking of process data, for example.

PROCESS SCREENS
The fully graphic process screens enable online visualization of process signals and the display of all internal process data.

DATA STORAGE
The HIPASE Engineering Tool is in a position to read out the planning of a HIPASE unit and process it further. The data read back can be processed at any time and re-loaded.

MULTILINGUAL
The HIPASE Engineering Tool is multilingual throughout and can therefore be translated project-specifically into any language. Because it is multilingual, the context-sensitive help also provides optimal engineering support.

HIGHLIGHTS

- IEC 61131-3 function diagram incl. online test
- Device configuration
- Trigger matrix
- Screen editor incl. online display of process screens for touch panel and PC
- Graph display and disturbance record evaluation
- Screenshots for plant documentation
- Event list
- User and role management

Excitation

HIPASE-E is a voltage regulator with all limiters, the additional regulators, and gate control set for synchronous single-phase and three-phase machines across a broad frequency range.

The regulator structure is modular and takes advantage of ANDRITZ'S long experience. The proven control and regulation functions have been re-used and adapted according to the latest requirements of the energy sector.

The user can combine the limiters and additional regulators according to plant requirements.

The HIPASE-E application component includes the current regulator and the formation of ignition impulses for the thyristors. There are analog and digital components available for the processing of analog and digital signals.

With the use of the compact housing (½ 19" housing), up to 32 digital inputs and outputs can be processed. For applications with more digital inputs and output signals, there is a full-width 19" housing.

SMART BRIDGE
The HIPASE-E voltage regulator controls the Smart Bridge thyristor bridge. The Smart Bridge distinguishes itself through its easy maintenance and high availability.

SPECIAL HIGHLIGHTS:
- Space-saving arrangement of the thyristor bridges
- Integrated ventilation concept with optional speed-controlled ventilation
- Integrated ventilator redundancy
- Easy accessibility of individual components
- Increased protection class (up to IP 54)

TECHNICAL DATA

Supply voltage:	24 VDC–250 VDC
Voltage measurement:	100–125 VAC / 3 VA Cl.1, 3-phase or 1-phase
Current measurement:	1 A or 5 A / 3 VA, Cl.3, 3-phase or 1-phase
Voltage regulator range:	0.9–1.1 UGN
Control accuracy:	<= +-0.2%
Power system stabilizer:	PSS2A/B, PSS4B
Generator rated frequency:	16.7 Hz–400 Hz
Generator working range:	10–440 Hz
Digital inputs:	24 VDC–250 VDC
Digital outputs:	250 VDC, 8 A permanent
Test voltage:	2 kVrms according to EN 50178/1997
EMC resistance:	IEC 60255
Communication protocols:	IEC 60870-5-104, Modbus TCP

Electrical protection

HIPASE-P

HIPASE-P is the optimal solution for state-of-the-art, high-performance generator and transformer protection at various rated frequencies (50 Hz, 60 Hz and 16.7 Hz).
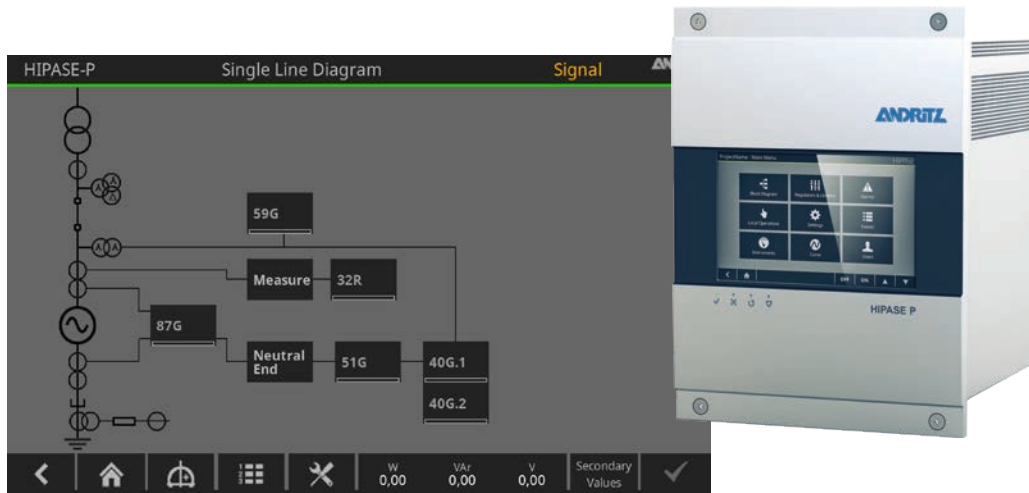
A special application component was developed for HIPASE-P, which generates and processes analog signals for special protective functions.

Examples of these protective functions are:
- Rotor earth fault
- Stator earth fault with external frequency shift
- Shaft current with adjustable harmonic wave assessment
- SFC overcurrent
- SFC earth fault
- Temperature measurement

With the use of the compact housing (½ 19" housing), up to 32 digital inputs and outputs can be processed. For more extensive applications with more digital inputs and output signals, there is a full-width 19" housing. In particular the generator protection requires many functions that are needed for complex applications such as pump turbines and large thermal blocks.

The HIPASE Engineering Tool assists the protection engineer with familiar and proven elements such as the software trigger matrix, test inputs for protection functions, and easy test of the interfaces.

Parameterization of the protective function is done with easy selection of all protective functions available for HIPASE-P.

With this action, all steps required for planning are executed completely automatically, on through to the creation of the process screens for the fully graphic touch panel.

In addition, there is a parameter window that allows clear and easy adjustment of the parameters.

