



GENERATION CONTROLS:

Compliance with Generator Regulatory Technical Requirements

22 - 25 MAY 2017 | KUALA LUMPUR

Topics Covered

Generator Capability

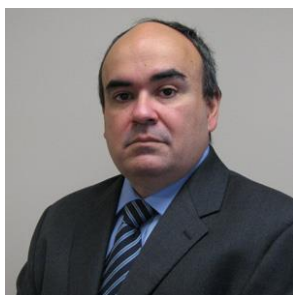
Excitation Limiters

Synchronous Generators

*MOD-025 Confirmation
of Reactive Capability*

*Power System Stability
and Stabilizers*

*Generator Protective
Relays*



Expert Course Faculty Leader

LEONARDO LIMA

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About This Training Course

The Generation Controls course is designed to instruct plant engineers and technicians on the core concepts of utility generators and associated control systems with a goal of familiarizing technical utility staff with the requirements of the latest NERC regulations and to help them identify their role in meeting these requirements within their organization. The material is tailored to cover the specific systems, configurations and operating scenarios associated with the attendees.

Learning Outcomes

Delegates will learn about:

- Review technical background material necessary to understand the topic and provide references for further study
- Review latest version of the applicable standard along with regional interpretations of the requirements
- Discuss methods of meeting technical requirements.
- Perform sample calculations, exercises and simulations illustrating the technical issues and test methods.

Course Delivery Method

The course provides classroom based instruction and utilizes a comprehensive computer based course manual along with a generator controls simulation software package. This software package allows each attendee to perform interactive simulation exercises that are related to various course topics, such as: Generator Reactive Capability, Generator Voltage Control, Auto Voltage Regulator Tuning, Power System Stabilizer Operation and others. The simulations utilize accurate generator and control system models and allow the user to adjust settings, alter system configurations and control operation while viewing the simulated response on graphs and meters. The interactive simulations are an excellent means of better understanding the practical application of the course material.

Who Should Attend

Electrical engineers involved in power generation, particularly for those plants in an interconnected system
Power plant operational staff, particularly for those units equipped with a PSS or considering the addition of a PSS
Electrical engineers involved in interconnected system operation and planning, particularly those involved in dynamic system simulation

Your Expert Course Faculty: Leonardo Lima

Leonardo Lima received his B.S.E.E. in 1986, his M.Sc. in 1991 and his D.Sc. in 1999 from Universidade Federal do Rio de Janeiro in Rio de Janeiro, Brazil. He has more than 20 years of professional experience in power system analysis and simulation, including system studies for transmission planning and operation. He worked in the development of the small-signal stability program PacDyn between 1984 and 1988. In 1992, he joined the Power System Engineering Department of the Universidade Federal Fluminense, in Niterói, Brazil, as an Assistant Professor, lecturing under-graduate and graduate courses in classical control theory, power system analysis, power system stability, power system planning, and electrical machines. He became a full Professor in 1999. He joined the PTI's (currently Siemens PTI) consulting practice in 2002 and became a Principal Consultant in 2009, where he specialized in dynamic modelling and simulation using PSS/E. He joined Kestrel Power Engineering in 2010 as a Senior Engineer. He is a member of the IEEE Power Engineering Society and is currently the Secretary of the Power System Stability Controls Subcommittee of the Power System Dynamic Performance Committee.

4 Day Course Outline

Module 1: Reactive Power Capability

Review of Basic Power System Concepts

- Basic concepts governing synchronously operating power systems
- The power system and control
- Power transfer in ac systems

Synchronous Generators

- Energy conversion and the synchronous generator - generator terminal characteristics
- Off-line and on-line operation
- Reactive capability

MOD-025 Confirmation of Reactive Capability

- Alternative methods (testing versus operating) voltage versus reactive limitations documentation requirements

Module 2: Excitation System Performance and Modeling

- Excitation System Design
- Excitation requirements imposed by the generator and by the power system
- Common designs: bus-fed static, rotating dc systems, rotating ac systems
- Automatic voltage regulation (AVR)
- Reactive current compensation

Power System Stability and Stabilizers

- Effect of excitation system on stability
- Oscillatory stability of synchronous machines
- Functional design of common stabilizers

MOD-026 Confirmation of Excitation Models and Performance

- Alternative methods manufacturer's data, testing, disturbance recording)
- Test instrumentation and procedures
- Documentation requirements

Module 3: Coordination of Protection, Limiters with Generator Capability

Generator Capability

- Overvoltage and V/Hz capability
- Limited time field winding limits
- Under-excited limitations

Excitation Limiters

- Over-excitation limiters
- Under-excitation limiters

Generator Protective Relays

- Multi-function digital versus discrete relays
- Fault versus overload relays

PRC-019 Confirmation of Excitation Models and Performance

- Excitation limiters and relation to generator and system capability
- Coordinating excitation limiters and protective relays
- Test and documentation requirements

Module 4: Verification of Generator Unit Frequency Response (Governor Controls)

Prime Movers

- Common elements of utility prime movers
- Steam, gas, hydraulic and wind turbines
- Frequency Control and Governors
- Speed governing of utility generation
- Design of conventional mechanical-hydraulic governors
- Design of electro-hydraulic governors
- Permanent droop and deadband
- Automatic generation control

MOD-027 Verification of Unit Frequency Response

- Methods of confirming frequency response (disturbance recording, staged tests)
- Models of turbine governors
- Documentation requirements

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Courses Available

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Frequently Asked Questions (FAQs)

1. Does PowerEdge have other programmes than those listed?

We have more than 200 programmes that we are capable of running. All we need is for you to contact us and request for the preferred programme and we will be able to develop it.

