



SEC DISTRIBUTION MATERIALS
SPECIFICATION

SUPP. A. 40-SDMS-02B REV. 8.1

DATE: September 2022

SUPPLEMENTARY
(SEC DLMS/COSEM OBIS CODE SPECIFICATION)
FOR
ELECTRONIC REVENUE WC METER
(40-SDMS-02B REV. 8.1)

[September 2022]

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1. General

1.1. Scope of Application

This specification shall apply to all Electronic Revenue Meters (hereafter referred to as meters) currently being supplied to COMPANY, and also meters to be supplied in the future. It includes the COSEM objects, their data format and OBIS codes, and any other necessary requirements regarding the meter communications and operational functions.

1.2. Communication Specifications

1.2.1. Configuration of communication specifications for meters

These specifications shall be in compliance with IEC regulations known as International Communication Specifications for communication with meters and also applied by the IEC standard for communication with meters revised and established in 2014.

1.2.2. Referenced Documents

Table 1 – Referenced Documents

Reference	Year	Title
IEC 62056-1-0	2014	Electricity metering data exchange – The DLMS/COSEM suite – Part 1-0: Smart metering standardization framework
IEC 62056-21	2002	Direct Local Data Exchange (3 rd edition of IEC 61107)
IEC 62056-42	2002	Physical layer services and procedures for connection oriented asynchronous data exchange
IEC 62056-46	2007	Data Link Layer using HDLC-Protocol
IEC 62056-5-3	2017	COSEM Application layer
IEC 62056-6-1	2017	Object Identification System (OBIS)
IEC 62056-6-2	2017	COSEM Interface Classes
IEC 9646-1	1994	Information technology - open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concept
IEC 9646-2	1994	Information technology - Open Systems interconnection - conformance testing methodology and framework - Part 2: Abstract test suite specification
DLMS UA 1000-1 Ed.12.2	2017	COSEM – Identification System and Interface Classes (Blue Book)



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DLMS UA 1000-2 Ed.9	2019	DLMS/COSEM – Architecture and Protocols (Green Book)
DLMS UA 1001-1 Ed.6.1	2018	DLMS/COSEM Conformance Testing Process (Yellow Book)
MODBUS	2012	Modbus Application Specification Protocol Specification V1.1b3

1.3. Terminology

Terminology not commonly included in the technical specifications registered in COMPANY or the standard specifications specified in the clause 1.4 are defined below.

1.3.1. Client

It indicates a device that requests data or service. A master station is generally referred to as client.

1.3.2. Server

It indicates a device that provides data or service. (e.g. an electricity meter that transfers the data requested from Client or performs a required function).

1.3.3. Master

It indicates a device that initializes and controls data flow.

1.3.4. Slave

It indicates a device responds to a request from a master; commonly referring to electricity meters.

1.3.5. OSI 7 Layer

An abstract description that provides data transmission method between computers linked in a communication network. It divides network architecture into seven layers and defines communication functions appropriately.

1.4. List of Abbreviation

- ACSE Application Control Service Element



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-	APDUs	Application Protocol Data Units
-	COSEM	COmpanion Specification for Energy Metering
-	CTT	Conformance Test Tool
-	DCE	Data Communication Equipment (Communication Interface or Modem)
-	DLMS	Device Language Message Specification
-	DLMS UA	Device Language Message Specification - User Association
-	DTE	Data Terminal Equipment (Computer, Terminal or Printer)
-	HDLC	High-level Data Link Control
-	HHU	Hand Held Unit
-	HLS	High Level Security
-	IC	Interface Class
-	ID	Identifier
-	IEC	International Electro-technical Commission
-	ISO	International Organization for Standardization
-	LLC	Logical Link Control
-	LLS	Low Level Security
-	LN	Logical Name
-	MAC	Medium Access Control
-	OBIS	Object Identification System
-	OSI	Open System Interconnection
-	PDU	Protocol Data Unit
-	PH	PHysical layout
-	PSTN	Public Switched Telephone Network
-	SN	Short Name
-	Xdlms	eXtended DLMS
-	xDLMS_ASE	eXtended DLMS Application Service Element0

2. Physical Layer

For direct local connection in the physical layer of this specification, the optical or electrical interface defined in the IEC 62056-21 is applied. For remote connection, use the standard interface between DTE and DCE defined in IEC 62056-42 with HDLC protocol. In addition, only mode E of the protocol defined in IEC 62056-21 shall be available. Therefore, the same DLMS protocol can be applied to both direct local and remote connections.

2.1. Application of IEC 62056-21

IEC 62056-21 describes hardware and protocol specifications for local meter data exchange. In such systems, a hand-held unit (HHU) or a unit with equivalent functions is connected to a meter or a group of meters.


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This is using an optical or electrical coupling. An electrical interface is proposed for use with a permanent connection, or when more than one meter needs to be read at one site. The optical coupler should be able to be easily disconnected to enable data collection via an HHU. The HHU or equivalent unit acts as a master while the meter acts as a slave in protocol modes A to D. In protocol E, the HHU acts as a client and the meter acts as a server.

The identical data link protocol is applied to both remote and local direct connections. The applied standard is IEC 62056-46. The Figure 1 shows the process in which the data link protocol specified in IEC 62056-46 is used when local direction connection is made with optical or electrical interface according the standard IEC 62056-21 (Mode E).

