SLOVENSKI STANDARD
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Splošne zahteve za stanovanjske in stavbne elektronske sisteme (HBES) in sisteme za avtomatizacijo in krmiljenje stavb (BACS) - 11. del: Inteligentno merjenje - Aplikacijske specifikacije - Preprost zunanji prikazovalnik za uporabnika

General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS) - Part 11: Smart Metering - Application Specifications - Simple External Consumer Display

Allgemeine Anforderungen an die Elektrische Systemtechnik für Heim und Gebäude (ESHG) und an Systeme der Gebäudeautomation (GA) -- Teil 11: Smart Metering - Applikationsbeschreibung - Einfache externe Verbrauchsanzeige

Exigences générales pour systèmes électroniques pour les foyers domestiques et les bâtiments (HBES) et pour systèmes de gestion technique du bâtiment (SGTB) -- Partie 11: Comptage intelligent - Spécifications d'application - Affichage simple et externe du client

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97.120	Avtomatske krmilne naprave za dom	Automatic controls for household use

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General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS) - Part 11: Smart Metering - Application Specifications - Simple External Consumer Display

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This draft European Standard is submitted to CENELEC members for CENELEC enquiry.
Deadline for CENELEC: 2014-04-18.

It has been drawn up by CLC/TC 205.

If this draft becomes a European Standard, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CENELEC in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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CENELEC
European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Contents

Foreword

This document (prEN 50491-11:2013) has been prepared by CLC/TC 205 "Home and Building Electronic Systems (HBES)".

This document is currently submitted to the Enquiry.

CENELEC takes no position concerning the evidence, validity and scope of patent rights.

EN 50491-11 is part of the EN 50491 series of European Standards, which will comprise the following parts:

Part 1: Standardization structure

Part 2: Environmental Conditions and Requirements

Part 3: Electrical Safety Requirements

Part 4-1: Functional Safety Requirements: General

Part 4-2: Functional Safety Requirements: Safety Related Equipment

Part 5-1: EMC – Requirements, conditions and test setups

Part 5-2: EMC – Requirements for systems used in residential, commercial and light industry

Part 5-3: EMC – Requirements for industrial environment

Part 6-1: Installation requirements

Part 6-2: Inspection and Testing of HBES/BACS Installation

Part 6-3: Assessment of HBES/BACS Installations

Part 11: Smart Metering – Application Specification – Simple External Consumer Display

Part 12: Smart Metering/Smart Grid – Application Specification – DSM and Energy Management

Introduction

In March 2009, the European Commission issued a mandate M/441 for the standardization of smart metering functionalities and communication for usage in Europe for electricity, gas, heat and water applications to ensure interoperability of technologies and applications within a harmonised European market.

As a result, a technical report, CEN-CLC-ETSI TR 50572:2011 "Functional reference architecture for communications in smart metering systems" was published in December 2011.

As a consequence of this work and in line with the TR 50572 functional reference architecture, CLC TC205 responsible for Home and Building Electronic Systems, was entrusted with the task to formulate standards for the communication from the smart metering system towards the home.

1 Scope

This European Standard specifies a data model to abstract the metering world towards a simple external consumer display. The data model, as described by means of functional blocks contained in this European Standard, lays down the format of metering data accessible by a simple external consumer display. This data interface would be typically part of the meter communication functions and be accessed by a simple external consumer display via the H1 interface of the TR 50572 between the display and the meter communication functions.

The data interface specified in this document may also be accessed by the LNAP or NNAP through the C or M interface, after which the data could be accessed by HBES devices through the H2 and H3 interface.

In other words, in this way the same data model can be used both on the H1 as well as the H2 and H3 interface.

The document specifies neither the communication mechanisms used on the data interface, nor the applied data privacy and security mechanisms, where national regulations may apply.

The document does also not specify the communication protocol used between the meters and the meter communication functions. However, it takes into account the existing European standards like the EN 13757 and the EN 62056 series for the definition of the data model.

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.

