INTERNATIONAL STANDARD

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Hydroelectric power plant automation – Guide for computer-based control

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HYDROELECTRIC POWER PLANT AUTOMATION –
GUIDE FOR COMPUTER-BASED CONTROL

FOREWORD

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International Standard IEC 62270 has been prepared by IEC technical committee 4: Hydraulic turbines.

The text of this standard is based on the IEEE Standard 1249 (1996) IEEE guide for computer-based control for hydroelectric power plant automation. It was submitted to the national committees for voting under the Fast Track procedure as the following documents:

<table>
<thead>
<tr>
<th>FDIS</th>
<th>Report on voting</th>
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<tr>
<td>4/188/FDIS</td>
<td>4/190/RVD</td>
</tr>
</tbody>
</table>

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.
The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.
INTRODUCTION

Automation of hydroelectric generating plants has been a known technology for many years. Due to the relative simplicity of the control logic for hydroelectric power plants, the application of computer-based control has lagged, compared to other types of generating stations, such as fossil. Now that computer-based control can be implemented for comparable costs as relay-based logic and can incorporate additional features, it is being applied in hydroelectric power stations worldwide, both in new installations and in the rehabilitation of older plants.
HYDROELECTRIC POWER PLANT AUTOMATION –
GUIDE FOR COMPUTER-BASED CONTROL

1 Overview

1.1 Scope

This standard sets down guidelines for the application, design concepts, and implementation of computer-based control systems for hydroelectric plant automation. It addresses functional capabilities, performance requirements, interface requirements, hardware considerations, and operator training. It includes recommendations for system testing and acceptance. Finally, case studies of actual computer-based automatic control applications are presented.

The automation of control and data logging functions has relieved the plant operator of these tasks, allowing the operator more time to concentrate on other duties. In many cases, the plant’s operating costs can be significantly reduced by automation (primarily via staff reduction) while still maintaining a high level of unit control reliability.

Automatic control systems for hydroelectric units based on electromechanical relay logic have been in general use for a number of years and, in fact, were considered standard practice for the industry. Within the last decade, microprocessor-based controllers have become available that are suitable for operation in a power plant environment. These computer-based systems have been applied for data logging, alarm monitoring, and unit and plant control. Advantages of computer-based control include use of graphical user interfaces, the incorporation of sequence of events and trending into the control system, the incorporation of artificial intelligence and expert system capabilities, and reduced plant life cycle cost.

1.2 Purpose

This standard is directed to the practicing engineer who has some familiarity with computer-based control systems and who is designing or implementing hydroelectric unit or plant control systems, either in a new project or as a retrofit to an existing one. This standard assumes that the control system logic has already been defined; therefore, its development is not covered. For information on control sequence logic, the reader is directed to the IEEE guides for control of hydroelectric power plants listed in Clause 2 of this standard.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61158, Digital data communications for measurement and control - Fieldbus for use in industrial control systems
ANSI C63.4-2001, Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz–40 GHz

1 ANSI publications are available from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.
2 IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.
IEEE Std 485-1997, IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications (ANSI)


IEEE 1379: 2000, IEEE Recommended Practice for Data Communications Between Remote Terminal Units and Intelligent Electronic Devices in a Substation (ANSI)


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3 ISO publications are available from the ISO Central Secretariat, Case Postale 56, 1 rue de Varembe, CH-1211, Genève 20, Switzerland/Suisse. ISO publications are also available in the United States from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.