Technical Training
Course Descriptions (e)
effective from 2020
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**SEMINARANMELDUNG / REGISTRATION**

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**ANDRITZ**

Technical Training (e) - Course Description
# 1 Protection

## 1.1 HIPASE-P Generator and Transformer Protection

<table>
<thead>
<tr>
<th>Duration</th>
<th>2 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisites</td>
<td>Relevant practice in electrical protection because general principles of the generator and transformer protection are not part of this training.</td>
</tr>
<tr>
<td>Objective</td>
<td>This training covers protection of generators and transformers using the protection device HIPASE-P. It is especially for engineers who will use HIPASE-P protection devices as part of their application field.</td>
</tr>
</tbody>
</table>
| Content | Protection system HIPASE-P  
  - Hardware-and software concept  
  - Structure of configuration files  
  - Structure of protective functions  
  - Protection device HIPASE-P  
    - Technical features  
    - Configuration code and license code  
    - Available hardware modules  
    - Interfaces  
  - HIPASE Engineering  
    - Introduction to PC software and touch panel  
  - HIPASE-P operation  
    - Measured values, disturbance recorder and alarm list  
    - Online features  
    - Test of hardware interface  
    - Test of serial interface  
  - HIPASE-P parameterization  
    - Protection parameterization via touch panel and PC software  
    - Parameterization of serial interface to SCADA  
    - Parameterization of hardware modules  
  - HIPASE-P maintenance  
    - Device fault analysis  
    - Software update  
    - Check of calibration  
    - Replacement of modules or devices  
    - Handling of spare parts  
  - HIPASE-P configurations  
    - Application examples generator / transformer protection  
    - Modification and extension of existing configuration  
    - Modification and extension of existing process display (touch panel) |

![Image of HIPASE-P device](image-url)
## 1.2 DRS GENERATOR AND TRANSFORMER PROTECTION

<table>
<thead>
<tr>
<th><strong>Duration</strong></th>
<th>1 day</th>
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<tbody>
<tr>
<td><strong>Prerequisites</strong></td>
<td>Relevant practice in electrical protection because general principles of the generator and transformer protection are not part of this training.</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td>This training covers protection of generators and transformers using protection family DRS-COMPACT and DRS-LIGHT. It is especially for engineers who will use DRS protection devices as part of their application field.</td>
</tr>
</tbody>
</table>
| **Content** | Protection system DRS  
Hardware- and software concept  
Structure of configuration files  
Structure of protective functions  
Protection devices DRS-COMPACT and DRS-LIGHT  
Technical features  
Configuration code  
Available hardware configurations  
Interfaces  
DRS-WIN and local operation  
Introduction to PC software and local keypad  
Installation and default settings  
DRS operation  
Measured values  
Disturbance recorder and alarm list  
Online features  
Test of hardware interface  
Test of serial interface  
DRS parameterization  
Protection parameterization via local keypad and PC software  
Parameterization of serial interface to SCADA  
Parameterization of hardware modules  
DRS maintenance  
Device fault analysis  
Software update  
Check of calibration  
Exchange of modules or devices  
Handling of spare parts  
DRS configurations  
Application examples generator / transformer protection |

![Image of DRS device](image-url)
1.3 DRS-BB BUSBAR PROTECTION

<table>
<thead>
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<th>Duration</th>
<th>1 day</th>
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<tbody>
<tr>
<td>Prerequisites</td>
<td>Relevant practice in electrical protection because general principles of the generator and transformer protection are not part of this training.</td>
</tr>
<tr>
<td>Objective</td>
<td>This training covers busbar protection in general and provides practical training using protection system DRS-BB or DRS-C2BB. It is especially for engineers who will specialize in the field of busbar protection and have DRS-BB or DRS-C2BB protection devices as part of their application field.</td>
</tr>
</tbody>
</table>

**Content**

- Protection system DRS
  - Hardware- and software concept
  - Structure of parameter files
  - Structure of protective functions
  - Logic of signals and basics of device operation
- Technical basics of busbar protection
- DRS-BB: features and technical data
- Protection devices DRS-MBB, DRS-CBB, DRS-LBB, DRS-C2BB
  - Technical features and configuration code
  - Available hardware configurations
  - Interfaces
  - Available hardware alarms and serial alarms
- DRS-WIN and local operation
  - Introduction to PC software and local keypad
  - Installation and default settings
- DRS operation
  - Measured values, disturbance recorder and alarm list
  - Online features
  - Test of hardware interface and test of serial interface
- DRS parameterization
  - Protection parameterization via local keypad and PC software
  - Parameterization of serial interface to SCADA
  - Parameterization of hardware modules
- DRS maintenance
  - Device fault analysis at FO-Ring failure or at field unit (FU) failure
  - Hardware failure central unit (CU)
  - Exchange of modules of CU, exchange of a FU
  - Handling of spare parts
- DRS-BB configurations
  - Application examples generator / transformer protection
# 1.4 BASICS OF GENERATOR- AND TRANSFORMER PROTECTION