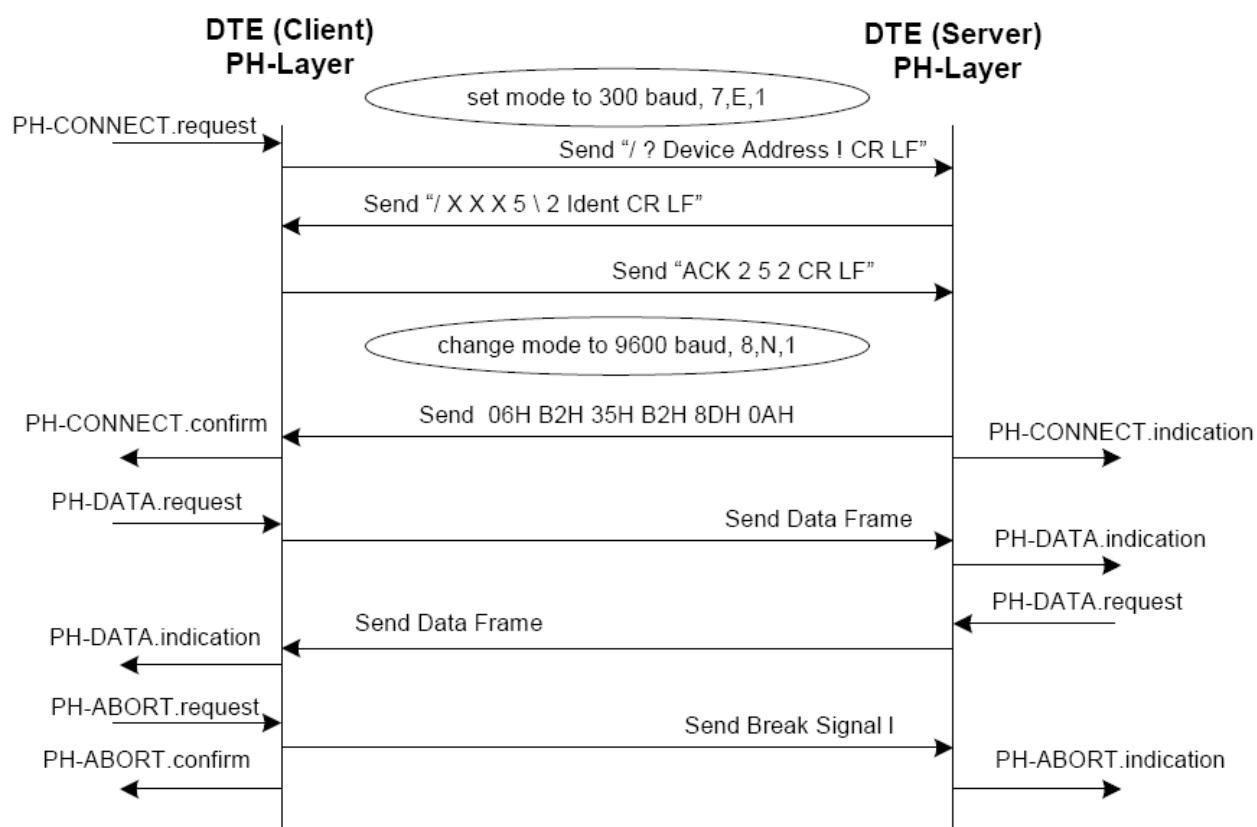


Figure 1 – Data link connection from IEC 62056-21 mode E

2.2. Application of IEC 62056-42

IEC 62056-42 specifies the physical layer service and protocols within the COSEM 3-layer, connection-oriented profile for asynchronous data communication. The document does not specify physical layer signals and mechanical aspects. From an external point of view, the physical layer

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provides the interface between the DTE and the DCE. A typical configuration of data exchange being implemented via wide area network (an example: PSTN) is illustrated in Figure 2 and Figure 3.

From the physical connection point of view, all communications involve two sets of equipment represented by the terms 'caller system' and 'called system'. From the data link point of view, the central station normally acts as a master, taking the initiative and controlling the data flow. The meter is the slave, responding to the master station. The central station normally acts as a client asking for services, and the meter acts as a server delivering the requested services.

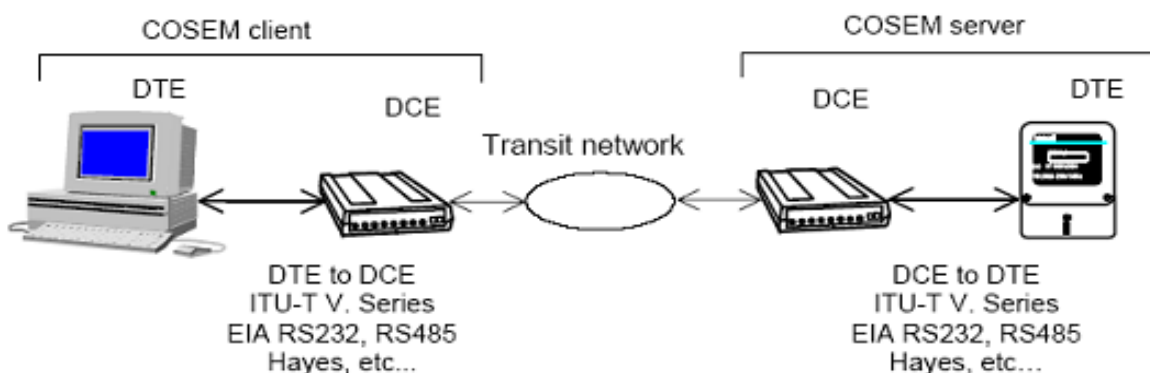


Figure 2 – Typical PSTN Configuration

The situation involving a caller client and a called server is undoubtedly the most frequent case, but a communication based on a caller server and a called client is also possible, in particular to report the occurrence of an urgent alarm.

For the purpose of local data exchange, two DTEs can be directly connected using appropriate connections.

To allow using a wide variety of media, this standard does not specify the physical layer signals and their characteristics. However, the following assumptions are made:

- The communication is point to point or point to multipoint;
- Both half-duplex and duplex connections are possible;
- Asynchronous transmission with 1 start bit, 8 data bits, no parity and 1 stop bit (8N1).

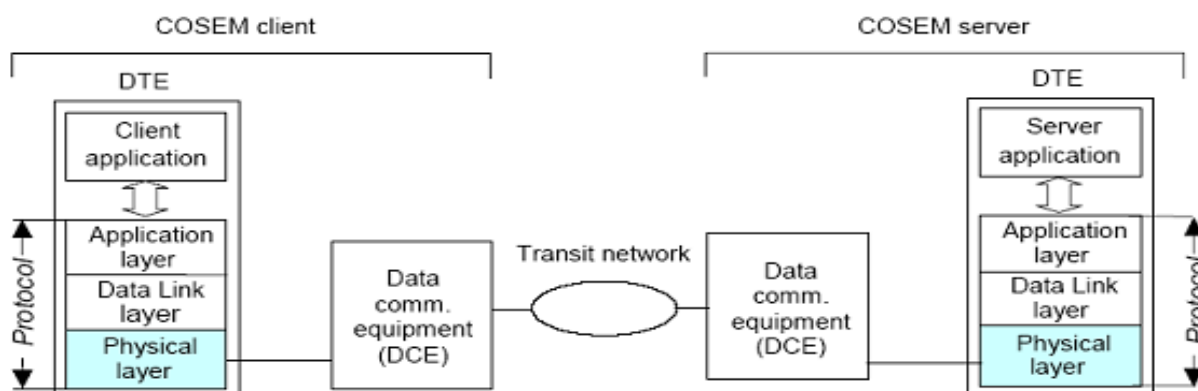


Figure 3 – The location of the physical layer

IEC 62056-42 defines the services of the physical layer towards its peer layer(s) and the upper layers, and the protocol of the physical layer.

2.3. RS-485 Serial Communication Interface

In this specification, RS-485 serial communication interface is used for physical layer communication interface standard. To secure scalability of RS-485 communications, RS-485 drivers of Gateways, PLC modems, and electronic revenue meters shall communicate with up to 32 drivers in a single serial line.

After a RS-485 driver of a device finishes receiving data packets from other device (Receive Mode), it shall delay at least 5ms before it is converted into Transmit Mode. After the RS-485 driver transmits data packets, it shall be converted into Receive Mode within 1ms.

3. Data Link Layer

3.1. Application of IEC 62056-46

IEC 62056-46 specifies the data link layer for connection-oriented, HDLC-based, asynchronous communication profile.

In order to ensure a coherent data layer service specification for both connection-oriented and connectionless operation modes, the data link layer is divided into two sub-layers: the Logical Link Control (LLC) sub layer and the Medium Access Control (MAC) sub layer.

3.2. COSEM Server (Meter) Addressing Scheme

In the 3-layer, connection-oriented, HDLC-based communications profile for Automatic Meter Reading (AMR) defined in the COSEM standard (IEC 62056), each server (meter) is identified by


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server HDLC addresses in Data link Layer. In this specification, the server HDLC address field has four bytes. The server HDLC address field is divided into Upper HDLC address and Lower HDLC address, each field has two bytes respectively. According to the COSEM standard, the upper HDLC address is used as Logical Device Address and the lower HDLC address is used as the Physical Device address of the meter.

According to the COSEM standard, available values to be used for the upper HDLC address and the lower HDLC address are specified in table below.

Upper HDLC address (HEX) [2 bytes]	
Management Logical Device (default)	0x0001
Reserved for future use	0x0002~0x000F
All-station (Broadcast) [Optional]	0x3FFF
Lower HDLC address (HEX) [2 bytes]	
Reserved for future use	0x0001~0x000F
Available values (Physical Device Address)	0x0010 ~ 0x3FFE
All-station (Broadcast) [Optional]	0x3FFF

For unique identification of each physical device, the last four (4) digits of the meter serial number are converted to the server lower HDLC address. The converting method between the meter serial number and the server HDLC address is described below.

