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TECHNICAL REPORT

colour inside

Power measurement applications within electrical distribution networks and electrical installations

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POWER MEASUREMENT APPLICATIONS WITHIN ELECTRICAL DISTRIBUTION NETWORKS AND ELECTRICAL INSTALLATIONS

FOREWORD

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IEC TR 63213, which is a Technical Report, has been prepared by IEC technical committee 85: Measuring equipment for electrical and electromagnetic quantities.

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

Draft TR	Report on voting
85/662/DTR	85/690/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.

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- withdrawn,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.

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INTRODUCTION

Utility engineers and facility managers are requesting rich power and energy data from many locations, with guaranteed and reliable accuracy. This data is essential for helping to understand and ensure the reliability, efficiency, and cost effectiveness of their power distribution systems and the energy generated or consumed.

A good understanding of the different kinds of measurement applications is critical to choosing the proper type and capabilities of measuring devices for each location that will deliver the required information.

To achieve these goals, a complete energy measurement plan supported by a network of metering devices.

This report offers an overview of the different categories of measurement applications, with detailed descriptions and illustrations of each, including references to the most relevant international standards.

POWER MEASUREMENT APPLICATIONS WITHIN ELECTRICAL DISTRIBUTION NETWORKS AND ELECTRICAL INSTALLATIONS

1 Scope

This Technical Report intends to provide state-of-the-art information on the various electricity measurement applications made in the grid (supply side) or in electrical installation (demand side), and on the related standards covering these applications.

This Technical Report does not address measurements made for specific purposes such as protection, control, automation or indication.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and notations

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

3.1 Measurement definitions

3.1.1
power quality instrument
PQI
instrument 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

[SOURCE: IEC 62586-1:2017, 3.1.1]

3.1.2
power quality assessment function
power quality functions whose measurement methods are defined in IEC 61000-4-30

[SOURCE: IEC 61557-12:2018, 3.1.2]

3.1.3
energy meter
instrument intended to measure electrical energy by integrating power with respect to time

[SOURCE: IEC 60050-313:2001, 313-01-35]

3.1.4
watt-hour meter
active energy meter
energy meter
instrument intended to measure active energy by integrating active power with respect to time

[SOURCE: IEC 60050-313:2001, 313-06-01, modified – The term "(active) energy meter" has been changed to "active energy meter" and the term "energy meter" has been added to comply with the ISO/IEC Directives Part 2:2018]

3.1.5
var-hour meter
reactive energy meter
instrument intended to measure reactive energy by integrating reactive power with respect to time

[SOURCE: IEC 60050-313:2001, 313-06-02]

3.1.6
power metering and monitoring device
PMD
combination in one or more devices of several functional modules dedicated to metering and monitoring electrical parameters in energy distribution systems or electrical installations, used for applications such as energy efficiency, power monitoring and network performance

Note 1 to entry: Under the generic term "monitoring" are also included functions of recording, alarm management, etc.

Note 2 to entry: These devices may include demand side quality functions for monitoring inside commercial/industrial installations.

[SOURCE: IEC 61557-12:2018, 3.1.1, modified – Note 3 to entry has been deleted.]

3.1.7
revenue meter
utility meter
billing meter
electricity meters for billing
energy meter used to meter energy delivered by an energy supplier and to calculate the related amount of money according to an agreed contract, defining the rate(s) and the time of use

Note 1 to entry: These devices are used to bill or invoice final customers.

3.1.8
rate
amount to be paid per unit purchased (e.g. 1 kWh, 1 kW, 1 kVA)

[SOURCE: IEC 60050-691:1973, 691-11-21]

3.1.9
time of use
segregation of energy rates based on the time in which the energy is being consumed

3.1.10
meter index
non-resettable numerical value representing the total energy measured by the meter

3.2 Measurement applications

3.2.1
grid power quality assessment
process that allows energy suppliers and/or their customers to verify that the quality of energy delivered/received fulfils requirements of a defined contract or regulation

Note 1 to entry: Limits for European public networks are defined in EN 50160.

3.2.2
power monitoring
process that allows a facility manager to monitor its electrical installation in order to ensure availability and reliability of energy as well as durability of electrical equipment.

3.2.3
energy management
process that allows a facility manager to monitor and control the energy consumption according to the uses and the cost of energy within an electrical installation

3.2.4
billing
process that allows energy suppliers or their representatives to invoice their customers according to a defined contract

Note 1 to entry: These applications can be covered by international standards, regulations such as MID in Europe or NMI in Australia, and/or utility specifications.

3.2.5
sub-billing
process that allows a landlord, property management firm, condominium association, homeowner association or other multi-tenant property to spread out invoice over energy users (assign portions of invoice to users), for measured usages or services.

Note 1 to entry: This fee is usually combined with other tenant's facility fees.

Note 2 to entry: The landlord does not commit on the quality of the supply.

3.2.6
cost allocation
process that allows a facility manager to account for energy costs from internal cost centres that consume energy

EXAMPLE: process line, test and inspection, administration.

3.2.7
calculation of tax incentives
process that allows an owner to get incentives from the state, based on measurements showing improvement in energy efficiency, according to a regulation

3.3 Grid definitions

3.3.1
electric power system
electricity supply system
all installations and plant provided for the purpose of generating, transmitting and distributing electricity

[SOURCE: IEC 60050-601:1985, 601-01-01, modified – The term "electricity supply system (in a broad sense)" has been changed to "electricity supply system" in order to comply with the ISO/IEC Directives Part 2:2018.]

3.3.2
generation of electricity
process whereby electrical energy is obtained from some other form of energy

[SOURCE: IEC 60050-601:1985, 601-01-06]

3.3.3
distribution of electricity
transfer of electricity to consumers within an area of consumption

[SOURCE: IEC 60050-601:1985, 601-01-10]

3.3.4
power station
electrical generating station
installation whose purpose is to generate electricity, and which includes civil engineering works, energy conversion equipment and all the necessary ancillary equipment

[SOURCE: IEC 60050-601:1985, 601-03-01]

3.3.5
substation
<of a power system> part of an electrical system, confined to a given area, mainly including ends of transmission or distribution lines, electrical switchgear and control gear, buildings and transformers

Note 1 to entry: The substation can be qualified according to the designation of the system of which it forms a part. Examples: transmission, substation (transmission system), distribution substation, 400 kV or 20 kV substation.

Note 2 to entry: A substation generally includes safety or control devices (for example, protection).

[SOURCE: IEC 60050-601:1985, 601-03-02, modified – In order to comply with the ISO/IEC Directives Part 2:2018, "(of a power system)" has been deleted from the term and added as a domain, and the last sentence of the definition has been moved to Note 2 to entry.]

3.3.6
supply side
part of the grid where electric energy is generated, transmitted and distributed to end-use customers through the public supply network

Note 1 to entry: This definition encompasses micro-grids, decentralised generators or renewable energy generators.

Note 2 to entry: This definition encompasses the electric power system defined in IEC 60050-601:1985, 601-01-01.

[SOURCE: IEC 61557-12:2018, 3.1.3, modified – Note 2 to entry has been added.]

3.3.7
demand side
part of the grid where electric energy is consumed by end-use customers within their electric distribution system

Note 1 to entry: This concept also encompasses prosumers.

[SOURCE: IEC 61557-12:2018, 3.1.4, modified – Note 1 to entry has been added.]