EN 50491 *General Requirements for Home and Building Electronic Systems (HBES) and Building Automation Control Systems (BACS) – All Parts*

TR 50572 *Functional reference architecture for communications in smart metering systems*

EN 13757 *Communication system for meters and remote reading of meters – All Parts*

EN 62056 *Electricity metering - Data exchange for meter reading, tariff and load control – All Parts*

IEC 62746 *System interfaces and communication protocol profiles relevant for systems connected to the Smart Grid*

3 Definitions and abbreviations

3.1 Definitions

3.1.1 Meter

Instrument for measuring, memorizing and displaying data related to the consumption of a commodity.

3.2 Abbreviations

C	C interface – for terms and definitions see TR50572
Cs	Company Specific
FB	Functional Block
H1	The H1 interface – for terms and definitions see TR50572
H2	The H2 interface – for terms and definitions see TR50572
H3	The H3 interface – for terms and definitions see TR50572
LNAP	Local Network Access Point - for terms and definitions see TR50572
M	The M interface – for terms and definitions see TR50572
NA	Not Allowed / Not Applicable
MCF	Meter Communication Function – for terms and definitions see TR50572
NNAP	Neighbourhood Network Access Point - for terms and definitions see TR50572
HVAC	Heating Ventilation Air Conditioning

4 General reference model

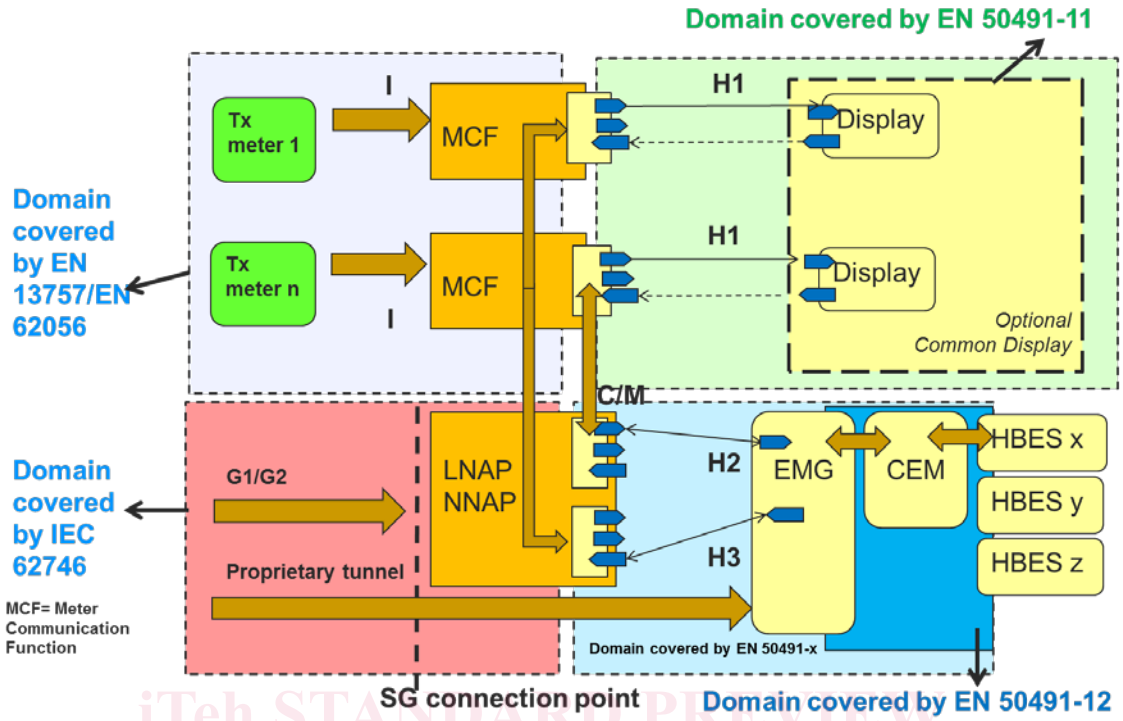

Figure 1 – Metering system topology

In this European Standard, a functional block is specified for each typical metering function, grouping a number of in- and output data points, as depicted in Figure 1.

Figure 1 depicts logical entities and not physical devices.

In line with the M441 architecture, the information flow on the H1 is predominantly from the meter communication function in one or more meters to one or more simple external consumer displays (or optionally one common display), whereby the latter acts as sink of the information obtained through the H1 interface from the meter communication functions. In exceptional cases, the consumer display may poll data from the meter communication functions, e.g. historical values. In no case shall it be able to alter metering data through the consumer display. Hence, most functional blocks of the data interface specified in this European Standard contain data that are intended as output data to a connected display.

