

# Course Description

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**PRODUCT TRAINING**

**THYNE1 Compact Excitation**

Duration	4 days
Prerequisites	Basic knowledge of electrical engineering
Objective	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.
Content	<ul style="list-style-type: none"> <li>▫ General introduction of the excitation system               <ul style="list-style-type: none"> <li>Principle function</li> <li>Machine arrangements</li> <li>Supply variants</li> </ul> </li> <li>▫ General introduction of the synchronous machine               <ul style="list-style-type: none"> <li>Simplified equivalent circuit</li> <li>Open circuit, short circuit characteristic</li> <li>Phasor diagram</li> <li>Load diagram</li> </ul> </li> <li>▫ Engineering design and dimensioning of THYNE1               <ul style="list-style-type: none"> <li>Type code</li> <li>Excitation transformer</li> <li>Field flashing</li> <li>Interface</li> </ul> </li> <li>▫ Control and operation with THYNE1               <ul style="list-style-type: none"> <li>Parameterization, control and operation via touch panel and PC Software</li> <li>Optimization of the regulator</li> <li>Alarms</li> </ul> </li> <li>▫ Commissioning of THYNE1               <ul style="list-style-type: none"> <li>Preparation</li> <li>Calibration</li> <li>Optimization</li> </ul> </li> </ul>



**PRODUCT TRAINING**

**ACP 1703 & OPM II Combi-Training**

Duration	5 days
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 1703 ACP, usage of the object-oriented data point manager and engineering tool OPM II.
Content	<ul style="list-style-type: none"> <li>▫ SICAM 1703 ACP product family in an overview</li> <li>▫ Features of AK 1703 ACP, ACP TM 1703, TM 1703 mic</li> <li>▫ Operation - from data acquisition to data output</li> <li>▫ Configuration and engineering based on pre-configured templates</li> <li>▫ Communication with other components</li> <li>▫ Addressing concept (IEC 60870)</li> <li>▫ Automatic dataflow mapping</li> <li>▫ Creation of process variables an preparation for usage in functional plans</li> <li>▫ Parameterization of SICAM 1703 ACP communication with other units or the control center 250 SCALA</li> <li>▫ Diagnosis and test</li> <li>▫ Possibilities for test and simulation with the TOOLBOX II</li> <li>▫ Parameter administration with the TOOOOLBOX II: Import/Export/Backup</li> <li>▫ OPM II feature list - overview</li> <li>▫ signal-oriented engineering with the OPM II</li> <li>▫ Working with predefined OPM II libraries</li> <li>▫ Handling large amounts of data with the OPM II</li> <li>▫ Reuse of existing project data with the OPM II</li> <li>▫ Use of formulas and references</li> <li>▫ Data import and export</li> <li>▫ Creation of higher aggregated objects in the OPM II</li> <li>▫ Overview parameter of OPM II handling for control center systems</li> <li>▫ Documentation of the process-signal interface</li> <li>▫ Practical exercises with TOOLBOX II and OPM II on the example of a TM 1703 ACP</li> </ul>





**PRODUCT TRAINING**

**250 SCALA Operation & Engineering**

Duration	3,5 days
Prerequisites	Windows knowledge OPM II Basic course or similar knowledge
Objective	<p>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:</p> <ul style="list-style-type: none"> <li>▫ New plant displays</li> <li>▫ Additional process data representations</li> </ul> <p>The participants know whether and how new requirements can be implemented. They know the capabilities and constraints of the system.</p>
Content	<ul style="list-style-type: none"> <li>▫ Operation</li> <li>▫ Creating pictures</li> <li>▫ Creating process variables</li> <li>▫ Object orientated parameterization of picture elements</li> <li>▫ Alarms</li> <li>▫ Reports and logs</li> <li>▫ Graphs: function and operation</li> <li>▫ Data security</li> <li>▫ Interfacing with MS Excel</li> <li>▫ Configurations</li> <li>▫ Short overview of more complex functions</li> <li>▫ Practical exercises</li> </ul>



