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Communication networks and systems for power utility automation – Part 7-510: Basic communication structure – Hydroelectric power plants, steam and gas turbines – Modelling concepts and guidelines

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CONTENTS

FOREWORD 7
INTRODUCTION 9
1 Scope 10
2 Normative references 10
3 Terms and definitions 11
4 Overview 11
4.1 General 11
4.2 Target group 11
4.3 Hydro power domain 11
4.3.1 General 11
4.3.2 Hydropower plant specific information 11
4.4 Thermal power domain 14
4.4.1 General 14
4.4.2 Steam turbine power plant specific information 14
4.4.3 Gas turbine specific information 15
4.4.4 Combined cycle power plants 16
4.4.5 Coal-fired power plant specific information 17
5 Process modelling 18
5.1 Reference designation system 18
5.1.1 General 18
5.1.2 Structuring principles and reference designation system 18
5.1.3 Object ownership principle 18
5.1.4 The concept of aspects 19
5.1.5 The RDS-structure and classification 20
5.1.6 Example: Unit 2 main inlet valve with a bypass system 21
5.1.7 The top node 21
5.2 SCL modelling of the functional structure of a hydropower plant 23
5.3 Mapping the SCL Process structure to the reference designation system RDS 24
5.3.1 General 24
5.3.2 Hierarchical mapping of information 25
5.3.3 Process object reference design considerations 27
5.3.4 Choice of logical node classes 27
5.4 The Alpha Valley River System examples 27
5.4.1 Introduction 27
5.4.2 The Reservoirs 29
5.4.3 Hydrometric 31
6 SCL:DataType template modelling 34
6.1 General 34
6.2 LNodeType definition 34
6.3 DOType definition 35
6.4 DAType and EnumType definition 36
6.5 Example using SLVL 37
7 SCL:IED modelling 37
7.1 General 37
7.2 Linking the SCL:IED model to the SCL:process model 37

7.3 Referencing the Logical Device 37
7.4 SCL:Function element 39
8 Communication Modelling 39
8.1 General 39
8.2 Communication structure in hydro power plants 41
8.2.1 General 41
8.2.2 Process bus level 41
8.2.3 Station Bus 42
8.2.4 Enterprise Bus 42
8.3 Communication structure in thermal power plants 42
9 Modelling of controls 46
9.1 General 46
9.2 Operational modes for hydropower plants 46
9.3 Operational modes for thermal power plants 47
9.4 Fundamental control strategies for hydropower plants 47
9.5 Joint control modelling examples 48
9.5.1 General 48
9.5.2 Joint control of active power 48
9.5.3 Joint Control of Reactive Power 50
9.5.4 Joint Control of Water 52
9.6 Scheduling Example 53
9.7 Example of application for an excitation system 54
9.7.1 General 54
9.7.2 Voltage regulation example 59
9.7.3 PSS example 61
9.8 Example of application for a turbine governor system 62
9.8.1 General 62
9.8.2 Signal hierarchy 62
9.8.3 Basic overview 62
9.8.4 Detailed description of used IED structure 64
9.9 Example of a braking system 71
9.9.1 General 71
9.9.2 Brake control with mandatory data objects in LN: HMBR 71
9.9.3 Brake control with process indications 72
9.10 Example of a heater system 72
9.10.1 General 72
9.10.2 Example of a LN: KHTR usage 73
9.11 Examples of how to reference a start / stop sequencer of a hydropower unit 73
9.11.1 General 73
9.11.2 Unit sequences definition with IEC 61850 74
9.11.3 Start sequence from a state "stopped" to a state "speed no load not excited" (Sequence 1) 75
9.11.4 Start sequence from state "speed no load not excited" to state "synchronised" (Sequence 2) 76
9.11.5 Stop sequence from state "synchronised" to state "speed no load not excited" (sequence 3) 78
9.11.6 Shutdown sequence from state " synchronised " to state "stopped" (Sequence 4) 79
9.11.7 Fast shutdown sequence from state " synchronised " to state "stopped" (Sequence 5) 82

9.11.8 Emergency shutdown sequence from state " synchronised " to state "stopped" (sequence 6) 84
9.12 Example of a capability chart representation 86
9.12.1 General 86
9.12.2 Example of a capability curve 86
9.12.3 Example of a Hill chart 88
9.12.4 Example of a multi-layer capability chart 89
9.13 Pump start priorities of a high-pressure oil system 91
9.13.1 General 91
9.13.2 Sequence to manage a pump start priorities 92
9.13.3 Sequence to manage a pump 94
9.14 Examples of how to use various types of curves and curve shape descriptions 95
9.15 Examples of voltage matching function 96
Annex A (informative) Electrical single line diagrams of thermal power plants 97
Annex B (informative) System Specification Description for the Alpha 2 power plant 100
Annex C (informative) RDS schema for the Alpha 2 power plant 163
Bibliography 169

