

Kommunikationsnetværk og -systemer til elforsyningsautomation – Del 90-17: Benyttelse af IEC 61850 til overførsel af data for elkvalitet

Communication networks and systems for power utility automation – Part 90-17: Using IEC 61850 to transmit power quality data

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TECHNICAL REPORT



Communication networks and systems for power utility automation – Part 90-17: Using IEC 61850 to transmit power quality data



CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	10
2 Normative references	11
3 Terms and definitions	12
4 Abbreviated terms	13
5 Uses cases and requirements: Application of power quality data	14
5.1 General.....	14
5.2 Constraints / assumptions / design considerations	14
5.3 Actors	15
5.4 Use case diagram	15
5.5 Use cases description.....	16
5.6 Sequence diagram	16
5.6.1 Request for power quality measurements	16
5.6.2 Sending of power quality events/limit violations	17
5.6.3 Retrieve power quality records	18
5.7 Classification and concepts for power quality measurements	18
5.7.1 General	18
5.8 PQ devices classification	21
5.9 PQ records	22
5.9.1 General	22
5.9.2 Evaluation of PQ records	24
5.9.3 Power frequency.....	24
5.9.4 Magnitude of power supply voltage.....	25
5.9.5 Supply voltage unbalance.....	27
5.9.6 Voltage Harmonics	28
5.9.7 Interharmonics.....	31
5.9.8 Mains signalling voltages.....	32
5.9.9 Flicker	33
5.9.10 Conducted emission in the 2 kHz to 9 kHz range	34
5.9.11 Conducted emissions in the 9 kHz to 150 kHz range.....	36
5.9.12 Magnitude of current.....	36
5.9.13 Current unbalance	37
5.9.14 Current harmonics	37
5.9.15 Current interharmonics	37
5.9.16 Current recording	37
5.10 PQ events.....	38
5.10.1 General	38
5.10.2 Supply voltage dips and interruptions	38
5.10.3 Evaluation of voltage events: Magnitude-duration table(s)	39
5.10.4 Flagging	41
5.10.5 Rapid voltage changes (RVC).....	42
6 IEC 61850 information models for power quality profiles.....	42
6.1 Power quality modelling name conventions	42
6.2 Modelling of a Class A power quality instrument	43
6.2.1 Use case 1: Request for power quality measurements	43

6.2.2	Use case 2: Sending of power quality events/limit violations	44
6.2.3	Use case 3: Retrieve power quality records	45
6.3	IEC 61850 PQ mapping	45
6.4	PQ monitoring.....	46
6.4.1	General	46
6.4.2	Use of LN MMXU/MMXN.....	46
6.4.3	Use of LN MHAI/MHAN.....	47
6.4.4	Use of LN MHFE – new LN	49
6.4.5	Use of LN MFLK	49
6.4.6	Use of LN MSQI	50
6.5	PQ event monitoring and PQ evaluation.....	50
6.5.1	General	50
6.5.2	Use of LN QVVR voltage variations	50
6.5.3	Use of LN QSVV Supply Voltage Variations – new LN	54
6.5.4	Use of LN QRVC rapid voltage changes – new LN.....	54
6.5.5	Use of LN QFVR frequency variations.....	55
6.5.6	Use of LN QVUB voltage unbalance	55
6.5.7	Use of LN QIUB current unbalance	55
6.5.8	Use of LN QFLK flicker limit violation.....	55
6.5.9	Use of LN QVHA harmonics/interharmonics limit violation – new LN -	56
6.5.10	Use of LN QMSV mains signalling voltage limit violation – new LN -	56
6.5.11	Use of LN QCPR continuous power quality recorder – new LN -	56
6.5.12	Use of LN QVTR voltage transients	57
6.5.13	Use of LN QITR current transients	57
7	Data model of namespace IEC 61850-90-17 for power quality	57
7.1	Namespace name and version	57
7.2	Abbreviated terms.....	57
7.3	Logical node classes.....	58
7.3.1	General	58
7.3.2	Package LNGroupM.....	58
7.3.3	Package LNGroupQ.....	61
7.4	Data semantics	80
7.5	Enumerated data attribute types	83
7.5.1	General	83
7.5.2	AffectedPhases90-17Kind enumeration	84
7.5.3	CalcMethod90-17Kind enumeration	85
7.5.4	FlickerCalcMethodKind enumeration.....	86
7.5.5	FreqRangeGroupKind enumeration.....	86
7.5.6	NumHarmonicPcbKind enumeration.....	87
7.5.7	VoltInterruptDetection90-17Kind enumeration.....	87
8	Communication services for data transfer	87
Annex A (normative)	SCL enumerations (IEC TR 61850-90-17)	89
A.1	SCL enumerations (from DOEnums_90_17).....	89
Figure 1	– Use cases related to Power Quality monitoring application.....	16
Figure 2	– Use case "Request for power quality measurements"	17
Figure 3	– Use case "Sending of power quality event/limit violation"	17
Figure 4	– Use case "Retrieve power quality records"	18