2. Where is PowerEdge based?

PowerEDGE is headquartered in Singapore but we run our training programmes in different venues around Asia.

3. What does PowerEdge do?

We are a Power & Utilities Training Specialist.

4. Can this course be done in our city?

It absolutely can. Get in touch with us to request for a training programme to be carried out in your city.

5. Can you reduce the price of our preferred course?

While our price has been reduced before it is even launched, we are always happy to help you with further discounts.

6. Can you change the dates of the course?

If you have a special requested date, let us know and we will arrange another session for you.

7. Who are the companies that will be participating?

This varies from a diversity of Power Operators, Regulators, Financiers, to Vendors in the Power & Utilities industry.

8. Where is the venue for the course?

We usually engage a 4 to 5 star hotel meeting room to ensure the comfort of our participants.

9. How many delegates should we expect for each course?

This varies from 15 to 20 participants. Class sizes are kept small to allow trainers to focus better on each participant.

10. What are the different payment modes?

We accept Visa/MasterCard, cheques, bank transfers and cash on site.

11. Is accommodation included when I sign up for a course?

Accommodation is not included in the course fee but we are always happy to advise on available accommodations.

12. Can I get a cheaper accommodation through PowerEdge?

We will be pleased to help you negotiate a better rate with hotels.

13. Is lunch provided during the course?

We provide lunch and 2 tea breaks every day during our training programmes.

14. Are the training materials included once I have signed up for a course?

Yes, training and course materials are included in the course fee.

15. Will there be a certificate for the course?

Yes, there will be a certificate of participation upon completion of a course.

16. Who are PowerEdge trainers?

They are expert consultants and practitioners with many years of experience in the subject matter that they deliver on.

17. Are PowerEdge trainers competent?

We have received numerous favourable feedbacks on our trainers from past participants.

18. Can PowerEdge assist with Visa travel applications?

We can assist in advising you on the relevant procedure(s) and embassies/consulates that provide Visa for travel purposes.

19. Can we purchase training materials without attending a course?

Unfortunately this option is not available as training materials are specially developed for courses.

20. Can course content be tweaked to cater to our needs?

Of course! Just let us know your request and we will get the trainer to assist in carrying it out.

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REGISTRATION FORM

	PER PARTICIPANT	2 PARTICIPANTS OR MORE	IN-HOUSE TRAINING
4 Day Programme	SGD 4, 500 Per Participant (*GST Exclusive)	SGD 4, 300 Per Participant (*GST Exclusive)	Guaranteed Minimum 40% Off Normal Price
	SGD 4, 815 Per Participant (GST Inclusive)	SGD 4, 601 Per Participant (GST Inclusive)	

ATTENDEE DETAILS

Name Job title

Tel Department Email

Name Job title

Tel Department Email

Name Job title

Tel Department Email

Name Job title

Tel Department Email

Name Job title

Tel Department Email

COMPANY DETAILS

Organisation name Industry.....

Address

Postcode..... Country.....

Tel Fax.....

PAYMENT METHODS

By Cheque/ Bank Draft: Make Payable to PowerEdge Pte Ltd.

By Telegraphic Transfer: Please quote AE1 with the remittance advise

Account Name: PowerEdge Pte. Ltd.

Bank Code: 7339 Branch code: 686 Account Number: 686-253386-001 Swift Code: OCBCSGSG

Bank Address: 65 Chulia Street OCBC Centre, Singapore 049513

All bank charges and payment in Singapore dollars (SGD) to be borne by payer. Please ensure that PowerEdge Pte Ltd receive the full invoiced amount.

PAYMENT POLICY

Payment is due in full at the time of registration. Full payment is mandatory for event attendance. I agree to PowerEdge Pte Ltd. payment terms

* GST- Exclusive price is only applicable for overseas corporate customers subject to qualifying conditions.

CANCELLATIONS & SUBSTITUTIONS

You may substitute delegates at any time. POWEREDGE PTE LTD does not provide refunds for cancellations. For cancellations received in writing more than seven (7) days prior to the training course you will receive a 100% credit to be used at another POWEREDGE PTE LTD training course for up to one year from the date of issuance. For cancellations received seven (7) days or less prior to an event (including day 7), no credits will be issued. In the event that POWEREDGE PTE LTD cancels an event, delegate payments at the date of cancellation will be credited to a future POWEREDGE PTE LTD event. This credit will be available for up to one year from the date of issuance. In the event that POWEREDGE PTE LTD postpones an event, delegate payments at the postponement date will be credited towards the rescheduled date. If the delegate is unable to attend the rescheduled event, the delegate will receive a 100% credit

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-  (65) 6741 9927
-  (65) 67478737

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-  (65) 6741 9927