Figure 1 – Principles for the joint control function 12
Figure 2 – Water flow control of a turbine 13
Figure 3 – Example of a large steam turbine 14
Figure 4 – Simplified example of a large steam turbine power plant with typical control system 15
Figure 5 – Example of a gas turbine 16
Figure 6 – Example of a combined cycle power plant with one GT and one ST in a multi-shaft configuration 16
Figure 7 – Example of a combined cycle power plant with one GT and one ST in a single shaft configuration 17
Figure 8 – Example of heat flow diagram of a coal-fired power plant 18
Figure 9 – IEC/ISO 81346 ownership principle 19
Figure 10 – A system breakdown structure showing the recursive phenomenon of system elements also being systems 20
Figure 11 – Three levels of classes within RDS 20
Figure 12 – A system breakdown structure for a system of interest 21
Figure 13 – Example of an RDS top node implementation 22
Figure 14 – SCL process elements are structured according to the RDS Power Supply system designations 24
Figure 15 – SCL process elements are structured according to the RDS Construction Works designations 24
Figure 16 – IED model (LNs) linked to the SCL Process structure with the Power Supply ystem profile 25
Figure 17 – IED model (LNs) linked to the SCL Process structure with the Construction works profile 25
Figure 18 – The Alpha Valley River System example 28
Figure 19 – Primary and supporting system to SCL overview 29
Figure 20 – Mapping between IEC/ISO 81346 (RDS) and IEC 61850 (SCL) 29
Figure 21 – Reservoir locations 30

Figure 22 – Mapping of water levels with logical node TLVL 31
Figure 23 – Mapping of water levels with logical HLVL 32
Figure 24 – Mapping of water levels with logical MHYD 32
Figure 25 – Mapping of the rate of discharge with logical node TFLW 33
Figure 26 – Mapping of the rate of discharge with logical node HWCL 33
Figure 27 – Mapping of the rate of discharge with logical node MHYD 34
Figure 28 – The structure of LN SLVL 37
Figure 29 – Schematic mapping of the process element to IED 38
Figure 30 – Mapping the process element to IED and DataTemplate 39
Figure 31 – Bus and services example 40
Figure 32 – Hydro bus and services 41
Figure 33 – Typical communication structure with two GTs and one ST, with the use of IEC 61850 interface controller 43
Figure 34 – Typical communication structure with two GTs and one ST, with IEC 61850 interface of process controllers 44
Figure 35 – Typical communication structure with two GTs and one ST, with IEC 61850 interface of process controllers from different manufacturers 45
Figure 36 – Typical communication structure with one ST, with IEC 61850 interface of process controllers 46
Figure 37 – Joint Control of active power 50
Figure 38 – Joint control of reactive power (SCL:Function:Fct2) 51
Figure 39 – Example of joint control of water 53
Figure 40 – An example of scheduling of active power output 54
Figure 41 – Examples of logical nodes used in an excitation system 55
Figure 42 – Example of an excitation a functional breakdown 57
Figure 43 – Example of logical devices of the regulation part of an excitation system 58
Figure 44 – AVR basic regulator 59
Figure 45 – Superimposed regulators, power factor regulator 59
Figure 46 – Superimposed regulators, over-excitation limiter 60
Figure 47 – Superimposed regulators, under-excitation limiter 60
Figure 48 – Superimposed regulators, follow up 61
Figure 49 – Power system stabilizer function 61
Figure 50 – Signal hierarchy 62
Figure 51 – Use of Logical Node HGOV with RDS-PS 63
Figure 52 – Governor control 66
Figure 53 – Flow control 67
Figure 54 – Level control 68
Figure 55 – Speed control 69
Figure 56 – Limitations 70
Figure 57 – Actuator control 71
Figure 58 – Brake control with mandatory data objects 72
Figure 59 – Brake control with indications 72
Figure 60 – Oil tank heater using a step controller 73
Figure 61 – Sequencer overview 74

Figure 62 – An example of a capability curve 87
Figure 63 – An example of a Hill chart (five variables) 88
Figure 64 – An example of a multi layered capability chart (five dimensions) 89
Figure 65 – Graphical representation of the high-pressure oil pumping unit 91
Figure 66 – Example of pump priority start logic sequence 93
Figure 67 – Example of pump start logic sequence 94
Figure 68 – Gate flow correlation 95
Figure 69 – Turbine correlation curve 95
Figure 70 – Example of traditional voltage adjusting pulses 96
Figure 71 – Example of mapping of the pulse time in IEC 61850 96
Figure 72 – Example of an IEC 61850 voltage adjusting command 96
Figure A.1 – Typical Single Line Diagram of a steam turbine power plant 97
Figure A.2 – Typical Single Line Diagram of a gas turbine power plant or a combined cycle power plant in single shaft configuration 98
Figure A.3 – Typical Single Line Diagram of a combined cycle power plant in multi-shaft configuration with separate step-up transformers 99
Figure A.4 – Typical Single Line Diagram of a combined cycle power plant in multi-shaft configuration with 3-winding step-up transformers 99

