Blue Book Edition 15 Part 1

TECHNICAL REPORT

Comprehensive Semantic Model

for Energy Management

OBIS CODES

DLMS UA 1000-1 Ed. 15 Part 1

Version 1.0

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DLMS User Association

CONTENTS

FOREWORD

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Acknowledgement

The document has been written by members of DLMS UA Maintenance Working Group.

Status of standardisation

The contents of this edition is the basis of future revisions to:

- IEC 62056-6-1, Electricity Metering Data Exchange – The DLMS/COSEM suite – Part 6-1: Object identification system (OBIS).

Revision history

List of main technical changes in Edition 15

Item	Clause	Description
1.	7.2	New clause to cover DC metering requirments (Clause 7 spilt into two parts AC and DC)
2.	Table 51	Value 53 corrected to 36
3.	5.1	Reference added for DC
4.	5.3	Reference added for DC
5.	5.4.4	Added reference to DC
6.	5.5	Reference added for DC
7.	7 7.2	Modified to include DC in addition to AC DC electricity (Value group A = 2) added
8.	Table 64	Two new attributes for diection of flow
9.		
10.		
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Introduction

Object modelling and data identification

COSEM was originally developed to address the requirements for interoperability and data security requirements in metering and control applications. The specification is not however limited to metering and control, it can be used to model any type of device that is designed to be connected to a communications network. (The COSEM acronym originally was *Companion Specification for Energy Metering* but this no longer applies.*)*

COSEM uses *object modelling* techniques to model all functions of devices, without making any assumptions about which functions need to be supported, how those functions are implemented and how the data is transported. The formal specification of COSEM interface classes forms a major part of COSEM.

To process and manage the information it is necessary to uniquely identify all data items in a standard way. The definition of OBIS, the *Object Identification System* is another essential part of COSEM. It is based on DIN 43863-3:1997, *Electricity meters – Part 3: Tariff metering device as additional equipment for electricity meters – EDIS – Energy Data Identification System.* The set of OBIS codes has been considerably extended over the years to meet new requirements.

Data identification

OBIS codes, based on DIN 43863-3:1997, *Electricity meters – Part 3: Tariff metering device as additional equipment for electricity meters – EDIS – Energy Data Identification System,* were originally developed to facilitate the analysis of metering information, for the purposes of billing, load, customer and contract management, it is necessary to uniquely identify data items, whether collected manually or automatically, via local or remote data exchange, in a manufacturer-independent way. The concept has been extended and the scope expaned to cover a wide range of equipment for energy management applications.

1 Scope

This part of DLMS UA 1000-1:Ed15 specifies the overall structure of the OBject Identification System (OBIS) and the mapping of all commonly used data items in equipment for energy management to their identification codes.

OBIS provides a unique identifier for all data within the equipment, including measurement values and abstract values used for configuration or for retrieving information about the behaviour of the equipment. The ID codes defined in this document are used for the identification of:

- logical names of the various instances of the ICs, or objects, as defined in DLMS UA 1000-1 Ed 15 Part 2:2021;
- data transmitted over communication media;
- data displayed on the equipment, see Clause A.2.

This document applies to all types of equipment.

For metering applications, the concepts of medium and channels are introduced. This allows meter data originating from different sources to be identified. While this document fully defines the structure of the identification system for other media, the mapping of non-electrical energy related data items to ID codes is completed separately.

NOTE EN 13757-1:2014 defines identifiers for metering equipment other than electricity: heat cost allocators, thermal energy, gas, cold water and hot water.

2 Referenced documents

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.

DLMS UA 1000-1 Ed 15 Part 2:2021, COSEM Interface Classes, Blue Book Part 2

EN 1434-1:2015 Heat meters – Part 1: General requirements

EN 1434-2:2015 Heat meters – Part 2: Constructional requirements

IEC TR 61000-2-8:2002, *Electromagnetic compatibility (EMC) – Part 2-8: Environment – Voltage dips and short interruptions on public electric power supply systems with statistical measurement results*

IEC TR 62051:1999, *Electricity metering – Glossary of terms*

IEC TR 62051-1:2004, *Electricity metering – Data exchange for meter reading, tariff and load control – Glossary of terms – Part 1: Terms related to data exchange with metering equipment using DLMS®/COSEM*

IEC 62053-23:2020, *Electricity metering equipment (a.c.) – Particular requirements – Part 23: Static meters for reactive energy (classes 2 and 3)*

IEC 62056-21:2002, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange*

DLMS UA 1000-1 Part 2 Ed15:2021, *COSEM interface classes.*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TR 62051:1999 and IEC TR 62051-1:2004, and the following 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

3.2 Abbreviated terms

AGA	American Gas Association
AGA 8	Method for calculation of compressibility (Gas Metering)
COSEM	Comprehensive Semantic Model for Energy Management
COSEM object	An instance of a COSEM interface class
DLMS	Device Language Message Specification
DLMS UA	DLMS User Association
GSM	Global System for Mobile Communications
HCA	Heat Cost Allocator
IC	Interface Class
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
OBIS	OBject Identification System
SGERG 88	Method for calculation of compressibility (Gas Metering)
VZ	Billing period counter

4 OBIS code structure

4.1 Value groups and their use

OBIS codes identify data items used in energy metering equipment, in a hierarchical structure using six value groups A to F, see Table 1.

Table 1 – OBIS code structure and use of value groups

Value group	Use of the value group
A	Identifies the media (energy type) to which the metering is related. Non-media related information is handled as abstract data.
B	Generally, identifies the measurement channel number, i.e. the number of the input of a metering equipment having several inputs for the measurement of energy of the same or different types (for example in data concentrators, registration units). Data from different sources can thus be identified. It may also identify the communication channel, and in some cases it may identify other elements. The definitions for this value group are independent from the value group A.
C	Identifies abstract or physical data items related to the information source concerned, for example current, voltage, power, volume, temperature. The definitions depend on the value in the value group A. Further processing, classification and storage methods are defined by value groups D, E and F. For abstract data, value groups D to F provide further classification of data identified by value groups A to C.
D	Identifies types, or the result of the processing of physical quantities identified by values in value groups A and C, according to various specific algorithms. The algorithms can deliver energy and demand quantities as well as other physical quantities.
E	Identifies further processing or classification of quantities identified by values in value groups A to D.
F	Identifies historical values of data, identified by values in value groups A to E, according to different billing periods. Where this is not relevant, this value group can be used for further classification.

4.2 Manufacturer specific codes

In value groups B to F, the following ranges are available for manufacturer-specific purposes:

- group B: 128…199;
- group C: 128…199, 240;
- group D: 128…254;
- group E: 128…254;
- group F: 128…254.

If any of these value groups contain a value in the manufacturer specific range, then the whole OBIS code shall be considered as manufacturer specific, and the value of the other groups does not necessarily carry a meaning defined in this document or in DLMS UA 1000-1 Part 2 Ed15:2021.

In addition, manufacturer specific ranges are defined in Table 8 with A = 0, C = 96 and in Table 20 with A = 1, C = 96, , in Table 36 with A = 4, C = 96, in Table 44 with A = 5/6, C = 96, in Table 60 with A = 7, C = 96 and in Table 67 with A = 8/9, C = 96.

4.3 Reserved ranges

By default, all codes not allocated are reserved. [1]

[1] Administered by the DLMS® User Association (see Foreword).

4.4 Summary of rules for manufacturer, utility, consortia and country specific codes

Table 2 summarizes the rules for manufacturer specific codes specified in 4.2, utility specific codes specified in 5.2, consortia specific codes specified in 5.4.2 and country specific codes specified in 5.4.3.

Table 2 – Rules for manufacturer, utility, consortia and country specific codes

Code type	Value group					
	A	B	C	D	E	F
Manufacturer specific, NOTE 1	0, 1, 4…9, F	128…199	*c*	*d*	*e*	*f*
		b	128… 199, 240	*d*	*e*	*f*
		b	*c*	128…254	*e*	*f*
		b	*c*	*d*	128…254	*f*
		b	*c*	*d*	*e*	128…254
Manufacturer specific abstract, NOTE 2	0	0…64	96	50…99	0…255	0…255
Manufacturer specific, media related general purpose, NOTE 2	1, 4…9, F	0…64	96	50…99	0…255	0…255
Utility specific, NOTE 3	0, 1, 4…9, F	65…127	0…255	0…255	0…255	0…255
Consortia specific, NOTE 4	0, 1, 4…9, F	0…64	93	See Table 6.		
Country specific, NOTE 5		0…64	94	See Table 7.		

NOTE 1 “b”, “c”, “d”, “e”, “f” means any value in the relevant value group.

NOTE 2 The range D = 50…99 is available for identifying objects, which are not represented by another defined code, but need representation on the display as well. If this is not required, the range D = 128…254 should be used.

NOTE 3 If the value in value group B is 65…127, the whole OBIS code should be considered as utility specific and the value of other groups does not necessarily carry a meaning defined neither in this document nor inDLMS UA 1000-1 Part 2 Ed15:2021.

NOTE 4 The usage of value group E and F are defined in consortia specific documents.

NOTE 5 The usage of value group E and F are defined in country specific documents.

Objects for which this document defines standard identifiers shall not be re-identified by manufacturer, utility, consortia or country specific identifiers. However, an object previously identified by a manufacturer-, utility-, consortia- or country-specific identifier may receive a standard identifier in the future if its use is of common interest for the users of this document.

4.5 Standard object codes

Standard object codes are meaningful combinations of defined values of the six value groups.

Notation: In the following tables, in the various value groups, *“b”, “c”,” d”, “e”, “f”* signifies any value in the respective value group. If only one object is instantiated, the value shall be 0. If a value group is shaded, then this value group is not used.

NOTE The DLMS® UA maintains a list of standard COSEM object definitions at www.dlms.com. The validity of the combination of OBIS codes and class_id-s as well as the data types of the attributes are tested during conformance testing.

5 Value group definitions – overview

5.1 Value group A

The range for value group A is 0 to 15; see Table 3.

Table 3 – Value group A codes

Value group A	
0	Abstract objects
1	(AC) Electricity related objects
2	DC Electricity related objects
3	Reserved
4	Heat cost allocator related objects
5, 6	Thermal energy related objects
7	Gas related objects
8	Cold water related objects
9	Hot water related objects
…	
15	Other media
All other	Reserved

The following subclauses contain value group definitions B to F common for all values of value group A.

5.2 Value group B

The range for value group B is 0 to 255; see Table 4.

Table 4 – Value group B codes

Value group B	
0	No channel specified
1…64	Channel 1..64
65…127	Utility specific codes
128…199	Manufacturer specific codes
200…255	Reserved

If channel information is not essential, the value 0 shall be assigned.

The range 65…127 is available for utility specific use. If the value of value group B is in this range, the whole OBIS code shall be considered as utility specific and the value of other groups does not necessarily carry a meaning defined neither in this document nor in DLMS UA 1000-1 Ed 15 Part 2:2021.

5.3 Value group C

5.3.1 General

The range for value group C is 0 to 255. The definitions depend on the value in value group A. The codes for abstract objects are specified in 5.3.2. See also:

- (a.c.) electricity related codes specified in 7.1.1;
- DC electricity related codes are specified in 7.2.1;
- heat cost allocator related codes specified in 8.1;
- thermal energy related codes specified in 8.2;
- gas related codes specified in 8.3;
- water related codes specified in 8.4;
- other media related codes specified in 9.2.

5.3.2 Abstract objects

Abstract objects are data items, which are not related to a certain type of physical quantity. See Table 5.

Table 5 – Value group C codes – Abstract objects

Value group C Abstract objects (A = 0)	
0…89	Context specific identifiers [a]
93	Consortia specific identifiers (See 5.4.2).
94	Country specific identifiers (See 5.4.3)
96	General and service entry objects – Abstract (See 6.1)
97	Error register objects – Abstract (See 6.2)
98	List objects – Abstract (See 6.3, 6.4)
99	Data profile objects – Abstract (See 6.5)
…	
127	Inactive objects [b]
128…199, 240	Manufacturer specific codes
All other	Reserved

[a] Context specific identifiers identify objects specific to a certain protocol and/or application. For the COSEM context, the identifiers are defined in DLMS UA 1000-1 Ed 15 Part 2:2021, 6.2.

[b] An inactive object is an object, which is defined and present in a meter, but which has no assigned functionality.

5.4 Value group D

5.4.1 General

The range for value group D is 0 to 255.

5.4.2 Consortia specific identifiers

Table 6 specifies the use of value group D for consortia specific applications. In this table, there are no reserved ranges for manufacturer specific codes. The usage of value group E and F are defined in consortia specific documents.

Objects that are already identified in this document shall not be re-identified by consortia specific identifiers.

Table 6 – Value group D codes – Consortia specific identifiers

Value group D Consortia specific identifiers (A = any, C = 93)	
0	Reserved
1	STS Association
2…255	Reserved
NOTE At the time of the publication of this document, no consortia specific identifiers are allocated.	

5.4.3 Country specific identifiers

Table 7 specifies the use of value group D for country specific applications. Wherever possible, the country calling codes are used. In this table, there are no reserved ranges for manufacturer specific codes. The usage of value group E and F are defined in country specific documents.

Objects that are already identified in this document shall not be re-identified by country specific identifiers.

Table 7 – Value group D codes – Country specific identifiers

Value group D Country specific identifiers[a] (A = any, C = 94)			
00	Finland (Country calling code = 358)	**50**	
01	USA (= Country calling code)	**51**	Peru (= Country calling code)
02	Canada (Country calling code = 1)	**52**	South Korea (Country calling code = 82)
03	Serbia (Country calling code = 381)	**53**	Cuba (= Country calling code)
04		**54**	Argentina (= Country calling code)
05		**55**	Brazil (= Country calling code)
06		**56**	Chile (= Country calling code)
07	Russia (Country calling code = 7)	**57**	Colombia (= Country calling code)
08		**58**	Venezuela (= Country calling code)
09		**59**	
10	Czech Republic (Country calling code = 420)	**60**	Malaysia (= Country calling code)
11	Bulgaria (Country calling code = 359)	**61**	Australia (= Country calling code)
12	Croatia (Country calling code = 385)	**62**	Indonesia (= Country calling code)
13	Ireland (Country calling code = 353)	**63**	Philippines (= Country calling code)
14	Israel (Country calling code = 972)	**64**	New Zealand (= Country calling code)

Value group D Country specific identifiers[a] (A = any, C = 94)			
15	Ukraine (Country calling code = 380)	**65**	Singapore (= Country calling code)
16	Yugoslavia [a]	**66**	Thailand (= Country calling code)
17	Qatar (Country calling code = 974)	**67**	
18		**68**	
19		**69**	
20	Egypt (= Country calling code)	**70**	
21		**71**	Latvia (Country calling code = 371)
22	Morocco (Country calling code = 212)	**72**	
23	Algeria (Country calling code = 213)	**73**	Moldova (Country calling code = 373)
24	Nigeria (Country calling code = 234)	**74**	
25	Ivory Coast (Country calling code = 225)	**75**	Belarus (Country calling code = 375)
26	Tunisia (Country calling code = 216)	**76**	
27	South Africa (= Country calling code)	**77**	
28		**78**	
29		**79**	
30	Greece (= Country calling code)	**80**	
31	Netherlands (= Country calling code)	**81**	Japan (= Country calling code)
32	Belgium (= Country calling code)	**82**	Mexico
33	France (= Country calling code)	**83**	
34	Spain (= Country calling code)	**84**	
35	Portugal (Country calling code = 351)	**85**	Hong Kong (Country calling code = 852)
36	Hungary (= Country calling code)	**86**	China (= Country calling code)
37	Lithuania (Country calling code = 370)	**87**	Bosnia and Herzegovina (Country calling code = 387)
38	Slovenia (Country calling code = 386)	**88**	
39	Italy (= Country calling code)	**89**	
40	Romania (= Country calling code)	**90**	Turkey (= Country calling code)
41	Switzerland (= Country calling code)	**91**	India (= Country calling code)
42	Slovakia (Country calling code = 421)	**92**	Pakistan (= Country calling code)
43	Austria (= Country calling code)	**93**	
44	United Kingdom (= Country calling code)	**94**	
45	Denmark (= Country calling code)	**95**	
46	Sweden (= Country calling code)	**96**	Saudi Arabia (Country calling code = 966)
47	Norway (= Country calling code)	**97**	United Arab Emirates (Country calling code = 971)
48	Poland (= Country calling code)	**98**	Iran (= Country calling code)
49	Germany (= Country calling code)	**99**	
	All other codes are reserved		

5.4.4 Identification of general and service entry objects

For the use of value group D to identify:

- abstract general and service entry objects, see 6.1, Table 8;
- (a.c.) electricity related general and service entry objects, see 7.1.5, Table 20;
- DC electricity related general and service entry objects, see 7.2.5, Table 28;
- HCA related general and service entry objects, see Table 36;
- thermal energy related general and service entry objects, see Table 44;
- gas related general and service entry objects, see Table 60;
- water related general and service entry objects, see Table 67.

5.5 Value group E

The range for value group E is 0 to 255. It can be used for identifying further classification or processing of values defined by values in value groups A to D, as specified in the relevant energy type specific clauses. The various classifications and processing methods are exclusive.

For the use of value group E to identify:

- abstract general and service entry objects, see 6.1, Table 8;
- (AC) electricity related general and service entry objects, see Table 20;
- DC electricity related general and service entry objects, see Table 28;
- HCA related general and service entry objects, see Table 36;
- thermal energy related general and service entry objects, see Table 44;
- gas related general and service entry objects, see Table 60;
- water related general and service entry objects, see Table 67.

5.6 Value group F

5.6.1 General

The range for value group F is 0 to 255. In all cases, if value group F is not used, it is set to 255.

5.6.2 Identification of billing periods

Value group F specifies the allocation to different billing periods (sets of historical values) for the objects defined by value groups A to E, where storage of historical values is relevant. A billing period scheme is identified with its billing period counter, number of available billing periods, time stamp of the billing period and billing period length. Several billing period schemes may be possible. For more, see 7.1.4.1, Clause A.3 and DLMS UA 1000-1 Ed 15 Part 2:2021, 6.2.2.

6 Abstract objects (Value group A = 0)

6.1 General and service entry objects – Abstract

Table 8 specifies OBIS codes for abstract objects. See also DLMS UA 1000-1 Ed 15 Part 2:2021, Table 49 for value group C.

Table 8 – OBIS codes for general and service entry objects

General and service entry objects	OBIS code					
	A	B	C	D	E	F
Billing period values/reset counter entries (First billing period scheme if there are two)						
Billing period counter (1)	0	*b*	0	1	0	VZ or 255
Billing period counter (1) in a recent billing period	0	*b*	0	1	0	101-125
Billing period counters (1) in unspecified number of recent billing periods	0	*b*	0	1	0	126
Number of available billing periods (1)	0	*b*	0	1	1	
Time stamp of the most recent billing period (1)	0	*b*	0	1	2	
Time stamp of the billing period (1) VZ (last reset)	0	*b*	0	1	2	VZ
Time stamp of the billing period (1) VZ_{-1}	0	*b*	0	1	2	VZ_{-1}
…	…	…	…	…	…	…
Time stamp of the billing period (1) VZ_{-n}	0	*b*	0	1	2	VZ_{-n}
Time stamp of the billing period (1) in a recent billing period	0	*b*	0	1	2	101-125
Time stamp of the billing period (1) in unspecified number of recent billing periods	0	*b*	0	1	2	126
Billing period values/reset counter entries (Second billing period scheme)						
Billing period counter (2)	0	*b*	0	1	3	VZ or 255
Billing period counter (2) in a recent billing period	0	*b*	0	1	3	101-125
Billing period counters (2) in unspecified number of recent billing periods	0	*b*	0	1	3	126
Number of available billing periods (2)	0	*b*	0	1	4	
Time stamp of the most recent billing period (2)	0	*b*	0	1	5	
Time stamp of the billing period (2) VZ (last reset)	0	*b*	0	1	5	VZ
Time stamp of the billing period (2) VZ_{-1}	0	*b*	0	1	5	VZ_{-1}
…	…	…	…	…	…	…
Time stamp of the billing period (2) VZ_{-n}	0	*b*	0	1	5	VZ_{-n}
Time stamp of the billing period (2) in a recent billing period	0	*b*	0	1	5	101-125
Time stamp of the billing period (2) in unspecified number of recent billing periods	0	*b*	0	1	5	126
Program entries						
Active firmware identifier	0	*b*	0	2	0	
Active firmware version	0	*b*	0	2	1	
Active firmware signature	0	*b*	0	2	8	
Time entries						
Local time	0	*b*	0	9	1	

General and service entry objects	OBIS code					
	A	B	C	D	E	F
Local date	0	*b*	0	9	2	
Device IDs						
Complete device ID	0	*b*	96	1		
Device ID # 1 (manufacturing number)	0	*b*	96	1	0	
…			…	…	…	
Device ID # 10	0	*b*	96	1	9	
Metering point ID (abstract)	0	0	96	1	10	
Parameter changes, calibration and access						
Number of configuration program changes	0	*b*	96	2	0	
Date [a] of last configuration program change	0	*b*	96	2	1	
Date [a] of last time switch program change	0	*b*	96	2	2	
Date [a] of last ripple control receiver program change	0	*b*	96	2	3	
Status of security switches	0	*b*	96	2	4	
Date [a] of last calibration	0	*b*	96	2	5	
Date [a] of next configuration program change	0	*b*	96	2	6	
Date [a] of activation of the passive calendar	0	*b*	96	2	7	
Number of protected configuration program changes [b]	0	*b*	96	2	10	
Date [a] of last protected configuration program change [b]	0	*b*	96	2	11	
Date [a] (corrected) of last clock synchronization/setting	0	*b*	96	2	12	
Date of last firmware activation	0	*b*	96	2	13	
Input/output control signals						
State of input/output control signals, global [c]	0	*b*	96	3	0	
State of input control signals (status word 1)	0	*b*	96	3	1	
State of output control signals (status word 2)	0	*b*	96	3	2	
State of input/output control signals (status word 3)	0	*b*	96	3	3	
State of input/output control signals (status word 4)	0	*b*	96	3	4	
Disconnect control	0	*b*	96	3	10	
Arbitrator	0	*b*	96	3	20.. 29	
Internal control signals						
Internal control signals, global [c]	0	*b*	96	4	0	
Internal control signals (status word 1)	0	*b*	96	4	1	
Internal control signals (status word 2)	0	*b*	96	4	2	
Internal control signals (status word 3)	0	*b*	96	4	3	
Internal control signals (status word 4)	0	*b*	96	4	4	
Internal operating status						
Internal operating status, global [c]	0	*b*	96	5	0	
Internal operating status (status word 1)	0	*b*	96	5	1	
Internal operating status (status word 2)	0	*b*	96	5	2	
Internal operating status (status word 3)	0	*b*	96	5	3	
Internal operating status (status word 4)	0	*b*	96	5	4	
Battery entries						

General and service entry objects	OBIS code					
	A	B	C	D	E	F
Battery use time counter	0	*b*	96	6	0	
Battery charge display	0	*b*	96	6	1	
Date of next battery change	0	*b*	96	6	2	
Battery voltage	0	*b*	96	6	3	
Battery initial capacity	0	*b*	96	6	4	
Battery installation date and time	0	*b*	96	6	5	
Battery estimated remaining use time	0	*b*	96	6	6	
Aux. supply use time counter	0	*b*	96	6	10	
Aux. voltage (measured)	0	*b*	96	6	11	
Power failure monitoring						
Number of power failures						
In all three phases	0	0	96	7	0	
In phase L1	0	0	96	7	1	
In phase L2	0	0	96	7	2	
In phase L3	0	0	96	7	3	
In any phase [sic]	0	0	96	7	21	
Auxiliary supply	0	0	96	7	4	
Number of long power failures						
In all three phases	0	0	96	7	5	
In phase L1	0	0	96	7	6	
In phase L2	0	0	96	7	7	
In phase L3	0	0	96	7	8	
In any phase	0	0	96	7	9	
Time of power failure [d]						
In all three phases	0	0	96	7	10	
In phase L1	0	0	96	7	11	
In phase L2	0	0	96	7	12	
In phase L3	0	0	96	7	13	
In any phase	0	0	96	7	14	
Duration of long power failure [e]						
In all three phases	0	0	96	7	15	
In phase L1	0	0	96	7	16	
In phase L2	0	0	96	7	17	
In phase L3	0	0	96	7	18	
In any phase	0	0	96	7	19	
Time threshold for long power failure						
Time threshold for long power failure	0	0	96	7	20	
NOTE 1 See *Number of power failures in any phase* above	*0*	*b*	*96*	*7*	*21*	
Operating time						
Time of operation	0	b	96	8	0	
Time of operation rate 1…rate 63	0	b	96	8	1… 63	

