IEC TR 61850-90-7

Edition 2.0 2023-08
REDLINE VERSION

TECHNICAL REPORT

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Communication networks and systems for power utility automation – Part 90-7: Object models for power converters in distributed energy resources (DER) systems

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.200

ISBN 978-2-8322-7452-1

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 90-7: Object models for power converters in distributed energy resources (DER) systems

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC TR 61850-90-7:2013. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC TR 61850-90-7 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 2013. This edition is primarily an editorial revision in order to be consistent with the publication of Edition 2 of IEC 61850-7-420:2021.

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

a) Clause 3 has been updated.
b) Clause 8 (IEC 61850 information models for power converter-based functions) has been deleted. This clause defined data models with the transitional namespace “(Tr) IEC 61850-90-7:2012”. The data models are now defined in IEC 61850-7-420.

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

Draft	Report on voting
57/2558/DTR	57/2610/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/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.

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 90-7: Object models for power converters in distributed energy resources (DER) systems

1 Scope

This part of IEC 61850, which is a Technical Report, describes functions for power converter-based distributed energy resources (DER) systems, focused on DC-to-AC and AC-to-AC conversions and including photovoltaic systems (PV), battery storage systems, electric vehicle (EV) charging systems, and any other DER systems with a controllable power converter.

The functions defined in this document were used to help define the ~~IEC 61850~~ information models ~~to~~ described in IEC 61850-7-420 and which can be used in the exchange of information between these power converter-based DER systems and the utilities, energy service providers (ESPs), or other entities which are tasked with managing the volt, var, and watt capabilities of these power converter-based systems.

These power converter-based DER systems can range from very small grid-connected systems at residential customer sites, to medium-sized systems configured as microgrids on campuses or communities, to very large systems in utility-operated power plants, and to many other configurations and ownership models. They may or may not combine different types of DER systems behind the power converter, such as a power converter-based DER system and a battery that are connected at the DC level.

~~The namespace of this document is:~~

~~"(Tr) IEC 61850-90-7:2012"~~

~~The namespace "IEC 61850-90-7" is considered as "transitional" since the models are expected to be included in IEC 61850-7-420. Potential extensions/modifications may happen if/when the models are moved to International Standard status.~~

~~Only the new data objects and CDCs which are represented in ***bold-italic font*** will be tagged with this namespace name. The others should still refer to the namespace where they are primarily defined.~~

NOTE The term power converter is being used in place of "inverter" since it covers more types of conversion from input to output power:

- AC to DC (rectifier)
- DC to AC (inverter)
- DC to DC (DC-to-DC converter)
- AC to AC (AC-to-AC converter)

2 Normative references

~~The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.~~

~~IEC 61850-7-2, *Communication networks and systems for power utility automation – Part 7-2: Basic communication structure – Abstract communication service interface (ACSI)*~~

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

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

~~IEC 61850-7-410, *Communication networks and systems for power utility automation – Part 7-410: Hydroelectric power plants – Communication for monitoring and control*~~

~~IEC 61850-7-420, *Communication networks and systems for power utility automation – Part 7-420: Basic communication structure – Distributed energy resources logical nodes*~~

~~IEC 61850-8-1, *Communication networks and systems for power utility automation – Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3*~~

~~ISO 4217, *Codes for the representation of currencies and funds*~~

~~*EEI Handbook for Electricity Metering*, 10th Edition (2002), Edison Electric Institute, Washington, D.C.~~

There are no normative references in this document.

IEC TR 61850-90-7

Edition 2.0 2023-08

TECHNICAL REPORT

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Communication networks and systems for power utility automation – Part 90-7: Object models for power converters in distributed energy resources (DER) systems



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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

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

Draft	Report on voting
57/2558/DTR	57/2610/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/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.

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 90-7: Object models for power converters in distributed energy resources (DER) systems

1 Scope

This part of IEC 61850, which is a Technical Report, describes functions for power converter-based distributed energy resources (DER) systems, focused on DC-to-AC and AC-to-AC conversions and including photovoltaic systems (PV), battery storage systems, electric vehicle (EV) charging systems, and any other DER systems with a controllable power converter.

The functions defined in this document were used to help define the information models described in IEC 61850-7-420 and which can be used in the exchange of information between these power converter-based DER systems and the utilities, energy service providers (ESPs), or other entities which are tasked with managing the volt, var, and watt capabilities of these power converter-based systems.

These power converter-based DER systems can range from very small grid-connected systems at residential customer sites, to medium-sized systems configured as microgrids on campuses or communities, to very large systems in utility-operated power plants, and to many other configurations and ownership models. They may or may not combine different types of DER systems behind the power converter, such as a power converter-based DER system and a battery that are connected at the DC level.

NOTE The term power converter is being used in place of “inverter” since it covers more types of conversion from input to output power:

- AC to DC (rectifier)
- DC to AC (inverter)
- DC to DC (DC-to-DC converter)
- AC to AC (AC-to-AC converter)

2 Normative references

There are no normative references in this document.