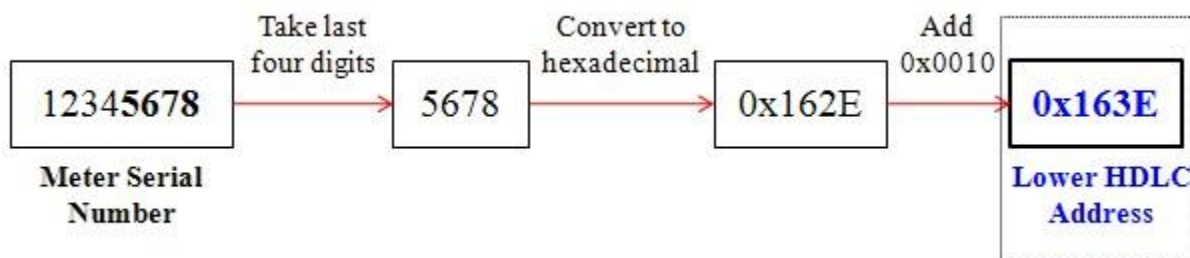


Figure 4 – COSEM Server HDLC addressing method

[Note]

- 1) The default value of server lower HDLC address has to be set to a hexadecimal number which is derived from the meter serial number. And, the lower HDLC addresses (It is not Serial Number) shall be rewritable during installation, commissioning and test period.



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- 2) The value “0x3FFF” in lower HDLC address of a COSEM server means the broadcasting address. All COSEM servers which are connected to the COSEM client will accept the message, if the COSEM client sends a message with the value “0x3FFF” in the lower HDLC address field of the destination address.
- 3) If one or more overlapped addresses of any lower HDLC addresses (physical device addresses) is occurred under the local area network with a Gateway or a DCU, one of the lower HDLC addresses which overlapped shall be reassigned with a reserved address from 0x2720 to 0x3FFD.
- 4) In DLMS/COSEM, data exchange takes place based on the Client/Server model. Physical devices are modeled as a set of logical devices, acting as servers, providing responses to requests.
- 5) The client may send requests, after its power-on and on a regular basis (the same as a gateway default reading interval) for Push objects (EventNotification), at the same time to multiple servers, if no response is expected (multi-cast or broadcast). If the client expects a response, it must send the request to a single server, giving also the right to talk. It has to wait then for the response before it may send a request to another server and with this, giving the right to talk (continuously sending broadcast or a single server, if there are other meters which are not registered or not sent Push objects maximum up to 31 times).
- 6) Messages from the client to the servers must contain addressing information. In this profile, it is ensured by using HDLC addresses. If a multi-drop arrangement is used, the HDLC address is split to two parts: the lower HDLC address to address physical devices and the upper HDLC address to address logical devices within the physical device. Both the lower and the upper address may contain a broadcast address (the meter passwords for each association shall be managed by clients).
- 7) To be able reporting events, a server may initiate a connection to the client, using the non-client/server type EventNotification / InformationReport services. As events in several or all meters connected to a multidrop may occur simultaneously – for example in the case of a power failure – they may initiate a call to the client simultaneously. For such cases, the problem has to be handled by above mentioned Master-Slave model and DLMS Client-Server model. (refer to Green Book 7th edition 218 page clause 10.2.6.4)

4. Application Layer

The applied standard for the application layer is IEC 62056-5-3.



4.1. Application of IEC 62056-5-3

IEC 62056-5-3 specifies the COSEM application layer in terms of structure, services and protocols for COSEM clients and servers, and defines how to use the COSEM application layer in various communication profiles.

4.2. The COSEM Server Model

The COSEM server is structured into three hierarchical levels as shown in Figure 5:

Level 1: Physical device

Level 2: Logical device

Level 3: Accessible COSEM objects

The COSEM Server Model is as below:

- 1) A meter is regarded as a physical device.
- 2) Physical device consists of at least one logical device.
- 3) The COSEM logical device contains a set of COSEM objects. Each physical device shall contain a “management logical device”. In the 3-layer, connection-oriented, HDLC-based communications profile, the upper HDLC address is used for the logical device address. The management logical device address is reserved as 0x0001.
- 4) All the objects defined in this specification are regarded as existing in the management logical device.

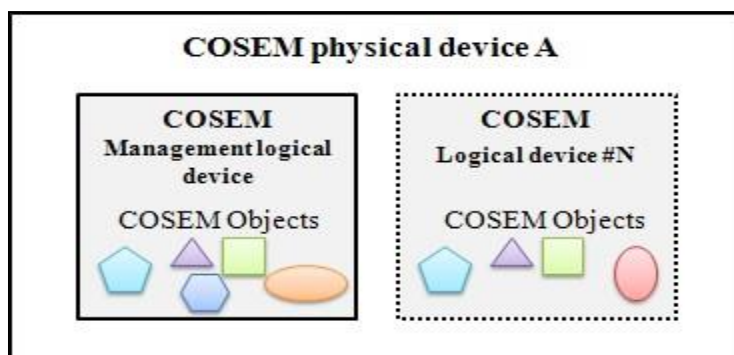


Figure 5 – The COSEM server model



5. Application Process

This specification complies with IEC 62056-6-1 and IEC 62056-6-2 standards which define informational structures on meters and their processes. All metering data transferred shall be encrypted or non-encrypted as per clause "9.9 Data Transport Security" of 40-SDMS-02B (SCHEDULE B – Attachment II – WC Meter Specifications) latest version.

5.1. Application of IEC 62056-6-1 (Object identification system)

Object Identification System (OBIS) defines the identification codes (ID-codes) for commonly used COSEM object in electricity meter. IEC 62056-6-1 specifies the overall structure of the identification system and the mapping of all COSEM object to their identification codes.

Each OBIS code provides a unique identifier for all data within the meter, including not only measurement values, but also abstract values used for configuration or obtaining information about the behavior of the meter. The ID codes defined in this standard are used for the identification of:

- Logical names of objects defined in IEC 62056-6-2;
- Data transmitted via communication line. (refer to 62056-6-1 A.1);
- Data displayed on meter (refer to 62056-6-1 A.2).

IEC 62056-6-1 applies it to all types of electricity meters, such as fully integrated meter, modular meter, and data concentrators (or DLMS clients).

5.2. Application of IEC 62056-6-2

IEC 62056-6-2 specifies a model of a meter as it is seen through its communication interfaces. Generic building blocks are defined using object-oriented methods, in the form of interface classes to model meters from simple up to very complex functionality.

Data collection systems (or DLMS clients) and meters from different vendors, following this standard shall exchange data in an interoperable way.

Object modeling: for specification purposes this standard uses the technique of object modeling. An object is a collection of attributes and methods. The information of an object is organized in attributes. They represent the characteristics of an object by means of attribute values. The value of an attribute may affect the behavior of identification of the object. An object may offer a number of methods to either examine or modify the values of the attributes.

Figure 6 illustrates these terms by means of an example.