Figure 5 – File transfer of PQ records from IED to user.....	23
Figure 6 – File transfer of PQ reports from IED to user	23
Figure 7 – Voltage record example (6 h): 10 min r.m.s values of magnitude of supply voltage and additional record containing voltage variations (1/2 cycle r.m.s. values) in a single phase LV system (U _{din} = 230 V).....	24
Figure 8 – One-month power frequency record (10 s) and limits of frequency deviation 50 Hz ± 1 % according to EN 50160.....	24
Figure 9 – Example of a one day 10 min voltage r.m.s record in a single phase LV system (U _{din} = 230 V) with dip (90 %) and swell (110 %) limits	26
Figure 10 – Harmonic subgroup calculation method according to IEC 61000-4-7/IEC 61000-4-30	28
Figure 11 – Example of 10 min 3 rd harmonic record (single phase, LV 230 V), 5 weeks	29
Figure 12 – Interharmonic centred subgroup calculation method according to IEC 61000-4-7 and IEC 61000-4-30	32
Figure 13 – Voltage levels of signal frequencies in percent of nominal voltage U _n used in public LV and MV networks from EN 50160 standard	33
Figure 14 – Example of a one month long term Flicker record (single phase, 230 V).....	34
Figure 15 – Grouping of 5 Hz frequencies to 200 Hz frequency bands Y	35
Figure 16 – Voltage events with hysteresis explanation	38
Figure 17 – Example of a voltage event: voltage dip with limits (dip, swell, interruption), hysteresis = 2 % of U _{din} and additional record of voltage variations (1/2 cycle r.m.s. values).....	40
Figure 18 – Voltage dip event with additional fault record	40
Figure 19 – Flagged data: supply voltage magnitude is flagged if a voltage dip occurred in aggregation interval.....	41
Figure 20 – RVC characterization	42
Figure 21 – State of the art data modeling for use case “Request for power quality measurements” (new in IEC 61000-4-30:2015)	44
Figure 22 – State of the art data modeling for use case "Sending of power quality events/limit violations" (new in IEC 61000-4-30:2015).....	45
Figure 23 – State of the art data modelling for use case “Retrieve power quality records” (new in IEC 61000-4-30:2015)	45
Figure 24 – Modelling of magnitude-duration table for voltage events with histogram HST...	53
Figure 25 – Visualization of example event in Figure 17/Figure 18/Figure 24 in ITI curve	53
Figure 26 – Class diagram LogicalNodes_90_17::LogicalNodes_90_17	58
Figure 27 – Class diagram LNGroupM::LNGroupM.....	59
Figure 28 – Class diagram LNGroupQ::LNGroupQ1	62
Figure 29 – Class diagram LNGroupQ::LNGroupQ2	63
Figure 30 – Voltage events with hysteresis explanation	78
Figure 31 – Enumerated data attribute types.....	84
Table 1 – Actors and roles	15
Table 2 – Use cases and applications	16
Table 3 – Use case "Request for power quality measurements"	16
Table 4 – Use case "Sending of power quality events/limits violations"	17
Table 5 – Use case "Retrieve power quality records"	18

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Table 6 – Mapping between PQ measurement methods, evaluation/reporting requirements and IEC 61850 modelling.....	19
Table 7 – Relation between LN and PQ use cases.....	21
Table 8 – PQ records for Class A and Class S devices	22
Table 9 – Transfer of PQ records vs. transfer of PQ reports.....	23
Table 10 – Evaluation of power frequency data according to EN 50160	25
Table 11 – Evaluation of a voltage magnitude record (single phase, LV: 230 V).....	27
Table 12 – Limits for harmonics in LV/MV networks	29
Table 13 – Limits for harmonics in HV networks.....	30
Table 14 – LV/MV network limits for harmonics/interharmonics according to IEC TS 62749	30
Table 15 – HV network limits for harmonics/interharmonics according to IEC TS 62749.....	31
Table 16 – Flicker severity Plt recommended values.....	34
Table 17 – Evaluation of a Flicker record (single phase, nominal voltage 230 V).....	34
Table 18 – Requirements from IEC 61000-4-7:2009.....	35
Table 19 – Requirements from IEC 61000-4-30:2015.....	36
Table 20 – PQ event overview	38
Table 21 – Voltage dip/interruption and swell classification according to EN 50160.....	39
Table 22 – Voltage event classification according to IEC TS 62749	39
Table 23 – Example of single event assessment according to IEC TS 62749	40
Table 24 – Flagging requirements vs. use cases according to Figure 1	41
Table 25 – Calculation methods for power quality values according to IEC 61000-4-30.....	43
Table 26 – Calculation methods for modified power quality values	43
Table 27 – PQ mapping	46
Table 28 – Relation between nominal frequency, number of cycles and harmonics/interharmonics grouping for PQ application.....	48
Table 29 – Order of DC, harmonics and interharmonics in MHAI for PQ application	49
Table 30 – hstVal indices (e.g. according to IEC TS 62749).....	51
Table 31 – Array arrangement for voltage events.....	52
Table 32 – Normative abbreviations for data object names	58
Table 33 – Data objects of MHFE	60
Table 34 – Data objects of QCPR	64
Table 35 – Data objects of QFLK	65
Table 36 – Data objects of QFVRExt	67
Table 37 – Data objects of QITRExt	68
Table 38 – Data objects of QIUBExt	70
Table 39 – Data objects of QMSV	71
Table 40 – Data objects of QRVC	72
Table 41 – Data objects of QSVV.....	74
Table 42 – Data objects of QVHA	75
Table 43 – Data objects of QVTRExt	76
Table 44 – Data objects of QVUBExt.....	77
Table 45 – Data objects of QVVRExt.....	79
Table 46 – Attributes defined on classes of LogicalNodes_90_17 package	81
Table 47 – Literals of AffectedPhases90-17Kind	85