<table>
<thead>
<tr>
<th>Duration</th>
<th>1 day</th>
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<tbody>
<tr>
<td>Prerequisites</td>
<td>Basic knowledge of electrical engineering</td>
</tr>
<tr>
<td>Objective</td>
<td>This training covers the fundamentals of electrical protection methods. Overview: Protection principles, Protection of generators, Protection of transformers. It is especially for engineers who are not protection experts but use protection devices in their installations - connected to the process control and automation system.</td>
</tr>
<tr>
<td>Content</td>
<td>What are the tasks of protection equipment? Sources of faults and kind of faults, Assembling of complete protection system, Primary devices, measurance &amp; protection transducers, Important protection functions and their effectivity, Communication with process control systems, Overview protection relay family DRS, Historical development of electrical protection equipment, Regional characteristic forms and protection philosophy, Spare protection concepts and redundancy concepts, Basic calculation methods, symmetric components, Neutral point handling of generator and transformer, Block circuit and bus bar circuit, Recommendations for protection adjustment, Interaction with other equipment (excitation, control technology, turbine controller), Typical setup procedure, protection tests, Operation management, operation, maintenance, test</td>
</tr>
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</table>
## 2 EXCITATION

### 2.1 HIPASE-E EXCITATION

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<tr>
<th>Duration</th>
<th>2 days</th>
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<tr>
<td>Prerequisites</td>
<td>Relevant practice in electrical excitation systems. General principles of generators, machines and excitation are not part of this training.</td>
</tr>
<tr>
<td>Objective</td>
<td>This training contains engineering, operation, parameterization and maintenance of HIPASE-E.</td>
</tr>
</tbody>
</table>
| Content        | General introduction of the excitation system  
                  Setup  
                  Tasks and requirements  
                  Voltage regulation  
                  Generator diagrams  

- HIPASE-E - Engineering  
  Introduction to the engineering and maintenance tool  
  Overview touch panel and operating philosophy  

- HIPASE-E operation  
  Curve records, event lists  
  Forcing values  
  Onlinetest  

- HIPASE-E parameterization  
  Parameter changes via HIPASE engineering tool  
  Parameter changes via touchpanel  
  Store parameter settings  

- HIPASE-E - Maintenance  
  Diagnostics  
  Fault analysis  
  Replacement of boards or devices  
  Loading of application software  

- HIPASE-E modification  
  Make minor changes to the program  
  Adaption of pictures |
### 2.2 THYNE1 COMPACT EXCITATION

<table>
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<th>Duration</th>
<th>4 days</th>
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<tbody>
<tr>
<td>Prerequisites</td>
<td>Basic knowledge of electrical engineering</td>
</tr>
<tr>
<td>Objective</td>
<td>Autonomous work with the compact excitation system THYNE1 - from design to commissioning. In addition, this training will also cover the required fundamentals of excitation and the synchronous machine.</td>
</tr>
</tbody>
</table>
| Content | ▸ General introduction of the excitation system  
  Principle function  
  Machine arrangements  
  Supply variants  
  General introduction of the synchronous machine  
  Simplified equivalent circuit  
  Open circuit, short circuit characteristic  
  Phasor diagram  
  Load diagram  
  Engineering design and dimensioning of THYNE1  
  Type code  
  Excitation transformer  
  Field flashing  
  Interface  
  Control and operation with THYNE1  
  Parameterization, control and operation via touch panel and PC Software  
  Optimization of the regulator  
  Alarms  
  Commissioning of THYNE1  
  Preparation  
  Calibration  
  Optimization |
# 2.3 BASICS OF EXCITATION