General and service entry objects	OBIS code					
	A	B	C	D	E	F
Environment related parameters						
Ambient temperature	0	*b*	96	9	0	
Ambient pressure	0	*b*	96	9	1	
Relative humidity	0	*b*	96	9	2	
Status register						
Status register (Status register 1 if several status registers are used)	0	*b*	96	10	1	
Status register 2	0	*b*	96	10	2	
…	0	*b*	96	10	…	
Status register 10	0	*b*	96	10	10	
Event code						
Event code objects # 1…#100	0	*b*	96	11	0…99	
Communication port log parameters						
Reserved	0	*b*	96	12	0	
Number of connections	0	*b*	96	12	1	
Reserved	0	*b*	96	12	2	
Reserved	0	*b*	96	12	3	
Communication port parameter 1	0	*b*	96	12	4	
GSM field strength	0	*b*	96	12	5	
Telephone number / Communication address of the physical device	0	*b*	96	12	6	
Consumer messages						
Consumer message via local consumer information port	0	*b*	96	13	0	
Consumer message via the meter display and / or via consumer information port	0	*b*	96	13	1	
Currently active tariff						
Currently active tariff objects # 1…#16 NOTE 2 Object #16 (E = 15) carries the name of register with the lowest tariff (default tariff register)	0	*b*	96	14	0…15	
Event counter objects						
Event counter objects #1…#100	0	*b*	96	15	0…99	
Profile entry digital signature objects						
Profile entry digital signature objects #1…#10	0	*b*	96	16	0…9	
Profile entry counter objects						
Profile entry counter objects #1..#128	0	*b*	96	17	0…127	
Meter tamper event related objects						
Meter open event counter	0	*b*	96	20	0	
Meter open event, time stamp of current event occurrence	0	*b*	96	20	1	
Meter open event, duration of current event	0	*b*	96	20	2	
Meter open event, cumulative duration	0	*b*	96	20	3	
Reserved	0	*b*	96	20	4	

General and service entry objects	OBIS code					
	A	B	C	D	E	F
Terminal cover open event counter	0	*b*	96	20	5	
Terminal cover open event, time stamp of current event occurrence	0	*b*	96	20	6	
Terminal cover open event, duration of current event	0	*b*	96	20	7	
Terminal cover open event, cumulative duration	0	*b*	96	20	8	
Reserved	0	*b*	96	20	9	
Tilt event counter	0	*b*	96	20	10	
Tilt event, time stamp of current event occurrence	0	*b*	96	20	11	
Tilt event, duration of current event	0	*b*	96	20	12	
Tilt event, cumulative duration	0	*b*	96	20	13	
Reserved	0	*b*	96	20	14	
Strong DC magnetic field event counter	0	*b*	96	20	15	
Strong DC magnetic field event, time stamp of current event occurrence	0	*b*	96	20	16	
Strong DC magnetic field event, duration of current event	0	*b*	96	20	17	
Strong DC magnetic field event, cumulative duration	0	*b*	96	20	18	
Reserved	0	*b*	96	20	19	
Supply control switch / valve tamper event counter	0	*b*	96	20	20	
Supply control switch / valve tamper event, time stamp of current event occurrence	0	*b*	96	20	21	
Supply control switch / valve tamper event, duration of current event	0	*b*	96	20	22	
Supply control switch / valve tamper event, cumulative duration	0	*b*	96	20	23	
Reserved	0	*b*	96	20	24	
Metrology tamper event counter	0	*b*	96	20	25	
Metrology tamper event, time stamp of current event occurrence	0	*b*	96	20	26	
Metrology tamper event, duration of current event	0	*b*	96	20	27	
Metrology tamper event, cumulative duration	0	*b*	96	20	28	
Reserved	0	*b*	96	20	29	
Communication tamper event counter	0	*b*	96	20	30	
Communication tamper event, time stamp of current event occurrence	0	*b*	96	20	31	
Communication tamper event, duration of current event	0	*b*	96	20	32	
Communication tamper event, cumulative duration	0	*b*	96	20	33	
Reserved	0	*b*	96	20	34	
Manufacturer specific [f] … Manufacturer specific	0 0	*b* *b*	96 96	50 99	*e* *e*	*f* *f*
All other codes are reserved						

General and service entry objects	OBIS code					
	A	B	C	D	E	F

[a] Date of the event may contain the date only, the time only or both, encoded as specified in DLMS UA 1000-1 Ed 15 Part 2:2021, 4.5.1.

[b] Protected configuration is characterized by the need to open the main meter cover to modify it, or to break a metrological seal.

[c] Global status words with E = 0 contain the individual status words E = 1…4. The contents of the status words are not defined in this document.

[d] Time of power failure is recorded when either a short or long power failure occurs.

[e] Duration of long power failure holds the duration of the last long power failure.

[f] The range D = 50…99 is available for identifying objects, which are not represented by another defined code, but need representation on the display as well. If this is not required, the range D = 128…254 should be used.

6.2 Error registers, alarm registers / filters / descriptor objects – Abstract

The OBIS codes for abstract error registers, alarm registers and alarm filters are shown in Table 9.

Table 9 – OBIS codes for error registers, alarm registers and alarm filters – Abstract

Error register, alarm register and alarm filter objects – Abstract	OBIS code					
	A	B	C	D	E	F
Error register objects 1…10	0	*b*	97	97	0…9	
Alarm register objects 1…10	0	*b*	97	98	0…9	
Alarm filter objects 1…10	0	*b*	97	98	10…19	
Alarm descriptor objects 1…10	0	*b*	97	98	20…29	
NOTE The information to be included in the error objects is not defined in this document.						

6.3 List objects – Abstract

Lists – identified with a single OBIS code – are defined as a series of any kind of data (for example measurement value, constants, status, events). See Table 10.

Table 10 – OBIS codes for list objects – Abstract

List objects – Abstract	OBIS code					
	A	B	C	D	E	F
Data of billing period (with billing period scheme 1 if there are more than one schemes available)	0	*b*	98	1	*e*	255 [a]
Data of billing period (with billing period scheme 2)	0	*b*	98	2	*e*	255 [a]
[a] F = 255 means a wildcard here. See Clause A.3.						

6.4 Register table objects – Abstract

Register tables are defined to hold a number of values of the same type. See Table 11.

Table 11 – OBIS codes for Register table objects – Abstract

Register table objects – Abstract	OBIS code					
	A	B	C	D	E	F
General use, abstract	0	*b*	98	10	*e*	

6.5 Data profile objects – Abstract

Abstract data profiles – instances of the “Profile generic IC” and identified with one single OBIS code as specified in Table 12 – are used to hold a series of measurement values of one or more similar quantities and/or to group various data.

Table 12 – OBIS codes for data profile objects – Abstract

Data profile objects – Abstract	OBIS code					
	A	B	C	D	E	F
Load profile with recording period 1 [a]	0	*b*	99	1	*e*	
Load profile with recording period 2 [a]	0	*b*	99	2	*e*	
Load profile during test [a]	0	*b*	99	3	0	
Connection profile	0	*b*	99	12	*e*	
GSM diagnostic profile	0	*b*	99	13	*e*	
Charge collection history (Payment metering)	0	*b*	99	14	e	
Token credit history (Payment metering)	0	*b*	99	15	e	
Parameter monitor log	0	*b*	99	16	*e*	
Token transfer log (Payment metering)	0	*b*	99	17	*e*	
LTE monitoring profile	0	*b*	99	18	*e*	
Event log [a]	0	*b*	99	98	*e*	
[a] These objects should be used if they (also) hold data not specific to the energy type.						

7 Electricity AC and DC (A = 1, A = 2)

7.1 AC Electricity (Value group A = 1)

7.1.1 Value group C codes – AC Electricity

Table 13 specifies the use of value group C for electricity related objects.

The quadrant definitions for active and reactive power are shown in Figure 1.

Table 13 – Value group C codes – Electricity

Value group C codes – Electricity (A = 1)				
0	General purpose objects (See 7.1.5.1)			
ΣL_i	**L_1**	**L_2**	**L_3**	(See also Note 2)
1	**21**	**41**	**61**	Active power+ (QI+QIV)
2	**22**	**42**	**62**	Active power– (QII+QIII)
3	**23**	**43**	**63**	Reactive power+ (QI+QII)
4	**24**	**44**	**64**	Reactive power– (QIII+QIV)
5	**25**	**45**	**65**	Reactive power QI
6	**26**	**46**	**66**	Reactive power QII
7	**27**	**47**	**67**	Reactive power QIII
8	**28**	**48**	**68**	Reactive power QIV
9	**29**	**49**	**69**	Apparent power+ (QI+QIV) (See also Note 3)
10	**30**	**50**	**70**	Apparent power– (QII+QIII)
11	**31**	**51**	**71**	Current: any phase (C = 11) / L_i phase [a] (C= 31, 51, 71)
12	**32**	**52**	**72**	Voltage: any phase (C = 12) / L_i phase [a] (C= 32, 52, 72)
13	**33**	**53**	**73**	Power factor (See also Note 4)
14	**34**	**54**	**74**	Supply frequency
15	**35**	**55**	**75**	Active power (abs(QI+QIV)+(abs(QII+QIII)) [a]
16	**36**	**56**	**76**	Active power (abs(QI+QIV)-abs(QII+QIII))
17	**37**	**57**[d]	**77**	Active power QI
18	**38**	**58**	**78**	Active power QII
19	**39**	**59**	**79**	Active power QIII
20	**40**	**60**	**80**	Active power QIV
….				
81	Angles [b]			
82	Unitless quantity (pulses or pieces)			
83	Transformer and line loss quantities [c]			
84	ΣL_i Power factor – (See also Note 4)			
85	L_1 Power factor –			
86	L_2 Power factor –			
87	L_3 Power factor –			
88	ΣL_i Ampere-squared hours (QI+QII+QIII+QIV)			
89	ΣL_i Volt-squared hours (QI+QII+QIII+QIV)			
90	ΣL_i current (algebraic sum of the – unsigned – value of the currents in all phases)			
91	L_0 current (neutral) [a]			
92	L_0 voltage (neutral) [a]			
93	Consortia specific identifiers (See 5.4.2)			
94	Country specific identifiers (See 5.4.3)			
96	General and service entry objects – Electricity (See 7.1.5.1)			
97	Error register objects – Electricity (See 7.1.5.2)			
98	List objects – Electricity (See 7.1.5.3)			

Value group C codes – Electricity (A = 1)				
99	Data profile objects – Electricity (See 7.1.5.4)			
ΣL_i	**L_1**	**L_2**	**L_3**	(See also Note 2)
100	101	102	103	Reactive power inductive (QI+QIII)
104	105	106	107	Reactive power capacitive (QII+QIV)
108..123	Reserved			
124	$L_1 - L_2$ line voltage			
125	$L_2 - L_3$ line voltage			
126	$L_3 - L_1$ line voltage			
127	Reserved			
128...199, 240	Manufacturer specific codes			
All other	Reserved			

NOTE 1 L_i *Quantity* is the value (to be measured) of a measurement system connected between the phase *i* and a reference point. In 3-phase 4-wire systems, the reference point is the neutral. In 3-phase 3-wire systems, the reference point is the phase L_2.

NOTE 2 ΣL_i *Quantity* is the total measurement value across all systems.

NOTE 3 If just one apparent energy/demand value is calculated over the four quadrants, C = 9 shall be used.

NOTE 4 Power factor quantities with C = 13, 33, 53, 73 are calculated either as PF = Active power+ (C = 1, 21, 41, 61) / Apparent power+ (C = 9, 29, 49, 69) or PF = Active power– (C = 2, 22, 42, 62) / Apparent power- (C = 10, 30, 50, 70).

In the first case, the sign is positive (no sign), it means power factor in the import direction (PF+).

In the second case, the sign is negative, it means power factor in the export direction (PF–).

Power factor quantities C = 84, 85, 86 and 87 are always calculated as PF– = Active power– / Apparent power–. This quantity is the power factor in the export direction; it has no sign.

[a] For details of extended codes, see 7.1.3.3.

[b] For details of extended codes, see 7.1.3.4.

[c] For details of extended codes, see 7.1.3.5.

[d] This was recorded erroneously as 58 in earlier versions.

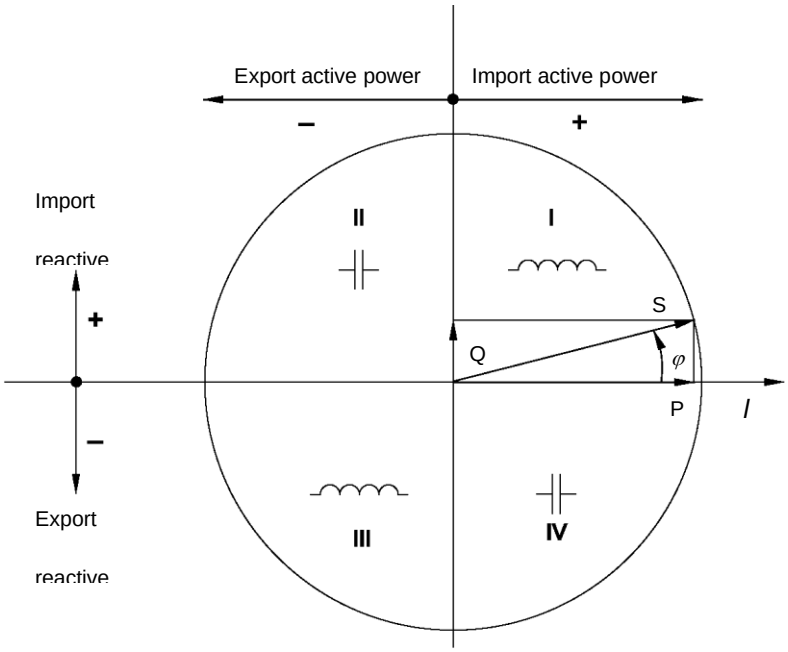


Figure 1 – Quadrant definitions for active and reactive power

NOTE The quadrant definitions shown in Figure 1 are in line with IEC 62053-23:2020.

7.1.2 Value group D codes – AC Electricity

7.1.2.1 Processing of measurement values

Table 14 specifies the use of value group D for electricity related objects.

Table 14 – Value group D codes – Electricity

Value group D codes – Electricity (A = 1, C <> 0, 93, 94, 96, 97, 98, 99)	
0	Billing period average (since last reset)
1	Cumulative minimum 1
2	Cumulative maximum 1
3	Minimum 1
4	Current average 1
5	Last average 1
6	Maximum 1
7	Instantaneous value
8	Time integral 1
9	Time integral 2
10	Time integral 3
11	Cumulative minimum 2
12	Cumulative maximum 2
13	Minimum 2
14	Current average 2
15	Last average 2
16	Maximum 2
17	Time integral 7
18	Time integral 8
19	Time integral 9
20	Time integral 10
21	Cumulative minimum 3
22	Cumulative maximum 3
23	Minimum 3
24	Current average 3
25	Last average 3
26	Maximum 3
27	Current average 5
28	Current average 6
29	Time integral 5
30	Time integral 6
31	Under limit threshold
32	Under limit occurrence counter
33	Under limit duration
34	Under limit magnitude

Value group D codes – Electricity (A = 1, C <> 0, 93, 94, 96, 97, 98, 99)	
35	Over limit threshold
36	Over limit occurrence counter
37	Over limit duration
38	Over limit magnitude
39	Missing threshold
40	Missing occurrence counter
41	Missing duration
42	Missing magnitude
43	Time threshold for under limit
44	Time threshold for over limit
45	Time threshold for missing magnitude
46	Contracted value
49	Average value for recording interval 1
50	Average value for recording interval 2
51	Minimum for recording interval 1
52	Minimum for recording interval 2
53	Maximum for recording interval 1
54	Maximum for recording interval 2
55	Test average
56	Current average 4 for harmonics measurement
58	Time integral 4
128...254	Manufacturer specific codes
All other	Reserved
NOTES	
Averaging scheme 1	Controlled by measurement period 1 (see Table 20), a set of registers is calculated by a metering device (codes 1...6). The typical usage is for billing purposes.
Averaging scheme 2	Controlled by measurement period 2, a set of registers is calculated by a metering device (codes 11...16). The typical usage is for billing purposes.
Averaging scheme 3	Controlled by measurement period 3, a set of registers is calculated by a metering device (codes 21...26). The typical usage is for instantaneous values.
Averaging scheme 4	Controlled by measurement period 4, a test average value (code 55) is calculated by the metering device.
Current average 1, 2, 3	See the definition of the “Demand register” IC in DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.4. The value is calculated using measurement period 1, 2 and/or 3 respectively.

Value group D codes – Electricity (A = 1, C <> 0, 93, 94, 96, 97, 98, 99)	
Last average 1,2,3	See the definition of the “Demand register” IC in in DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.4. The value is calculated using measurement period 1, 2 or 3 respectively.
Minimum	The smallest of last average values during a billing period, see Table 20.
Maximum	The largest of last average values during a billing period.
Cumulative min.	The cumulative sum of minimum values over all the past billing periods.
Cumulative max.	The cumulative sum of maximum values over all the past billing periods.
Current average 4	For harmonics measurement
Current average 5	See the definition of the “Demand register” IC in in DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.4. The value is calculated using recording interval 1; see Table 20.
Current average 6	See the definition of the “Demand register” IC in in DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.4. The value is calculated using recording interval 2.
Time integral 1	For a current billing period (F= 255): Time integral of the quantity calculated from the origin (first start of measurement) to the instantaneous time point. For a historical billing period (F= 0…99): Time integral of the quantity calculated from the origin to the end of the billing period given by the billing period code.
Time integral 2	For a current billing period (F = 255): Time integral of the quantity calculated from the beginning of the current billing period to the instantaneous time point. For a historical billing period (F = 0…99): Time integral of the quantity calculated over the billing period given by the billing period code.
Time integral 3	Time integral of the positive difference between the quantity and a prescribed threshold value.
Time integral 4 ("Test time integral”)	Time integral of the quantity calculated over a time specific to the device or determined by test equipment.
Time integral 5	Used as a base for load profile recording: Time integral of the quantity calculated from the beginning of the current recording interval to the instantaneous time point for recording period 1, see Table 20.
Time integral 6	Used as a base for load profile recording: Time integral of the quantity calculated from the beginning of the current recording interval to the instantaneous time point for recording period 2, see Table 20.
Time integral 7	Time integral of the quantity calculated from the origin (first start of measurement) up to the end of the last recording period with recording period 1, see Table 20.
Time integral 8	Time integral of the quantity calculated from the origin (first start of measurement) up to the end of the last recording period with recording period 2, see Table 20.
Time integral 9	Time integral of the quantity calculated from the beginning of the current billing period up to the end of the last recording period with recording period 1, see Table 20.
Time integral 10	Time integral of the quantity calculated from the beginning of the current billing period up to the end of the last recording period with recording period 2, see Table 20.
Under limit values	Values under a certain threshold (for example dips).
Over limit values	Values above a certain threshold (for example swells).
Missing values	Values considered as missing (for example interruptions).

7.1.2.2 Use of value group D for identification of other objects

For identifiers of electricity related general purpose objects see 7.1.5.1.

7.1.3 Value group E codes – AC Electricity

7.1.3.1 General

The following subclauses define the use of value group E for identifying further classification or processing the measurement quantities defined by values in value groups A to D. The various classifications and processing methods are exclusive.

7.1.3.2 Tariff rates

Table 15 shows the use of value group E for identification of tariff rates typically used for energy (consumption) and demand quantities.

Table 15 – Value group E codes – Electricity – Tariff rates

Value group E codes – Electricity – Tariff rates (A = 1)	
0	Total
1	Rate 1
2	Rate 2
3	Rate 3
…	…
63	Rate 63
128…254	Manufacturer specific codes
All other	Reserved

7.1.3.3 Harmonics

Table 16 shows the use of value group E for the identification of harmonics of instantaneous values of voltage, current or active power.

Table 16 – Value group E codes – Electricity – Harmonics

Value group E codes – Electricity – Measurement of harmonics of voltage, current or active power (A = 1, C = 12, 32, 52, 72, 92, 11, 31, 51, 71, 90, 91, 15, 35, 55, 75, D = 7, 24, 56)	
0	Total (fundamental + all harmonics)
1	1st harmonic (fundamental)
2	2nd harmonic
...	*n*th harmonic
120	120th harmonic
124	Total Harmonic Distortion (THD) [a]
125	Total Demand Distortion (TDD) [b]
126	All harmonics [c]
127	All harmonics to nominal value ratio [d]
128...254	Manufacturer specific codes
All other	Reserved

[a] THD is calculated as the ratio of the square root of the sum of the squares of each harmonic to the value of the fundamental quantity, expressed as a percent of the value of the fundamental.

[b] TDD is calculated as the ratio of the square root of the sum of the squares of each harmonic to the maximum value of the fundamental quantity, expressed as percent of the maximum value of the fundamental.

[c] Calculated as the square root of the sum of the squares of each harmonic.

[d] This is calculated as ratio of the square root of the sum of the squares of each harmonic, to the nominal value of the fundamental quantity, expressed as percent of the nominal value of the fundamental.

7.1.3.4 Phase angles

Table 17 shows the use of value group E for identification of phase angles.

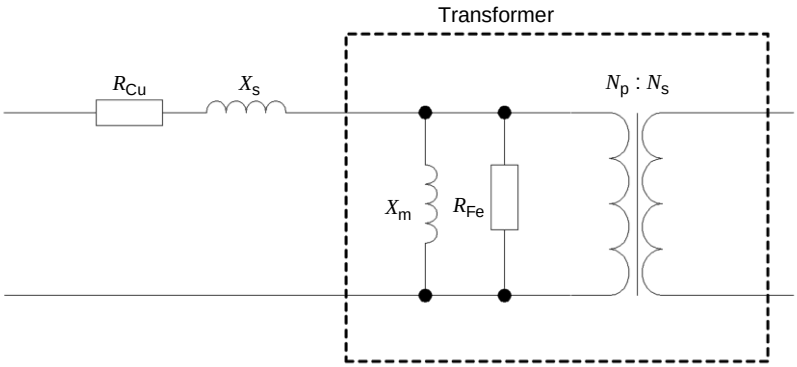
Table 17 – Value group E codes – Electricity – Extended phase angle measurement

Value group E codes – Electricity – Extended phase angle measurement (A = 1, C = 81; D = 7)								
Angle	**U(L1)**	**U(L2)**	**U(L3)**	**I(L1)**	**I(L2)**	**I(L3)**	**I(L0)**	**<= From**
U(L1)	(00)	01	02	04	05	06	07	
U(L2)	10	(11)	12	14	15	16	17	
U(L3)	20	21	(22)	24	25	26	27	
I(L1)	40	41	42	(44)	45	46	47	
I(L2)	50	51	52	54	(55)	56	57	
I(L3)	60	61	62	64	65	(66)	67	
I(L0)	70	71	72	74	75	76	(77)	
^ To (reference)								

7.1.3.5 Transformer and line loss quantities

Table 18 shows the meaning of value group E for the identification of transformer and line loss quantities. The use of value group D shall be according to Table 14, the use of value group F shall be according to Table A.2. For these quantities, no tariffication is available.

The model of the line and the transformer used for loss calculation is shown on Figure 2.



Key

- R_{Cu} Line resistance losses, OBIS code 1.x.0.10.2.VZ
- X_s Line reactance losses, OBIS code 1.x.0.10.3.VZ
- X_m Transformer magnetic losses, OBIS code 1.x.0.10.0.VZ
- R_{Fe} Transformer iron losses, OBIS code 1.x.0.10.1.VZ
- N_p Number of turns on the primary side of the transformer
- N_s Number of turns on the secondary side of the transformer

NOTE Serial elements of the transformer are normally low compared to that of the line, therefore they are not considered here.

