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TECHNICAL REPORT

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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
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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.

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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.