<table>
<thead>
<tr>
<th>Duration</th>
<th>1 day</th>
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<tbody>
<tr>
<td>Prerequisites</td>
<td>Basic knowledge of electrical engineering</td>
</tr>
<tr>
<td>Objective</td>
<td>This training covers the fundamentals of excitation methods. It is especially for engineers who are not excitation experts but use excitation devices in their installations - connected to the process control and automation system.</td>
</tr>
</tbody>
</table>
| Content     | ▪ For what do we need excitation?  
▪ What does excitation mean?  
▪ Tasks of excitation  
▪ Different variants of excitation (static or with exciter)  
▪ Differences (advantages/disadvantages) between this variants  
▪ Main components of excitation equipment (switch cabinets, excitation transformer)  
▪ Cohesion between generator voltage, reactive power and active power  
▪ Parallel operation of generators  
▪ Different kinds of operations (automatic, manual, reactive power/cosphi-controlling, brake operation)  
▪ Interaction between excitation and other equipment (excitation, control technology, turbine controller)  
▪ Design principle of excitation equipment: redundancy in controller and/or power part  
▪ Typical setup procedure and adjustment possibilities |
3 CONTROL

3.1 SICAM RTUS & OPM II COMBI-TRAINING

<table>
<thead>
<tr>
<th>Duration</th>
<th>5 days</th>
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</table>
| Prerequisites | Knowledge of the most important terms in telecontrol technology  
                  Windows usage |
| Objective | Knowledge of autonomous expansion and diagnosis for the scalable automation system SICAM RTUs, usage of the object-oriented data point manager and engineering tool OPM II. |
| Content | □ SICAM RTUs product family in an overview  
          □ Features of AK 1703 ACP, ACP TM 1703, TM 1703 mic  
          □ Operation - from data acquisition to data output  
          □ Configuration and engineering based on pre-configured templates  
          □ Communication with other components  
          □ Addressing concept (IEC 60870)  
          □ Automatic dataflow mapping  
          □ Creation of process variables an preparation for usage in functional plans  
          □ Parameterization of SICAM RTUs communication with other units or the control center 250 SCALA  
          □ Diagnosis and test  
          □ Possibilities for test and simulation with the TOOLBOX II  
          □ Parameter administration with the TOOLBOX II: Import/Export/Backup  
          □ OPM II feature list - overview  
          □ signal-oriented engineering with the OPM II  
          □ Working with predefined OPM II libraries  
          □ Handling large amounts of data with the OPM II  
          □ Reuse of existing project data with the OPM II  
          □ Use of formulas and references  
          □ Data import and export  
          □ Creation of higher aggregated objects in the OPM II  
          □ Overview parameter of OPM II handling for control center systems  
          □ Practical tasks with TOOLBOX II & OPM II on the example of TM 1703 ACP  
          □ A8000 assembly modules and performance characteristic  
          □ Basic parameterization of CP-8050  
          □ Diagnosis & maintenance with A8000 product family (CP-8050) |
# 3.2 SICAM RTUS / A8000 UPGRADE TRAINING

<table>
<thead>
<tr>
<th>Duration</th>
<th>2 days</th>
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</table>
| Prerequisites | Knowledge of the most important terms in telecontrol / automation technology  
Two years of experience using the object-oriented data point manager and engineering tool OPM II (creating AE and images, modeling types, ONLINE tools, CAEX Plus, ...)
| Objective | Comparison of the new A8000 product family versus current SICAM RTUs  
Independent expansion and parameterization of the A8000 product family.  
Independent commissioning, diagnosis & maintenance of the A8000 modules.
| Content | ▫ Overview of the A8000 product family  
▫ SICAM TM modules versus A8000 modules  
▫ Performance characteristic  
▫ Parameterization of communication with other SICAM RTUs or the control center system 250 SCALA and CP-8050  
▫ Parameterization in OPM II (system technology & process engineering)  
▫ Diagnosis & test (Online Tools)  
▫ Tips & tricks  
▫ Possible errors  
▫ Practical exercises with TOOLBOX II and OPM II using the example of CP-8050 |
## 3.3 CAEX PLUS FOR SICAM RTUS

<table>
<thead>
<tr>
<th>Duration</th>
<th>3 days</th>
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<tbody>
<tr>
<td>Prerequisites</td>
<td>Basic knowledge of digital technology, Basic knowledge on the SICAM RTUs automation system, Basic knowledge of the OPM II</td>
</tr>
<tr>
<td>Objective</td>
<td>Knowledge of the tool CAEx plus for creation of a control task in the target system SICAM RTUs. Training of the IEC 61131 programming language with the focus FBS (functional component language) and their use.</td>
</tr>
<tr>
<td>Content</td>
<td>▪ Overview of the standard IEC 61131 ▪ Handling of the functional component language CAEx plus ▪ Create and structuring of a control task ▪ Loading to the target system SICAM RTUs ▪ Application of the test options (OFFLINE, ONLINE oscilloscope) ▪ Create a documentation with CAEx plus ▪ Practical exercises</td>
</tr>
</tbody>
</table>
### 3.4 250 SCALA OPERATION & ENGINEERING

