



# IEEE Guide for Test Procedures for Synchronous Machines

Part I—Acceptance and Performance Testing

Part II—Test Procedures and Parameter  
Determination for Dynamic Analysis

IEEE Power & Energy Society

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# Ieee Std 115 2009 Ieee Guide For Test Procedures For

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## **Ieee Std 115 2009 Ieee Guide For Test Procedures For:**

**IEEE Std 115-2009 (Revision of IEEE Std 115-1995) - Redline**, 2010      *115-2009 - IEEE Guide for Test Procedures for Synchronous Machines Part I--Acceptance and Performance Testing Part II--Test Procedures and Parameter Determination for Dynamic Analysis - Redline*, 2010      **Test bench design for power measurement of**

**inverter-operated machines in the medium voltage range** Schneider, Simon Michael, 2018-12-21 This thesis gives an overview of test bench design for inverter operated Medium Voltage MV drives with the focus on the active power measurement The sources of measurement setup uncertainty are analysed and methods are shown to assess these uncertainties Further a possibility is shown to do quantitative uncertainty estimations which are verified with measurements through different measurement setups for MV drives operated with multilevel converters The influence of measurement transducers voltage dividers power meters and data acquisition boards are considered The digital signal processing is analysed and the possibilities to reduce its uncertainty contribution on an active power measurement is shown An analysis is made with the conventional measurement devices in the MV range The transfer behaviour of the devices and the characteristics of the uncertainty are investigated Measurements are done on typical medium voltage drives with an uncertainty analysis which shows the essential aspects of active power measurement The results show the significance of a measurement setup performance The investigations on the drives are used to indicate the impact on the determination of the drive efficiency and gives a significant input for further standardisation processes The handling of measurement uncertainties during active power measurement of drives is shown concerning the permanent topic of energy saving and its efficient use The work proposes a way of categorising electrical drives in energy efficiency classes and to make their determination comparable Die vorliegende Dissertation gibt einen Überblick über den Prüfstands Aufbau von Umrichtergetriebenen Mittelspannungsantrieben Die Unsicherheitsquellen werden analysiert und Methoden werden aufgezeigt um die Messunsicherheit zu bewerten Des Weiteren werden die Machbarkeit von Unsicherheitsabschätzungen gezeigt welche mit Messungen an typischen Mittelspannungsantrieben mit Umrichterspeisung verglichen werden Der Einfluss von Messwandlern Spannungsteilern Leistungsmessern und Messkarten zur Signalerfassung wird berücksichtigt Die digitale Signalverarbeitung wird analysiert um den Unsicherheitsbeitrag zur Wirkleistungsmessung zu reduzieren Es werden konventionellen Messwandler und teile im Mittelspannungsbereich bezüglich ihres Übertragungsverhaltens sowie Messunsicherheiten untersucht Die Ergebnisse der Untersuchungen verdeutlichen die Signifikanz eines performanten Messaufbaus Des Weiteren werden Auswirkungen auf die Bestimmung der Effizienz aufgezeigt Die Arbeit liefert einen wesentlichen Beitrag für weitere Standardisierungsprozesse Der Umgang mit Messunsicherheiten der Wirkleistungsmessung wird betrachtet im Hinblick auf Energieeinsparpotenziale und deren effiziente Nutzung Die Arbeit schlägt eine Möglichkeit vor wie elektrische Antriebe in Energieeffizienzklassen kategorisiert werden können um diese vergleichbar zu machen

**IEEE Std 115-1995: IEEE Guide: Test Procedures for Synchronous Machines Part I--Acceptance and Performance Testing Part II-Test Procedures and Parameter Determination for Dynamic Analysis**, 1995 Abstract