Figure 2 – Model of the line and the transformer for calculation of loss quantities

Table 18 – Value group E codes – Electricity – Transformer and line losses

Value group E codes – Electricity – Transformer and line losses (A = 1, C = 83)			
E=	**Quantity**	**Formula**	**Quadrant / comment**
1	ΣL_i Active line losses+	On Load Active, positive OLA+ = (CuA_1+) + (CuA_2+) + (CuA_3+)	QI+QIV
2	ΣL_i Active line losses–	On Load Active, negative OLA– = (CuA_1–) + (CuA_2–) + (CuA_3–)	QII+QIII
3	ΣL_i Active line losses	On Load Active OLA = (CuA_1) + (CuA_2) + (CuA_3)	QI+QII+QIII+QIV
4	ΣL_i Active transformer losses+	No Load Active, positive NLA+ = (FeA_1+) + (FeA_2+) + (FeA_3+)	QI+QIV
5	ΣL_i Active transformer losses–	No Load active, negative NLA– = (FeA_1–) + (FeA_2–) + (FeA_3–)	QII+QIII
6	ΣL_i Active transformer losses	No Load Active NLA = (FeA_1) + (FeA_2) + (FeA_3)	QI+QII+QIII+QIV

Value group E codes – Electricity – Transformer and line losses (A = 1, C = 83)			
E=	**Quantity**	**Formula**	**Quadrant / comment**
7	ΣL_i Active losses+	Total Losses Active, positive TLA+ = (OLA+) + (NLA+)	QI+QIV
8	ΣL_i Active losses–	Total Losses Active, negative TLA– = (OLA–) + (NLA–)	QII+QIII
9	ΣL_i Active losses	Total Losses Active TLA = OLA + NLA = TLA_1 + TLA_2 + TLA_3	QI+QII+QIII+QIV
10	ΣL_i Reactive line losses+	On Load Reactive, positive OLR+ = (CuR_1+) + (CuR_2+) + (CuR_3+)	QI+QII
11	ΣL_i Reactive line losses–	On Load Reactive, negative OLR– = (CuR_1–) + (CuR_2–) + (CuR_3–)	QIII+QIV
12	ΣL_i Reactive line losses	On Load Reactive OLR = (CuR_1) + (CuR_2) + (CuR_3)	QI+QII+QIII+QIV
13	ΣL_i Reactive transformer losses+	No Load reactive, positive NLR+ = (FeR_1+) + (FeR_2+) + (FeR_3+)	QI+QII
14	ΣL_i Reactive transformer losses–	No Load Reactive, negative NLR– = (FeR_1–) + (FeR_2–) + (FeR_3–)	QIII+QIV
15	ΣL_i Reactive transformer losses	No Load Reactive NLR = (FeR_1) + (FeR_2) + (FeR_3)	QI+QII+QIII+QIV
16	ΣL_i Reactive losses+	Total Losses Reactive, positive TLR+ = (OLR+) + (NLR+)	QI+QII
17	ΣL_i Reactive losses–	Total Losses Reactive, negative TLR– = (OLR–) + (NLR–)	QIII+QIV
18	ΣL_i Reactive losses	Total Losses Reactive TLR = OLR + NLR = TLR_1 + TLR_2 + TLR_3	QI+QII+QIII+QIV
19	Total transformer losses with normalized R_{Fe} = 1 MΩ	U^2h 1/R_{Fe} × (U^2h_{L1} + U^2h_{L2} + U^2h_{L3})	QI+QII+QIII+QIV
20	Total line losses with normalized R_{Cu} = 1 Ω	I^2h R_{Cu} × (I^2h_{L1} + I^2h_{L2} + I^2h_{L3})	QI+QII+QIII+QIV
21	Compensated active gross+	CA+ = (A+) + (TLA+)	QI+QIV; A+ is the quantity A = 1, C = 1
22	Compensated active net+	CA+ = (A+) – (TLA+)	QI+QIV
23	Compensated active gross–	CA– = (A–) + (TLA–)	QII+QIII, A– is the quantity A = 1, C = 2
24	Compensated active net–	CA– = (A–) – (TLA–)	QII+QIII
25	Compensated reactive gross+	CR+ = (R+) + (TLR+)	QI+QII; R+ is the quantity A = 1, C = 3
26	Compensated reactive net+	CR+ = (R+) – (TLR+)	QI+QII
27	Compensated reactive gross–	CR– = (R–) + (TLR–)	QIII+QIV;R– is the quantity A = 1, C = 4
28	Compensated reactive net–	CR– = (R–) – (TLR–)	QIII+QIV
29	Reserved		
30	Reserved		
31	L_1 Active line losses+	CuA_1+ = I^2h_{L1} × R_{Cu}	QI+QIV R_{Cu} is the serial resistive element of the line loss, OBIS code 1.x.0.10.2.VZ
32	L_1 Active line losses–	CuA_1– = I^2h_{L1} × R_{Cu}	QII+QIII

Value group E codes – Electricity – Transformer and line losses (A = 1, C = 83)			
E=	**Quantity**	**Formula**	**Quadrant / comment**
33	L_1 Active line losses	$CuA_1 = I^2h_{L1} \times R_{Cu}$	QI+QII+QIII+QIV
34	L_1 Active transformer losses+	$FeA_1+ = U^2h_{L1}/R_{Fe}$	QI+QIV R_{Fe} is the parallel resistive element of the transformer loss, OBIS code 1.x.0.10.1.VZ
35	L_1 Active transformer losses–	$FeA_1– = U^2h_{L1}/R_{Fe}$	QII+QIII
36	L_1 Active transformer losses	$FeA_1 = U^2h_{L1}/R_{Fe}$	QI+QII+QIII+QIV
37	L_1 Active losses+	$TLA_1+ = (CuA_1+) + (FeA_1+)$	QI+QIV
38	L_1 Active losses–	$TLA_1– = (CuA_1–) + (FeA_1–)$	QII+QIII
39	L_1 Active losses	$TLA_1 = CuA_1 + FeA_1$	QI+QII+QIII+QIV
40	L_1 Reactive line losses+	$CuR_1+ = I^2hL_1 \times X_s$	QI+QII X_s is the serial reactive element of the line loss, OBIS code 1.x.0.10.3.VZ
41	L_1 Reactive line losses–	$CuR_1– = I^2h_{L1} \times X_s$	QIII+QIV
42	L_1 Reactive line losses	$CuR_1 = I^2h_{L1} \times X_s$	QI+QII+QIII+QIV
43	L_1 Reactive transformer losses+	$FeR_1+ = U^2h_{L1}/X_m$	QI+QII X_m is the parallel reactive element of the transformer loss, OBIS code 1.x.0.10.0.VZ
44	L_1 Reactive transformer losses–	$FeR_1– = U^2h_{L1}/X_m$	QIII+QIV
45	L_1 Reactive transformer losses	$FeR_1 = U^2h_{L1}/X_m$	QI+QII+QIII+QIV
46	L_1 Reactive losses+	$TLR_1+ = (CuR_1+) + (FeR_1+)$	QI+QII
47	L_1 Reactive losses–	$TLR_1– = (CuR_1–) + (FeR_1–)$	QIII+QIV
48	L_1 Reactive losses	$TLR_1 = CuR_1 + FeR_1$	QI+QII+QIII+QIV
49	L_1 Ampere-squared hours	A^2h_{L1}	QI+QII+QIII+QIV
50	L_1 Volt-squared hours	V^2h_{L1}	QI+QII+QIII+QIV
51	L_2 Active line losses+	$CuA_2+ = I^2h_{L2} \times R_{Cu}$	QI+QIV R_{Cu} is the serial resistive element of the line loss, OBIS code 1.x.0.10.2.VZ
52	L_2 Active line losses–	$CuA_2– = I^2h_{L2} \times R_{Cu}$	QII+QIII
53…70	L_2 quantities, (See 33…48)		
71	L_3 Active line losses +	$CuA_3+ = I^2h_{L3} \times R_{Cu}$	QI+QIV R_{Cu} is the serial resistive element of the line loss, OBIS code 1.x.0.10.2.VZ
72	L_3 Active line losses -	$CuA_3– = I^2h_{L3} \times R_{Cu}$	QII+QIII
73…90	L_3 quantities (See 33…48)		
91… 255	Reserved		
NOTE In this table, no manufacturer specific range is available.			

7.1.3.6 UNIPEDE voltage dips

Table 19 shows the use of value group E for the identification of voltage dips according to the UNIPEDE classification.

Table 19 – Value group E codes – Electricity – UNIPEDE voltage dips

Value group E codes – Electricity – UNIPEDE voltage dips measurement (A = 1, C = 12, 32, 52, 72, 124…126 D = 32)							
Depth in % of U_n	Residual voltage U in % of U_n	Duration Δt s					
		$0{,}01 < \Delta t \leq 0{,}1$	$0{,}1 < \Delta t \leq 0{,}5$	$0{,}5 < \Delta t \leq 1$	$1 < \Delta t \leq 3$	$3 < \Delta t \leq 20$	$20 < \Delta t \leq 60$
10 %…< 15 %	$90 > U \geq 85$	00	01	02	03	04	05
15 %…< 30 %	$85 > U \geq 70$	10	11	12	13	14	15
30 %…< 60 %	$70 > U \geq 40$	20	21	22	23	24	25
60 %…< 90 %	$40 > U \geq 10$	30	31	32	33	34	35
90 %…< 100 %	$10 > U \geq 0$	40	41	42	43	44	45

NOTE These *dip classes* form a subset of the classes defined in DLMS UA 1000-1 Ed 15 Part 2:2021, COSEM Interface Classes, Blue Book Part 2

EN 1434-1:2015 Heat meters – Part 1: General requirements

EN 1434-2:2015 Heat meters – Part 2: Constructional requirements

IEC TR 61000-2-8:2002, Table 2.

7.1.3.7 Use of value group E for the identification of other objects

For identifiers of electricity related general purpose objects see 7.1.5.1.

7.1.4 Value group F codes – AC Electricity

7.1.4.1 Billing periods

Value group F specifies the allocation to different billing periods (sets of historical values) for the objects with following codes:

- value group A: 1;
- value group C: as defined in Table 13
- value group D:
  - 0: Billing period average (since last reset);
  - 1, 2, 3, 6: (Cumulative) minimum / maximum 1;
  - 8, 9, 10: Time integral 1 / 2 / 3;
  - 11, 12, 13, 16: (Cumulative) minimum / maximum 2;
  - 21, 22, 23, 26: (Cumulative) minimum / maximum 3;

There are two billing period schemes available (for example to store weekly and monthly values). For each billing period scheme, the following general purpose objects are available:

- billing period counter;
- number of available billing periods;
- time stamp of most recent and historical billing periods;
- billing period length.

For OBIS codes see Table 20. For additional information, see Clause A.3 and DLMS UA 1000-1 Ed 15 Part 2:2021, 6.2.2.

7.1.4.2 Multiple thresholds

Value group F is also used to identify several thresholds for the same quantity, identified with the following codes:

- value group A = 1;
- value group C = 1…20, 21…40, 41…60, 61…80, 82, 84…89, 90… 92;
- value group D = 31, 35, 39 (under limit, over limit and missing thresholds);
- value group F = 0…99.

NOTE All quantities monitored are instantaneous values: D = 7 or D = 24.

When multiple thresholds are identified by value group F, then the Under limit / Over limit / Missing Occurrence counter / Duration / Magnitude quantities relative to a threshold are identified with the same value in value group F. In this case, value group F cannot be used to identify values relative to billing period. However, such values can be held by “Profile generic” objects.

Example:

– Over limit threshold #1 for current in any phase is identified with OBIS code 1-0:11.35.0*0;

– Over limit duration above threshold # 1 for current in any phase is identified with OBIS code 1-0:11.37.0*0.

To avoid ambiguity, value group F cannot be used to identify historical values of Under limit / Over limit / Missing Occurrence counter / Duration / Magnitude quantities. For historical values of these quantities “Profile generic” objects can be used and values related to previous billing periods can be accessed using selective access.

7.1.5 OBIS codes – AC Electricity

7.1.5.1 General and service entry objects – Electricity

Table 20 specifies OBIS codes for electricity related general and service entry objects.

Table 20 – OBIS codes for general and service entry objects – Electricity

General and service entry objects – Electricity	OBIS code					
	A	B	C	D	E	F
Free ID-numbers for utilities						
Complete combined electricity ID	1	*b*	0	0		
Electricity ID 1	1	*b*	0	0	0	
…	…	…	…	…	…	
Electricity ID 10	1	*b*	0	0	9	
Billing period values/reset counter entries (First billing period scheme if there are more than one)						
Billing period counter (1)	1	*b*	0	1	0	VZ or 255
Billing period counter (1) in a recent billing period	1	*b*	0	1	0	101-125
Billing period counters (1) in unspecified number of recent billing periods	1	*b*	0	1	0	126
Number of available billing periods (1)	1	*b*	0	1	1	
Time stamp of the most recent billing period (1)	1	*b*	0	1	2	
Time stamp of the billing period (1) VZ (last reset)	1	*b*	0	1	2	VZ
Time stamp of the billing period (1) VZ_{-1}	1	*b*	0	1	2	VZ_{-1}
…	…	…	…	…	…	…
Time stamp of the billing period (1) VZ_{-n}	1	*b*	0	1	2	VZ_{-n}
Time stamp of the billing period (1) in a recent billing period	1	*b*	0	1	2	101-125
Time stamp of the billing period (1) in unspecified number of recent billing periods	1	*b*	0	1	2	126
Billing period values/reset counter entries (Second billing period scheme)						
Billing period counter (2)	1	*b*	0	1	3	VZ or 255
Billing period counter (2) in a recent billing period	1	*b*	0	1	3	101-125
Billing period counters (2) in unspecified number of recent billing periods	1	*b*	0	1	3	126
Number of available billing periods (2)	1	*b*	0	1	4	
Time stamp of the most recent billing period (2)	1	*b*	0	1	5	
Time stamp of the billing period (2) VZ (last reset)	1	*b*	0	1	5	VZ
Time stamp of the billing period (2) VZ_{-1}	1	*b*	0	1	5	VZ_{-1}
…	…	…	…	…	…	…
Time stamp of the billing period (2) VZ_{-n}	1	*b*	0	1	5	VZ_{-n}
Time stamp of the billing period (2) in a recent billing period	1	*b*	0	1	5	101-125
Time stamp of the billing period (2) in unspecified number of recent billing periods	1	*b*	0	1	5	126
Program entries						
Active firmware identifier (Previously: Configuration program version number)	1	*b*	0	2	0	
Parameter record number	1	*b*	0	2	1	
Parameter record number, line 1	1	*b*	0	2	1	1
Reserved for future use	1	*b*	0	2	1	2… 127

General and service entry objects – Electricity	OBIS code					
	A	B	C	D	E	F
Manufacturer specific	1	*b*	0	2	1	128 …254
Time switch program number	1	*b*	0	2	2	
RCR program number	1	*b*	0	2	3	
Meter connection diagram ID	1	*b*	0	2	4	
Passive calendar name	1	*b*	0	2	7	
Active firmware signature	1	*b*	0	2	8	
Output pulse values or constants NOTE For units, see DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.2						
Active energy, metrological LED	1	*b*	0	3	0	
Reactive energy, metrological LED	1	*b*	0	3	1	
Apparent energy, metrological LED	1	*b*	0	3	2	
Active energy, output pulse	1	*b*	0	3	3	
Reactive energy, output pulse	1	*b*	0	3	4	
Apparent energy, output pulse	1	*b*	0	3	5	
Volt-squared hours, metrological LED	1	*b*	0	3	6	
Ampere-squared hours, metrological LED	1	*b*	0	3	7	
Volt-squared hours, output pulse	1	*b*	0	3	8	
Ampere-squared hours, output pulse	1	*b*	0	3	9	
Ratios						
Reading factor for power	1	*b*	0	4	0	
Reading factor for energy	1	*b*	0	4	1	
Transformer ratio – current (numerator) [a]	1	*b*	0	4	2	VZ
Transformer ratio – voltage (numerator) [a]	1	*b*	0	4	3	VZ
Overall transformer ratio (numerator) [a]	1	*b*	0	4	4	VZ
Transformer ratio – current (denominator) [a]	1	*b*	0	4	5	VZ
Transformer ratio – voltage (denominator) [a]	1	*b*	0	4	6	VZ
Overall transformer ratio (denominator) [a]	1	*b*	0	4	7	VZ
Demand limits for excess consumption metering						
Reserved for Germany	1	*b*	0	5		
Nominal values						
Voltage	1	*b*	0	6	0	
Basic/nominal current	1	*b*	0	6	1	
Frequency	1	*b*	0	6	2	
Maximum current	1	*b*	0	6	3	
Reference voltage for power quality measurement	1	*b*	0	6	4	VZ
Reference voltage for aux. power supply	1	*b*	0	6	5	
Input pulse values or constants [b] NOTE For units, see DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.2						
Active energy	1	*b*	0	7	0	
Reactive energy	1	*b*	0	7	1	
Apparent energy	1	*b*	0	7	2	
Volt-squared hours	1	*b*	0	7	3	
Ampere-squared hours	1	*b*	0	7	4	
Unitless quantities	1	*b*	0	7	5	
Active energy, export	1	*b*	0	7	10	
Reactive energy, export	1	*b*	0	7	11	

General and service entry objects – Electricity	OBIS code					
	A	B	C	D	E	F
Apparent energy, export	1	*b*	0	7	12	
Measurement period- / recording interval- / billing period duration						
Measurement period 1, for averaging scheme 1	1	*b*	0	8	0	VZ
Measurement period 2, for averaging scheme 2	1	*b*	0	8	1	VZ
Measurement period 3, for instantaneous value	1	*b*	0	8	2	VZ
Measurement period 4, for test value	1	*b*	0	8	3	VZ
Recording interval 1, for load profile	1	*b*	0	8	4	VZ
Recording interval 2, for load profile	1	*b*	0	8	5	VZ
Billing period (Billing period 1 if there are two billing period schemes)	1	*b*	0	8	6	VZ
Billing period 2	1	*b*	0	8	7	VZ
Measurement period 4, for harmonics measurement	1	*b*	0	8	8	VZ
Time entries						
Time expired since last end of billing period (First billing period scheme if there are more than one)	1	*b*	0	9	0	
Local time	1	*b*	0	9	1	
Local date	1	*b*	0	9	2	
Reserved for Germany	1	*b*	0	9	3	
Reserved for Germany	1	*b*	0	9	4	
Week day (0…7)	1	*b*	0	9	5	
Time of last reset (First billing period scheme if there are more than one)	1	*b*	0	9	6	
Date of last reset (First billing period scheme if there are more than one)	1	*b*	0	9	7	
Output pulse duration	1	*b*	0	9	8	
Clock synchronization window	1	*b*	0	9	9	
Clock synchronization method	1	*b*	0	9	10	
Clock time shift limit (default value: s)	1	*b*	0	9	11	
Billing period reset lockout time (First billing period scheme if there are more than one)	1	*b*	0	9	12	
Second billing period scheme						
Time expired since last end of billing period	1	*b*	0	9	13	
Time of last reset	1	*b*	0	9	14	
Date of last reset	1	*b*	0	9	15	
Billing period reset lockout time	1	*b*	0	9	16	
Coefficients						
Transformer magnetic losses, X_m	1	*b*	0	10	0	VZ
Transformer iron losses, R_{Fe}	1	*b*	0	10	1	VZ
Line resistance losses, R_{Cu}	1	*b*	0	10	2	VZ
Line reactance losses, X_s	1	*b*	0	10	3	VZ
Measurement methods						
Algorithm for active power measurement	1	*b*	0	11	1	
Algorithm for active energy measurement	1	*b*	0	11	2	
Algorithm for reactive power measurement	1	*b*	0	11	3	
Algorithm for reactive energy measurement	1	*b*	0	11	4	
Algorithm for apparent power measurement	1	*b*	0	11	5	
Algorithm for apparent energy measurement	1	*b*	0	11	6	
Algorithm for power factor calculation	1	*b*	0	11	7	

General and service entry objects – Electricity	OBIS code					
	A	B	C	D	E	F
Metering point ID (electricity related)						
Metering point ID 1 (electricity related)	1	0	96	1	0	
……						
Metering point ID 10 (electricity related)	1	0	96	1	9	
Internal operating status, electricity related						
Internal operating status, global [c]	1	*b*	96	5	0	
Internal operating status (status word 1)	1	*b*	96	5	1	
Internal operating status (status word 2)	1	*b*	96	5	2	
Internal operating status (status word 3)	1	*b*	96	5	3	
Internal operating status (status word 4)	1	*b*	96	5	4	
Meter started status flag	1	*b*	96	5	5	
Electricity related status data						
Status information missing voltage	1	0	96	10	0	
Status information missing current	1	0	96	10	1	
Status information current without voltage	1	0	96	10	2	
Status information auxiliary power supply	1	0	96	10	3	
Manufacturer specific [d]	1	*b*	96	50	*e*	*f*
……	…	…	…	…	…	…
Manufacturer specific	1	*b*	96	99	*e*	*f*

[a] If a transformer ratio is expressed as a fraction the ratio is numerator, divided by denominator. If the transformer ratio is expressed by an integer or real figure, only the numerator is used.

[b] The codes for export active, reactive and apparent energy shall be used only if meters measuring import energy and meters measuring export energy are connected to the pulse inputs.

[c] Global status words with E = 0 contain the individual status words E = 1…5. The contents of the status words are not defined In this document.

[d] The range D = 50…99 is available for identifying objects, which are not represented by another defined code, but need representation on the display as well. If this is not required, the range D = 128…254 should be used.

It should be noted, that some of the codes above are normally used for display purposes only, as the related data items are attributes of objects having their own OBIS name. See DLMS UA 1000-1 Ed 15 Part 2:2021, Clause 4.

7.1.5.2 Error register objects – Electricity

Table 21 specifies the OBIS codes for electricity related error register objects.

Table 21 – OBIS codes for error register objects – Electricity

Error register objects – Electricity	OBIS code					
	A	B	C	D	E	F
Error register	1	*b*	97	97	*e*	
NOTE The information to be included in the error objects is not defined in this document.						

7.1.5.3 List objects – Electricity

Table 22 specifies the OBIS codes for electricity related list objects.

Table 22 – OBIS codes for list objects – Electricity

List objects – Electricity	OBIS code					
	A	B	C	D	E	F
Electricity related data of billing period (with billing period scheme 1 if there are two schemes available)	1	*b*	98	1	*e*	255 [a]
Electricity related data of billing period (with billing period scheme 2)	1	*b*	98	2	*e*	255 [a]
[a] F = 255 means a wildcard here. See Clause A.3.						

7.1.5.4 Data profile objects – Electricity

Electricity related data profiles – identified with one single OBIS code – are used to hold a series of measurement values of one or more similar quantities and/or to group various data. The OBIS codes are specified in Table 23.

Table 23 – OBIS codes for data profile objects – Electricity

Data profile objects – Electricity	OBIS code					
	A	B	C	D	E	F
Load profile with recording period 1	1	*b*	99	1	*e*	
Load profile with recording period 2	1	*b*	99	2	*e*	
Load profile during test	1	*b*	99	3	0	
Dips voltage profile	1	*b*	99	10	1	
Swells voltage profile	1	*b*	99	10	2	
Cuts voltage profile	1	*b*	99	10	3	
Voltage harmonic profile	1	*b*	99	11	n^{th}	
Current harmonic profile	1	*b*	99	12	n^{th}	
Voltage unbalance profile	1	*b*	99	13	0	
Power quality	1	*b*	99	14	0	
Power failure event log	1	*b*	99	97	*e*	
Event log	1	*b*	99	98	*e*	
Certification data log	1	*b*	99	99	*e*	

7.1.5.5 Register table objects – Electricity

Register tables – identified with a single OBIS code – are defined to hold a number of values of the same type. The OBIS codes are specified in Table 24.

Table 24 – OBIS codes for register table objects – Electricity

Register table objects – Electricity	OBIS code					
	A	B	C	D	E	F
UNIPEDE voltage dips, any phase	1	*b*	12	32		
UNIPEDE voltage dips, L_1	1	*b*	32	32		
UNIPEDE voltage dips, L_2	1	*b*	52	32		
UNIPEDE voltage dips, L_3	1	*b*	72	32		
Extended angle measurement	1	*b*	81	7		
General use, electricity related	1	*b*	98	10	*e*	

7.2 DC electricity (Value group A = 2)

7.2.1 Value group C codes – DC electricity

Table 25 specifies the use of value group C for DC electricity related objects.

The definitions for voltage measurements positive to negative and negative to ground are shown in Figure 3.