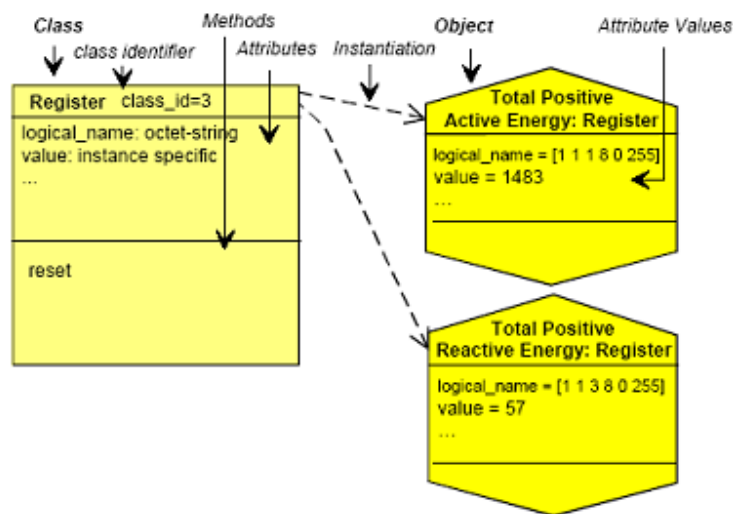


Figure 6 – An interface class and its instances

The user can know the register characteristics through the "logical_name" as OBIS identifier (refer to IEC 62056-6-1), and the "value" contains the actual contents of the register.

Defining a specific meter means defining several specific registers. In Figure 7, the meter has two registers, and it generates two COSEM objects ("Register" interface class) in this case. One of the COSEM object is "total, positive, active energy register" and the other is "total, positive, reactive energy register".

5.3. COSEM Logical Device

The COSEM logical device is a set of COSEM objects. Each physical device shall contain a "Management logical device". The addressing of COSEM logical devices shall be provided by the addressing scheme of the lower layers of the protocol stack used.

In order to access COSEM objects in the server, an Application Association (AA) shall be first established with the client. This identifies the partners and characterizes the context within which the associated applications will communicate. The major parts of this context are application context, authentication context and xDLMS context. This information is contained in the "Association LN" object.

5.4. Classification of Application Association (AA)


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Depending on the AA established between the client and the server, different access rights may be granted by the server. Access rights concern a set of COSEM objects – the visible objects – that can be accessed within the given AA. In addition, access to attributes and methods of these COSEM objects may also be restricted within the AA.

The structure and purpose of the associations to be supported in the meters are described below:

- The server (meter) classifies each association by identifying the client address.
- The server (meter) has to define at least four (4) associations with different IDs and passwords;
- The access right (GET/SET/ACTION) for each COSEM object shall be addressed differently by each association;
- The meter can allow only one client access per each association at the same time (the multiple accesses are not allowed).

User	Association Index	Client Address	Security Level
Client Management Process (default)	-	0x01	No Security
Public Client	-	0x10	No Security
Manual Meter Reader	Association 2	0x02	Low Level Security
		0x09	High Level Security
AMR/AMM System and On-Site Engineer for maintenance	Association 3	0x03	Low Level Security
		0x0A	High Level Security
Testing, Critical configuration, Recycle used meter	Association 4	0x04	Low Level Security (Separate passwords)
		0x0B	High Level Security
Security Server	Association 5	0x05	Low Level Security
		0x0C	High Level Security

[Note] xDLMS services of COSEM Application Layer are accomplished through the conformance parameters at the agreement time of Application Layer association.

- ✘ Default Passwords for Association 2 and Association 3 should be different for the meter (Default passwords of Association 2 and Association 3 shall be provided by the meter manufacturers). The password management method for Association 4 to protect meter data



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manipulation shall be provided by the meter manufacturers.

- ✘ The Association 4 password for each meter shall be differently set by manufacturer and those passwords shall be provided to COMPANY (including all passwords management program).
- ✘ The password of Meter's Association 2, 3, and 4 should be changed remotely by AMR and locally.
- ✘ Low Level Security shall be optionally associated by the clients, only if High Level Security is not accessible (In Data Transport Security's "disabled" mode).
- ✘ The associations of Low Level Security shall be disabled / enabled with the access right of each High Level Security.
- ✘ The policy and methods, including detail technical specifications of High Level Security Policy shall be proposed and implemented by the Vendor. The proposed detail technical specifications shall be approved by COMPANY.

Association Index	Supported Services
Association 2	GET, selective-access, block-transfer-with-get
Association 3	GET, SET, selective-access, event-notification, ACTION, block-transfer-with-get
Association 4	GET, SET, selective-access, event-notification, ACTION, block-transfer-with-get, block-transfer-with-set
Association 5	GET, SET, selective-access, event-notification, ACTION, block-transfer-with-get, block-transfer-with-set. (Use the same access right with Association 4 for the Meter data reading)

6. Definition of COSEM objects and OBIS codes

In this section, the common COSEM objects and their standard interface classes, formats are defined. For detailed information about specific meaning of the standard Interface Classes, refer to 'IEC 62056-6-2' and 'DLMS UA 1000-1:2017, Ed. 12.2' or latest version.

The Meter shall have required OBIS codes, not specified in this "Supplementary_OBIS_Code" for Meter operation and maintenance purposes including firmware upgrade functions.

[Note] Access right notations [R: Read-only, W: Write-only, R/W: Read/Write, A: Action]



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6.1. Energy

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Total Energy Register	1	0	c	8	0	255 VZ	Register (Class id=3, version: 0)
TOU Energy Register (e = 1 ~ 8)	1	0	c	8	e	255 VZ	Register (Class id=3, version: 0)
Energy Register (Current value from last reset)	1	0	c	9	0	255 VZ	Register (Class id=3, version: 0)
Energy profile	1	0	98	1	1	255 VZ	Profile Generic (Class id=7, version: 1)
EOB Data Profile	1	0	98	1	2	255 VZ	Profile Generic (Class id=7, version: 1)

- ✗ Refer to VZ of OBIS CODE “F” group in IEC 62056-6-1 A3.
- ✗ All VZ tables shall support up to VZ-3 (at least previous three (3) months EOB data).
- ✗ VZ shall use Modulo-100: after VZ=99, VZ shall be zero (0) (VZ=0).
- ✗ VZ means billing period counter (form Vorwertzahler in German)

6.1.1. Total Energy Registers

The total energy registers store the all energy quantities consumed during entire meter operation period. The total energy registers consist of the aggregate (three phases summation) registers and the per-phase registers.

1) OBIS codes of the total energy register objects

* ‘Li’ in each energy type notation indicates the phase of the input source. ‘L1’ means ‘Phase 1’, ‘L2’ means ‘Phase 2’, ‘L3’ means ‘Phase 3’, ‘ $\sum$ Li’ means ‘Aggregate (L1+L2+L3)’.

No.	Total Energy Registers	OBIS Code
1	$\sum$ Li Import active energy (QI+QIV)	1.0.1.8.0.255
2	$\sum$ Li Export active energy (QII+QIII)	1.0.2.8.0.255
3	$\sum$ Li Import reactive energy (QI+QII)	1.0.3.8.0.255
4	$\sum$ Li Export reactive energy (QIII+QIV)	1.0.4.8.0.255
3	$\sum$ Li Reactive energy (QI)	1.0.5.8.0.255



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No.	Total Energy Registers	OBIS Code			
4	$\sum$ Li Reactive energy (QII)	1.0.6.8.0.255			
5	$\sum$ Li Reactive energy (QIII)	1.0.7.8.0.255			
6	$\sum$ Li Reactive energy (QIV)	1.0.8.8.0.255			
7	$\sum$ Li Import apparent energy (QI+QIV)	1.0.9.8.0.255			
8	$\sum$ Li Export apparent energy (QII+QIII)	1.0.10.8.0.255			
9	$\sum$ Li Active energy (abs(QI+QIV)+(abs(QII+QIII)))	1.0.15.8.0.255			
2) Attributes description of the object “Register”					
Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A.2	A.3	A.4
1. logical_name	octet-string	-	R	R	R
2. value	long64-unsigned	-	R	R	R
3. scaler_unit	Scaler: 0 or -1 (integer) Unit: Active energy = 30 [Wh], Reactive energy = 32 [varh], Apparent energy =31 [VAh]	-	R	R	R
[Note] When the scaler of the register values (123) is 3 and its unit is [Wh], it indicates the metering value is measured and stored in unit of kWh with zero (0) decimal point number. E.g. 123 [kWh] or 123,000 [Wh].					
6.1.2. TOU Energy Registers					
The TOU (Time of Use) energy registers store all energy quantities consumed during each tariff period. The number of TOU rates supported shall be at least 8 rates.					
The number of TOU channels supported shall be at least 8 channels. The energy types defined in this specification shall be used as a default setting.					
[Note] The memory capacity for TOU energy registers shall be at least 64 (Refer to Clause 9.1.3. 3 of 40-SDMS-02B).					