<table>
<thead>
<tr>
<th>Duration</th>
<th>3.5 days</th>
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</thead>
</table>
| Prerequisites | Windows knowledge  
OPM II Basic course or similar knowledge |
| Objective | The participants master the process-specific adaptation of the pre-configured 250 SCALA control centre computer system. In accordance with the preset goals they can integrate:  
- New plant displays  
- Additional process data representations  
The participants know whether and how new requirements can be implemented. They know the capabilities and constraints of the system. |
| Content |  
- Operation  
- Creating pictures  
- Creating process variables  
- Object orientated parameterization of picture elements  
- Alarms  
- Reports and logs  
- Graphs: function and operation  
- Data security  
- Interfacing with MS Excel  
- Configurations  
- Short overview of more complex functions  
- Practical exercises |
## 4 NETWORK

### 4.1 LAN AND WAN FOR AUTOMATION NETWORKS

<table>
<thead>
<tr>
<th>Duration</th>
<th>2 days</th>
</tr>
</thead>
</table>
| Prerequisites | Windows basics  
Basic IT- and communication knowledge |
| Objective | In this training practice oriented employment and use of networks in automation are imparted. Network technology plays a major role for data transmission, data analyzing and monitoring as well as maintenance of plants. This training should not be missed in the training program of an automation engineer. It is aligned for user, who are increased faced with usage and maintenance of networks. |
| Content | □ Basics (OSI-model)  
□ Overview network protocols  
□ Differences TCP / UPD  
□ IP addressing  
□ Network products  
□ Security  
 ▪ Physical Security  
 ▪ Network Security  
 ▪ Awareness of external access of networks  
□ Remote Control  
*Not covered in this training are:*  
RTU protocols like e.g. IEC 60870-5-104, IEC 61850, Modbus IP etc. |
| Practical exercises | □ Setup of network with TCP/IP protocol  
□ Building of network connections  
□ Configuration of most important router parameter |
### 4.2 SECURITY OF AUTOMATION NETWORKS

<table>
<thead>
<tr>
<th>Duration</th>
<th>2 days</th>
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<tbody>
<tr>
<td><strong>Prerequisites</strong></td>
<td>Basic knowledge of networking (TCP/IP)</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td>This training covers the usage of firewalls und network protection techniques especially in the range of process-automation and SCADA system infrastructure. High secure and high available networks for process-automation and SCADA systems can only be achieved by careful design and implementation of network security concepts. The seminar is dedicated to technicians who already have experience in networking and want to go on with their expertise towards network security.</td>
</tr>
</tbody>
</table>
| **Content** | □ OSI Model  
□ TCP / UDP  
□ IP Addressing  
□ Targets for attacks  
□ Kinds of assaults  
□ Firewall technology  
□ Firewall & DMZ concepts  
□ ASA (Cisco Firewall)  
□ Router /Switches  
□ Monitoring  
□ Attacking the ASA (Cisco Firewall) |
| **Practical exercises** | □ Basic configuration of ASA (Cisco Firewall)  
□ Setup of the network with ASA (Cisco Firewall)  
□ Setup of a VPN site-to-site connection with ASA (Cisco Firewall) |
5  CONTACT & REGISTRATION

5.1  CONTACT

Visit us on the internet at www.andritz.com/training-hydro or let us provide you with individual advice.

Manfred Kunes
Technical Training
Product Management & Training
Automation

Tel.: +43 50805 56759
Manfred.Kunes@andritz.com

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Eibesbrunnergasse 20
A-1120 Vienna

Karin Binder
Technical Training
Product Management & Training
Automation

Tel.: +43 50805 56812
Karin.Binder@andritz.com

ANDRITZ HYDRO GmbH
Eibesbrunnergasse 20
A-1120 Vienna
5.2 REGISTRATION

We kindly request that you send a written registration by e-mail or mail using our registration form (see last page).

Further information you can find in our conditions of training.

5.3 CONDITIONS OF TRAINING

1. Registrations
We request that you send a written registration by mail or e-mail to our training department. Unfortunately we cannot accept telephone registrations. Registrations will be accepted in the order that they are received. If your desired training program is already full, you will automatically be placed on the wait list for this date. We will not preregister you for a different training date. If you would like a different training date, please notify us in writing.