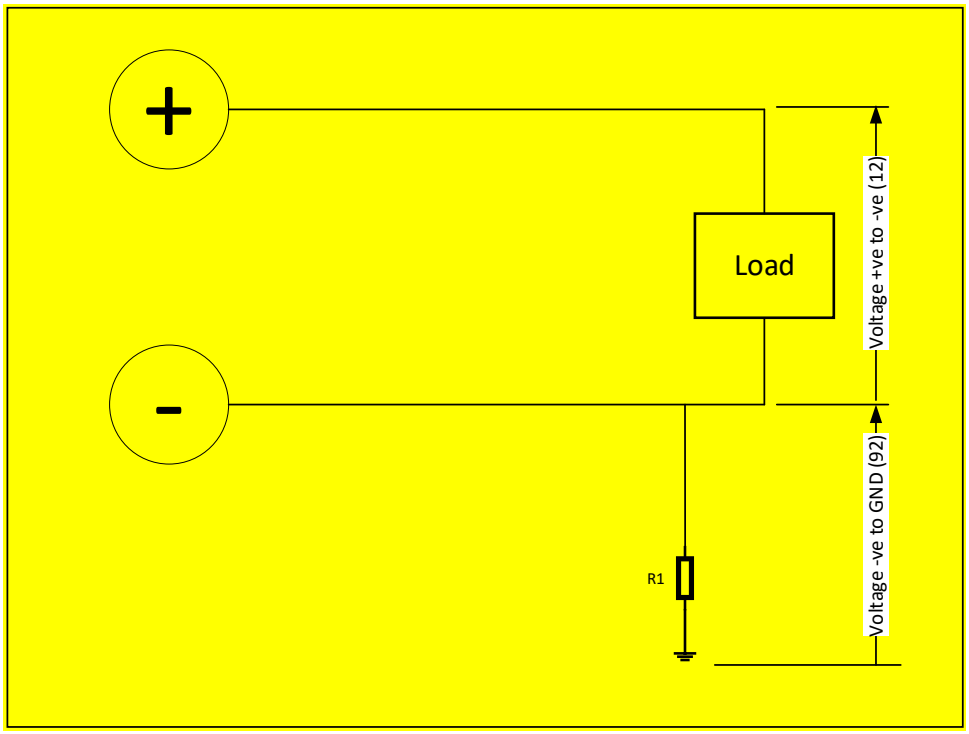


Figure 3 – DC voltage measurements

Table 25 – Value group C codes – DC electricity

Value group C codes – DC electricity (A = 2)	
0	General purpose objects (See 7.2.5.1)
1	Power +
2	Power -
11	Current
12	Voltage (high to low) (positive to negative)
92	Voltage (low to ground) (negative to ground)
93	Consortia specific identifiers (See 5.4.2)
94	Country specific identifiers (See 5.4.3)
96	General and service entry objects – DC electricity (See 7.2.5.1)
97	Error register objects – DC electricity (See 7.2.5.2)
98	List objects – DC electricity (See 7.2.5.3)

Value group C codes – DC electricity (A = 2)	
99	Data profile objects – DC electricity (See 7.2.5.4)
100..127	Reserved
128...199, 240	Manufacturer specific codes
All other	Reserved

7.2.2 Value group D codes – DC electricity

7.2.2.1 Processing of measurement values

Table 26 specifies the use of value group D for DCelectricity related objects.

Table 26 – Value group D codes – DC electricity

Value group D codes – DC electricity (A = 2, C = 1,2,11,12,92)	
0	Billing period average (since last reset)
1	Cumulative minimum 1
2	Cumulative maximum 1
3	Minimum 1
4	Current average 1
5	Last average 1
6	Maximum 1
7	Instantaneous value
8	Time integral 1
9	Time integral 2
10	Time integral 3
11	Cumulative minimum 2
12	Cumulative maximum 2
13	Minimum 2
14	Current average 2
15	Last average 2
16	Maximum 2
17	Time integral 7
18	Time integral 8
19	Time integral 9
20	Time integral 10
21	Cumulative minimum 3
22	Cumulative maximum 3
23	Minimum 3
24	Current average 3
25	Last average 3
26	Maximum 3
27	Current average 5
28	Current average 6
29	Time integral 5

Value group D codes – DC electricity (A = 2, C = 1,2,11,12,92)	
30	Time integral 6
31	Under limit threshold
32	Under limit occurrence counter
33	Under limit duration
34	Under limit magnitude
35	Over limit threshold
36	Over limit occurrence counter
37	Over limit duration
38	Over limit magnitude
39	Missing threshold
40	Missing occurrence counter
41	Missing duration
42	Missing magnitude
43	Time threshold for under limit
44	Time threshold for over limit
45	Time threshold for missing magnitude
46	Contracted value
49	Average value for recording interval 1
50	Average value for recording interval 2
51	Minimum for recording interval 1
52	Minimum for recording interval 2
53	Maximum for recording interval 1
54	Maximum for recording interval 2
55	Test average
56	Current average 4
58	Time integral 4
128...254	Manufacturer specific codes
All other	Reserved
NOTES	
Averaging scheme 1	Controlled by measurement period 1 (see Table 28), a set of registers is calculated by a metering device (codes 1...6). The typical usage is for billing purposes.
Averaging scheme 2	Controlled by measurement period 2, a set of registers is calculated by a metering device (codes 11...16). The typical usage is for billing purposes.
Averaging scheme 3	Controlled by measurement period 3, a set of registers is calculated by a metering device (codes 21...26). The typical usage is for instantaneous values.
Averaging scheme 4	Controlled by measurement period 4, a test average value (code 55) is calculated by the metering device.
Current average 1, 2, 3, 4	See the definition of the “Demand register” IC in DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.4. The value is calculated using measurement period 1, 2 and/or 3 respectively.

Value group D codes – DC electricity (A = 2, C = 1,2,11,12,92)	
Last average 1,2,3	See the definition of the “Demand register” IC in DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.4. The value is calculated using measurement period 1, 2 or 3 respectively.
Minimum	The smallest of last average values during a billing period, see Table 28.
Maximum	The largest of last average values during a billing period.
Cumulative min.	The cumulative sum of minimum values over all the past billing periods.
Cumulative max.	The cumulative sum of maximum values over all the past billing periods.
Current average 5	See the definition of the “Demand register” IC in DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.4. The value is calculated using recording interval 1; see Table 28.
Current average 6	See the definition of the “Demand register” IC in DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.4. The value is calculated using recording interval 2.
Time integral 1	For a current billing period (F= 255): Time integral of the quantity calculated from the origin (first start of measurement) to the instantaneous time point. For a historical billing period (F= 0…99): Time integral of the quantity calculated from the origin to the end of the billing period given by the billing period code.
Time integral 2	For a current billing period (F = 255): Time integral of the quantity calculated from the beginning of the current billing period to the instantaneous time point. For a historical billing period (F = 0…99): Time integral of the quantity calculated over the billing period given by the billing period code.
Time integral 3	Time integral of the positive difference between the quantity and a prescribed threshold value.
Time integral 4 ("Test time integral")	Time integral of the quantity calculated over a time specific to the device or determined by test equipment.
Time integral 5	Used as a base for load profile recording: Time integral of the quantity calculated from the beginning of the current recording interval to the instantaneous time point for recording period 1, see Table 28.
Time integral 6	Used as a base for load profile recording: Time integral of the quantity calculated from the beginning of the current recording interval to the instantaneous time point for recording period 2, see Table 28.
Time integral 7	Time integral of the quantity calculated from the origin (first start of measurement) up to the end of the last recording period with recording period 1, see Table 28.
Time integral 8	Time integral of the quantity calculated from the origin (first start of measurement) up to the end of the last recording period with recording period 2, see Table 28.
Time integral 9	Time integral of the quantity calculated from the beginning of the current billing period up to the end of the last recording period with recording period 1, see Table 28.
Time integral 10	Time integral of the quantity calculated from the beginning of the current billing period up to the end of the last recording period with recording period 2, see Table 28.
Under limit values	Values under a certain threshold (for example dips).
Over limit values	Values above a certain threshold (for example swells).
Missing values	Values considered as missing (for example interruptions).

7.2.2.2 Use of value group D for identification of other objects

For identifiers of DC electricity related general purpose objects see 7.2.5.1.

7.2.3 Value group E codes – DC electricity

7.2.3.1 General

The following clauses define the use of value group E for identifying further classification or processing the measurement quantities defined by values in value groups A to D. The various classifications and processing methods are exclusive.

7.2.3.2 Tariff rates

Table 27 shows the use of value group E for identification of tariff rates typically used for energy (consumption) and demand quantities.

Table 27 – Value group E codes – DC electricity – Tariff rates

Value group E codes – DC electricity – Tariff rates (A = 2)	
0	Total
1	Rate 1
2	Rate 2
3	Rate 3
...	...
63	Rate 63
128...254	Manufacturer specific codes
All other	Reserved

7.2.3.3 Use of value group E for the identification of other objects

For identifiers of DC electricity related general purpose objects see 7.2.5.1.

7.2.4 Value group F codes – DC electricity

7.2.4.1 Billing periods

Value group F specifies the allocation to different billing periods (sets of historical values) for the objects with following codes:

- value group A: ;
- value group C: as defined in Table 25;
- value group D:
  - 0: Billing period average (since last reset);
  - 1, 2, 3, 6: (Cumulative) minimum / maximum 1;
  - 8, 9, 10: Time integral 1 / 2 / 3;
  - 11, 12, 13, 16: (Cumulative) minimum / maximum 2;
  - 21, 22, 23, 26: (Cumulative) minimum / maximum 3;

There are two billing period schemes available (for example to store weekly and monthly values). For each billing period scheme, the following general-purpose objects are available:

- billing period counter;
- number of available billing periods;
- time stamp of most recent and historical billing periods;
- billing period length.

For OBIS codes see Table 28. For additional information, see DLMS UA 1000-1 Ed 15 Part 2:2021, 6.2.2, 7.2.5.1 and 7.2.5.3.

7.2.4.2 Multiple thresholds

Value group F is also used to identify several thresholds for the same quantity, identified with the following codes:

- value group A = 1;
- value group C = 1,2,11,12,92;
- value group D = 31, 35, 39 (under limit, over limit and missing thresholds);
- value group F = 0…99.

NOTE All quantities monitored are instantaneous values: D = 7 or D = 24.

When multiple thresholds are identified by value group F, then the Under limit / Over limit / Missing Occurrence counter / Duration / Magnitude quantities relative to a threshold are identified with the same value in value group F. In this case, value group F cannot be used to identify values relative to billing period. However, such values can be held by “Profile generic” objects.

Example:

- Over limit threshold #1 for current is identified with OBIS code 2-0:11.35.0*0;

- Over limit duration above threshold # 1 for current is identified with OBIS code 2-0:11.37.0*0.

To avoid ambiguity, value group F cannot be used to identify historical values of Under limit / Over limit / Missing Occurrence counter / Duration / Magnitude quantities. For historical values of these quantities “Profile generic” objects can be used and values related to previous billing periods can be accessed using selective access.

7.2.5 OBIS codes – DC electricity

7.2.5.1 General and service entry objects – DC electricity

Table 28 specifies the OBIS codes for DC electricity related general and service entry objects.

Table 28 – OBIS codes for general and service entry objects – DC electricity

General and service entry objects – DC electricity	OBIS code					
	A	B	C	D	E	F
Free ID-numbers for utilities						
Complete combined DC electricity ID	2	*b*	0	0		
DC electricity ID 1	2	*b*	0	0	0	
…	…	…	…	…	…	
DC electricity ID 10	2	*b*	0	0	9	
Billing period values/reset counter entries (First billing period scheme if there are more than one)						
Billing period counter (1) in a recent billing period VZ	2	*b*	0	1	0	VZ or 255
Billing period counter (1) in a recent billing period	2	*b*	0	1	0	101-125
Billing period counters (1) in unspecified number of recent billing periods	2	*b*	0	1	0	126
Number of available billing periods (1)	2	*b*	0	1	1	
Time stamp of the most recent billing period (1)	2	*b*	0	1	2	

General and service entry objects – DC electricity	OBIS code					
	A	B	C	D	E	F
Time stamp of the billing period (1) VZ (last reset)	2	*b*	0	1	2	VZ
Time stamp of the billing period (1) VZ_{-1}	2	*b*	0	1	2	VZ_{-1}
…	…	…	…	…	…	…
Time stamp of the billing period (1) VZ_{-n}	2	*b*	0	1	2	VZ_{-n}
Time stamp of the billing period (1) in a recent billing period	2	*b*	0	1	2	101-125
Time stamp of the billing period (1) in unspecified number of recent billing periods	2	*b*	0	1	2	126
Billing period values/reset counter entries (Second billing period scheme)						
Billing period counter (2)	2	*b*	0	1	3	VZ or 255
Billing period counter (2) in a recent billing period	2	*b*	0	1	3	101-125
Billing period counters (2) in unspecified number of recent billing periods	2	*b*	0	1	3	126
Number of available billing periods (2)	2	*b*	0	1	4	
Time stamp of the most recent billing period (2)	2	*b*	0	1	5	
Time stamp of the billing period (2) VZ (last reset)	2	*b*	0	1	5	VZ
Time stamp of the billing period (2) VZ_{-1}	2	*b*	0	1	5	VZ_{-1}
…	…	…	…	…	…	…
Time stamp of the billing period (2) VZ_{-n}	2	*b*	0	1	5	VZ_{-n}
Time stamp of the billing period (2) in a recent billing period	2	*b*	0	1	5	101-125
Time stamp of the billing period (2) in unspecified number of recent billing periods	2	*b*	0	1	5	126
Program entries						
Active firmware identifier (Previously: Configuration program version number)	2	*b*	0	2	0	
Parameter record number	2	*b*	0	2	1	
Parameter record number, line 1	2	*b*	0	2	1	1
Reserved for future use	2	*b*	0	2	1	2…127
Manufacturer specific	2	*b*	0	2	1	128…254
Time switch program number	2	*b*	0	2	2	
RCR program number	2	*b*	0	2	3	
Meter connection diagram ID	2	*b*	0	2	4	
Passive calendar name	2	*b*	0	2	7	
Active firmware signature	2	*b*	0	2	8	
Output pulse values or constants NOTE For units, see DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.2.						
Active energy, metrological LED	2	*b*	0	3	0	
Active energy, output pulse	2	*b*	0	3	3	
Volt-squared hours, metrological LED	2	*b*	0	3	6	
Ampere-squared hours, metrological LED	2	*b*	0	3	7	
Volt-squared hours, output pulse	2	*b*	0	3	8	
Ampere-squared hours, output pulse	2	*b*	0	3	9	
Ratios						
Reading factor for power	2	*b*	0	4	0	
Reading factor for energy	2	*b*	0	4	1	
Sensor ratio – current (numerator) [a]	2	*b*	0	4	2	VZ

General and service entry objects – DC electricity	OBIS code					
	A	B	C	D	E	F
Sensor ratio – voltage (numerator) [a]	2	*b*	0	4	3	VZ
Overall sensor ratio (numerator) [a]	2	*b*	0	4	4	VZ
Sensor ratio – current (denominator) [a]	2	*b*	0	4	5	VZ
Sensor ratio – voltage (denominator) [a]	2	*b*	0	4	6	VZ
Overall sensor ratio (denominator) [a]	2	*b*	0	4	7	VZ
Demand limits for excess consumption metering						
Reserved for future use (eg German requirements)	2	*b*	0	5		
Nominal values						
Voltage	2	*b*	0	6	0	
Basic/nominal current	2	*b*	0	6	1	
Maximum current	2	*b*	0	6	3	
Reference voltage for power quality measurement	2	*b*	0	6	4	VZ
Reference voltage for aux. power supply	2	*b*	0	6	5	
Input pulse values or constants [b] NOTE For units, see DLMS UA 1000-1 Ed 15 Part 2:2021, 4.3.2.						
Active energy	2	*b*	0	7	0	
Volt-squared hours	2	*b*	0	7	3	
Ampere-squared hours	2	*b*	0	7	4	
Unitless quantities	2	*b*	0	7	5	
Active energy, export	2	*b*	0	7	10	
Measurement period- / recording interval- / billing period duration						
Measurement period 1, for averaging scheme 1	2	*b*	0	8	0	VZ
Measurement period 2, for averaging scheme 2	2	*b*	0	8	1	VZ
Measurement period 3, for instantaneous value	2	*b*	0	8	2	VZ
Measurement period 4, for test value	2	*b*	0	8	3	VZ
Recording interval 1, for load profile	2	*b*	0	8	4	VZ
Recording interval 2, for load profile	2	*b*	0	8	5	VZ
Billing period (Billing period 1 if there are two billing period schemes)	2	*b*	0	8	6	VZ
Billing period 2	2	*b*	0	8	7	VZ
Measurement period 4, for harmonics measurement	2	*b*	0	8	8	VZ
Time entries						
Time expired since last end of billing period (First billing period scheme if there are more than one)	2	*b*	0	9	0	
Local time	2	*b*	0	9	1	
Local date	2	*b*	0	9	2	
Reserved for Germany	2	*b*	0	9	3	
Reserved for Germany	2	*b*	0	9	4	
Week day (0…7)	2	*b*	0	9	5	
Time of last reset (First billing period scheme if there are more than one)	2	*b*	0	9	6	
Date of last reset (First billing period scheme if there are more than one)	2	*b*	0	9	7	
Output pulse duration	2	*b*	0	9	8	
Clock synchronization window	2	*b*	0	9	9	
Clock synchronization method	2	*b*	0	9	10	
Clock time shift limit (default value: s)	2	*b*	0	9	11	
Billing period reset lockout time (First billing period scheme if there are more than one)	2	*b*	0	9	12	
Second billing period scheme						

General and service entry objects – DC electricity	OBIS code					
	A	B	C	D	E	F
Time expired since last end of billing period	2	*b*	0	9	13	
Time of last reset	2	*b*	0	9	14	
Date of last reset	2	*b*	0	9	15	
Billing period reset lockout time	2	*b*	0	9	16	
Coefficients						
Line resistance losses, R_{Cu}	2	*b*	0	10	2	VZ
Measurement methods						
Algorithm for active power measurement	2	*b*	0	11	1	
Algorithm for active energy measurement	2	*b*	0	11	2	
Metering point ID (DC electricity related)						
Metering point ID 1 (DC electricity related)	2	0	96	1	0	
.....						
Metering point ID 10 (DC electricity related)	2	0	96	1	9	
Internal operating status, DC electricity related						
Internal operating status, global [c]	2	*b*	96	5	0	
Internal operating status (status word 1)	2	*b*	96	5	1	
Internal operating status (status word 2)	2	*b*	96	5	2	
Internal operating status (status word 3)	2	*b*	96	5	3	
Internal operating status (status word 4)	2	*b*	96	5	4	
Meter started status flag	2	*b*	96	5	5	
DC electricity related status data						
Status information missing voltage	2	0	96	10	0	
Status information missing current	2	0	96	10	1	
Status information current without voltage	2	0	96	10	2	
Status information auxiliary power supply	2	0	96	10	3	
Manufacturer specific [d]	2	*b*	96	50	*e*	*f*
.....	...	...	...	...	...	...
Manufacturer specific	2	*b*	96	99	*e*	*f*

a	If a sensor ratio is expressed as a fraction the ratio is numerator, divided by denominator. If the sensor ratio is expressed by an integer or real figure, only the numerator is used.
b	The codes for export DC energy shall be used only if meters measuring import energy and meters measuring export energy are connected to the pulse inputs.
c	Global status words with E = 0 contain the individual status words E = 1…5. The contents of the status words are not defined In this Technical Report.
d	The range D = 50…99 is available for identifying objects, which are not represented by another defined code, but need representation on the display as well. If this is not required, the range D = 128…254 should be used.

It should be noted, that some of the codes above are normally used for display purposes only, as the related data items are attributes of objects having their own OBIS name. See Clause 4.

7.2.5.2 Error register objects – DC electricity

Table 29 specifies the OBIS codes for DC electricity related error register objects.

Table 29 – OBIS codes for error register objects – DC electricity

Error register objects – DC electricity	OBIS code					
	A	B	C	D	E	F
Error register	2	*b*	97	97	*e*	

Error register objects – DC electricity	OBIS code					
	A	B	C	D	E	F
NOTE The information to be included in the error objects is not defined in this document.						

7.2.5.3 List objects – DC electricity

Table 30 specifies the OBIS codes for DC electricity related list objects.

Table 30 – OBIS codes for list objects – DC electricity

List objects – DC electricity	OBIS code					
	A	B	C	D	E	F
DC electricity related data of billing period (with billing period scheme 1 if there are two schemes available)	2	*b*	98	1	*e*	255 [a]
DC electricity related data of billing period (with billing period scheme 2)	2	*b*	98	2	*e*	255 [a]
[a] F = 255 means a wildcard here. See A.3.						

7.2.5.4 Data profile objects – DC electricity

DC electricity related data profiles – identified with one single OBIS code – are used to hold a series of measurement values of one or more similar quantities and/or to group various data. The OBIS codes are specified in Table 31.

Table 31 – OBIS codes for data profile objects – DC electricity

Data profile objects – DC electricity	OBIS code					
	A	B	C	D	E	F
Load profile with recording period 1	2	*b*	99	1	*e*	
Load profile with recording period 2	2	*b*	99	2	*e*	
Load profile during test	2	*b*	99	3	0	
Dips voltage profile	2	*b*	99	10	1	
Swells voltage profile	2	*b*	99	10	2	
Cuts voltage profile	2	*b*	99	10	3	
Power quality	2	*b*	99	14	0	
Power failure event log	2	*b*	99	97	*e*	
Event log	2	*b*	99	98	*e*	
Certification data log	2	*b*	99	99	*e*	

7.2.5.5 Register table objects – DC electricity

Register tables - identified with a single OBIS code - are defined to hold a number of values of the same type. The OBIS codes are specified in Table 32.

Table 32 – OBIS codes for Register table objects – DC electricity

Register table objects – DC electricity	OBIS code					
	A	B	C	D	E	F
General use, DC electricity related	2	*b*	98	10	*e*	

8 Heat Cost Allocators, Thermal Energy, Gas and Water

8.1 Heat Cost Allocators (Value group A = 4)

8.1.1 General

NOTE The following introductory text is from EN 13757-1:2014, 11.3.2.1.

Heat Cost Allocators (HCAs) are mounted on radiators in the area to be monitored. The HCA should be mounted with in free air and radiators should not be enclosed. There will normally also be multiple HCAs, even for a single customer. This makes at, the present, direct connection to all HCAs using a two way connections an infeasible solution. It is nevertheless important, that data coming from a (number of) HCAs (via a concentrator) can be handled in the same way as data from other meters for remote reading.

This subclause 8.1 describes the naming of objects carrying HCA information in a COSEM environment. The words used in this clause are those used in EN 834:1994, the corresponding media standard.

The output from an HCA is "the temperature integral with respect to time", and it is only a relative sum. The main parameter from a HCA is this integral. Time series of this integral may be stored in the HCA for later readout. Other media related information available from a HCA are temperature and rating factors.

8.1.2 Value group C codes – HCA

The name of the different objects in the table for HCA objects corresponds to the name used in the relevant standard, EN 834:1994. The OBIS codes are specified in Table 33.

Table 33 – Value group C codes – HCA

Value group C codes – HCA (A = 4)	
0	General purpose objects [a]
1	Unrated integral [b]
2	Rated integral [c]
3	Radiator surface temperature [d]
4	Heating medium temperature, t_m
5	Flow (forward) temperature, t_V
6	Return temperature, t_R
7	Room temperature, t_L
93	Consortia specific identifiers, see 5.4.2.
94	Country specific identifiers, see 5.4.3.
96	General and service entry objects– HCA (See 8.1.5.1).
97	Error register objects – HCA (See 8.1.5.2).
98	List objects – HCA (See 8.1.5.3
99	Data profile objects – HCA (See 8.1.5.4)
128...199, 240	Manufacturer specific codes
All other	Reserved

Value group C codes – HCA (A = 4)	
[a]	Settings like time constant, thresholds etc. See the table of object codes in EN 13757-1:2014, 11.3.2.2.
[b]	Readout prior to compensation as specified in EN 834:1994.
[c]	Readout after compensation as specified in EN 834:1994.
[d]	Temperature measured prior to any rating
NOTE 1	The radiator surface (C = 3) temperature and the heating media (C=4) temperature are mutually exclusive.
NOTE 2	The forward flow (C = 5) and reverse flow (C = 6) temperatures are exclusive to the radiator surface (C = 3) temperature.
NOTE 3	The room temperature measurement (C = 7) is always be accompanied by either a radiator surface (C = 3) temperature, a heating media (C = 4) temperature or a pair of forward / return flow (C = 5 / C = 6) temperatures.

8.1.3 Value group D codes – HCA

This value group specifies the result of processing a *Quantity* according to a specific algorithm for Heat Cost Allocator related values. The OBIS codes are specified inTable 34.