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E.g. When the 8 energy quantities (see below table) are selected as TOU energy registers, the available TOU periods are 8 (tariff #1 ~ #8). And when the 8 energy quantities are selected, the available TOU periods are 8 (tariff #1 ~ #8).

1) Default set of the TOU energy register objects

Registers from 33 to 40

* 'Li' in each energy type notation indicates the phase of the input source. 'L1' means 'Phase 1', 'L2' means 'Phase 2', 'L3' means 'Phase 3', 'ΣLi' means 'Aggregate (L1+L2+L3)'.

No.	TOU Energy Registers	OBIS Code
1	ΣLi Import active energy (QI+QIV) [Tariff 1]	1.0.1.8.1.255
2	ΣLi Export active energy (QII+QIII) [Tariff 1]	1.0.2.8.1.255
3	ΣLi Import reactive energy (QI+QII) [Tariff 1]	1.0.3.8.1.255
4	ΣLi Export reactive energy (QIII+QIV) [Tariff 1]	1.0.4.8.1.255
5	ΣLi Reactive energy (QI) [Tariff 1]	1.0.5.8.1.255
6	ΣLi Reactive energy (QIV) [Tariff 1]	1.0.8.8.1.255
7	ΣLi Import apparent energy (QI+QIV) [Tariff 1]	1.0.9.8.1.255
8	ΣLi Export apparent energy (QII+QIII) [Tariff 1]	1.0.10.8.1.255
9	ΣLi Import active energy (QI+QIV) [Tariff 2]	1.0.1.8.2.255
10	ΣLi Export active energy (QII+QIII) [Tariff 2]	1.0.2.8.2.255
11	ΣLi Import reactive energy (QI+QII) [Tariff 2]	1.0.3.8.2.255
12	ΣLi Export reactive energy (QIII+QIV) [Tariff 2]	1.0.4.8.2.255
13	ΣLi Reactive energy (QI) [Tariff 2]	1.0.5.8.2.255
14	ΣLi Reactive energy (QIV) [Tariff 2]	1.0.8.8.2.255
15	ΣLi Import apparent energy (QI+QIV) [Tariff 2]	1.0.9.8.2.255
16	ΣLi Export apparent energy (QII+QIII) [Tariff 2]	1.0.10.8.2.255
17	ΣLi Import active energy (QI+QIV) [Tariff 3]	1.0.1.8.3.255
18	ΣLi Export active energy (QII+QIII) [Tariff 3]	1.0.2.8.3.255
19	ΣLi Import reactive energy (QI+QII) [Tariff 3]	1.0.3.8.3.255
20	ΣLi Export reactive energy (QIII+QIV) [Tariff 3]	1.0.4.8.3.255



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No.	TOU Energy Registers	OBIS Code
21	$\sum$ Li Reactive energy (QI) [Tariff 3]	1.0.5.8.3.255
22	$\sum$ Li Reactive energy (QIV) [Tariff 3]	1.0.8.8.3.255
23	$\sum$ Li Import apparent energy (QI+QIV) [Tariff 3]	1.0.9.8.3.255
24	$\sum$ Li Export apparent energy (QII+QIII) [Tariff 3]	1.0.10.8.3.255
Sufficient memory space for configuring registers #25 ~ 64 (at least) shall be available (Tariff 4 ~ 8 shall be available to be added).		

2) Attributes description of the object "Register"

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A.2	A.3	A.4
1. logical_name	octet-string	-	R	R	R
2. value	long64-unsigned	-	R	R	R
3. scaler_unit	Scaler: 0 or -1 (integer) Unit: Active energy = 30 [Wh], Reactive energy = 32 [varh], Apparent energy = 31 [VAh]	-	R	R	R

6.1.3. Energy Register (Current value from last Demand-reset)

The energy registers are used to store all energy quantities (all items defined in the Clause 6.1.1) calculated from the beginning of the current billing period to the instantaneous time point. The values of these registers are set to zero whenever reset is occurred.

1) OBIS codes of the energy objects (Current value from last Demand-reset)

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Energy Register (Current value from last Demand-reset)	1	0	c	9	0	255 VZ	Register (Class id=3, version: 0)

* 'Li' in each energy type notation indicates the phase of the input source. 'L1' means 'Phase



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1', 'L2' means 'Phase 2', 'L3' means 'Phase 3', ' $\sum Li$ ' means 'Aggregate (L1+L2+L3)'.

Energy Registers (Current value from last Demand-reset)	OBIS Code
$\sum Li$ Import active energy (QI+QIV)	1.0.1.9.0.255
$\sum Li$ Import reactive energy (QI+QII)	1.0.3.9.0.255
$\sum Li$ Import apparent energy (QI+QIV)	1.0.9.9.0.255
$\sum Li$ Export active energy (QII+QIII)	1.0.2.9.0.255
$\sum Li$ Export reactive energy (QIII+QIV)	1.0.4.9.0.255
$\sum Li$ Export apparent energy (QII+QIII)	1.0.10.9.0.255

2) Attributes description of the object "Register"

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A.2	A.3	A.4
1. logical_name	octet-string	-	R	R	R
2. value	long64-unsigned	-	R	R	R
3. scaler_unit	Scaler: 0 or -1 (integer) Unit: Active energy = 30 [Wh], Reactive energy = 32 [varh], Apparent energy = 31 [VAh]	-	R	R	R

6.1.4. Energy Profile (Daily snapshot)

This object holds total energy values and each TOU values. All registers defined in the attribute "capture_object" are captured on a daily basis and when Daily Auto Reset is occurred.

The daily capture process is called "Auto Reset" and triggered by the "Daily Single Action Schedule" object (OBIS: 0.0.15.1.0.255).

1) OBIS codes of the "energy profile" object

* For reading a part of elements stored in buffer, use method "entry_descriptor" or "range_descriptor" of selective access.

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[Note]

Selective access (Applicable for all the profiles across the documents)

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Energy Profile	1	0	98	1	1	255 VZ	Profile Generic (Class id=7, version: 1)

2) Attributes description of the object "Profile Generic"

Profile generic		Class_id = 7, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. buffer	array	-	R	R	R
3. capture_objects	array (See below table)	-	R	R	R/W
4. capture_period	double-long-unsigned (0: No automatic capture)	-	-	R	R
5. sort_method	Enum: FIFO (first in first out)	-	-	R	R
6. sort_object	No object to sort by (default)	-	-	R	R
7. entries_in_use	double-long-unsigned	-	R	R	R
8. profile_entries	double-long-unsigned (default: 3)	-	-	R	R

3) Capture_objects description of the object "Profile Generic"

* When the attribute_index is zero (0), it means all public attributes of the object are captured.