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Table 48 – Literals of CalcMethod90-17Kind	86
Table 49 – Literals of FlickerCalcMethodKind	86
Table 50 – Literals of FreqRangeGroupKind	87
Table 51 – Literals of NumHarmonicPcbKind	87
Table 52 – Literals of VoltInterruptDetection90-17Kind	87

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**COMMUNICATION NETWORKS AND SYSTEMS
FOR POWER UTILITY AUTOMATION –**

Part 90-17: Using IEC 61850 to transmit power quality data

FOREWORD

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IEC 61850-90-17, which is a technical report, has been prepared by IEC technical committee 57: Power systems management and associated information exchange, in cooperation with IEC technical committee 85: Measuring equipment for electrical and electromagnetic quantities.

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The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
57/1676/DTR	57/1836/RVDTR

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 "<http://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.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication 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

Power quality (PQ) measurement methods are defined in IEC 61000-4-30.

Power quality measurement instruments are used to evaluate the quality of electricity (voltage characteristics) supplied by distribution and transmission systems and to evaluate the performance (emission) of equipment.

These instruments provide different types of data for different applications of PQ data:

- Power quality monitoring:
 - Continuity of supply monitoring,
 - Monitoring of different voltage characteristics: Voltage quality (VQ) covers a wide range of voltage disturbances and deviations in voltage magnitude or waveform from the optimum values.
- Power quality compliance reporting:
 - Continuous monitoring and compliance reporting of different voltage characteristics at point of connection.
 - Additional data are helpful for:
 - a) Detailed problem analysis (e.g. waveform or transient records),
 - b) Flexible data evaluation (e.g. grid codes for data post processing).

NOTE See also "Document on Guidelines of Good Practice on the Implementation and Use of Voltage Quality Monitoring Systems for Regulatory Purposes, which has been jointly developed by CEER and the ECRB" (C12-EQS-51-03) and CIGRÉ/CIREN Joint Working Group (JWG) C4.112: "Guidelines for Power quality monitoring – measurement locations, processing and presentation of data".

IEC 61850 provides the services and data modeling for transmission of PQ related data from instruments to substation/SCADA systems.

There is a desire to have a communication mechanism that is compliant to the concept of IEC 61850. This document lays out how this shall be done.

File based transmission of PQ data is based on the following standards:

- IEC 60255-24/IEEE Std. C37.111, *Measuring relays and protection equipment – Part 24: Common format for transient data exchange (COMTRADE) for power systems for fault records*,
- IEEE Std. 1159.3, PQDIF for PQ records (events, measurements, records).

During modelling of PQ applications IEC 61850-7-4 and IEC 61850-7-3 will be reviewed.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 90-17: Using IEC 61850 to transmit power quality data

1 Scope

This part of IEC 61850, which is a technical report, provides a way of exchanging power quality data between instruments whose functions include measuring, recording and possibly monitoring power quality phenomena in power supply systems, and clients using them in a way that is compliant to the concepts of IEC 61850.

The main goal is the interoperability of power quality instruments.

NOTE 1 The measurement of PQ phenomena maybe provided by communication e.g. IEC 61850-9-2 or instrument transformers. Their application is outside of the scope of this document.

NOTE 2 This document does not set any limits for power quality values, but only repeats limits from other sources (e.g. EN 50160, IEC TS 62749) as suitable examples.