Table 34 – Value group D codes – HCA

Value group D codes – HCA (A = 4, C <> 0, 96…99)	
0	Current value
1	Integral value over measurement periods (Periodical value) [a]
2	Integral value relative to billing periods: Set date value
3	Integral value relative to billing periods: Billing date value
4	Minimum of value
5	Maximum of value
6	Test value [b]
All other	Reserved
[a]	A set of values periodically stored (this may be once or twice a month)
[b]	A value specially processed for test purpose. This may be due to an increased precision of the data, or to a faster (but less precise) processing of data.

8.1.4 Value group E codes – HCA

Table 35 shows the use of value group E for identification of tariff rates typically used for energy (consumption) and demand quantities.

Table 35 – Value group E codes – HCA

Value group E codes – HCA	
0	Total
1	Rate 1
2	Rate 2
3	Rate 3
…	…

9	Rate 9
128…254	Manufacturer specific codes
All other	Reserved

8.1.5 OBIS codes – HCA

8.1.5.1 General and service entry objects – HCA

Table 36 specifies OBIS codes for heat cost allocator related general and service entry objects.

Table 36 – OBIS codes for general and service entry objects – HCA

General and service entry objects – HCA	OBIS code					
	A	B	C	D	E	F
Free ID-numbers for utilities						
Complete combined ID	4	*b*	0	0		
ID 1	4	*b*	0	0	0	
…			…	…	…	
ID 10	4	*b*	0	0	9	
Storage information						
Status (VZ) of the historical value counter	4	*b*	0	1	1	
Number of available historical values	4	*b*	0	1	2	
Set date (target date)	4	*b*	0	1	10	
Billing date	4	*b*	0	1	11	
Configuration						
Program version no.	4	*b*	0	2	0	
Firmware version no.	4	*b*	0	2	1	
Software version no.	4	*b*	0	2	2	
Device measuring principle						
Device measuring principle [a]	4	*b*	0	2	3	
Conversion factors						
Resulting rating factor, K	4	*b*	0	4	0	
Thermal output rating factor, K_Q	4	*b*	0	4	1	
Thermal coupling rating factor overall, K_C	4	*b*	0	4	2	
Thermal coupling rating factor room side, K_{CR}	4	*b*	0	4	3	
Thermal coupling rating factor heater side, K_{CH}	4	*b*	0	4	4	
Low temperature rating factor, K_T	4	*b*	0	4	5	
Display output scaling factor	4	*b*	0	4	6	
Threshold values						
Start temperature threshold	4	*b*	0	5	10	
Difference temperature threshold	4	*b*	0	5	11	
Period information						

General and service entry objects – HCA	OBIS code					
Measuring period for average value	4	*b*	0	8	0	
Recording interval for consumption profile	4	*b*	0	8	4	
Billing period	4	*b*	0	8	6	
Time entries						
Local time	4	*b*	0	9	1	
Local date	4	*b*	0	9	2	
Time stamp (local time) of the most recent billing period [b]	4	*b*	0	9	3	
Manufacturer specific [c]	4	*b*	96	50	*e*	*f*
.....						
Manufacturer specific	4	*b*	96	99	*e*	*f*

[a]	This is an object of the type 'Data' enumerated, (0) single sensor, (1) single sensor + start sensor, (2) dual sensor, (3) triple sensor.
[b]	In case of billing period schemes absence or event triggered, commonly calculated from local date and local time information.
[c]	The range D = 50...99 is available for identifying objects, which are not represented by another defined code, but need representation on the display as well. If this is not required, the range D = 128...254 should be used.

8.1.5.2 Error register objects – HCA

Table 37 specifies OBIS codes for HCA related error register objects.

Table 37 – OBIS codes for error register objects – HCA

Error register objects – HCA	OBIS code					
	A	B	C	D	E	F
Error registers	4	*b*	97	97	*e*	

8.1.5.3 List objects - HCA

Table 38 specifies the OBIS codes for HCA related list objects.

Table 38 – OBIS codes for list objects – HCA

List objects – HCA	OBIS code					
	A	B	C	D	E	F
HCA related data of billing period (with billing period scheme 1 if there are two schemes available)	4	*b*	98	1	*e*	255 [a]
HCA related data of billing period (with billing period scheme 2)	4	*b*	98	2	*e*	255 [a]
[a] F = 255 means a wildcard here. See A.3.						

8.1.5.4 Data profile objects – HCA

HCA related data profiles – identified with one single OBIS code – are used to hold a series of measurement values of one or more similar quantities and/or to group various data. The OBIS codes are specified in Table 39.

Table 39 – OBIS codes for data profile objects – HCA

Data profile objects – HCA	OBIS code					
	A	B	C	D	E	F
Data profile objects	4	*b*	99	1	*e*	

8.1.5.5 OBIS codes for HCA related objects (examples)

Table 40 specifies examples for OBIS codes of HCA related objects.

Table 40 – OBIS codes for HCA related objects (examples)

HCA related objects	OBIS code					
	A	B	C	D	E	F
Consumption						
Current unrated integral	4	*b*	1	0	0	
Current rated integral	4	*b*	2	0	0	
Rated integral, last set date	4	*b*	2	2	0	V_Z
Unrated integral, previous billing date	4	*b*	1	3	0	V_{Z-1}
Rated integral, two most recent periodical values	4	*b*	2	1	0	102
Monitoring values						
Radiator temperature, current value	4	*b*	3	0		
Radiator temperature, minimum value	4	*b*	3	4		
Radiator temperature, maximum value	4	*b*	3	5		
Flow temperature, test value	4	*b*	5	6		
Room temperature, current value	4	*b*	7	0		
Room temperature, minimum value	4	*b*	7	4		
Room temperature, maximum value	4	*b*	7	5		

8.2 Thermal energy (Value group A = 5 or A = 6)

8.2.1 General

This section describes the naming of objects carrying Thermal energy meter information in a COSEM environment. It covers the handling of heat, as well as cooling. The media specific terms used in this clause are those used in EN 1434-1:2015, EN 1434-2:2015 and parts of the

corresponding media standard. The output from a Thermal energy meter is "the integral of power, i.e. the enthalpy difference times the mass flow-rate, with respect to time".

Thermal energy meters can be used for measurement in heating (A=6) or cooling (A=5) systems.

Value group A = 5 has been set aside for metering of cooling specific objects and value group A = 6 for the metering of heat specific objects. The other value groups are identical for heating and cooling.

8.2.2 Value group C codes – Thermal energy

The name of the different objects in the table for heat metering and cooling metering objects corresponds to the name used in EN 1434-1:2015. The OBIS codes are specified in Table 41.

Table 41 – Value group C codes – Thermal energy

Value group C codes – Thermal energy related objects (A = 5 or A = 6)	
0	General and service entry objects – Thermal energy (See 8.2.4.1)
1	Energy
2	Volume
3	Mass [b]
4	Inlet (Flow) volume [a]
5	Inlet (Flow) mass [a]
6	Outlet (Return) volume [a]
7	Outlet (Return) mass [a]
8	Power
9	Flow rate
10	Inlet (Flow) temperature [a]
11	Outlet (Return) temperature [a]
12	Temperature difference [c]
13	Pressure [d]
93	Consortia specific identifiers, see 5.4.2.
94	Country specific identifiers, see 5.4.3.
96	General and service entry objects – Thermal energy (See 8.2.4.1)
97	Error register objects – Thermal energy (See 8.2.4.2)
98	List objects – Thermal energy (see 8.2.4.3)
99	Data profile objects – Thermal energy (See 8.2.4.4)
128...199, 240	Manufacturer specific codes
All other	Reserved

[a]	In a heating system the term “flow” is equivalent to “inlet” and the term “return” is equivalent to “outlet”
[b]	Used when metering steam.
[c]	Will often be available with a higher precision and accuracy than inlet (flow) and outlet (return) temperature.

Value group C codes – Thermal energy related objects (A = 5 or A = 6)	
[d]	Pressure of the media, if measured. Pressure can be retrieved as backup value from a general and service entry object (C=0), if incapable of measurement.

8.2.3 Value group D codes – Thermal energy

This value group specifies the result of processing a *Quantity* according to a specific algorithm for heat or cooling related values. See Table 42.

Table 42 – Value group D codes – Thermal energy

Value group D codes – Thermal energy (A = 5 or A = 6), (C <> 0, 96…99)	
0	Current value
1	Periodical value 1[a]
2	Set date value
3	Billing date value
4	Minimum of value 1
5	Maximum of value 1
6	Test value [b]
7	Instantaneous value [c]
8	Time integral 1 [d]
9	Time integral 2 [e]
10	Current average [f]
11	Last average [g]
12	Periodical value 2 [a]
13	Periodical value 3 [a]
14	Minimum of value 2
15	Maximum of value 2
20	Under limit occurrence counter
21	Under limit duration
22	Over limit occurrence counter
23	Over limit duration
24	Missing data occurrence counter [h]
25	Missing data duration [h]
All other	Reserved
[a]	A set of data that is collected periodically. Recording of data in this way is directly supported by 'profiles'.
[b]	A value specially processed for test purpose. This may be due to an increased precision of the data, or to a faster (but less precise) processing of data.
[c]	An immediate readout from the system, typically with a shorter measuring time than the current value.
[d]	For a current billing period (F = 255): Time integral of the *quantity* calculated from the origin (first start of measurement) to the instantaneous time point. For a historical billing period (F = 0…99): Time integral of the *quantity* calculated from the origin to the end of the billing period given by the billing period code.

Value group D codes – Thermal energy (A = 5 or A = 6), (C <> 0, 96…99)	
e	For a current billing period (F = 255): Time integral of the *quantity* calculated from the beginning of the current billing period to the instantaneous time point. For a historical billing period (F = 0…99): Time integral of the *quantity* calculated over the billing period given by the billing period code.
f	The value of a current demand register.
g	The value of a demand register at the end of the last measurement period.
h	Values considered as missing (for instance due to sensor failure).

8.2.3.1 Value group E codes – Thermal energy

Table 43 shows the use of value group E for identification of tariff rates typically used for energy (consumption) and demand quantities.

Table 43 – Value group E codes – Thermal Energy – Tariff rates

Value group E codes – Thermal Energy	
0	Total
1	Rate 1
2	Rate 2
3	Rate 3
…	…
9	Rate 9
128…254	Manufacturer specific codes
All other	Reserved

8.2.4 OBIS codes – Thermal energy

8.2.4.1 General and service entry objects – Thermal energy

Table 44 specifies OBIS codes for thermal energy related general and service entry objects.

Table 44 – OBIS codes for general and service entry objects – Thermal energy

General and service entry objects – Thermal energy	OBIS code					
	A	B	C	D	E	F
Free ID-numbers for utilities						
Complete combined ID	5/6	*b*	0	0		
ID 1	5/6	*b*	0	0	0	
…			…	…	…	
ID 10	5/6	*b*	0	0	9	
Storage information						
Status (VZ) of the historical /periodical value counter	5/6	*b*	0	1	1	[f]
Status (VZ) of the periodical value counter, period 1	5/6	*b*	0	1	1	1 [f]
Number of available historical / periodical values	5/6	*b*	0	1	2	[f]
Number of available periodical values for period 2	5/6	*b*	0	1	2	2 [f]
Set date	5/6	*b*	0	1	10	
Billing date	5/6	*b*	0	1	11	
Configuration						
Program version	5/6	*b*	0	2	0	
Firmware version	5/6	*b*	0	2	1	
Software version	5/6	*b*	0	2	2	
Meter location (flow or return) [a]	5/6	*b*	0	2	3	
Device version	5/6	*b*	0	2	4	
Serial number of inlet (flow) temperature transducer	5/6	*b*	0	2	10	
Serial number of outlet (return) temperature transducer	5/6	*b*	0	2	11	
Serial number of forward flow transducer	5/6	*b*	0	2	12	
Serial number of return flow transducer	5/6	b	0	2	13	
Conversion factors						
Heat coefficient, k	5/6	*b*	0	4	1	
Pressure (backup value) [b]	5/6	*b*	0	4	2	
Enthalpy [c]	5/6	*b*	0	4	3	
Threshold values						
Threshold value limit for rate 1 [d]	5/6	*b*	0	5	1	
…			…	…	…	
Threshold value limit for rate 9 [d]	5/6	*b*	0	5	9	
Maximum contracted flow rate [e]	5/6	*b*	0	5	21	
Maximum contracted power [e]	5/6	*b*	0	5	22	
Maximum contracted $\Delta\theta$ [e]	5/6	*b*	0	5	23	
Minimum contracted return temperature [e]	5/6	*b*	0	5	24	

General and service entry objects – Thermal energy	OBIS code					
	A	B	C	D	E	F
Timing information						
Averaging period for measurements, generic	5/6	*b*	0	8	0	
Averaging period for instantaneous measurements	5/6	*b*	0	8	1	
Averaging period for volume / flow measurements	5/6	*b*	0	8	2	
Averaging period for temperature measurements	5/6	*b*	0	8	3	
Averaging period for pressure measurements	5/6	*b*	0	8	4	
Averaging period, power	5/6	*b*	0	8	5	
Averaging period, flow rate	5/6	*b*	0	8	6	
Averaging period, test values	5/6	*b*	0	8	7	
Measurement period, peak values, period 1(short) [g]	5/6	*b*	0	8	11	
Measurement period, peak values, period 2 [g]	5/6	*b*	0	8	12	
Measurement period, peak values, period 3 [g]	5/6	*b*	0	8	13	
Measurement period, peak values, period 4 [g]	5/6	*b*	0	8	14	
Measurement period, periodical values, period 1(short) [g]	5/6	*b*	0	8	21	
Measurement period, periodical values, period 2 [g]	5/6	*b*	0	8	22	
Measurement period, periodical values, period 3 [g]	5/6	*b*	0	8	23	
Measurement period, periodical values, period 4 [g]	5/6	*b*	0	8	24	
Measurement period, test values	5/6	*b*	0	8	25	
Recording interval 1 for profiles [h]	5/6	*b*	0	8	31	
Recording interval 2 for profiles [h]	5/6	*b*	0	8	32	
Recording interval 3 for profiles [h]	5/6	*b*	0	8	33	
Billing period	5/6	*b*	0	8	34	
Time entries						
Local time	5/6	*b*	0	9	1	
Local date	5/6	*b*	0	9	2	
Time stamp (local time) of the most recent billing period [i]	5/6	*b*	0	9	3	
Manufacturer specific [j]	5/6	*b*	96	50	*e*	*f*
.....						
Manufacturer specific	5/6	*b*	96	99	*e*	*f*

a	Information about where the (single) flow meter is inserted. A non-zero value is used when the flow meter is located in the flow path.
b	Defines the pressure of the media, if not measured. The default value is 16 bar according to EN 1434-2:2015.
c	The enthalpy of the thermal conveying liquid. This will be necessary when using media other than pure water. The enthalpy is a part of the calculations when converting from mass to power.
d	Part of the contract between the customer and the supplier. The threshold defines when to switch rate, and can be used for diagnostic purposes, or to control limiting valves as well.
e	Part of the contract between the customer and the supplier. The threshold may be used to set a 'flag', for diagnostic purposes, or to control limiting valves.
f	Value group 'F' may be left unused, if there is only one set of historical / periodical values in the meter.
g	The instantiation of periods in a meter shall always start at period 1.
h	If only one recording interval is implemented, then it shall be recording interval 1. If multiple recording intervals are implemented, the recording interval 1 shall be the interval with the shorter period.
i	In case of billing period schemes absence or event triggered, commonly calculated from local date and local time information

General and service entry objects – Thermal energy		OBIS code					
		A	B	C	D	E	F
j	The range D = 50…99 is available for identifying objects, which are not represented by another defined code, but need representation on the display as well. If this is not required, the range D = 128…254 should be used.						

8.2.4.2 Error register objects – Thermal energy

Table 45 specifies OBIS codes for thermal energy related error register objects.

Table 45 – OBIS codes for error register objects – Thermal energy

Error register objects – Thermal energy	OBIS code					
	A	B	C	D	E	F
Error registers	5/6	*b*	97	97	*e*	
NOTE The information to be included in the error objects is not defined in this document.						

8.2.4.3 List objects – Thermal Energy Meters

Table 46 specifies the OBIS codes for Thermal Energy Meters related list objects. .

Table 46 – OBIS codes for list objects – Thermal Energy Meters

List objects – Thermal Energy Meters	OBIS code					
	A	B	C	D	E	F
Thermal energy related data of billing period (with billing period scheme 1 if there are two schemes available)	5/6	*b*	98	1	*e*	255 [a]
Thermal energy related data of billing period (with billing period scheme 2)	5/6	*b*	98	2	*e*	255 [a]
[a] F = 255 means a wildcard here. See A.3.						

8.2.4.4 Data profile objects – Thermal energy

Thermal energy related data profiles – identified with one single OBIS code – are used to hold a series of measurement values of one or more similar quantities and/or to group various data. The OBIS codes are specified in Table 47.

Table 47 – OBIS codes for data profile objects – Thermal energy

Data profile objects – Thermal energy	OBIS code					
	A	B	C	D	E	F
Consumption / load profile with recording interval 1	5/6	*b*	99	1	1	
Consumption / load profile with recording interval 2	5/6	*b*	99	1	2	
Consumption / load profile with recording interval 3	5/6	*b*	99	1	3	
Profile of maxima with recording interval 1	5/6	*b*	99	2	1	
Profile of maxima with recording interval 2	5/6	*b*	99	2	2	

Data profile objects – Thermal energy	OBIS code					
	A	B	C	D	E	F
Profile of maxima with recording interval 3	5/6	*b*	99	2	3	
Consumption / load profile during test	5/6	*b*	99	3	1	
Certification data log	5/6	*b*	99	99	*e*	

8.2.4.5 OBIS codes for Thermal energy related objects (examples)

Table 48 shows examples for OBIS codes of Thermal energy related objects.

Table 48 – OBIS codes for Thermal energy related objects (examples)

Thermal energy related objects (examples)	OBIS code					
	A	B	C	D	E	F
Consumption						
Energy, current value, total	5/6	*b*	1	0	0	
Energy, current value, rate 1	5/6	*b*	1	0	1	
Energy, periodical, total, the second last storage	5/6	*b*	1	1	0	102
Energy, billing date value, total, last storage, rate 1	5/6	*b*	1	3	1	V_Z
Monitoring values						
Energy, maximum value (current period)	5/6	*b*	1	5		
Flow rate, Period value 2, previous storage	5/6	*b*	9	12		V_{Z-1}
Power, Max value, previous period	5/6	*b*	8	5		V_{Z-1}
Energy, Missing duration c	5/6	*b*	1	25		
Differential temperature, Test value	5/6	*b*	12	6		
Flow path, temperature transducers serial no.	5/6	*b*	0	2	10	
Error handling						
Overall error status [a]	5/6	*b*	97	97	0	
Subsystem where error has occurred [b]	5/6	*b*	97	97	1	
Duration of error condition [c]	5/6	*b*	97	97	2	

[a]	This object is a 'mirror' of the object 0.x.97.97.0.
[b]	This is the time during which the meter has not been able to calculate energy.
[c]	A further subdivision of error information.

8.3 Gas (Value group A = 7)

8.3.1 General introduction to gas measurement

8.3.1.1 Overview

Measurement of the energy supplied in the form of gas to customers is a complex process. It has to take into account the characteristics of the measuring site, the gas measurement technology, the conditions and the properties of the gas and the characteristics of the billing process.

Energy measurement is generally a multi-step process:

- The first step is to measure either the amount of the volume or the mass of gas based on various measuring principles, like volume, flow, density or mass measurement. Accuracy can be improved by correcting the measurement error of the meter;
- In the case of volume measurement, the next step is to convert the volume measured at metering conditions to volume at base conditions;
- In the final step, the energy is calculated from the volume at base conditions or the mass, and the calorific value. The calorific value – either per volume unit or per mass unit – is determined using gas analysis techniques.

The measurement technology and the implementation of the volume conversion and energy calculation process depend on the application segment.

Conversion and calculation steps can take place at the measuring site by electronic devices, or in the IT system.

For measurement of larger volumes, there are several devices involved in the process, depending on installation and hazardous area requirements. Not only the final results, but also interim values in the conversion and calculation process are of interest for checking and controlling purposes.

8.3.1.2 Typical gas metering installations

8.3.1.2.1 Residential application

A typical residential gas metering installation is shown in Figure 4.

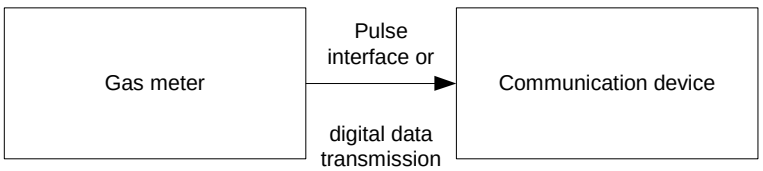


Figure 4 – Residential gas metering installation

The meter is typically a diaphragm (positive displacement) meter, which may perform mechanical temperature correction.

The information from the gas meter to the communication device may be transferred in the form of pulses. Alternatively, the meter may be equipped with a digital interface, e.g. an encoder turning the index reading to digital information.

Volume conversion and energy calculation takes place in the IT system.

8.3.1.2.2 Industrial application

A typical industrial gas metering installation is shown in Figure 5.

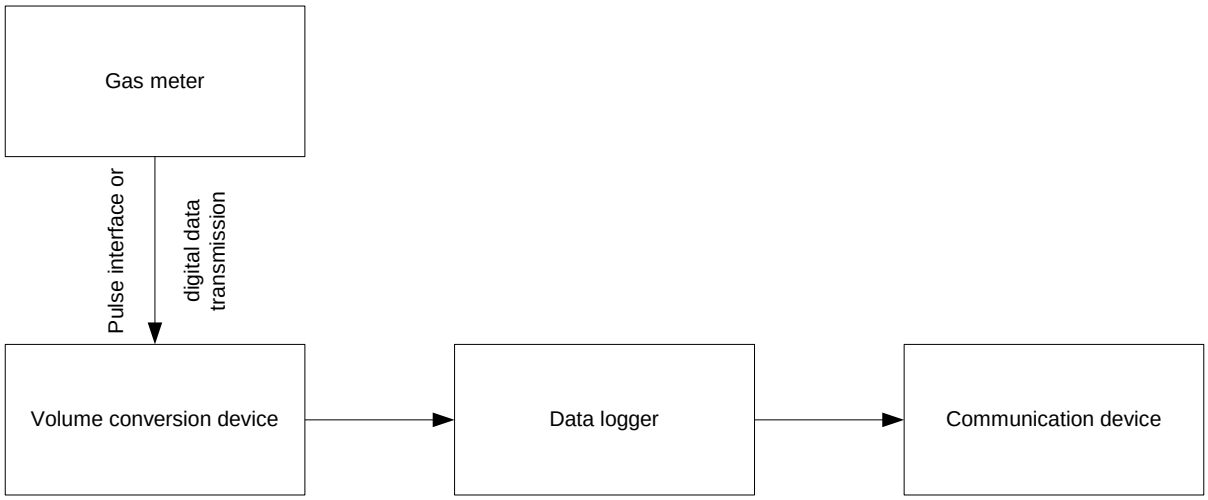


Figure 5 – Industrial gas metering installation (single stream)

In industrial applications, typically more functions are implemented at the measuring site than in residential applications. This may include the calculation of the volume at base conditions, and, if the calorific value is available (e.g. via remote communication), the calculation of the energy.

The data logger stores data relevant for billing, data validation and process control.

The functions may be integrated in fewer devices, depending on the hazardous zone restrictions and the level of integration of electronics.

8.3.1.2.3 Gas transport application

A typical gas transport metering “city gate” installation – also used for very large consumers – is shown in Figure 6.

Such gas stations are equipped with more than one pipe for the gas flow (multi stream).Typically, volume conversion devices are installed on each pipe, because the measurement is closely pipe related. Generally, there is one data logger and a device used to determine the calorific value (e.g. gas chromatograph).

All devices are connected via a bus system.

Depending on the design of these devices, selected functions may be implemented in a single cabinet or physical device.