No.	Capture_objects	Logical_name	Attribute_index	Data_index
1	Current date/time	0.0.1.0.0.255	2	0
2	Status information	0.0.96.5.0.255	2	0
3	ΣLi Import active energy (QI+QIV)	1.0.1.8.0.255	0	0



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No.	Capture_objects	Logical_name	Attribute_index	Data_index
4	$\sum$ Li Export active energy (QII+QIII)	1.0.2.8.0.255	0	0
5	$\sum$ Li Import reactive energy (QI+QII)	1.0.3.8.0.255	0	0
6	$\sum$ Li Export reactive energy (QIII+QIV)	1.0.4.8.0.255	0	0
7	$\sum$ Li Reactive energy (QI)	1.0.5.8.0.255	0	0
8	$\sum$ Li Reactive energy (QII)	1.0.6.8.0.255	0	0
9	$\sum$ Li Reactive energy (QIII)	1.0.7.8.0.255	0	0
10	$\sum$ Li Reactive energy (QIV)	1.0.8.8.0.255	0	0
11	$\sum$ Li Import apparent energy (QI+QIV)	1.0.9.8.0.255	0	0
12	$\sum$ Li Export apparent energy (QII+QIII)	1.0.10.8.0.255	0	0
13	$\sum$ Li Active energy (abs(QI+QIV)+(abs(QII+QIII)))	1.0.15.8.0.255	0	0
14	$\sum$ Li Average import power factor	1.0.13.0.0.255	0	0
15	$\sum$ Li Average export power factor	1.0.84.0.0.255	0	0
16	$\sum$ Li Import active energy (QI+QIV) [Tariff 1]	1.0.1.8.1.255	0	0
17	$\sum$ Li Export active energy (QII+QIII) [Tariff 1]	1.0.2.8.1.255	0	0
18	$\sum$ Li Import reactive energy (QI+QII) [Tariff 1]	1.0.3.8.1.255	0	0
19	$\sum$ Li Export reactive energy (QIII+QIV) [Tariff 1]	1.0.4.8.1.255	0	0
20	$\sum$ Li Reactive energy (QI) [Tariff 1]	1.0.5.8.1.255	0	0
21	$\sum$ Li Reactive energy (QIV) [Tariff 1]	1.0.8.8.1.255	0	0
22	$\sum$ Li Import apparent energy (QI+QIV) [Tariff 1]	1.0.9.8.1.255	0	0
23	$\sum$ Li Export apparent energy (QII+QIII) [Tariff 1]	1.0.10.8.1.255	0	0
24	$\sum$ Li Average import power factor [Tariff 1]	1.0.13.0.1.255	0	0
25	$\sum$ Li Average export power factor [Tariff 1]	1.0.84.0.1.255	0	0
26	$\sum$ Li Import active energy (QI+QIV) [Tariff 2]	1.0.1.8.2.255	0	0
27	$\sum$ Li Export active energy (QII+QIII) [Tariff 2]	1.0.2.8.2.255	0	0
28	$\sum$ Li Import reactive energy (QI+QII) [Tariff 2]	1.0.3.8.2.255	0	0
29	$\sum$ Li Export reactive energy (QIII+QIV) [Tariff 2]	1.0.4.8.2.255	0	0
30	$\sum$ Li Reactive energy (QI) [Tariff 2]	1.0.5.8.2.255	0	0



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No.	Capture_objects	Logical_name	Attribute_index	Data_index
31	$\sum$ Li Reactive energy (QIV) [Tariff 2]	1.0.8.8.2.255	0	0
32	$\sum$ Li Import apparent energy (QI+QIV) [Tariff 2]	1.0.9.8.2.255	0	0
33	$\sum$ Li Export apparent energy (QII+QIII) [Tariff 2]	1.0.10.8.2.255	0	0
34	$\sum$ Li Average import power factor [Tariff 2]	1.0.13.0.2.255	0	0
35	$\sum$ Li Average export power factor [Tariff 2]	1.0.84.0.2.255	0	0
36	$\sum$ Li Import active energy (QI+QIV) [Tariff 3]	1.0.1.8.3.255	0	0
37	$\sum$ Li Export active energy (QII+QIII) [Tariff 3]	1.0.2.8.3.255	0	0
38	$\sum$ Li Import reactive energy (QI+QII) [Tariff 3]	1.0.3.8.3.255	0	0
39	$\sum$ Li Export reactive energy (QIII+QIV) [Tariff 3]	1.0.4.8.3.255	0	0
40	$\sum$ Li Reactive energy (QI) [Tariff 3]	1.0.5.8.3.255	0	0
41	$\sum$ Li Reactive energy (QIV) [Tariff 3]	1.0.8.8.3.255	0	0
42	$\sum$ Li Import apparent energy (QI+QIV) [Tariff 3]	1.0.9.8.3.255	0	0
43	$\sum$ Li Export apparent energy (QII+QIII) [Tariff 3]	1.0.10.8.3.255	0	0
44	$\sum$ Li Average import power factor [Tariff 3]	1.0.13.0.3.255	0	0
45	$\sum$ Li Average export power factor [Tariff 3]	1.0.84.0.3.255	0	0
The sufficient memory space for adding registers #46 ~ 94 (at least) shall be available (Tariff 4 ~ 8 shall be available to be added).				
4) “buffer”: Contains a sequence of entries. Each entry contains values of the captured objects 5) “capture_period”: Period to record (0: No automatic capture) 6) “sort_method”: Storage method (FIFO: first input first output) 7) “sort_object”: Default (FIFO: first input first output) 8) “entries_in_use”: Number of entries that are stored into “buffer” (double long unsigned: 6) 9) “profile_entries”: Maximum number of entries that can be stored into “buffer” (double long unsigned: 10) The Energy Profile data capture and store at least three historical data.				
6.1.5. EOB data Profile (Monthly snapshot for billing purpose)				
This profile object records all values necessary for monthly EOB Reset process. This monthly capture process belongs to “EOB reset” (refer to Clause 6.5 for further explanation about the term) and is triggered by the “Monthly EOB Action Schedule” object (OBIS: 0.0.15.0.0.255).				

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1) OBIS codes of the EOB data profile objects

* For reading a part of elements stored in buffer, use method "entry_descriptor" of selective access.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
EOB Data Profile	1	0	98	1	2	255 VZ	Profile Generic (Class id=7, version: 1)

2) Attributes description of the object "Profile Generic"

Profile generic		Class_id = 7, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. buffer	array	-	R	R	R
3. capture_objects	array (See below table)	-	R	R	R/W
4. capture_period	double-long-unsigned (0: No automatic capture)	-	-	R	R
5. sort_method	Enum: FIFO (first in first out)	-	-	R	R
6. sort_object	No object to sort by (default)	-	-	R	R
7. entries_in_use	double-long-unsigned	-	R	R	R
8. profile_entries	double-long-unsigned (default: 3)	-	-	R	R

3) Capture_objects description of the object "Profile Generic"

No.	Capture_objects	Logical_name	Attribute_index	Data_index
1	Current date/time	0.0.1.0.0.255	2	0
2	Status information	0.0.96.5.0.255	2	0
3	Maximum demand profile	1.0.98.1.3.255	2	Last entry
4	Cumulative maximum demand profile	1.0.98.1.4.255	2	Last entry