Instructions for conducting the more generally applicable and accepted tests to determine the performance characteristics of synchronous machines are contained in this guide Although the tests described are applicable in general to synchronous generators synchronous motors larger than fractional horsepower synchronous condensers and synchronous frequency changers the descriptions make reference primarily to synchronous generators and synchronous motors Keywords acceptance and performance testing dynamic analysis parameter determination synchronous machines **Power System Modeling, Computation, and Control** Joe H. Chow, Juan J. Sanchez-Gasca, 2020-01-21 Provides students with an understanding of the modeling and practice in power system stability analysis and control design as well as the computational tools used by commercial vendors Bringing together wind FACTS HVDC and several other modern elements this book gives readers everything they need to know about power systems It makes learning complex power system concepts models and dynamics simpler and more efficient while providing modern viewpoints of power system analysis Power System Modeling Computation and Control provides students with a new and detailed analysis of voltage stability a simple example illustrating the BCU method of transient stability analysis and one of only a few derivations of the transient synchronous machine model It offers a discussion on reactive power consumption of induction motors during start up to illustrate the low voltage phenomenon observed in urban load centers Damping controller designs using power system stabilizer HVDC systems static var compensator and thyristor controlled series compensation are also examined In addition there are chapters covering flexible AC transmission Systems FACTS including both thyristor and voltage sourced converter technology and wind turbine generation and modeling Simplifies the learning of complex power system concepts models and dynamics Provides chapters on power flow solution voltage stability simulation methods transient stability small signal stability synchronous machine models steady state and dynamic models excitation systems and power system stabilizer design Includes advanced analysis of voltage stability voltage recovery during motor starts FACTS and their operation damping control design using various control equipment wind turbine models and control Contains numerous examples tables figures of block diagrams MATLAB plots and problems involving real systems Written by experienced educators whose previous books and papers are used extensively by the international scientific community Power System Modeling Computation and Control is an ideal textbook for graduate students of the subject as well as for power system engineers and control design professionals *Power System Control and Stability* Vijay Vittal, James D. McCalley, Paul M. Anderson, A. A. Fouad, 2019-10-15 The third edition of the landmark book on power system stability and control revised and updated with new material The revised third edition of Power System Control and Stability continues to offer a comprehensive text on the fundamental principles and concepts of power system stability and control as well as new material on the latest

developments in the field The third edition offers a revised overview of power system stability and a section that explores the industry convention of q axis leading d axis in modeling of synchronous machines In addition the third edition focuses on simulations that utilize digital computers and commercial simulation tools it offers an introduction to the concepts of the stability analysis of linear systems together with a detailed formulation of the system state matrix The authors also include a revised chapter that explores both implicit and explicit integration methods for transient stability Power System Control and Stability offers an in depth review of essential topics and Discusses topics of contemporary and future relevance in terms of modeling analysis and control Maintains the approach style and analytical rigor of the two original editions Addresses both power system planning and operational issues in power system control and stability Includes updated information and new chapters on modeling and simulation of round rotor synchronous machine model excitation control renewable energy resources such as wind turbine generators and solar photovoltaics load modeling transient voltage instability modeling and representation of three widely used FACTS devices in the bulk transmission network and the modeling and representation of appropriate protection functions in transient stability studies Contains a set of challenging problems at the end of each chapter Written for graduate students in electric power and professional power system engineers Power System Control and Stability offers an invaluable reference to basic principles and incorporates the most recent techniques and methods into projects

115-2009 *IEEE Guide: Test Procedures for Synchronous Machines Part I-- Acceptance and Performance Testing Part II-Test Procedures and Parameter Determination for Dynamic Analysis* , Converter-Based Dynamics and Control of Modern Power Systems Antonello Monti,Federico Milano,Ettore Bompard,Xavier Guillaud,2020-10-22 Converter Based Dynamics and Control of Modern Power Systems addresses the ongoing changes and challenges in rotating masses of synchronous generators which are transforming dynamics of the electrical system These changes make it more important to consider and understand the role of power electronic systems and their characteristics in shaping the subtleties of the grid and this book fills that knowledge gap Balancing theory discussion diagrams mathematics and data this reference provides the information needed to acquire a thorough overview of resilience issues and frequency definition and estimation in modern power systems This book offers an overview of classical power system dynamics and identifies ways of establishing future challenges and how they can be considered at a global level to overcome potential problems The book is designed to prepare future engineers for operating a system that will be driven by electronics and less by electromechanical systems Includes theory on the emerging topic of electrical grids based on power electronics Creates a good bridge between traditional theory and modern theory to support researchers and engineers Links the two fields of power systems and power electronics in electrical engineering