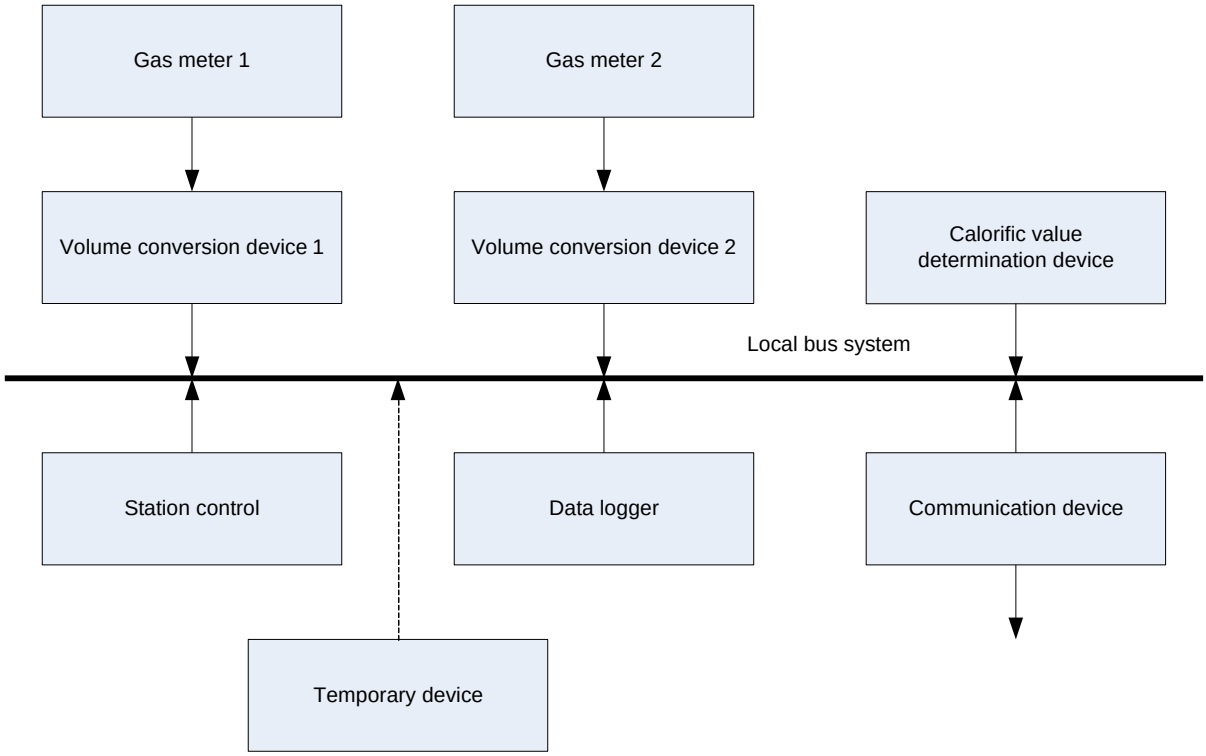


Figure 6 – City gate or border crossing installation (multi stream)

8.3.1.3 Gas volume conversion

8.3.1.3.1 General

The gas volume conversion process needs the following inputs:

- the volume information from a gas meter;
- the temperature of the gas measured;
- the pressure of the gas measured: this may be replaced by a constant;
- the compressibility, this may be replaced by a constant.

When the process is implemented in a gas conversion device, it is assumed to be capable of:

- performing error correction (optionally);
- measuring the temperature;
- measuring the pressure of the gas (optionally); and
- calculating the compressibility according to agreed algorithms, in function of temperature, pressure and gas composition (optionally).

The volume conversion device may handle bidirectional gas flows. The main direction of flow is *forward*.

It may be equipped with *disturbance registers* used when the value of temperature, pressure or compressibility is outside permissible metrological limits of plausibility, leading to an *alert condition*. When such alert condition occurs, the gas conversion process switches to store results in disturbance registers, until the alert conditions disappear.

8.3.1.3.2 Step 1: Error correction (optional)

The error curve of the gas meter is corrected by a correction factor:

$$V_c = C_f * V_m$$

Where:

- V_c is the corrected volume;
- C_f is the correction factor given by an equation Cf = f(q) or Cf = f(Re); where q is the flow and Re is the Reynolds number;
- V_m is the volume at metering conditions.

The error correction method depends on station construction and operating conditions and its selection is made generally by manufacturer, utility or market specific.

8.3.1.3.3 Step 2: Volume conversion to base conditions

Volume at base conditions is calculated using the equation:

$$V_b = C \times V$$

Where:

- V_b is the volume at base conditions,
- V may be V_m or V_c (Volume at metering conditions or corrected volume);
- C is the conversion factor given by the relationship:

$$C = (P / P_b) \times (T_b / T) \times (Z_b / Z)$$

Where Z is the compressibility factor allowing to take into account the difference in compressibility between the gas measured and the ideal gas. It is a function of the pressure and the temperature:

$$Z = f(P, T)$$

Settable gas properties and components are used for the compressibility calculation, combined into one of several existing calculation methods. If the compressibility factor is not

calculated, it may be included as a fixed value in the calculation of the conversion factor. Below 1,5 bar, the value of Z is usually set to 1.

If the pressure is not measured, it may be included as a fixed value in the calculation of the conversion factor.

8.3.1.3.4 Step 3: Energy conversion

The final step is to calculate the energy, using the equation:

E = CalValue x V_b

where CalValue is the calorific value, expressed in J/m^3. Typically, it is measured by calorimeter or gas chromatograph devices.

8.3.1.3.5 Model of data flow for volume conversion and energy calculation

The model of data flow for volume conversion and energy calculation is shown in Figure 7.

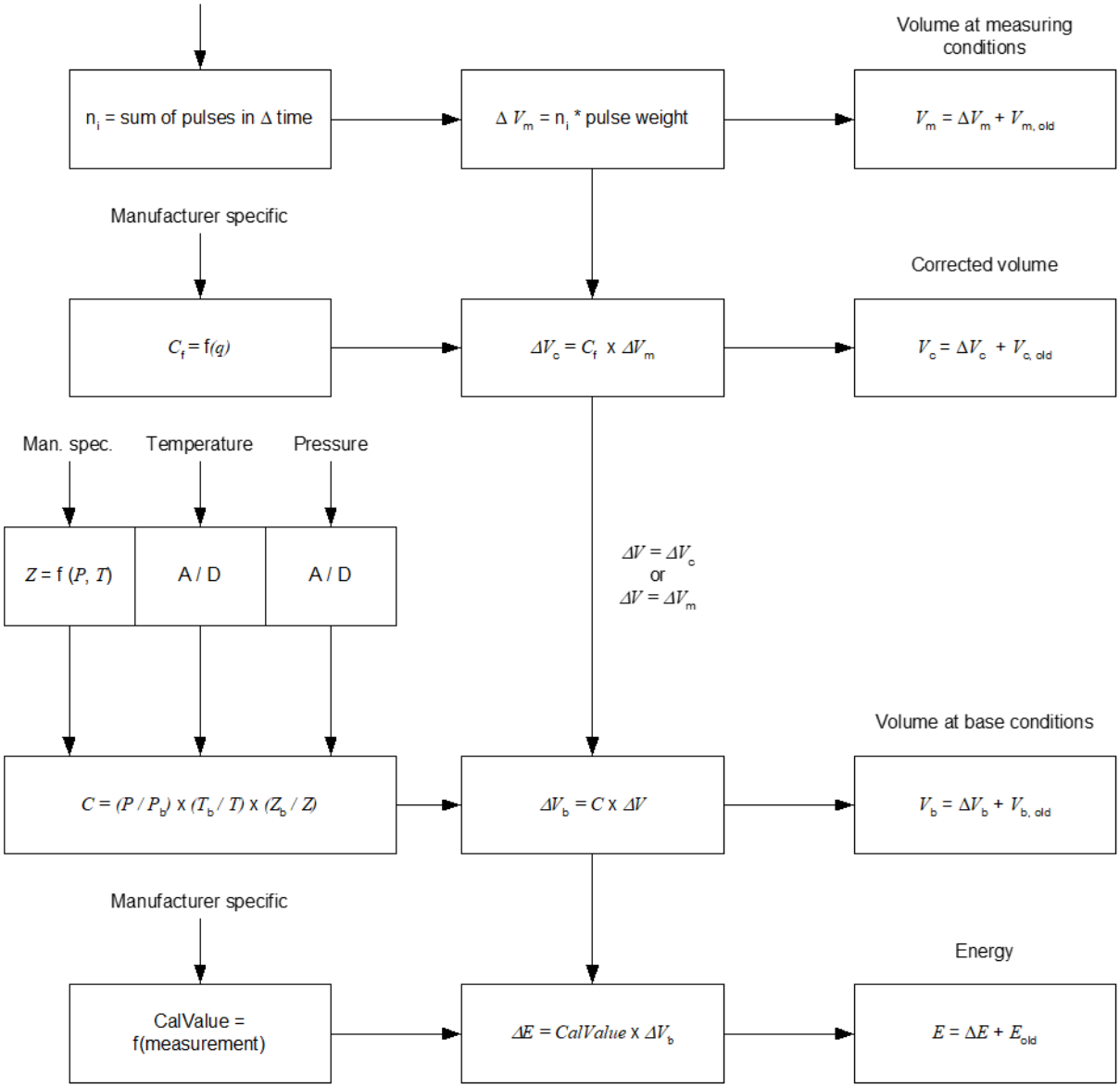


Figure 7 – Data flow of volume conversion and energy calculation

The OBIS codes of the main objects in the data flow are shown in Table 49, with the following assumptions:

- the conversion process passes through all four functions from metering to energy;
- the device has one single channel;
- the direction of the gas flow is forward;
- energy is the result of the conversion process from volume at base conditions to energy, by applying the calorific value as factor;
- the data of interest are current values of absolute indexes and the gas process data.

Table 49 – OBIS codes of the main objects in the gas conversion process data flow

Name	Symbol	OBIS code
Indexes		
Forward absolute meter volume, index, at metering conditions	V_m	7.0.3.0.0.255
Forward absolute converter volume, index, at metering conditions	V_m	7.0.13.0.0.255
Forward absolute converter volume, index, corrected value	V_c	7.0.13.1.0.255
Forward absolute converter volume, index, at base conditions	V_b	7.0.13.2.0.255
Forward absolute energy, index, at base conditions	E	7.0.33.2.0.255
Compressibility, correction and conversion values		
Correction factor [a]	C_f	7.0.51.0.0.255
Conversion factor [b]	C	7.0.52.0.0.255
Compressibility factor, current value at metering conditions [c]	Z	7.0.53.0.0.255
Compressibility factor, current value at base conditions [c]	Z_b	7.0.53.2.0.255
Compressibility factor, preset value [c]	Z_b	7.0.53.11.0.255
Compressibility factor, calculation method [c]		7.0.53.12.0.255
Superior calorific value [d]	CalVal	7.0.54.0.0.255
Metering site condition information		
Gas temperature (absolute), value at metering conditions [e]	T	7.0.41.0.0.255
Gas temperature (absolute), value at base conditions [e]	T_b	7.0.41.2.0.255
Gas temperature (absolute), backup value [e]	T	7.0.41.3.0.255
Gas pressure (absolute), value at metering conditions [f]	P	7.0.42.0.0.255
Gas pressure (absolute), value at base conditions [f]	P_b	7.0.42.2.0.255
Gas pressure (absolute), backup value [f]	P	7.0.42.3.0.255

a	A fixed value used to correct a scalar error on a meter: for example, if a meter under-registers volume by 0,5 %, then a correction factor value of 1,005 will compensate for the error.
b	See 8.3.1.3.3.
c	Compressibility, Z: effectively, the “difference” in compressibility between the gas being measured and “noble” gas. For example, EN 12405, SGERG-88, AGA 8 give full information on this, though below 1,5 Bar (a) this is usually set to 1.
d	The superior (or gross) calorific value can be seen as a conversion factor for converting volume to energy although it is also used for the conversion algorithm.
e	Temperature of the gas, expressed in Kelvin. Volume conversion depends on Kelvin temperature measurement. This may represent a measured value or a base condition, or a backup value, used if the temperature sensor fails, as identified by the value of value group D.
f	Pressure of the gas, expressed in a suitable unit, in absolute terms, for example Bar (a). This means that the value is referenced to a perfect vacuum, as opposed to “Gauge” pressure, which is referenced to current atmospheric conditions. This may represent a measured value or a base condition, or a backup value, used if the pressure sensor fails, as identified by the value of value group D.

8.3.1.4 Data logging

8.3.1.4.1 General

The data logging process captures, generates and makes available the data necessary for billing, as well as the data necessary for managing the measurement process and the gas grid.

8.3.1.4.2 Time bound processing

Quantities measured by the gas meter, calculated in the data logger or in the IT system may be:

- indexes, index differences and maxima of index differences; and
- average, minimum and maximum values

related to various intervals and periods. A distinction is made between:

- recording intervals for profiles;
- measurement periods for average values;
- process intervals;
- measurement periods for index differences;
- billing periods for indexes, index differences and maxima of index differences;
- averaging periods.

Some of these periods and intervals may have a default length, or otherwise their length can be held by specific objects. See 8.3.6.1, Table 60.

The processing methods depend on the kind of the quantity:

- indexes and index differences; see 8.3.4.2;
- flow rate, see 8.3.4.4;
- process values, see 8.3.4.4;
- conversion related factors and coefficients, see 8.3.4.5; and
- natural gas analysis, see 8.3.4.7.

8.3.1.4.3 Gas day

One specific element in gas metering is that the start of a gas day may be different from the start of a calendar day.

NOTE 1 For example the gas day starts at 6:00 in Germany.

NOTE 2 In some countries, the gas day start time retains its value when DST starts and ends, causing a 25 hour and 23 hour day in each year.

Therefore, taking the example above, a gas month lasts from 6:00 of the first day of a calendar month to 6:00 of the first day of the next calendar month. Similarly, a gas year starts at 6:00 on 1st of January and ends at 6:00 on 1st January of the next year.

8.3.1.4.4 Data profiles

COSEM “Profile generic” objects may capture one or several values – attributes of COSEM objects – in their buffer.

For gas metering, both *general purpose* and *dedicated* profiles are available:

- a general purpose “Profile generic” object captures one or several values. Such objects have a general OBIS code / logical name that do not provide specific information on the values captured. These profiles are also available with some fixed recording intervals;

- a dedicated “Profile generic” object captures only one value. The OBIS code / logical name of such a dedicated ”Profile generic” object is “self-explanatory”, i.e. it reflects the OBIS code of the object the value attribute of which is captured.

NOTE A time stamp and a status attribute may be captured in addition to the value(s) of interest.

In any case, the values captured are identified by the capture_objects attribute. See 8.3.6.4.

8.3.2 Value group C codes – Gas

The allocations in the value group C – see Table 50 – take into account the different combinations of measuring and calculating devices located at a metering point, to allow identifying the source where the data are generated.

For the purposes of volume / mass / energy measurement, value group C identifies:

- the location of the device in the measurement chain: meter (encoder), converter, logger;
- the direction of the gas flow: forward or reverse;
- the qualifier of the measurement: undisturbed, disturbed, or absolute, where absolute value is the sum of the values calculated under undisturbed and disturbed conditions.
- Value group C is also used for identifying process data.

For the purposes of gas analysis, a distinction is made between measured values generated by gas analysing systems (C = 70) and parameters used for calculation (C = 0, D = 12).

Table 50 – Value group C codes – Gas

Value group C codes – Gas (A = 7)	
0	General purpose objects
1	Forward undisturbed meter volume
2	Forward disturbed meter volume
3	Forward absolute meter volume
4	Reverse undisturbed meter volume
5	Reverse disturbed meter volume
6	Reverse absolute meter volume
7	Forward absolute meter volume (encoder)
8	Reverse absolute meter volume (encoder)
11	Forward undisturbed converter volume
12	Forward disturbed converter volume
13	Forward absolute converter volume
14	Reverse undisturbed converter volume
15	Reverse disturbed converter volume
16	Reverse absolute converter volume
21	Forward undisturbed logger volume
22	Forward disturbed logger volume

Value group C codes – Gas (A = 7)	
23	Forward absolute logger volume
24	Reverse undisturbed logger volume
25	Reverse disturbed logger volume
26	Reverse absolute logger volume
31	Forward undisturbed energy
32	Forward disturbed energy
33	Forward absolute energy
34	Reverse undisturbed energy
35	Reverse disturbed energy
36	Reverse absolute energy
41	Absolute temperature
42	Absolute pressure
43	Flow rate
44	Velocity of sound
45	Density (of gas)
46	Relative density
47	Gauge pressure
48	Differential pressure
49	Density of air
51	Correction factor
52	Conversion factor
53	Compressibility factor
54	Superior calorific value [a]
55	Gas law deviation coefficient (= compressibility factor ratio)
61	Forward undisturbed mass
62	Forward disturbed mass
63	Forward absolute mass
64	Reverse undisturbed mass
65	Reverse disturbed mass
66	Reverse absolute mass
70	Natural gas analysis
93	Consortia specific identifiers
94	Country specific identifiers
96	General and service entry objects – Gas (See 8.3.6.1)
97	Error register objects – Gas (See 8.3.6.2)

Value group C codes – Gas (A = 7)	
98	List objects – Gas (See 8.3.6.3)
99	Data profiles – Gas (See 8.3.6.4)
128...199, 240	Manufacturer specific codes
All other	Reserved
Notes	
[a] The superior (or gross) caloric value can be seen as a conversion factor for converting volume to energy although it is also used for the conversion algorithm.	

8.3.3 Value group D codes – Gas

8.3.3.1 General

Allocations in value group D allow to further classify quantities identified by codes in value group A to C. The allocations depend on the kind of quantity:

- indexes and index differences; see 8.3.3.2;
- flow rate, see 8.3.3.3;
- process values, see 8.3.3.4;
- conversion related factors and coefficients, see 8.3.3.5; and
- natural gas analysis values, see 8.3.3.6.

8.3.3.2 Gas indexes and index differences

The allocations allow identifying the various volume, mass and energy quantities measured along the measuring chain and the gas volume conversion process, relative to various measurement and billing periods:

- indexes: current values and historical values relative to various billing periods;
- index differences: current and last values relative to measurement periods and billing periods;

NOTE Index difference over a certain measurement or billing period is also known as consumption. For consumption, thresholds may be defined, see Table 60.

- maximum of index differences over various measurement periods, relative to various billing periods;

A distinction is made between *value at metering conditions*, *corrected value* and *value at base conditions (converted value)*. The applicability of these qualifiers depends on the location in the measuring chain and in the gas volume conversion process.

Three measurement periods are available:

- measurement period 1: default value 15 min;
- measurement period 2: default value 1 hour;
- measurement period 3: no default value specified.

Four billing periods are available:

- billing period 1: default value 1 day;
- billing period 2: default value 1 month;

- billing period 3: default value 1 year;
- billing period 4: no default value specified.

The default values specified reflect the most common applications. If other values are used, they may be held by COSEM objects specified for this purpose; see DLMS UA 1000-1 Ed 15 Part 2:2021,6.7.4 and Table 60.

In addition to the current values of the indexes, the following values are available:

For measurement periods 1 to 3:

- index differences for the current and the last measurement period (6 values each).

For billing periods 1, 3 and 4:

- historical indexes (3 values each);
- index differences for the current and the last billing period (6 values each);
- maximum of index differences over measurement periods 1, 2 and 3 (9 values each);
- in total, 18 values each.

For billing period 2:

- historical indexes (3 values);
- index differences for the current and the last billing period (6 values);
- maximum of index differences over measurement periods 1, 2 and 3, as well as over billing period 1 (12 values);
- in total, 21 values.

For all these values, tariffs may be applied. See 8.3.4.2.

Table 51 specifies the use of value group D to identify gas related indexes and index differences.

Table 51 – Value group D codes – Gas – Indexes and index differences

Value group D codes – Gas – Indexes and index differences (A= 7, C = 1…8, 11…16, 21…26, 31…36, 61…66)			
	Quantity	**Qualifier**	**Period**
0	Index	Value at metering conditions	Current [c)]
1	Index	Corrected value [a]	Current [c)]
2	Index	Value at base conditions / “Converted value”	Current [c)]
3	Index	Current redundant value at metering conditions [b]	Current [c)]
Values relative to measurement period 1 (default value = 15 minutes)			
6	Index difference	Value at metering conditions	Current
7	Index difference	Corrected value	Current
8	Index difference	Value at base conditions	Current
9	Index difference	Value at metering conditions	Last
10	Index difference	Corrected value	Last
11	Index difference	Value at base conditions	Last

Value group D codes – Gas – Indexes and index differences (A= 7, C = 1…8, 11…16, 21…26, 31…36, 61…66)			
	Quantity	**Qualifier**	**Period**
Values relative to measurement period 2 (default value = 1 hour)			
12	Index difference	Value at metering conditions	Current
13	Index difference	Corrected value	Current
14	Index difference	Value at base conditions	Current
15	Index difference	Value at metering conditions	Last
16	Index difference	Corrected value	Last
17	Index difference	Value at base conditions	Last
Values relative to measurement period 3 (no default value)			
18	Index difference	Value at metering conditions	Current
19	Index difference	Corrected value	Current
20	Index difference	Value at base conditions	Current
21	Index difference	Value at metering conditions	Last
22	Index difference	Corrected value	Last
23	Index difference	Value at base conditions	Last
Values relative to billing period 1 (default value = 1 day)			
24	Index	Value at metering conditions	Historical [c]
25	Index	Corrected value	Historical [c]
26	Index	Value at base conditions	Historical [c]
27	Index difference	Value at metering conditions	Current
28	Index difference	Corrected value	Current
29	Index difference	Value at base conditions	Current
30	Index difference	Value at metering conditions	Last
31	Index difference	Corrected value	Last
32	Index difference	Value at base conditions	Last
33	Maximum of Index differences over measurement period 1 [c]	Value at metering conditions	
34	Maximum of Index differences over measurement period 1 [c]	Corrected value	
35	Maximum of Index differences over measurement period 1 [c]	Value at base conditions	
36	Maximum of Index differences over measurement period 2 [c]	Value at metering conditions	
37	Maximum of Index differences over measurement period 2 [c]	Corrected value	
38	Maximum of Index differences over measurement period 2 [c]	Value at base conditions	
39	Maximum of Index differences over measurement period 3 [c]	Value at metering conditions	
40	Maximum of Index differences over measurement period 3 [c]	Corrected value	
41	Maximum of Index differences over measurement period 3 [c]	Value at base conditions	
Values relative to billing period 2 (default value = 1 month)			
42	Index	Value at metering conditions	Historical [c]

Value group D codes – Gas – Indexes and index differences (A= 7, C = 1…8, 11…16, 21…26, 31…36, 61…66)			
	Quantity	**Qualifier**	**Period**
43	Index	Corrected value	Historical [c]
44	Index	Value at base conditions	Historical [c]
45	Index difference	Value at metering conditions	Current
46	Index difference	Corrected value	Current
47	Index difference	Value at base conditions	Current
48	Index difference	Value at metering conditions	Last
49	Index difference	Corrected value	Last
50	Index difference	Value at base conditions	Last
51	Maximum of Index differences over measurement period 1 [c]	Value at metering conditions	
52	Maximum of Index differences over measurement period 1 [c]	Corrected value	
53	Maximum of Index differences over measurement period 1 [c]	Value at base conditions	
54	Maximum of Index differences over measurement period 2 [c]	Value at metering conditions	
55	Maximum of Index differences over measurement period 2 [c]	Corrected value	
56	Maximum of Index differences over measurement period 2 [c]	Value at base conditions	
57	Maximum of Index differences over measurement period 3 [c]	Value at metering conditions	
58	Maximum of Index differences over measurement period 3 [c]	Corrected value	
59	Maximum of Index differences over measurement period 3 [c]	Value at base conditions	
60	Maximum of Index differences over billing period 1 [c]	Value at metering conditions	
61	Maximum of Index differences over billing period 1 [c]	Corrected value	
62	Maximum of Index differences over billing period 1 [c]	Value at base conditions	
Values relative to billing period 3 (default value = 1 year)			
63	Index	Value at metering conditions	Historical [c]
64	Index	Corrected value	Historical [c]
65	Index	Value at base conditions	Historical [c]
66	Index difference	Value at metering conditions	Current
67	Index difference	Corrected value	Current
68	Index difference	Value at base conditions	Current
69	Index difference	Value at metering conditions	Last
70	Index difference	Corrected value	Last
71	Index difference	Value at base conditions	Last
72	Maximum of Index differences over measurement period 1 [c]	Value at metering conditions	
73	Maximum of Index differences over measurement period 1 [c]	Corrected value	
74	Maximum of Index differences over measurement period 1 [c]	Value at base conditions	
75	Maximum of Index differences over measurement	Value at metering conditions	

Value group D codes – Gas – Indexes and index differences (A= 7, C = 1…8, 11…16, 21…26, 31…36, 61…66)			
	Quantity	**Qualifier**	**Period**
	period 2 [c]		
76	Maximum of Index differences over measurement period 2 [c]	Corrected value	
77	Maximum of Index differences over measurement period 2 [c]	Value at base conditions	
78	Maximum of Index differences over measurement period 3 [c]	Value at metering conditions	
79	Maximum of Index differences over measurement period 3 [c]	Corrected value	
80	Maximum of Index differences over measurement period 3 [c]	Value at base conditions	
Values relative to billing period 4 (no default value)			
81	Index	Value at metering conditions	Historical [c]
82	Index	Corrected value	Historical [c]
83	Index	Value at base conditions	Historical [c]
84	Index difference	Value at metering conditions	Current
85	Index difference	Corrected value	Current
86	Index difference	Value at base conditions	Current
87	Index difference	Value at metering conditions	Last
88	Index difference	Corrected value	Last
89	Index difference	Value at base conditions	Last
90	Maximum of Index differences over measurement period 1 [c]	Value at metering conditions	
91	Maximum of Index differences over measurement period 1 [c]	Corrected value	
92	Maximum of Index differences over measurement period 1 [c]	Value at base conditions	
93	Maximum of Index differences over measurement period 2 [c]	Value at metering conditions	
94	Maximum of Index differences over measurement period 2 [c]	Corrected value	
95	Maximum of Index differences over measurement period 2 [c]	Value at base conditions	
96	Maximum of Index differences over measurement period 3 [c]	Value at metering conditions	
97	Maximum of Index differences over measurement period 3 [c]	Corrected value	
98	Maximum of Index differences over measurement period 3 [c]	Value at base conditions	
All other	Reserved		
[a]	Error correction of meter curves can be allocated to meters (e.g. temperature compensation of a diaphragm gas meter) or subsequent connected devices (e.g. high pressure correction curve of a turbine meter implemented in an associated volume conversion device).		
[b]	From data logger (parallel recording) for use in case of a measurement device fails.		