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No.	Capture_objects	Logical_name	Attribute_index	Data_index
5	Energy Profile	1.0.98.1.1.255	2	Last entry
6	$\sum$ Li Import active energy (QI+QIV) [current billing period]	1.0.1.9.0.255	0	0
7	$\sum$ Li Import reactive energy (QI+QII) [current billing period]	1.0.3.9.0.255	0	0
8	$\sum$ Li Import apparent energy (QI+QIV) [current billing period]	1.0.9.9.0.255	0	0
9	$\sum$ Li Export active energy (QII+QIII) [current billing period]	1.0.2.9.0.255	0	0
10	$\sum$ Li Export reactive energy (QIII+QIV) [current billing period]	1.0.4.9.0.255	0	0
11	$\sum$ Li Export apparent energy (QII+QIII) [current billing period]	1.0.10.9.0.255	0	0
12	$\sum$ Li Average import power factor (Current billing period average)	1.0.13.0.e.255	0	0
13	$\sum$ Li Average export power factor (Current billing period average)	1.0.84.0.e.255	0	0

* The 'E' code value in the OBIS code indicates tariff period as described below.

e	0	1	2	3	4	5	6	7	8
Tariff Period	Total	Tariff 1	Tariff 2	Tariff 3	Tariff 4	Tariff 5	Tariff 6	Tariff 7	Tariff 8

- 4) "buffer": Contains a sequence of entries. Each entry contains values of the captured objects
- 5) "capture_period": Period to record (0: No automatic capture)
- 6) "sort_method": Storage method (FIFO: first input first output)
- 7) "sort_object": Default (first input first output)
- 8) "entries_in_use": Number of entries that are stored into "buffer" (double long unsigned: 6)
- 9) "profile_entries": Maximum number of entries that can be stored into "buffer" (double long unsigned: 6)
- 10) The EOB Data Profile data shall capture and store at least three historical data (entry).

[Note]

1. Active Tariff registers shall be captured in the profiles.
2. With EOB execution for capture object 5 Energy Profile shall follow "DP (Energy Profile) inside EOB only and not inside DP (Energy Profile), any other EOB triggers mentioned shall not add DP (Energy Profile) entries"

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6.2. Demand / Maximum Demand / Cumulative Maximum Demand

The demand register objects are modeled by the “Demand Register” IC (Class id=5, version: 0).

The maximum demand register objects are modeled by the “Extended Register” IC (Class id=4, version: 0) and “Profile Generic” IC (Class id=7, version: 1).

The cumulative maximum demand register objects are modeled by the “Register” IC (Class id=3, version: 0) and “Profile Generic” IC (Class id=7, version: 1).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Demand register	1	0	c	4	0	255	Demand Register (Class id=5, version: 0)
Maximum demand register	1	0	c	6	e	255 VZ	Extended Register (Class id=4, version: 0)
Cumulative maximum demand register	1	0	c	2	e	255 VZ	Register (Class id=3, version: 0)
Maximum demand profile	1	0	98	1	3	255 VZ	Profile Generic (Class id=7, version: 1)
Cumulative maximum demand profile	1	0	98	1	4	255 VZ	Profile Generic (Class id=7, version: 1)

- ※ Refer to VZ of OBIS CODE “F” group in IEC 62056-6-1 A3.
- ※ All VZ tables shall support up to VZ-3 (at least previous three (3) months EOB data).
- ※ VZ shall use Modulo-100: after VZ=99, VZ shall be zero (0) (VZ=0).
- ※ VZ means billing period counter (form Vorwertzahler in German).

6.2.1. Demand Registers (current/last average demand)

The demand is calculated by the ‘Sliding Window’ method with the period is 300 seconds and the number of period is 6. Thus the current_average_value is updated every 300 seconds and the denominator of the current_average_value is 1,800 seconds (=30min).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	



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Demand registers	1	0	c	4	0	255	Demand Register (Class id=5, version: 0)
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1) Default set of the demand register objects

* 'Li' in each energy type notation indicates the phase of the input source. 'L1' means 'Phase 1', 'L2' means 'Phase 2', 'L3' means 'Phase 3', ' $\sum$ Li' means 'Aggregate'.

No.	Demand Type	OBIS Code
1	$\sum$ Li Import active power (QI+QIV) [Total]	1.0.1.4.0.255
2	$\sum$ Li Export active power (QII+QIII) [Total]	1.0.2.4.0.255
3	$\sum$ Li Import reactive power (QI+QII) [Total]	1.0.3.4.0.255
4	$\sum$ Li Export reactive power (QIII+QIV) [Total]	1.0.4.4.0.255
5	$\sum$ Li Reactive power (QI) [Total]	1.0.5.4.0.255
6	$\sum$ Li Reactive power (QIV) [Total]	1.0.8.4.0.255
7	$\sum$ Li Import apparent power (QI+QIV) [Total]	1.0.9.4.0.255
8	$\sum$ Li Export apparent power (QII+QIII) [Total]	1.0.10.4.0.255
9	$\sum$ Li Import active power (QI+QIV) [Tariff 1]	1.0.1.4.1.255
10	$\sum$ Li Export active power (QII+QIII) [Tariff 1]	1.0.2.4.1.255
11	$\sum$ Li Import reactive power (QI+QII) [Tariff 1]	1.0.3.4.1.255
12	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 1]	1.0.4.4.1.255
13	$\sum$ Li Reactive power (QI) [Tariff 1]	1.0.5.4.1.255
14	$\sum$ Li Reactive power (QIV) [Tariff 1]	1.0.8.4.1.255
15	$\sum$ Li Import apparent power (QI+QIV) [Tariff 1]	1.0.9.4.1.255
16	$\sum$ Li Export apparent power (QII+QIII) [Tariff 1]	1.0.10.4.1.255
17	$\sum$ Li Import active power (QI+QIV) [Tariff 2]	1.0.1.4.2.255
18	$\sum$ Li Export active power (QII+QIII) [Tariff 2]	1.0.2.4.2.255
19	$\sum$ Li Import reactive power (QI+QII) [Tariff 2]	1.0.3.4.2.255
20	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 2]	1.0.4.4.2.255
21	$\sum$ Li Reactive power (QI) [Tariff 2]	1.0.5.4.2.255
22	$\sum$ Li Reactive power (QIV) [Tariff 2]	1.0.8.4.2.255



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No.	Demand Type	OBIS Code
23	$\sum$ Li Import apparent power (QI+QIV) [Tariff 2]	1.0.9.4.2.255
24	$\sum$ Li Export apparent power (QII+QIII) [Tariff 2]	1.0.10.4.2.255
25	$\sum$ Li Import active power (QI+QIV) [Tariff 3]	1.0.1.4.3.255
26	$\sum$ Li Export active power (QII+QIII) [Tariff 3]	1.0.2.4.3.255
27	$\sum$ Li Import reactive power (QI+QII) [Tariff 3]	1.0.3.4.3.255
28	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 3]	1.0.4.4.3.255
29	$\sum$ Li Reactive power (QI) [Tariff 3]	1.0.5.4.3.255
30	$\sum$ Li Reactive power (QIV) [Tariff 3]	1.0.8.4.3.255
31	$\sum$ Li Import apparent power (QI+QIV) [Tariff 3]	1.0.9.4.3.255
32	$\sum$ Li Export apparent power (QII+QIII) [Tariff 3]	1.0.10.4.3.255
Sufficient memory space for adding registers #33 ~ 72 (at least) shall be available (Tariff 4 ~ 8 shall be available to be added).		