Table 1 – IEC/ISO 81346 aspects 19
Table 2 – Mapping SCL to RDS-PS 26
Table 3 – Reservoir descriptions 30
Table 4 – Examples of water level measurements 31
Table 5 – Examples of the rate of discharge measurements 33
Table 6 – Functional breakdown of an RDS component with functions for joint control 48
Table 7 – Joint Control active power setpoints data flow 50
Table 8 – Joint Control reactive power setpoints data flow 52
Table 9 – Joint Control flow setpoints data flow 53
Table 10 – Functional breakdown of a Process child RDS component with functions 56
Table 11 – Functional breakdown of a Process child RDS component with functions 64
Table 12 – Alpha2 Typical sequences 74
Table 13 – Capability table 87
Table 14 – Mapping of Hill charts 88
Table 15 – Five-dimensional capability chart 90
Table 16 – Alpha2 Typical pump sequences 91

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-510: Basic communication structure – Hydroelectric power plants, steam and gas turbines – Modelling concepts and guidelines

FOREWORD

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IEC TR 61850-7-510 has been prepared by IEC technical committee 57: Power systems management and associated information exchange. It is a Technical Report.

This second edition cancels and replaces the first edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Process modelling according to IEC 61850-6:2009, including IEC 61850-6:2009/AMD1:2018.
b) Examples of application of Reference Designation System together with the process modelling, in particular application of IEC/ISO 81346.
c) Description of modelling related to Steam- and Gas turbines.
d) Annexes with examples of application of SCL according to the examples in the Technical Report.

e) The dynamic exchange of values by using polling, GOOSE, Reporting or Sampled Values is no longer included in the Technical Report.

f) Updated examples of application of SCL:Process and IED modelling applying the Logical Nodes defined in IEC 61850-7-410:2012, including IEC 61850-7-410:2012/AMD1:2015.

The text of this Technical Report is based on the following documents:

DTR	Report on voting
57/2391/DTR	57/2432/RVDTR

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

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts of the IEC 61850 series, under the general title: *Communication networks and systems for power utility automation*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This Technical Report is connected with IEC 61850-7-410, as well as IEC 61850-7-4:2010, explaining how the control system and other functions in a hydropower, steam or gas turbine plant can use logical nodes and information exchange services within the complete IEC 61850 package to specify the information needed and generated by, and exchanged between functions.

The dynamic exchange of values by using polling, GOOSE, Reporting or Sampled Values is beyond the scope of this document.

This document applies the SCL Process element structure for modelling of the processes.

Examples of application of SCL Code according to the modelling examples in this document are presented in Annex B and Annex C.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-510: Basic communication structure – Hydroelectric power plants, steam and gas turbines – Modelling concepts and guidelines

1 Scope

This part of IEC 61850, which is a technical report, is intended to provide explanations on how to use the Logical Nodes defined in IEC 61850-7-410 as well as other documents in the IEC 61850 series to model complex control functions in power plants, including variable speed pumped storage power plants.

IEC 61850-7-410 introduced the general modelling concepts of IEC 61850 for power plants. It is however not obvious from the standard how the modelling concepts can be implemented in actual power plants.

This document explains how the data model and the concepts defined in the IEC 61850 standard can be applied in Hydro; both directly at the process control level, but also for data structuring and data exchange at a higher level. Application of the data model for Thermal is limited to power evacuation (in principle the extraction of the generated electrical power) and the prime mover shaft and bearing system. The interfaces of the fuel and steam valves are modelled for the purpose of process control.

Communication services, and description of the use of mappings of the IEC 61850 data model to different communication protocols, are outside the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61362:2012, *Guide to specification of hydraulic turbine governing systems*

IEC 61850-6:2009, *Communication networks and systems for power utility automation – Part 6: Configuration description language for communication in electrical substations related to IEDs*

IEC 61850-7-3:2010, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*
IEC 61850-7-3:2010/AMD1:2020

IEC 61850-7-4:2010, *Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object classes*
IEC 61850-7-4:2010/AMD1:2020

IEC 61850-7-410:2012, *Communication networks and systems for power utility automation – Part 7-410: Basic communication structure – Hydroelectric power plants – Communication for monitoring and control*
IEC 61850-7-410:2012/AMD1:2015

ISO 81346-10:—[1], *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 10: Power Supply systems*

[1] Under preparation. Stage at the time of publication: ISO/DIS 81346-10:2021.