NOTE 3 This document provides recommendations for naming conventions for PQ measurements provided by power quality instruments to manifest the usage of Power quality measurement methods and to ensure interoperability.

This document provides

- Guidelines for using of IEC 61850 for power quality domain,
- Name space extensions based on power quality function assessment,
- Profile for using IEC 61850 in the specific context of IEC 61000-4-30.

Specific power quality requirements that cannot be wholly covered with existing Logical Nodes (LN) or Common Data Classes (CDC) (e.g. LN for continuous power quality recorders, LN for RVC, etc.) will be addressed and added in the next editions of IEC 61850-7-3 and IEC 61850-7-4.

NOTE 4 This document references to/is compliance with the future 61850 amendment 2.1, and also bring the needed elements which are mandatory to understand the document; at least the new presence conditions rules, as well as the enumeration models.

The namespace introduced by this document in Clause 7 has the following properties:

- Namespace Version: 2016
- Namespace Revision:
- UML model file which reflects this namespace edition: wg10uml02v20draftPQ00-wg18uml02v11b-wg17uml02v17c-jwg25uml02v04c-tc17umlv0-tc38umlv0.eap, UML model version WG10UML02v20DraftUpdate
- Namespace release date: 2017-01-17
- Namespace name: "(Tr)IEC61850-90-17:2016"

This name space is considered as "transitional" since the models are expected to be included in future editions of IEC 61850-7-4xx. 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 will be tagged with this namespace name. The others still refer to the namespace where they are primarily defined.

The Profile (set of additional rules) for using IEC 61850 in the specific context of IEC 61000-4-30, introduced in this document in Clause 6 is named "Profile_61000-4-30_(Tr)IEC61850-90-17:2016".

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 TR 61000-3-6, *Electromagnetic compatibility (EMC) – Part 3-6: Limits – Assessment of emission limits for the connection of distorting installations to MV, HV and EHV power systems*

IEC TR 61000-3-7, *Electromagnetic compatibility (EMC) – Part 3-7: Limits – Assessment of emission limits for the connection of fluctuating installations to MV, HV and EHV power systems*

IEC TR 61000-3-13, *Electromagnetic compatibility (EMC) – Part 3-13: Limits – Assessment of emission limits for the connection of unbalanced installations to MV, HV and EHV power systems*

IEC TR 61000-3-14, *Electromagnetic compatibility (EMC) – Part 3-14: Assessment of emission limits for harmonics, interharmonics, voltage fluctuations and unbalance for the connection of disturbing installations to LV power systems*

IEC 61000-4-7:2009, *Electromagnetic compatibility (EMC) – Part 4-7: Testing and measurement techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto*

IEC 61000-4-15:2010, *Electromagnetic compatibility (EMC) – Part 4-15: Testing and measurement techniques – Flickermeter – Functional and design specifications*

IEC 61000-4-30:2015, *Electromagnetic compatibility (EMC) – Part 4-30: Testing and measurement techniques – Power quality measurement methods*

IEC TS 61850-2, *Communication networks and systems in substations – Part 2: Glossary*

IEC 61850-7-1:2011, *Communication networks and systems for power utility automation – Part 7-1: Basic communication structure – Principles and models*

IEC 61850-7-2:2010, *Communication networks and systems for power utility automation – Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)*

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 61850-8-1:2011, *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*

IEC TR 61850-90-2, *Communication networks and systems for power utility automation – Part 90-2: Using IEC 61850 for the communication between substations and control centres*

IEC 62586-1:2013, *Power quality measurement in power supply systems – Part 1: Power quality instruments (PQI)*

IEC TS 62749:2015, *Assessment of power quality – Characteristics of electricity supplied by public networks*

IEEE Std. 1159.3:2003, *Power Quality Data Interchange Format (PQDIF)*

EN 51060, *Voltage characteristics in public distribution systems*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

power quality instrument

PQI

instrument according to IEC 62586-1 whose main function is to measure, record and possibly monitor power quality parameters in power supply systems, and whose measuring methods (class A or class S) are defined in IEC 61000-4-30

3.2

power quality instrument class A

PQI-A

PQI according to IEC 62586-1 whose measuring methods comply with class A of IEC 61000-4-30

3.3

channel

individual measurement path through an instrument

Note 1 to entry: "Channel" and "phase" are not the same. A voltage channel is by definition the difference in potential between 2 conductors. Phase refers to a single conductor. On polyphase systems, a channel may be between 2 phases, or between a phase and neutral, or between a phase and earth, or between neutral and earth.

3.4

power quality instrument class S

PQI-S

PQI according to IEC 62586-1 whose measuring methods comply with class S of IEC 61000-4-30

3.5

declared input voltage

U_{in}

value obtained from the declared supply voltage by a transducer ratio

3.6

declared supply voltage

U_c

nominal voltage U_n of the system