The data structures used on the H1 interface are part of this European Standard. All other underneath described interfaces are informative.

The functional blocks specified in this document may also be accessed by the LNAP or NNAP through the C or M interface, after which the data could be accessed bi-directionally with HBES devices through the H2 and H3 interface.

The communication on the H2 and H3 interface is part of the EN 50491-12 standard.

For each connected metering function (Tx Meter in Figure 1), the corresponding metering communication function shall hold an entity of the corresponding functional block. The input for each connected metering function is supplied by meters complying with EN 62056 and EN 13757 and is not part of this standard.

The input to the LNAP and NNAP is part of the IEC Standard 62746.

The measurable quantities shown in Table 1 can be represented in the data interface through the listed functional blocks (FB):

Table 1 – Measurable quantities

Physical Media	FB
Other	M_GENERICM
Oil	M_GENERICM
Electricity	M_ELECM
Gas	M_GASM b)
Heat (outlet)	M_HEATM
Steam	M_GENERICM
Warm Water (30°C to 90°C)	M_WATERM
Water	M_WATERM
Heat cost allocator	M_HCA
Cooling Load meter (outlet)	M_HEATM
Cooling Load meter (inlet)	M_HEATM
Heat (inlet)	M_HEATM
Heat and Cool	M_HEATM
Breaker	M_BREAKERM
Valve	M_VALVEM
Waste water meter	M_WATERM

5 Requirements for the Data interface

5.1 General

Each metering function shall be represented by a corresponding functional block, typically part of the metering communication function and accessed by a simple user display.

Some meters may also provide metering data history values (e.g. monthly data). It is highly recommended that for each meter a limited set of history values is available.

NOTE depending on national regulations, it may be necessary that some of the data survives power down situations.

In case of one common display unit supporting multiple meter devices, during installation and teach-in procedures of metering devices, a meter device directory shall be created to assign linked meters.

The format and management of the metering device directory is company and/or protocol specific and not part of this specification. Appropriate procedures shall be provided to:

- add a new metering device, and
- replace a metering device by another device (with different identification number and e.g. different unit/resolution of the metering data), and
- delete a metering device.

The above workflow shall be supported by appropriate means (e.g. device localisation via display, text information, …).

Two data points ‘MeterReplacement’ and ‘MeterReplacementCounter’ are defined for each metering Functional Block to detect and manage replacement of metering devices. Further company specific mechanisms can be implemented to simplify the meter replacement workflow.

For each meter a ‘UserText’ may be configured to simplify identification and localization of the meter. This ‘UserText’ can be useful in case of

- service, maintenance
- binding of metering data to displays
- billing information for the end user
- etc.

In case of removal or deletion of a metering device from the device directory, it is highly recommended to keep the corresponding instance of the functional block alive and set all data in the Functional Block to void values (see below). It is not recommended to re-assign functional block Indices of the remaining functional blocks because data processing by the data display could be corrupted.

After commissioning or power up, metering data can be void or outdated for hours until a new message from a metering device is received by the metering communication function.

On customer move out, certain data may need to be made unavailable for the next customer.

On supplier change, certain data needs to be made unavailable for the next supplier.

The ‘OutOfService’ Status attribute in metering Data Points shall indicate void data. This status attribute may be set in the following cases:

- No metering device is connected to the metering Functional Block (ex-factory default data).
- A previously connected metering device is removed or deleted from the device directory. Handling of the metering device directory is manufacturer specific.

In case of meter replacement, all metering data in the corresponding Functional Block shall be set to void as upon removal of the previous meter until the first valid metering data message from the new device is received. This may take several hours.

NOTE This specification does not foresee specific mechanisms to supervise the presence/function of connected metering devices using life-check mechanisms etc. Because of very manufacturer specific cyclic update periods for metering messages, a life-check ‘timeout’ cannot be standardized. Therefore this specification does not put requirements to set metering data automatically ‘OutOfService’ in case of missing/outdated data from the connected metering device.

The simply user display can access metering data by

- polling of Functional Blocks and Data Points or
- regularly by data being pushed to the display or
- notifications or messages (e.g. sent by an external actor or generated by the meter). Data structures for this type of messages are not specified in this standard.