Value group D codes – Gas – Indexes and index differences (A= 7, C = 1…8, 11…16, 21…26, 31…36, 61…66)			
	Quantity	**Qualifier**	**Period**
[c]	Current value: F = 255 Historical values (F ≠ 255): - With F = 1…12, 0…99 value(s) of (a) previous billing period, relative to the billing period counter. - With F = 101…126 value(s) of (a) previous billing period(s) relative to the current billing period.		

8.3.3.3 Flow rate

The allocations allow identifying values associated with the flow rate of the gas. The flow rate is a process information. It is not linked to a physical device. No tariffication is applicable.

A distinction is made between:

- current average, last average, and maximum of last average values measured over various averaging periods, relative to various measurement and billing periods. Measurement period 2 and 3 shall be multiple of the averaging period of block demand / sliding demand measurement.
- values at metering conditions, corrected value, value at base conditions (converted value) and value at standard conditions;

NOTE Standard conditions refer to national regulations, which may differ from ISO standards reference values for base conditions.

EXAMPLE Gas reference temperature at standard conditions is 0 °C, gas reference temperature at base conditions is +15 °C.

For averaging period 2, block demand (default) or sliding demand is available. In the case of sliding demand, the averaging period is split to sub-periods. The number of sub-periods is carried by the object 7.b.0.8.35.255; see Table 60.

The last average values of the various flow rate quantities can be captured to load profiles, with self-explanatory OBIS codes, see 8.3.6.4.

Table 52 specifies the use of value group D to identify gas related flow rate values.

Table 52 – Value group D codes – Gas – Flow rate

Value group D codes – Gas – Flow rate (A = 7, C = 43)		
	Quantity	**Qualifier**
0	Instantaneous	Current value at metering conditions
1	Instantaneous	Corrected value
2	Instantaneous	Value at base conditions / “Converted value”
13	Instantaneous	Value at standard conditions
Averaging period 1, default value = 5 minutes		
15	Current average for averaging period 1	Value at metering conditions
16		Corrected value
17		Value at base conditions

Value group D codes – Gas – Flow rate (A = 7, C = 43)		
18		Value at standard conditions
19	Last average for averaging period 1	Value at metering conditions
20		Corrected value
21		Value at base conditions
22		Value at standard conditions
23	Maximum of last averages for averaging period 1 relative to measurement period 2 (default value = 1 hour)	Value at metering conditions
24		Corrected value
25		Value at base conditions
26		Value at standard conditions
27	Maximum of last averages for averaging period 1 relative to measurement period 3 (no default value)	Value at metering conditions
28		Corrected value
29		Value at base conditions
30		Value at standard conditions
31	Maximum of last averages for averaging period 1 relative to billing period 1 (default value = 1 day)	Value at metering conditions
32		Corrected value
33		Value at base conditions
34		Value at standard conditions
Averaging period 2, default value = 15 minutes (block demand or sliding demand)		
35	Current average for averaging period 2	Value at metering conditions
35		Corrected value
37		Value at base conditions
38		Value at standard conditions
39	Last average for averaging period 2	Value at metering conditions
40		Corrected value
41		Value at base conditions
42		Value at standard conditions
43	Maximum of last averages for averaging period 2 relative to measurement period 2 (default value = 1 hour)	Value at metering conditions
44		Corrected value
45		Value at base conditions
46		Value at standard conditions
47	Maximum of last averages for averaging period 2 relative to measurement period 3 (no default value)	Value at metering conditions
48		Corrected value
49		Value at base conditions
50		Value at standard conditions
51	Maximum of last averages for averaging period 2 relative to billing period 1 (default value = 1 day)	Value at metering conditions
52		Corrected value

Value group D codes – Gas – Flow rate (A = 7, C = 43)		
53		Value at base conditions
54		Value at standard conditions
Averaging period 3, default value = 1 hour		
55	Current average for averaging period 3	Value at metering conditions
56		Corrected value
57		Value at base conditions
58		Value at standard conditions
59	Last average for averaging period 3	Value at metering conditions
60		Corrected value
61		Value at base conditions
62		Value at standard conditions
Averaging period 4, (no default value)		
63	Current average for averaging period 4	Value at metering conditions
64		Corrected value
65		Value at base conditions
66		Value at standard conditions
67	Last average for averaging period 4	Value at metering conditions
68		Corrected value
69		Value at base conditions
70		Value at standard conditions
All other	Reserved	

8.3.3.4 Process values

For process values, a distinction is made between:

- instantaneous values;
- average, minimum and maximum values over various process intervals;
- value at metering conditions, value at base conditions; and value at standard conditions;

  NOTE Standard conditions refer to national regulations, which may differ from ISO standards reference values for base conditions.

  EXAMPLE Gas reference temperature at standard conditions is 0 °C, gas reference temperature at base conditions is +15 °C.
- for some quantities, backup, actual and preset values are available.

Table 53 specifies the use of value group D to identify gas related process values.

Table 53 – Value group D codes – Gas – Process values

Value group D codes – Gas – Process values (A = 7, C = 41, 42, 44...49)		
	Quantity	**Qualifier**
0	Instantaneous	Current value at metering conditions [a]
2	Instantaneous	Value at base conditions / “Converted value” [b]
3	Instantaneous	Backup value
10	Instantaneous	Actual value
11	Instantaneous	Preset value
13	Instantaneous	Value at standard conditions
Process interval 1 (default value = 15 minutes)		
15	Average, current interval, process interval 1	Value at metering conditions
16		Value at base conditions
17		Value at standard conditions
18	Minimum, current interval, process interval 1	Value at metering conditions
19		Value at base conditions
20		Value at standard conditions
21	Maximum, current interval, process interval 1	Value at metering conditions
22		Value at base conditions
23		Value at standard conditions
24	Average, last interval, process interval 1	Value at metering conditions
25		Value at base conditions
26		Value at standard conditions
27	Minimum, last interval, process interval 1	Value at metering conditions
28		Value at base conditions
29		Value at standard conditions
30	Maximum, last interval, process interval 1	Value at metering conditions
31		Value at base conditions
32		Value at standard conditions
Process interval 2 (default value = 1 hour)		
33	Average, current interval, process interval 2	Value at metering conditions
34		Value at base conditions
35		Value at standard conditions
36	Minimum, current interval, process interval 2	Value at metering conditions
37		Value at base conditions
38		Value at standard conditions
39	Maximum, current interval, process interval 2	Value at metering conditions
40		Value at base conditions

Value group D codes – Gas – Process values (A = 7, C = 41, 42, 44...49)		
41		Value at standard conditions
42	Average, last interval, process interval 2	Value at metering conditions
43		Value at base conditions
44		Value at standard conditions
45	Minimum, last interval, process interval 2	Value at metering conditions
46		Value at base conditions
47		Value at standard conditions
48	Maximum, last interval, process interval 2	Value at metering conditions
49		Value at base conditions
50		Value at standard conditions
Process interval 3 (default value = 1 day)		
51	Average, current interval, process interval 3	Value at metering conditions
52		Value at base conditions
53		Value at standard conditions
54	Minimum, current interval, process interval 3	Value at metering conditions
55		Value at base conditions
56		Value at standard conditions
57	Maximum, current interval, process interval 3	Value at metering conditions
58		Value at base conditions
59		Value at standard conditions
60	Average, last interval, process interval 3	Value at metering conditions
61		Value at base conditions
62		Value at standard conditions
63	Minimum, last interval, process interval 3	Value at metering conditions
64		Value at base conditions
65		Value at standard conditions
66	Maximum, last interval, process interval 3	Value at metering conditions
67		Value at base conditions
68		Value at standard conditions
Process interval 4 (default value = 1 month)		
69	Average, current interval, process interval 4	Value at metering conditions
70		Value at base conditions
71		Value at standard conditions
72	Minimum, current interval, process interval 4	Value at metering conditions
73		Value at base conditions
74		Value at standard conditions

Value group D codes – Gas – Process values (A = 7, C = 41, 42, 44…49)		
75	Maximum, current interval, process interval 4	Value at metering conditions
76		Value at base conditions
77		Value at standard conditions
78	Average, last interval, process interval 4	Value at metering conditions
79		Value at base conditions
80		Value at standard conditions
81	Minimum, last interval, process interval 4	Value at metering conditions
82		Value at base conditions
83		Value at standard conditions
84	Maximum, last interval, process interval 4	Value at metering conditions
85		Value at base conditions
86		Value at standard conditions
Process interval 5, since last event		
87	Average, process interval 5, interval since last event	Value at metering conditions
88		Value at base conditions
89		Value at standard conditions
90	Average, process interval 6, interval between last two events	Value at metering conditions
91		Value at base conditions
92		Value at standard conditions
All other	Reserved	
[a]	To be used for e.g. velocity of sound.	
[b]	Value of the base conditions is associated with reference values for volume conversion: C = 41, 42.	

8.3.3.5 Conversion related factors and coefficients

For correction, conversion, compressibility, superior calorific value and gas law deviation coefficient values, various OBIS code allocations are made taking into consideration the specifics of the measuring process. See Table 54.

For these values, average values over various averaging periods are also defined; see 8.3.4.5.

Table 54 specifies the use of value group D to identify gas conversion related factors and coefficients values.

Table 54 – Value group D codes – Gas – Conversion related factors and coefficients

Value group D codes – Gas – Conversion related factors and coefficients (A = 7, C = 51…55)	
0	Current value at metering conditions
2	Current value at base conditions / “Converted Value”

3	Backup
10	Actual
11	Preset
12	Method
All other	Reserved

8.3.3.6 Natural gas analysis values

For natural gas analysis, allocations in value group D identify the key parameters and the components of the natural gas. For these values, average values over various averaging periods are also defined; see 8.3.4.6. Table 55 specifies the use of value group D to identify natural gas analysis values.

Table 55 – Value group D codes – Gas – Natural gas analysis values

Value group D codes – Gas – Natural gas analysis values (A = 7, C = 70)	
8	Reference pressure of gas analysis
9	Reference temperature of gas analysis
10	Superior [a] Wobbe index 0 °C
11	Inferior [b] Wobbe index 0 °C
12	Methane number
13	Total sulphur
14	Hydrogen sulphide H_2S
15	Mercaptans
16	Water dew point (DP H_2O)
17	Water (H_2O) dew point outlet / normalised
18	Hydrocarbon dew point (DP C_XH_Y)
19	Inferior [c] calorific value $H_{i,n}$
20	Water H_2O
60	Nitrogen N_2
61	Hydrogen H_2
62	Oxygen O_2
63	Helium He
64	Argon Ar
65	Carbon monoxide CO
66	Carbon dioxide CO_2
67	Methane CH_4
68	Ethene C_2H_4
69	Ethane C_2H_6

Value group D codes – Gas – Natural gas analysis values (A = 7, C = 70)	
70	Propene C_3H_6
71	Propane C_3H_8
72	i-butane i-C_4H_{10}
73	n-butane n-C_4H_{10}
74	neo-pentane neo-C_5H_{12}
75	i-pentane i-C_5H_{12}
76	n-pentane n-C_5H_{12}
77	Hexane C_6H_{14}
78	Hexane share higher hydrocarbons C_6H_{14} %
79	Hexane+ C_6H_{14}+
80	Heptane C_7H_{16}
81	Octane C_8H_{18}
82	Nonane C_9H_{20}
83	Decane $C_{10}H_{22}$
84	Tetrahydrothiophene C_4H_8S
All other	Reserved
a	Superior (gross) Wobbe index
b	Inferior (net) Wobbe index
c	Inferior (net) calorific value

8.3.4 Value group E codes – Gas

8.3.4.1 General

The following clauses define the use of value group E for identifying further classification or processing the measurement quantities defined by value groups A to D. The various classifications and processing methods are exclusive.

8.3.4.2 Indexes and index differences – Tariff rates

Table 56 shows the use of value group E for identification of tariff rates typically used for indexes and index differences of volume, mass and energy, specified in Table 51.

Table 56 – Value group E codes – Gas – Indexes and index differences – Tariff rates

Value group E codes – Gas – Indexes and index differences – Tariff rates (A = 7, C = 1…8, 11…16, 21…26, 31…36, 61…66, D = 0…3, 6…98)	
0	Total
1	Rate 1
…	
63	Rate 63

Value group E codes – Gas – Indexes and index differences – Tariff rates (A = 7, C = 1…8, 11…16, 21…26, 31…36, 61…66, D = 0…3, 6…98)	
128…254	Manufacturer specific codes
All other	Reserved

8.3.4.3 Flow rate

No further classification in value group E are made, therefore E shall be 0.

8.3.4.4 Process values

No further classification in value group E is made, therefore E shall be 0.

8.3.4.5 Conversion related factors and coefficients – Averages

Table 57 shows the use of value group E for the identification of average values of conversion related factors and coefficients – as specified in8.3.3.5– over various averaging periods.

Table 57 – Value group E codes – Gas – Conversion related factors and coefficients

	Value group E codes – Gas – Conversion related factors and coefficients– Averages (A = 7, C = 51…55, D = 0, 2, 3, 10, 11)
0	Process independent current value[a]
1	Weighted value (e.g. Superior calorific value)[b]
11	Average, current interval, averaging period 1 (default 5 minutes)
12	Average, last interval, averaging period 1 (default 5 minutes)
13	Average, current interval, averaging period 2 (default 15 minutes)
14	Average, last interval, averaging period 2 (default 15 minutes)
15	Average, current interval, averaging period 3 (default 1 hour)
16	Average, last interval, averaging period 3 (default 1 hour)
17	Average, current interval, averaging period 4 (no default value)
18	Average, last interval, averaging period 4 (no default value)
19	Average, current interval, averaging period 5 (default 1 day)
20	Average, last interval, averaging period 5 (default 1 day)
21	Average, current interval, averaging period 6 (default 1 month)
22	Average, last interval, averaging period 6 (default 1 month)
23	Average, current interval, averaging period 7 (default 1 year)
24	Average, last interval, averaging period 7 (default 1 year)
25	Average, current interval, averaging period 8 (no default value)
26	Average, last interval, averaging period 8 (no default value)
27	Average, averaging period 9, interval since last event
28	Average, averaging period 10, interval between last two events
All other	Reserved
a	Process independent current value is a gas analysis technology independent value, which is generated asynchronous to processing cycles, but used for further calculations.
b	Weighted value is the result of specific algorithms taking into account different values by weighting their influence on the algorithm result.

8.3.4.6 Calculation methods

Table 58 – Value group E codes – Gas – Calculation methods shows the use of value group E for the identification of calculation methods. See also DLMS UA 1000-1 Ed 15 Part 2:2021, 6.7.8.

Table 58 – Value group E codes – Gas – Calculation methods

	Value group E codes – Calculation methods (A = 7, C = 51...55, D = 12)
0	Calculation method in use
1	Calculation method 1 supported
...	…
20	Calculation method 20 supported
All other	Reserved

8.3.4.7 Natural gas analysis values – Averages

Table 59 shows the use of value group E for the identification of natural gas analysis values – as specified in 7.8.3.6 – over various averaging periods.

Table 59 – Value group E codes – Gas – Natural gas analysis values – Averages

Value group E codes – Gas – Natural gas analysis values – Averages (A = 7, C = 70, D = 8...20, 60...84)	
0	Process independent current value [a]
1	Weighted value (e.g. CO_2 in [GJ / t]) [b]
11	Average, current interval, averaging period 1 (default 5 minutes)
12	Average, last interval, averaging period 1 (default 5 minutes)
13	Average, current interval, averaging period 2 (default 15 minutes)
14	Average, last interval, averaging period 2 (default 15 minutes)
15	Average, current interval, averaging period 3 (default 1 hour)
16	Average, last interval, averaging period 3 (default 1 hour)
17	Average, current interval, averaging period 4 (no default value)
18	Average, last interval, averaging period 4 (no default value)
19	Average, current interval, averaging period 5 (default 1 day)
20	Average, last interval, averaging period 5 (default 1 day)
21	Average, current interval, averaging period 6 (default 1 month)
22	Average, last interval, averaging period 6 (default 1 month)
23	Average, current interval, averaging period 7 (default 1 year)
24	Average, last interval, averaging period 7 (default 1 year)
25	Average, current interval, averaging period 8 (no default value)
26	Average, last interval, averaging period 8 (no default value)
27	Average, averaging period 9, interval since last event
28	Average, averaging period 10, interval between last two events
All other	Reserved
a	Process independent current value is a gas analysis technology independent value, which is generated asynchronous to processing cycles, but used for further calculations.
b	Weighted value is the result of specific algorithms taking into account different values by weighting their influence on the algorithm result.

8.3.5 Value group F codes – Gas

Value group F identifies current (with F = 255) or historical values of quantities identified by value groups A to E, where appropriate.

There are four billing period schemes available (for example to store daily, monthly, yearly and weekly values). For each billing period scheme, the following general purpose objects are available:

- billing period counter;
- number of available billing periods;
- time stamp of most recent and historical billing periods;
- billing period length.

For OBIS codes see Table 60. For additional information, see A.3 and DLMS UA 1000-1 Ed 15 Part 2:2021, 6.2.2.

8.3.6 OBIS codes – Gas

8.3.6.1 General and service entry objects – Gas

Table 60 specifies the OBIS codes for gas related general and service entry objects.

Table 60 – OBIS codes for general and service entry objects – Gas

General and shows service entry objects – Gas	OBIS code					
	A	B	C	D	E	F
Free ID-numbers for utilities						
Complete combined gas ID	7	*b*	0	0		
Gas ID 1	7	*b*	0	0	0	
…	…	…	…	…	…	
Gas ID 10	7	*b*	0	0	9	
Billing period values / reset counter entries (First billing period scheme if there are more than one)						
Billing period counter (1)	7	*b*	0	1	0	VZ or 255
Number of available billing periods (1)	7	*b*	0	1	1	
Time stamp of the most recent billing period (1)	7	*b*	0	1	2	
Time stamp of the billing period (1) VZ (last reset)	7	*b*	0	1	2	VZ
Time stamp of the billing period (1) VZ-1	7	*b*	0	1	2	VZ_{-1}
…			…	…	…	
Time stamp of the billing period (1) VZ-n	7	*b*	0	1	2	VZ_{-n}
Billing period values / reset counter entries (Second billing period scheme)						
Billing period counter (2)	7	*b*	0	1	3	VZ or 255

General and shows service entry objects – Gas	OBIS code					
	A	B	C	D	E	F
Number of available billing periods (2)	7	*b*	0	1	4	
Time stamp of the most recent billing period (2)	7	*b*	0	1	5	
Time stamp of the billing period (2) VZ (last reset)	7	*b*	0	1	5	VZ
Time stamp of the billing period (2) VZ-1	7	*b*	0	1	5	VZ_{-1}
…			…	…	…	
Time stamp of the billing period (2) VZ-n	7	*b*	0	1	5	VZ_{-n}
Billing period values / reset counter entries (Third billing period scheme)						
Billing period counter (3)	7	*b*	0	1	6	VZ or 255
Number of available billing periods (3)	7	*b*	0	1	7	
Time stamp of the most recent billing period (3)	7	*b*	0	1	8	
Time stamp of the billing period (3) VZ (last reset)	7	*b*	0	1	8	VZ
Time stamp of the billing period (3) VZ-1	7	*b*	0	1	8	VZ_{-1}
…			…	…	…	
Time stamp of the billing period (3) VZ-n	7	b	0	1	8	VZ_{-n}
Billing period values / reset counter entries (Fourth billing period scheme)						
Billing period counter (4)	7	*b*	0	1	9	VZ or 255
Number of available billing periods (4)	7	*b*	0	1	10	
Time stamp of the most recent billing period (4)	7	*b*	0	1	11	
Time stamp of the billing period (4) VZ (last reset)	7	*b*	0	1	11	VZ
Time stamp of the billing period (4) VZ-1	7	*b*	0	1	11	VZ_{-1}
…			…	…	…	
Time stamp of the billing period (4) VZ-n	7	*b*	0	1	11	VZ_{-n}
Configuration						
Program version	7	*b*	0	2	0	
Firmware version	7	*b*	0	2	1	
Software version	7	*b*	0	2	2	
Device version	7	*b*	0	2	3	
Active firmware signature	7	*b*	0	2	8	
Number of device channels	7	*b*	0	2	10	
Pressure sensor, serial no.	7	*b*	0	2	11	
Temperature sensor, serial no.	7	*b*	0	2	12	
Calculator, serial no.	7	*b*	0	2	13	
Volume sensor [a], serial no.	7	*b*	0	2	14	
Density sensor, serial no.	7	b	0	2	15	
Sensor (medium irrespective), serial no.	7	*b*	0	2	16	

General and shows service entry objects – Gas	OBIS code					
	A	B	C	D	E	F
Digital output configuration	7	*b*	0	2	17	
Analogue output configuration	7	*b*	0	2	18	
Output pulse constants converted / unconverted						
Volume forward at metering conditions	7	*b*	0	3	0	
Volume reverse at metering conditions	7	*b*	0	3	1	
Volume absolute [b] at metering conditions	7	*b*	0	3	2	
Volume forward at base conditions	7	*b*	0	3	3	
Volume reverse at base conditions	7	*b*	0	3	4	
Volume absolute [b] at base conditions	7	*b*	0	3	5	
Conversion factors						
	7	*b*	0	4	0	
	7	*b*	0	4	1	
{This area is to be used for polynomials, constants						
for conversion, and similar}	7	*b*	0	4	2	
…	7	*b*	0	4	3	
	7	*b*	0	4	4	
Threshold values						
Threshold power for over-consumption relative to measurement period 2 for indexes and index differences						
limit 1	7	*b*	0	5	1	1
…			…	…	…	…
limit 4	7	*b*	0	5	1	4
Threshold power for over-consumption relative to measurement period 3 for indexes and index differences						
limit 1	7	*b*	0	5	1	11
…			…	…	…	…
limit 4	7	*b*	0	5	1	14
Threshold limit for rate 1 for over-consumption relative to measurement period 2 for indexes and index differences	7	*b*	0	5	2	1
…			…	…	…	…
limit for rate 9	7	*b*	0	5	2	9
Threshold limit for rate 1 for over-consumption relative to measurement period 3 for indexes and index differences	7	*b*	0	5	2	11
…			…	…	…	…
limit for rate 9	7	*b*	0	5	2	19
Maximum contracted consumption for rec. interval 1	7	*b*	0	5	3	
Maximum contracted consumption for rec. interval 2	7	*b*	0	5	4	
Absolute temperature, minimum limit setting [c]	7	*b*	0	5	11	