**TECHNICAL TRAINING**

**LAN and WAN for Automation Networks**

Duration	2 days
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	<ul style="list-style-type: none"> <li>▫ Basics (OSI-model)</li> <li>▫ Overview network protocols</li> <li>▫ Differences TCP / UDP</li> <li>▫ IP addressing</li> <li>▫ Network products</li> <li>▫ Security             <ul style="list-style-type: none"> <li>▪ Physical Security</li> <li>▪ Network Security</li> <li>▪ Awareness of external access of networks</li> </ul> </li> <li>▫ Remote Control</li> </ul> <p><i>Not covered in this training are:</i> RTU protocols like e.g. IEC 60870-5-104, IEC 61850, Modbus IP etc.</p>
Practical exercises	<ul style="list-style-type: none"> <li>▫ Setup of network with TCP/IP protocol</li> <li>▫ Building of network connections</li> <li>▫ Configuration of most important router parameter</li> </ul>



**TECHNICAL TRAINING**

**Security of Automation Networks**

Duration	2 days
Prerequisites	Basic knowledge of networking (TCP/IP)
Objective	<p>This training covers the usage of firewalls und network protection techniques especially in the range of process-automation and SCADA system infrastructure.</p> <p>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.</p> <p>The seminar is dedicated to technicians who already have experience in networking and want to go on with their expertise towards network security.</p>
Content	<ul style="list-style-type: none"> <li>▫ OSI Model</li> <li>▫ TCP / UDP</li> <li>▫ IP Addressing</li> <li>▫ Targets for attacks</li> <li>▫ Kinds of assaults</li> <li>▫ Firewall technology</li> <li>▫ Firewall &amp; DMZ concepts</li> <li>▫ ASA (Cisco Firewall)</li> <li>▫ Router /Switches</li> <li>▫ Monitoring</li> <li>▫ Attacking the ASA (Cisco Firewall)</li> </ul>
Practical exercises	<ul style="list-style-type: none"> <li>▫ Basic configuration of ASA (Cisco Firewall)</li> <li>▫ Setup of the network with ASA (Cisco Firewall)</li> <li>▫ Setup of a VPN site-to-Site connection with ASA (Cisco Firewall)</li> </ul>



**TECHNICAL TRAINING**

**Basics of Generator- and Transformer Protection**

Duration	1 day
Prerequisites	Basic knowledge of electrical engineering
Objective	<p>This training covers the fundamentals of electrical protection methods.</p> <p>Overview:</p> <ul style="list-style-type: none"> <li>▫ Protection principles</li> <li>▫ Protection of generators</li> <li>▫ Protection of transformers</li> </ul> <p>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.</p>
Content	<ul style="list-style-type: none"> <li>▫ What are the tasks of protection equipment?</li> <li>▫ Sources of faults and kind of faults</li> <li>▫ Assembling of complete protection system</li> <li>▫ Primary devices, measuranc &amp; protection transducers</li> <li>▫ Important protection functions and their effectivity</li> <li>▫ Communication with process control systems</li> <li>▫ Overview protection relay family DRS</li>   <li>▫ Historical development of electrical protection equipment</li> <li>▫ Regional characteristic forms and protection philosophy</li> <li>▫ Spare protection concepts and redundancy concepts</li> <li>▫ Basic calculation methods, symmetric components</li> <li>▫ Neutral point handling of generator and transformer</li> <li>▫ Block circuit and bus bar circuit</li> <li>▫ Recommendations for protection adjustment</li> <li>▫ Interaction with other equipment (excitation, control technology, turbine controller)</li> <li>▫ Typical setup procedure, protection tests</li> <li>▫ Operation management, operation, maintenance, test</li> </ul>