**Electromagnetic Analysis and Condition Monitoring of Synchronous Generators** Hossein Ehya,Jawad Faiz,2022-12-06 Electromagnetic Analysis and Condition Monitoring of Synchronous Generators Discover an insightful and complete overview of electromagnetic analysis and fault diagnosis in large

synchronous generators In **Electromagnetic Analysis and Condition Monitoring of Synchronous Generators** a team of distinguished engineers delivers a comprehensive review of the electromagnetic analysis and fault diagnosis of synchronous generators Beginning with an introduction to several types of synchronous machine structures the authors move on to the most common faults found in synchronous generators and their impacts on performance The book includes coverage of different modeling tools including the finite element method winding function and magnetic equivalent circuit as well as various types of health monitoring systems focusing on the magnetic field voltage current shaft flux and vibration Finally **Electromagnetic Analysis and Condition Monitoring of Synchronous Generators** covers signal processing tools that can help identify hidden patterns caused by faults and machine learning tools enabling automated condition monitoring The book also includes A thorough introduction to condition monitoring in electric machines and its importance to synchronous generators Comprehensive explorations of the classification of synchronous generators including armature arrangement machine construction and applications Practical discussions of different types of electrical and mechanical faults in synchronous generators including short circuit faults eccentricity faults misalignment core related faults and broken damper bar faults In depth examinations of the modeling of healthy and faulty synchronous generators including analytical and numerical methods Perfect for engineers working in electrical machine analysis maintenance and fault detection **Electromagnetic Analysis and Condition Monitoring of Synchronous Generators** is also an indispensable resource for professors and students in electrical power engineering

**Proceedings of the 4th International Conference on Electrical Engineering and Control Applications** Sofiane Bououden, Mohammed Chadli, Salim Ziani, Ivan Zelinka, 2020-09-29 This book gathers papers presented during the 4th International Conference on Electrical Engineering and Control Applications It covers new control system models troubleshooting tips and complex system requirements such as increased speed precision and remote capabilities Additionally the papers discuss not only the engineering aspects of signal processing and various practical issues in the broad field of information transmission but also novel technologies for communication networks and modern antenna design This book is intended for researchers engineers and advanced postgraduate students in the fields of control and electrical engineering computer science and signal processing as well as mechanical and chemical engineering

**Power and Distribution Transformers** K.R.M. Nair, 2021-02-12 This book is based on the author's 50 years experience in the power and distribution transformer industry The first few chapters of the book provide a step by step procedures of transformer design Engineers without prior knowledge or exposure to design can follow the procedures and calculation methods to acquire reasonable proficiency necessary to designing a transformer Although the transformer is a mature product engineers working in the industry need to understand its fundamentals and design to enable them to offer products to meet the challenging demands of the power system and the customer This book can function as a useful guide for practicing engineers to undertake new designs cost optimization design automation etc without the need for external help or

consultancy The book extensively covers the design processes with necessary data and calculations from a wide variety of transformers including dry type cast resin transformers amorphous core transformers earthing transformers rectifier transformers auto transformers transformers for explosive atmospheres and solid state transformers The other subjects covered include carbon footprint calculation of transformers condition monitoring of transformers and design optimization techniques In addition to being useful for the transformer industry this book can serve as a reference for power utility engineers consultants research scholars and teaching faculty at universities

### **Transient Analysis of Power Systems**

Juan A. Martinez-Velasco, 2020-02-10 A hands on introduction to advanced applications of power system transients with practical examples Transient Analysis of Power Systems A Practical Approach offers an authoritative guide to the traditional capabilities and the new software and hardware approaches that can be used to carry out transient studies and make possible new and more complex research The book explores a wide range of topics from an introduction to the subject to a review of the many advanced applications involving the creation of custom made models and tools and the application of multicore environments for advanced studies The authors cover the general aspects of the transient analysis such as modelling guidelines solution techniques and capabilities of a transient tool The book also explores the usual application of a transient tool including over voltages power quality studies and simulation of power electronics devices In addition it contains an introduction to the transient analysis using the ATP All the studies are supported by practical examples and simulation results This important book Summarises modelling guidelines and solution techniques used in transient analysis of power systems Provides a collection of practical examples with a detailed introduction and a discussion of results Includes a collection of case studies that illustrate how a simulation tool can be used for building environments that can be applied to both analysis and design of power systems Offers guidelines for building custom made models and libraries of modules supported by some practical examples Facilitates application of a transients tool to fields hardly covered with other time domain simulation tools Includes a companion website with data input files of examples presented case studies and power point presentations used to support cases studies Written for EMTP users electrical engineers Transient Analysis of Power Systems is a hands on and practical guide to advanced applications of power system transients that includes a range of practical examples