General and shows service entry objects – Gas	OBIS code					
	A	B	C	D	E	F
Absolute temperature, maximum limit setting [c]	7	*b*	0	5	12	
Absolute pressure, minimum limit setting [c]	7	*b*	0	5	13	
Absolute pressure, maximum limit setting [c]	7	*b*	0	5	14	
Nominal values volume sensor						
Pressure	7	*b*	0	6	1	
Temperature	7	*b*	0	6	2	
Q_{min}	7	*b*	0	6	3	
Q_{max}	7	*b*	0	6	4	
Input pulse constants						
Volume forward at metering conditions	7	*b*	0	7	0	
Volume reverse metering conditions	7	*b*	0	7	1	
Volume absolute [b] at metering conditions	7	*b*	0	7	2	
Volume forward at base conditions	7	*b*	0	7	3	
Volume reverse at base conditions	7	*b*	0	7	4	
Volume absolute [b] at base conditions	7	*b*	0	7	5	
Intervals and periods						
Recording interval 1, for profile [d]	7	*b*	0	8	1	
Recording interval 2, for profile [d]	7	*b*	0	8	2	
Measurement period 1, for average value 1	7	*b*	0	8	3	
Measurement period 2, for average value 2	7	*b*	0	8	4	
Measurement period 3, for instantaneous value	7	*b*	0	8	5	
Measurement period 4, for test value	7	*b*	0	8	6	
Billing period	7	*b*	0	8	10	
NOTE Codes 7.b.0.8.11...35 are newly defined in Blue Book Edition 9.						
Process interval 1, default value 15 minutes	7	*b*	0	8	11	
Process interval 2, default value 1 hour	7	*b*	0	8	12	
Process interval 3, default value 1 day	7	*b*	0	8	13	
Process interval 4, default value 1 month	7	*b*	0	8	14	
Process interval 5, for process value, since last event	7	*b*	0	8	15	
Process interval 6, between last two events	7	*b*	0	8	16	
Measurement period 1, for indexes and index differences, default value 15 minutes	7	*b*	0	8	17	
Measurement period 2, for indexes and index differences, default value 1 hour	7	*b*	0	8	18	
Measurement period 3, for indexes and index differences, no default value	7	*b*	0	8	19	
Billing period 1, for indexes and index differences, default value 1 day	7	*b*	0	8	20	

General and shows service entry objects – Gas	OBIS code					
	A	B	C	D	E	F
Billing period 2, for indexes and index differences, default value 1 month	7	*b*	0	8	21	
Billing period 3, for indexes and index differences, default value 1 year,	7	*b*	0	8	22	
Billing period 4, for indexes and index differences, no default value	7	*b*	0	8	23	
Averaging period 1, default value 5 minutes	7	*b*	0	8	25	
Averaging period 2, default value 15 minutes	7	*b*	0	8	26	
Averaging period 3, default value 1 hour	7	*b*	0	8	27	
Averaging period 4, no default value	7	*b*	0	8	28	
Averaging period 5, default value 1 day	7	*b*	0	8	29	
Averaging period 6, default value 1 month	7	*b*	0	8	30	
Averaging period 7, default value 1 year	7	*b*	0	8	31	
Averaging period 8, no default value	7	*b*	0	8	32	
Averaging period 9, since last event	7	*b*	0	8	33	
Averaging period 10, between two last events	7	*b*	0	8	34	
Number of sub-periods for averaging period 2	7	*b*	0	8	35	
Time entries						
Number of days (time expired) since last reset (First billing period scheme if there are more than one)	7	*b*	0	9	0	
Local time	7	*b*	0	9	1	
Local date	7	*b*	0	9	2	
Start of conventional gas day	7	*b*	0	9	3	
Residual time shift [e]	7	*b*	0	9	4	
Time of last reset (First billing period scheme if there are more than one)	7	*b*	0	9	6	
Date of last reset (First billing period scheme if there are more than one)	7	*b*	0	9	7	
Clock time shift limit	7	*b*	0	9	11	
First billing period scheme						
Number of days (time expired) since last reset (end of billing period)	*See above.*					
Time of last reset	*See above.*					
Date of last reset	See above.					
Billing period reset lockout time (First billing period scheme if there are more than one)	7	*b*	0	9	12	
Second billing period scheme						
Number of days (time expired) since last end of billing period	7	*b*	0	9	13	
Time of last reset	7	*b*	0	9	14	
Date of last reset	7	*b*	0	9	15	
Billing period reset lockout time	7	*b*	0	9	16	

General and shows service entry objects – Gas	OBIS code					
	A	B	C	D	E	F
Third billing period scheme						
Number of days (Time expired) since last end of billing period	7	*b*	0	9	17	
Time of last reset	7	*b*	0	9	18	
Date of last reset	7	*b*	0	9	19	
Billing period reset lockout time	7	*b*	0	9	20	
Fourth billing period scheme						
Number of days (time expired) since last end of billing period	7	*b*	0	9	21	
Time of last reset	7	*b*	0	9	22	
Date of last reset	7	*b*	0	9	23	
Billing period reset lockout time	7	*b*	0	9	24	
Station management information objects						
Heating temperature [f], current value	7	*b*	0	10	0	
Heating temperature, average 15 minutes	7	*b*	0	10	1	
Heating temperature, average 60 minutes	7	*b*	0	10	11	
Heating temperature, average day	7	*b*	0	10	21	
Heating temperature, average month	7	*b*	0	10	31	
Ambient device temperature [g], current value	7	*b*	0	11	0	
Ambient device temperature, average 15 minutes	7	*b*	0	11	1	
Ambient device temperature, average 60 minutes	7	*b*	0	11	11	
Ambient device temperature, average day	7	*b*	0	11	21	
Ambient device temperature, average month	7	*b*	0	11	31	
Gas parameters for volume conversion, currently used in compressibility calculation						
Reference pressure of gas analysis	7	*b*	0	12	8	
Reference temperature of gas analysis	7	*b*	0	12	9	
Superior Wobbe number 0 °C	7	*b*	0	12	10	
Inferior Wobbe number 0 °C	7	*b*	0	12	11	
Methane number	7	*b*	0	12	12	
Total sulphur	7	*b*	0	12	13	
Hydrogen sulphide H_2S	7	*b*	0	12	14	
Mercaptans	7	*b*	0	12	15	
Water dew point (DP H_2O)	7	*b*	0	12	16	
Water (H_2O) dew point outlet / normalised	7	*b*	0	12	17	
Hydrocarbon dew point (DP C_XH_Y)	7	*b*	0	12	18	

General and shows service entry objects – Gas	OBIS code					
	A	B	C	D	E	F
Inferior calorific value $H_{i,n}$	7	*b*	0	12	19	
Water H_2O	7	*b*	0	12	20	
Density (of gas), base conditions	7	*b*	0	12	45	
Relative density	7	*b*	0	12	46	
Superior calorific value $H_{s,n}$	7	*b*	0	12	54	
Nitrogen N_2	7	*b*	0	12	60	
Hydrogen H_2	7	*b*	0	12	61	
Oxygen O_2	7	*b*	0	12	62	
Helium He	7	*b*	0	12	63	
Argon Ar	7	*b*	0	12	64	
Carbon monoxide CO	7	*b*	0	12	65	
Carbon dioxide CO_2	7	*b*	0	12	66	
Methane CH_4	7	*b*	0	12	67	
Ethene C_2H_4	7	*b*	0	12	68	
Ethane C_2H_6	7	*b*	0	12	69	
Propene C_3H_6	7	*b*	0	12	70	
Propane C_3H_8	7	*b*	0	12	71	
i-butane i-C_4H_{10}	7	*b*	0	12	72	
n-butane n-C_4H_{10}	7	*b*	0	12	73	
neo-pentane neo-C_5H_{12}	7	*b*	0	12	74	
i-pentane i-C_5H_{12}	7	*b*	0	12	75	
n-pentane n-C_5H_{12}	7	*b*	0	12	76	
Hexane C_6H_{14}	7	*b*	0	12	77	
Hexane share higher hydrocarbons C_6H_{14} %	7	*b*	0	12	78	
Hexane+ C_6 H_{14}+	7	*b*	0	12	79	
Heptane C_7H_{16}	7	*b*	0	12	80	
Octane C_8H_{18}	7	*b*	0	12	81	
Nonane C_9H_{20}	7	*b*	0	12	82	
Decane $C_{10}H_{22}$	7	*b*	0	12	83	
Tetrahydrothiophene	7	*b*	0	12	84	
Gas parameters for Venturi measurement						
Internal pipe diameter	7	*b*	0	13	1	
Orifice diameter	7	*b*	0	13	2	
Pressure type (orifice fitting)	7	*b*	0	13	3	
Flow coefficient (alfa)	7	*b*	0	13	4	

General and shows service entry objects – Gas	OBIS code					
	A	B	C	D	E	F
Expansion coefficient (epsilon)	7	*b*	0	13	5	
Reflux coefficient	7	*b*	0	13	6	
Isoentropic coefficient	7	*b*	0	13	7	
Dynamic viscosity	7	*b*	0	13	8	
Differential pressure dp for cut off	7	*b*	0	13	9	
Reynold number	7	*b*	0	13	10	
Gas parameters for density measurement						
K0 Densimeter Coefficient	7	*b*	0	14	1	
K2 Densimeter Coefficient	7	*b*	0	14	2	
Densimeter period for instantaneous measurement	7	*b*	0	14	10	
Densimeter period for measurement period 15 minutes	7	*b*	0	14	11	
Sensor manager						
Sensor manager objects	7	*b*	0	15	*e*	
Internal operating status, gas related						
Internal operating status, global [h]	7	*b*	96	5	0	
Internal operating status (status word 1) [h]	7	*b*	96	5	1	
Internal operating status (status word 2) [h]	7	*b*	96	5	2	
Internal operating status (status word 3) [h]	7	*b*	96	5	3	
Internal operating status (status word 4) [h]	7	*b*	96	5	4	
Internal operating status (status word 5) [h]	7	*b*	96	5	5	
Internal operating status (status word 6) [h]	7	*b*	96	5	6	
Internal operating status (status word 7) [h]	7	*b*	96	5	7	
Internal operating status (status word 8) [h]	7	*b*	96	5	8	
Internal operating status (status word 9) [h]	7	*b*	96	5	9	
Manufacturer specific [i)]	7	*b*	96	50	e	
.....						
Manufacturer specific	7	*b*	96	99	e	

[a]	A volume sensor could be an external mechanical meter / encoder / electronic index.
[b]	Absolute in the sense that negative volume is summed as positive ABS().
[c]	An absolute temperature or absolute pressure outside these limits may affect the error status of the device.
[d]	If multiple recording intervals are implemented, then recording interval 1 shall be the shorter.
[e]	This value indicates the remaining time interval for soft time setting, where the clock is corrected in small steps (equivalent to Clock object method 6).
[f]	Temperature heating is applied by stations with gas heating systems.
[g]	Application for control of battery environment or volume conversion device environmental control.

General and shows service entry objects – Gas		OBIS code					
		A	B	C	D	E	F
h	Status words referring to a status table with fix status words or to any status table bits using mapped status (class_id = 63).						
i	The range D = 50...99 is available for identifying objects, which are not represented by another defined code, but need representation on the display as well. If this is not required, the range D = 128...254 should be used.						

8.3.6.2 Error register objects – Gas

Table 61 – OBIS codes for error register specifies the OBIS codes for gas related error register objects.

Table 61 – OBIS codes for error register objects – Gas

Error register objects – Gas	OBIS code					
	A	B	C	D	E	F
Error registers	7	*b*	97	97	*e*	
NOTE The information to be included in the error objects is not defined in this document.						

8.3.6.3 List objects – Gas

Table 62 – OBIS codes for list objects – Gas specifies the OBIS codes for gas related list objects.

Table 62 – OBIS codes for list objects – Gas

List objects – Gas	OBIS code					
	A	B	C	D	E	F
Gas related data of billing period (with billing period scheme 1 if there are more than one schemes available)	7	*b*	98	1	*e*	255 [a]
Gas related data of billing period (with billing period scheme 2)	7	*b*	98	2	*e*	255 [a]
Gas related data of billing period (with billing period scheme 3)	7	*b*	98	3	*e*	255 [a]
Gas related data of billing period (with billing period scheme 4)	7	*b*	98	4	*e*	255 [a]
Gas related data of event triggered billing profile [b]	7	*b*	98	11	*e*	255 [a]
[a] F = 255 means a wildcard here. See A.3.						
[b] Event triggered means the termination of a billing period by events, e.g. by commands. (Therefore, the profile entries are not equidistant in time).						

8.3.6.4 Data profile objects – Gas

Gas related data profiles – identified with one single OBIS code – are used to hold a series of measurement values of one or more similar quantities and/or to group various data. The OBIS codes are specified in Table 63.

Table 63 – OBIS codes for data profile objects – Gas

Data profile objects – Gas	OBIS code					
	A	B	C	D	E	F
Load profile with recording interval 1	7	*b*	99	1	4 [a]	
Load profile with recording interval 2	7	*b*	99	2	4 [a]	
Profile of maxima with recording interval 1	7	*b*	99	3	4 [a]	
Profile of maxima with recording interval 2	7	*b*	99	4	4 [a]	
Load profiles for indexes and index differences of volume, mass and energy [b]	7	*b*	99	*d* [c]	*e* [d]	
Load profiles for process values	7	*b*	99	*d* [e]	*e* [f]	
Load profiles for flow rate	7	*b*	99	43	*e* [g]	
Power failure event log	7	*b*	99	97	*e*	
Event log	7	*b*	99	98	*e*	
Certification data log	7	*b*	99	99	0	
Load profile with recording interval 15 minutes	7	*b*	99	99	1	
Load profile with recording interval 60 minutes	7	*b*	99	99	2	
Load profile with recording interval day	7	*b*	99	99	3	
Load profile with recording interval month	7	*b*	99	99	4	

[a]	The value in value group E has been changed from 0 to 4 to avoid overlaps with the self-descriptive profile OBIS codes. The use of the value 0 is deprecated.
[b]	Value group D and E identify the value captured in these profiles. Value group D and E of the OBIS code of the load profile is mapped to value group C and D of the OBIS code identifying the value captured. The value captured in the buffer is always attribute 2 (value) of the respective Register / Extended register object.
[c]	The possible values are 1…8, 11…16, 21…26, 31…36, 61…66. See Table 50.
[d]	The possible values are 0…3, 6…98. See Table 51. EXAMPLE A load profile with OBIS code 7.b.99.11.17.255 contains the logged values from a volume conversion device: Forward undisturbed converter volume, index difference, value at base conditions, relative to measurement period 2. The values are captured at the end of each measurement period (last values).
[e]	The possible values are 41, 42, 44…49. See Table 50.
[f]	The possible values are 0, 2, 13, 24…32, 42…50, 60…68, 78…86, 90…92. See Table 57. EXAMPLE A load profile with OBIS code 7.b.99.41.43.255 contains the logged values of absolute gas temperature, average, last interval, (relative to) process interval 2.
[g]	The possible values are 0, 1, 2, 13, 19…22, 39…42, 59…62, 67…70. See Table 52. EXAMPLE A load profile with OBIS code 7.b.99.43.19.255 contains the logged values of the flow rate, last average for averaging period 1, value at metering conditions.

8.4 Water (Value group A = 8 and A = 9)

8.4.1 General

This subclause 8.4 specifies the naming of objects carrying water meter information in a COSEM environment. It covers the handling of hot, as well as the handling of cold water.

8.4.2 Value group C codes – Water

Table 64 specifies the use of value group C for hot and cold water.

Table 64 – Value group C codes – Water

Value group C codes – Water (A=8 or A=9)	
0	General purpose objects

Value group C codes – Water (A=8 or A=9)	
1	Accumulated volume
2	Flow rate
3	Temperature
4	Forward volume
5	Reverse volume
93	Consortia specific identifiers, see Table 54.
94	Country specific identifiers, see Table 55.
96	General and service entry objects – Water (See DLMS UA 1000-1 Ed 15 Part 2:2021, 6.8.4)
97	Error register objects – Water (See DLMS UA 1000-1 Ed 15 Part 2:2021, 6.8.6)
98	List objects – Water
99	Data profile objects – Water (See DLMS UA 1000-1 Ed 15 Part 2:2021, 6.8.8)
128...199, 240	Manufacturer specific codes
All other	Reserved

8.4.3 Value group D codes – Water

This value group specifies the result of processing a *Quantity* according to a specific algorithm for water related values. See Table 65.

Table 65 – Value group D codes – Water

Value group D codes – Water (A = 8 or A = 9, C <> 0, 96...99)	
0	Current value
1	Periodical value
2	Set date value
3	Billing date value
4	Minimum of value
5	Maximum of value
6	Test value
All other	Reserved

8.4.4 Value group E codes – Water

Table 66 shows the use of value group E for identification of tariff rates typically used for consumption and demand quantities.

Table 66 – Value group E codes – Water

Value group E codes – Water	
0	Total
1	Rate 1
2	Rate 2

3	Rate 3
…	…
9	Rate 9
128…254	Manufacturer specific codes
All other	Reserved

8.4.5 OBIS codes – Water

8.4.5.1 General and service entry objects – Water

Table 67 specifies the OBIS codes for water related general and service entry objects.

Table 67 – OBIS codes for general and service entry objects – Water

General and service entry objects – Water	OBIS code					
	A	B	C	D	E	F
Free ID-numbers for utilities						
Complete combined ID	8/9	*b*	0	0		
ID 1	8/9	*b*	0	0	0	
…			…	…	…	
ID 10	8/9	*b*	0	0	9	
Storage information						
Status (VZ) of the historical value counter	8/9	*b*	0	1	1	
Number of available historical values	8/9	*b*	0	1	2	
Due date	8/9	*b*	0	1	10	
Billing date	8/9	*b*	0	1	11	
Billing date period	8/9	*b*	0	1	12	
Program entries						
Program version no.	8/9	*b*	0	2	0	
Device version no.	8/9	*b*	0	2	3	
Threshold values						
Contracted maximum consumption	8/9	*b*	0	5	1	
Input pulse constants						
Volume forward	8/9	*b*	0	7	1	
Measurement / registration-period duration						
Recording interval for load profile	8/9	*b*	0	8	1	
Time integral, averaging period for actual flow rate value	8/9	*b*	0	8	6	
Time entries						
Local time	8/9	*b*	0	9	1	
Local date	8/9	*b*	0	9	2	
Time stamp (local time) of the most recent billing period [a]	8/9	*b*	0	9	3	
Manufacturer specific [b]	8/9	b	96	50	*e*	*f*

General and service entry objects – Water	OBIS code					
	A	B	C	D	E	F
Manufacturer specific	8/9	*b*	96	99	*e*	*f*

[a] In case of billing period schemes absence or event triggered, commonly calculated from local date and local time information.

[b] The range D = 50…99 is available for identifying objects, which are not represented by another defined code, but need representation on the display as well. If this is not required, the range D = 128…254 should be used.

8.4.5.2 Error register objects – Water

Table 68 specifies the OBIS codes for water related error register objects.

Table 68 – OBIS codes for error register objects – Water

Error register objects – Water	OBIS code					
	A	B	C	D	E	F
Error registers	8/9	*b*	97	97	*e*	
NOTE The information to be included in the error objects is not defined in this document.						

8.4.5.3 List objects – water meters

Table 69 specifies the OBIS codes for Water meter related list objects.

Table 69 – OBIS codes for list objects – Water Meters

List objects – Water Meters	OBIS code					
	A	B	C	D	E	F
Water Meter related data of billing period (with billing period scheme 1 if there are two schemes available)	8/9	*b*	98	1	*e*	255 [a]
Water Meter related data of billing period (with billing period scheme 2)	8/9	*b*	98	2	*e*	255 [a]
[a] F = 255 means a wildcard.						

8.4.5.4 Data profile objects – Water

Water related data profiles – identified with one single OBIS code – are used to hold a series of measurement values of one or more similar quantities and/or to group various data. The OBIS codes are specified in Table 70.

Table 70 – OBIS codes for data profile objects – Water

Data profile objects – Water	OBIS code					
	A	B	C	D	E	F
Consumption/load profile	8/9	*b*	99	1	*e*	

8.4.5.5 OBIS codes for water related objects (examples)

Table 71 – OBIS codes for water related objects (examples) specifies examples for OBIS codes of water related objects.

Table 71 – OBIS codes for water related objects (examples)

Water related objects	OBIS code					
	A	B	C	D	E	F
Consumption						
Current index, total	8/9	*b*	1	0	0	
Current index, tariff 1	8/9	*b*	1	0	1	
Current index, periodical, total, the two last periods	8/9	*b*	1	1	0	102
Monitoring values						
Flow rate, maximum value, previous period	8/9	*b*	2	5	0	V_{Z-1}
Forward temperature, billing date value, last billing period	8/9	*b*	3	3	0	101

9 Other media (Value group A = 15)

9.1 General

This Clause 8 specifies naming of objects related to other media than what is defined with values A = 1, 4…9. Typical application is distributed energy generation using renewable energy sources.

NOTE The details of OBIS codes will be specified as application of DLMS®/COSEM in this area grows.

9.2 Value group C codes – Other media

Table 72 specifies the use of value group C for other media.

Table 72 – Value group C codes – Other media

Value group C codes – Other media	
0	General purpose objects
1…10	Solar
11…20	Wind
128…254	Manufacturer specific codes
All other	Reserved

9.3 Value group D codes – Other media

To be specified later.

9.4 Value group E codes – Other media

To be specified later.

9.5 Value group F codes – Other media

To be specified later.

Annex A
(normative)

Code presentation

A.1 Reduced ID codes (e.g. for IEC 62056-21)

To comply with the syntax defined for protocol modes A to D of IEC 62056-21 the range of ID codes is reduced to fulfil the limitations which usually apply to the number of digits and their ASCII representation. Values in all value groups are limited to a range of 0…99 and within that range, to the values specified in the clauses specifying the use of the value groups.

Some value groups may be suppressed, if they are not relevant to an application:

- optional value groups: A, B, E, F;
- mandatory value groups: C, D.

To allow the interpretation of shortened codes delimiters are inserted between all value groups, see Figure A.1:

Figure A.1 – Reduced ID code presentation

The delimiter between value groups E and F can be modified to carry some information about the source of a reset (& instead of * if the reset was performed manually).

The manufacturer shall ensure that the combination of the OBIS code and the class_id (see DLMS UA 1000-1 Ed 15 Part 2:2021, Clause 4) uniquely identifies each COSEM object.

A.2 Display

The usage of OBIS codes to display values is normally limited in a similar way as for data transfer, for example according to IEC 62056-21.

Some codes in value group C and D may be replaced by letters to clearly indicate the differences from other data items; see Table A.1.

Table A.1 – Example of display code replacement

Value group C and D	
OBIS code	**Display code**
96	C
97	F
98	L
99	P
NOTE The letter codes may also be used in protocol modes A to D.	

A.3 Special handling of value group F

Unless otherwise specified, the value group F is used for the identification of values of billing periods.

The billing periods can be identified relative to the status of the billing period counter or relative to the current billing period.

For electricity, there are two billing period schemes available in Table 20, each scheme defined by the length of the billing period, the billing period counter, the number of available billing periods and the time stamps of the billing period. See also 7.1.4.1 and DLMS UA 1000-1 Ed 15 Part 2:2021, 6.2.2.

With $0 \leq F \leq 99$, a single billing period is identified relative to the value of the billing period counter, VZ. If the value of the value group of any OBIS code is equal to VZ, this identifies the most recent (youngest) billing period. VZ_{-1} identifies the second youngest, etc. The billing period counter may have different operating modes, for example modulo-12 or modulo-100. The value after reaching the limit of the billing period counter is 0 for the operating mode modulo-100 and 1 for other operating modes (for example modulo-12).

With $101 \leq F \leq 125$, a single billing period or a set of billing periods are identified relative to the current billing period. F = 101 identifies the last billing period, F = 102 the second last / two last billing periods, etc., F = 125 identifies the 25th last / 25 last billing periods.

F = 126 identifies an unspecified number of last billing periods, therefore it can be used as a wildcard.

F = 255 means that the value group F is not used, or identifies the current billing period value(s).

For use of ICs for representing values of historical billing periods, see DLMS UA 1000-1 Ed 15 Part 2:2021, 6.2.2 and Table A.2:

Table A.2 – Value group F – Billing periods

Value group F	
VZ	Most recent value
VZ_{-1}	Second most recent value
VZ_{-2}	Third most recent value
VZ_{-3}	Fourth most recent value
VZ_{-4}	…
etc.	
101	Last value
102	Second / two last value(s)
….	
125	25th/25 last value(s)
126	Unspecified number of last values

A.4 COSEM

The usage of OBIS codes in the COSEM environment shall be as defined in DLMS UA 1000-1 Ed 15 Part 2:2021, Clause 6.

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