## TECHNICAL TRAINING

### Generator- and Transformer Protection

Duration	2,5 days + optional 1 day practical exercises
Prerequisites	Basic knowledge of electrical engineering
Objective	<p>This training covers the fundamentals of electrical protection methods.</p> <p>Overview:</p> <ul style="list-style-type: none"> <li>▫ Protection principles</li> <li>▫ Protection of generators</li> <li>▫ Protection of transformers</li> </ul>
Content	<ul style="list-style-type: none"> <li>▫ What are the tasks of protection equipment?</li> <li>▫ Sources of faults and kind of faults</li> <li>▫ Assembling of complete protection system</li> <li>▫ Primary devices, measuring &amp; protection transformer</li> <li>▫ Important protection functions and its effectiveness</li> <li>▫ Communication with process control systems</li> <li>▫ Overview protection relay family DRS</li>   <li>▫ Historical development of electrical protection equipment</li> <li>▫ Regional characteristic forms and protection philosophy</li> <li>▫ Spare protection concepts and redundancy concepts</li> <li>▫ Basic calculation methods, symmetric components</li> <li>▫ Neutral point handling of generator and transformer</li> <li>▫ Block circuit and bus bar circuit</li> <li>▫ Recommendations for protection adjustment</li> <li>▫ Interaction with other equipment (excitation, control technology, turbine controller)</li> <li>▫ Typical setup procedure, protection tests</li> <li>▫ Operation management, operation, maintenance, test</li>   <li>▫ Selected details of our protection relays</li>   <li>▫ Practical exercises (1 day appended) can be booked optional - sufficient number of participants postulated</li> </ul>



**TECHNICAL TRAINING**

**Basics of Excitation**

Duration	1 day
Prerequisites	Basic knowledge of electrical engineering
Objective	<p>This training covers the fundamentals of excitation methods.</p> <p>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.</p>
Content	<ul style="list-style-type: none"> <li>▫ For what do we need excitation ?</li> <li>▫ What does excitation mean ?</li> <li>▫ Tasks of excitation</li> <li>▫ Different variants of excitation (static or with exciter)</li> <li>▫ Differences (advantages/disadvantages) between this variants</li> <li>▫ Main components of excitation equipment (switch cabinets, excitation transformer)</li> <li>▫ Cohesion between generator voltage, reactive power and active power</li> <li>▫ Parallel operation of generators</li> <li>▫ Different kinds of operations (automatic, manual, reactive power/cosphi-controlling, brake operation)</li> <li>▫ Interaction between excitation and other equipment (excitation, control technology, turbine controller)</li> <li>▫ Design principle of excitation equipment: redundancy in controller and/or power part</li> <li>▫ Typical setup procedure and adjustment possibilities</li> </ul>



**CONTACT & REGISTRATION**

**Contact**

Visit us on the internet at [www.andritz.com/training-hydro](http://www.andritz.com/training-hydro)  
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A-1120 Vienna



## CONTACT & REGISTRATION

### 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.

### Conditions of Training

#### 1. Registrations

We request that you send a written registration by mail or e-mail to our training department. Unfortunately we can not 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 reregister 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  
EURO PLAZA - Object D  
Wienerbergstrasse 41  
A-1120 Vienna, Austria

#### 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  
EURO PLAZA – Objekt D  
Abt. PMT  
Wienerbergstrasse 41  
A-1120 Vienna

Bitte senden Sie das Formular an / Please submit this form to [training.automation@andritz.com](mailto:training.automation@andritz.com)

Vorname / First Name \* ..... Zuname / Last Name \* .....

Firma / Company \* .....

Rechnungsadresse / Invoicing Address \* .....

.....

UID-Nr. / VAT Number .....

Telefonnr. / Phone number .....

E-Mail \* .....

Seminarname / Title of Training *	Termin / Date *	TeilnehmerInnen / Participants
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\* erforderlich / required

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Datum / Date

.....  
Unterschrift / Signature