### Large Turbo-Generators

Isidor Kerszenbaum, Geoff Klempner, 2016-09-15 This book presents a comprehensive ordered relationship between malfunctions and symptoms occurring in large turbogenerators With this book the operator and or engineer in a generating station could identify underlying causes of a developing component degradation or a failure quicker which could potentially save both time and money and reduce the trial and error troubleshooting process Large turbogenerators are the most important source of electricity They can be found in thousands of power stations in every country Forced outages failures and degradation of these very expensive machines have an enormous aggregate cost to society As such any tool that can ameliorate loss of production by shaving time from troubleshooting activities and avoiding

unnecessary costs by detecting and promptly responding to component degradation represents a step forward *Springer Handbook of Power Systems* Konstantin O. Papailiou, 2021-04-12 This handbook offers a comprehensive source for electrical power professionals It covers all elementary topics related to the design development operation and management of power systems and provides an insight from worldwide key players in the electrical power systems industry Edited by a renowned leader and expert in Power Systems the book highlights international professionals longstanding experiences and addresses the requirements of practitioners but also of newcomers in this field in finding a solution for their problems The structure of the book follows the physical structure of the power system from the fundamentals through components and equipment to the overall system In addition the handbook covers certain horizontal matters for example Energy fundamentals High voltage engineering and High current and contact technology and thus intends to become the major one stop reference for all issues related to the electrical power system *Partial Discharges in Hydroelectric Generators* Victor Dmitriev, Rodrigo M. S. Oliveira, Ronaldo F. Zampolo, Paulo R. Moutinho de Vilhena, Fernando de Souza Brasil, Martim Felipe Fernandes, 2023-12-01 Effective implementation of predictive maintenance programs in power plants requires the online condition monitoring of electrical generators This book offers a comprehensive guide on the measurement detection and interpretation of partial discharges in hydroelectric generators It covers a range of essential topics such as the physics of partial discharge phenomenon various types of defects and partial discharge patterns sensors and acquisition procedures signal processing techniques automatic classification of discharge types and correlation between partial discharge occurrence and ozone generation Numerical modelling of partial discharges and calculation of the associated radiating electromagnetic fields are also discussed To aid understanding the book provides theoretical explanations practical examples and functional Python code on Google s Colaboratory platform This book is a valuable resource for anyone seeking a deep understanding of partial discharges in hydroelectric generators Presents in depth theory with examples Provides experimental data illustrating effects of PD in machine components Includes functional Python and C code examples **Synchronous Generators and Excitation Systems Operating in a Power System** Stefan Paszek, Andrzej Boboń, Sebastian Berhausen, Łukasz Majka, Adrian Nocoń, Piotr Pruski, 2020-01-03 In simulation tests of dynamic states of the power system PS the database of parameters of mathematical models of generating units is most commonly used In many cases the parameter values are burdened with large errors Consequently the results obtained are not reliable and do not allow drawing true conclusions This monograph presents the developed methods and tools supporting the process of measurement determination of reliable values of parameters of mathematical models of synchronous generators and excitation systems Special measurement tests are the basis for determining the parameters The tests can be carried out in conditions of normal operation of generating units in which electrical machines operate in the state of saturation of magnetic cores and voltage regulators can reach limits This book is intended for specialists in power engineering as well as students of faculties of electrical engineering interested



in issues of PS transient states      *The Rediscovery of Synchronous Reluctance and Ferrite Permanent Magnet Motors*  
Gianmario Pellegrino, Thomas M. Jahns, Nicola Bianchi, Wen L. Soong, Francesco Cupertino, 2016-04-28 This book offers an essential compendium on the analysis and design of synchronous motors for variable speed applications Focusing on synchronous reluctance and ferrite permanent magnet PM synchronous reluctance machines it provides a broad perspective on three phase machines for variable speed applications a field currently dominated by asynchronous machines and rare earth PM synchronous machines It also describes synchronous reluctance machines and PM machines without rare earth materials comparing them to state of the art solutions The book provides readers with extensive information on and finite element models of PM synchronous machines including all relevant equations and with an emphasis on synchronous reluctance and PM assisted synchronous reluctance machines It covers ferrite assisted machines modeled as a subcase of PM assistance fractional slot combinations solutions and a quantitative normalized comparison of torque capability with benchmark PM machines The book discusses a wealth of techniques for identifying machine parameters with an emphasis on self commissioning algorithms and presents methods for automated machine design and optimization including a software tool developed for this purpose Addressing an important gap in the field of PM less and less PM electrical machines it is intended as a self contained reference guide for both graduate students and professional machine designers and as a useful text for university courses on automated and or optimized design of electrical machines and drives      **Index of Specifications and Standards** ,2005      **IEEE 115: 2009** ,      **Index to IEEE Publications** Institute of Electrical and Electronics Engineers,1985 Issues for 1973 cover the entire IEEE technical literature

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