5.2 Minimization of data transmission

Meter data comprises data that change infrequently and some that change frequently. The data transmission rate shall reflect the frequency with which the data is expected to change. In the case the data is polled, the user display shall not access a next Data Point value before the meter communication function has responded to the previous Data Point access, unless the meter communication function did not respond to the user display’s request within a time that can be set manufacturer specific.

5.3 Data consistency

During polling of metering data, new metering data may be received and read-out data may be inconsistent. For data consistency checking each metering Functional Block shall provide a Data Point 'RxSequenceCounter' that shall be incremented each time new metering data is received from the corresponding metering device.

The user display reading out metering data shall check the 'RxSequenceCounter' counter before and after read out of the complete set of metering data. If the sequence counter value has changed, metering data may be inconsistent. The user display shall then retry the procedure.

6 Conformity and Testing

The requirements for the data interface between the meter communication function and a simple user display are given in clause 5 of this standard.

The measurable quantity or quantities determine the need to implement the functional blocks as given in Table 1. If a certain function of the functional blocks as described in the relevant part of clause 7 is implemented, then the data structures shall comply with the format as given in clause 8. If a certain function is added that is not described in functional blocks as given in clause 7, the data structures used may be manufacturer or country specific.

Testing of compliance consist in the checking of the correct implementation of the (different parts) of the data structures. As this standard does not describe the communication protocols used to transport the specified data structures, testing of compliance of the implemented data structures may have to be performed with testing tools that are specific to the used communication protocol.

7 Metering Functional Blocks of MDC

7.1 MDC Heat Meter (M_HEATM)

7.1.1 Aims and objectives

The Functional Block 'MDC Heat Meter' shall contain heat meter data (Device Type = 4, 10 to 13 – see clause 0).

NOTE The same Functional Block also covers measurement of cooling energy.

7.1.2 Functional specification

The data points of the functional block representing heat meter data can be accessed by the display.

7.1.3 Constraints

Only a subset of metering data may be accessible by the display. The effective number of data that is provided by meters is company specific.

7.1.4 Data Point Overview

Table 2 – Data Point Overview M_HEATM

Datapoint	Description	Datapoint Type
CurrentEnergyConsumption	Accumulated energy value	DPT_MeteringValue
TempFlowWater	Current flow temperature	DPT_Value_Temp
TempReturnWater	Current Return temperature	DPT_Value_Temp
TempDiffWater	Current Temperature difference	DPT_Value_Tempd
ReliabilityOfMeteringData	Indicates whether metering data are up-to-date or outdated.	DPT_Bool
CurrentPower	Current measured power	DPT_MeteringValue
CurrentVolumeFlow	Current measured volume flow	DPT_MeteringValue
CurrentEnergyConsumption_T1	Current energy consumption Tarif 1	DPT_MeteringValue
HistoryStorageNumbers	Array of storage numbers for history values	DPT_Value_1_Ucount[n]
HistoryDate	Array of date/time information for history values	DPT_DateTime[n]
HistoryEnergyConsumption	Array of energy consumption history values	DPT_MeteringValue[n]
HistoryEnergyConsumption_T1	Array of energy consumption tarif 1 history values	DPT_MeteringValue[n]
HistoryVolumeMaxFlow	Array of Max Volume Flow history values	DPT_MeteringValue[n]
HistoryVolumeMinFlow	Array of Min Volume Flow history values	DPT_MeteringValue[n]
HistoryMaxPower	Array of Max. Power history values	DPT_MeteringValue[n]
HistoryMinPower	Array of Min. Power history values	DPT_MeteringValue[n]
RxSequenceCounter	Sequence counter generated locally by the receiver and incremented each time a metering message is received. This data point shall be used for consistency checking.	DPT_Value_1_Ucount
RxReceptionTime	Time stamp generated locally by the receiver each time a metering message is received	DPT_DateTime
Manufacturer	manufacturer code of the connected meter	DPT_Value_2_Ucount
IdentificationNumber	Mapping 8 Digit BCD to unsigned long integer	DPT_Value_4_Ucount
VersionNumber	Version of the device, structure is manufacturer specific	DPT_Value_1_Ucount