TECHNICAL DATA

Rated frequencies:	50/60/16.7 Hz
Current transformer:	Quantity 12/24, I_n = 1 A and 5 A
Voltage transformer:	Quantity 8/16, U_n = 100–125 VAC
Digital wide-range inputs:	Quantity 8-64, U_n = 24–250 VDC
Digital outputs:	Quantity 8–72, trigger and signal contacts
Protective functions:	Generator and transformer protection (modular)
Communication protocols:	IEC 61850 Ed 2.0, IEC 60870-5-103, IEC 60870-5-104, Modbus TCP

Turbine regulation

HIPASE-T considers the requirements of various turbine types (Francis, Kaplan and Pelton) and the plant due to a scalable, modular application.

As essential component of the unit, the turbine governor is responsible for transforming the existing hydraulic energy into electrical energy as efficiently as possible. It guarantees a stable speed for the turbines in no-load and isolated operation, and ensures adherence to the set points in mains operation.

The enhanced core algorithm meets the increasing challenges for the turbine governor with respect to frequency and primary control.

In order to guarantee easy connection of the digital turbine governor to the project-specific interfaces, the application component supports every type of input and output signals. Therefore, connections are provided for speed sensors and the generator voltage to determine the turbine speed, as well as analog inputs and output for measurement of the positions and the connection of power transducers.

The analog outputs can be used as voltage or current signal with variable limits. If necessary, an oscillator signal can be switched to the analog output in order to control all types of servo valves.

TECHNICAL DATA

Speed/ frequency inputs:	max. 6, passive or active, VT
Analog inputs/outputs	max. 12/14, -20...20mA, -10...10V
Binary inputs/outputs	max. 64
Speed deadband:	0.02%
Measurement range speed measurement:	1.2–10,000 Hz
Resolution speed measurement:	0.01%
International standards:	IEC 61362, IEC 60308
Communication protocols:	IEC 60870-5-104, Modbus TCP

Synchronization

HIPASE-S is a state-of-the-art synchronization device for paralleling generators to grids in electrical systems with a frequency of 50 Hz, 60 Hz, and 16.7 Hz.

In HIPASE-S there are expanded settings for synchronization, which cover all requirements of modern grids, for example an internal correction of switching groups and the assessment of the rotation direction of systems to be synchronized.

HIPASE-S has a lot of persistent RAM for recording and saving long-lasting and many short synchronization processes.

With three-phase voltage and current measurement, it is possible to create a very detailed qualitative assessment of the synchronization process immediately after connection. The graphs and assessments of the results saved in the HIPASE unit can be read out directly with the HIPASE Engineering Tool.

Thanks to the circuit breaker operating time measurement integrated into HIPASE-S, it is not necessary to purchase external testing and measurement equipment. After plant-side preparation, the circuit breaker's operating time can be determined directly in the HIPASE-S.

TECHNICAL DATA

Supply voltage:	24 VDC–250 VDC
Rated frequency:	50 / 60 / 16.7 Hz
Voltage measurement accuracy:	0.2%
Phase angle measurement accuracy:	0.5°
Frequency measurement accuracy:	0.0025 Hz
Digital inputs:	U_n = 24–250 VDC (Wide-range inputs)
Current measurement channel:	for synchronizer assessment
Remote selection inputs:	7
Circuit breaker operating time measurement:	10–1000 ms
Communication protocols:	IEC 60870-5-104, Modbus TCP
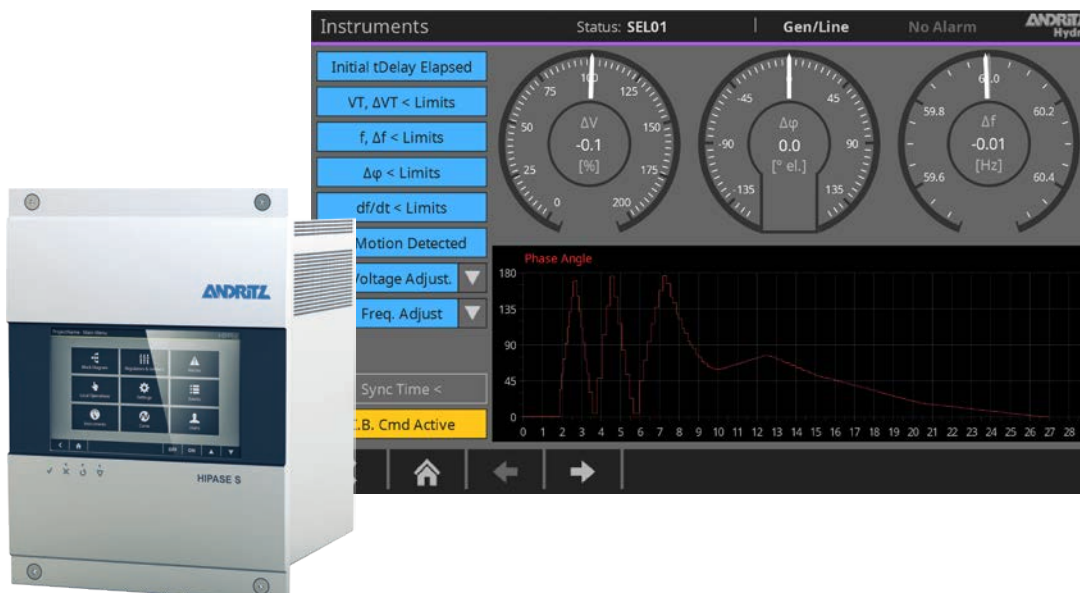
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