2. Registration Confirmation
You will receive a registration notification within 14 days of the receipt of your registration. This notification is not yet definite. Please keep this fact in mind when booking tickets, hotel rooms, etc. Since we require a minimum of 4 participants for our courses, we cannot confirm your registration until 14 calendar days before the beginning of the training program. This registration confirmation will contain all details concerning the training program. In the event that you haven’t received notification/confirmation within the above given time frames, please contact our training department.

3. Cancellation by the Course Participant
In the event that a course participant drops out, you may nominate a replacement at no extra cost. If this is not an option, cancellation is possible. Cancellations should be carried out in the same way as the registrations (see 1, Registrations). Cancellation may be made at no charge for up to 21 calendar days before the beginning of the training course. Beyond this deadline up to 7 calendar days, we charge 50%, and beyond 7 calendar days, the full price of the training. In case, as a result of your cancellation, hotel cancellation fees arise as the result of reservations made by us in your name, we will be forced to pass these costs on to you. The cancellation fees defined here are valid even when the training date is rescheduled.

4. Changes and Cancellations by ANDRITZ HYDRO GmbH
If we are forced to cancel a training course for justifiable reasons (for example cancellation by a lecturer, too few course participants), we will not be obligated to pay any remunerations beyond refund of course fees which have already been paid to us. In particular, we are not obligated to pay for possible cancellation fees of hotels, flights, etc. In the case of illness of a course lecturer, we reserve the right to postpone or cancel a training session at any time.

5. Training Location
ANDRITZ HYDRO GmbH
Elbsandkronengasse 20
A-1120 Vienna

6. Hotel
Hotel costs are not included in the course price. Should you require assistance with a hotel reservation, please inform us when registering. Please settle accounts directly with the hotel.

7. Prices
All prices are given without the addition of VAT. Please transfer the invoice amount to the given account within the payment deadline.

7.1. Course Prices:
Course prices are for one participant and given without the addition of VAT.

7.2. Workshop Prices
Workshop prices cover the entire workshop and are given without the addition of VAT. A maximum of 6 participants may be sent to a workshop for this price. In the case of more than 6 participants, the workshop price will be calculated on an individual basis.

Should a workshop be held at an agreed upon location other than the “training location” specified in section 5, then we will add the extra costs of meals, transportation, and overnight accommodations of the instructor in the workshop price (hotel, airplane, train, car, taxi, etc.). We will not be able to provide infrastructure such as PCs, training facilities, etc. at remote locations.

8. Services
Small groups allow for intensive supervision by our instructor during the training sessions. Every participant receives a set of training materials for his/her personal use. If required in the context of the training exercises, a PC with English installation or target system—at least one workstation for every 2 participants—will be made available at the “training location” specified in section 5. Beverages and lunch are also included in the price.

Upon successful completion of the training course, you will receive a training certificate.

All other services such as parking charges, arrival and departure, hotel, breakfast, transportation from the hotel to the training location, taxi costs, etc., are not included in the price and must be paid on location.

9. Security and Data Protection
The participants’ personal information will be entered in our IT system for preparation, organizational and billing purposes. By registering for the training course, you give your implied consent to the usage of your data. The data will neither be stored collateral nor circulated to third parties.

The equipment used as part of the training course is equipped with the commercially available security measures. For reasons of security, the course participants may neither install programs or data onto the equipment nor establish connections between personal equipment and the training workstations. In particular, the use of a training workstation to establish an internet connection during the training course is explicitly forbidden.

10. Liability
We are not liable for damages caused by the application of skills acquired in the training or by the usage of training materials. We are not liable for the personal property of the participants or for any articles brought to the training course.

11. Copyrights
The training documents may not be reproduced, translated, or used for purposes other than the personal use of the participants without the written consent of ANDRITZ HYDRO GmbH. Software, licenses, activation and access codes used as part of the training course may not be copied or used for any other purposes.

12. Coverage, Written form, Law, Place of Jurisdiction
These conditions apply to all training courses offered by ANDRITZ HYDRO GmbH. All other agreements must be made in writing. The place of jurisdiction is Vienna. These conditions are governed exclusively by Austrian law.
# Seminaranmeldung / Registration

## Trainingsort / Training Location

ANDRITZ HYDRO GmbH  
Abt. RD1  
Eibesbrunnergasse 20  
1120 WIEN  
AUSTRIA

Bitte senden Sie das Formular an / Please submit this form to [contact-hydro.train@andritz.com](mailto:contact-hydro.train@andritz.com)

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<th>Termin / Date *</th>
<th>TeilnehmerInnen / Participants</th>
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