2) Attributes / Methods description of the object "Demand Register"

Demand Register		Class_id = 5, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. current_average_value	double-long-unsigned	-	R	R	R
3. last_average_value	double-long-unsigned	-	R	R	R
4. scaler_unit	Scaler: 0 (integer) Unit: Active power = 27 [W], Reactive power = 29 [var], Apparent power = 28 [VA]	-	R	R	R
5. status	Bit-string (default = 0)	-	R	R	R
6. capture_time	date_time (octet-string (size(12)))	-	R	R	R
7. start_time_current	date_time (octet-string (size(12)))	-	R	R	R



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Demand Register		Class_id = 5, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
8. period	double-long-unsigned (default: 300 seconds)	-	R	R/W	R/W
9. number_of_periods	long-unsigned (default: 6)	-	R	R/W	R/W

6.2.2. Maximum Demand Registers

At the end of the current/average demand integration period, the current demand is compared with the previous maximum demand recorded by the meter, and if the new value is greater, the new value replaces the previous maximum and the current time is used to time stamp of this new maximum.

The maximum demand registers hold the maximum values and its event date/times of each current/average demand automatically by the meter during the current billing period.

When Demand reset or EOB reset or Manual reset are occurred, these registers are captured into the object "Maximum demand profile", and then set to zero. The demand-reset is triggered by the "Monthly EOB Action Schedule" object (OBIS: 0.0.15.0.0.255).

1) Default set of the maximum demand register objects

* 'Li' in each energy type notation indicates the phase of the input source. 'L1' means 'Phase 1', 'L2' means 'Phase 2', 'L3' means 'Phase 3', 'ΣLi' means 'Aggregate'.

No.	Maximum Demand Type	OBIS Code
1	ΣLi Import active power (QI+QIV) [Total]	1.0.1.6.0.255
2	ΣLi Export active power (QII+QIII) [Total]	1.0.2.6.0.255
3	ΣLi Import reactive power (QI+QII) [Total]	1.0.3.6.0.255
4	ΣLi Export reactive power (QIII+QIV) [Total]	1.0.4.6.0.255
5	ΣLi Reactive power (QI) [Total]	1.0.5.6.0.255
6	ΣLi Reactive power (QIV) [Total]	1.0.8.6.0.255
7	ΣLi Import apparent power (QI+QIV) [Total]	1.0.9.6.0.255
8	ΣLi Export apparent power (QII+QIII) [Total]	1.0.10.6.0.255



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No.	Maximum Demand Type	OBIS Code
9	$\sum$ Li Import active power (QI+QIV) [Tariff 1]	1.0.1.6.1.255
10	$\sum$ Li Export active power (QII+QIII) [Tariff 1]	1.0.2.6.1.255
11	$\sum$ Li Import reactive power (QI+QII) [Tariff 1]	1.0.3.6.1.255
12	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 1]	1.0.4.6.1.255
13	$\sum$ Li Reactive power (QI) [Tariff 1]	1.0.5.6.1.255
14	$\sum$ Li Reactive power (QIV) [Tariff 1]	1.0.8.6.1.255
15	$\sum$ Li Import apparent power (QI+QIV) [Tariff 1]	1.0.9.6.1.255
16	$\sum$ Li Export apparent power (QII+QIII) [Tariff 1]	1.0.10.6.1.255
17	$\sum$ Li Import active power (QI+QIV) [Tariff 2]	1.0.1.6.2.255
18	$\sum$ Li Export active power (QII+QIII) [Tariff 2]	1.0.2.6.2.255
19	$\sum$ Li Import reactive power (QI+QII) [Tariff 2]	1.0.3.6.2.255
20	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 2]	1.0.4.6.2.255
21	$\sum$ Li Reactive power (QI) [Tariff 2]	1.0.5.6.2.255
22	$\sum$ Li Reactive power (QIV) [Tariff 2]	1.0.8.6.2.255
23	$\sum$ Li Import apparent power (QI+QIV) [Tariff 2]	1.0.9.6.2.255
24	$\sum$ Li Export apparent power (QII+QIII) [Tariff 2]	1.0.10.6.2.255
25	$\sum$ Li Import active power (QI+QIV) [Tariff 3]	1.0.1.6.3.255
26	$\sum$ Li Export active power (QII+QIII) [Tariff 3]	1.0.2.6.3.255
27	$\sum$ Li Import reactive power (QI+QII) [Tariff 3]	1.0.3.6.3.255
28	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 3]	1.0.4.6.3.255
29	$\sum$ Li Reactive power (QI) [Tariff 3]	1.0.5.6.3.255
30	$\sum$ Li Reactive power (QIV) [Tariff 3]	1.0.8.6.3.255
31	$\sum$ Li Import apparent power (QI+QIV) [Tariff 3]	1.0.9.6.3.255
32	$\sum$ Li Export apparent power (QII+QIII) [Tariff 3]	1.0.10.6.3.255
Sufficient memory space for adding registers #33 ~ 72 (at least) shall be available (Tariff 4 ~ 8 shall be available to be added).		

2) Attributes description of the object "Extended Register"



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Extended Register		Class_id = 4, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned	-	R	R	R
3. scaler_unit	Scaler: 0 (integer) Unit: Active power = 27 [W], Reactive power = 29 [var], Apparent power = 28 [VA]	-	R	R	R
4. status	bit-string	-	R	R	R
5. capture_time	date_time[9] (OCTET STRING (SIZE(12)))	-	R	R	R

* Bit mapping table of the attribute “status”: Refer to Clause 6.5.

6.2.3. Maximum demand profile

The maximum demand registers are captured into the object “Maximum demand profile” on a monthly basis or manual reset. The monthly capture process is triggered by the “Monthly EOB Action Schedule” object (OBIS: 0.0.15.0.0.255).

1) OBIS code of maximum demand profile

* For reading a part of elements stored in buffer, use method “entry_descriptor” of selective access.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Maximum demand profile	1	0	98	1	3	255 VZ	Profile Generic (Class id=7, version: 1)

2) Attributes description of the object “Profile Generic”



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Profile generic		Class_id = 7, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. buffer	array	-	R	R	R
3. capture_objects	array (See below table)	-	R	R	R/W
4. capture_period	double-long-unsigned (0: No automatic capture)	-	-	R	R
5. sort_method	enum: FIFO (first in first out)	-	-	R	R
6. sort_object	No object to sort by (default)	-	-	R	R
7. entries_in_use	double-long-unsigned	-	R	R	R
8. profile_entries	double-long-unsigned (default: 3)	-	-	R	R

3) Capture_objects description of the object "Profile Generic"

* When the attribute_index is zero (0), it means all public attributes of the object are captured.

No.	Capture_objects	Logical_name	Attribute_index	Data_index
1	Current date/time	0.0.1.0.0.255	2	0
2	$\sum$ Li Import active power (QI+QIV) [Total]	1.0.1.6.0.255	0	0
3	$\sum$ Li Export active power (QII+QIII) [Total]	1.0.2.6.0.255	0	0
4	$\sum$ Li Import reactive power (QI+QII) [Total]	1.0.3.6.0.255	0	0
5	$\sum$ Li Export reactive power (QIII+QIV) [Total]	1.0.4.6.0.255	0	0
6	$\sum$ Li Reactive power (QI) [Total]	1.0.5.6.0.255	0	0
7	$\sum$ Li Reactive power (QIV) [Total]	1.0.8.6.0.255	0	0
8	$\sum$ Li Import apparent power (QI+QIV) [Total]	1.0.9.6.0.255	0	0
9	$\sum$ Li Export apparent power (QII+QIII) [Total]	1.0.10.6.0.255	0	0
10	$\sum$ Li Import active power (QI+QIV) [Tariff 1]	1.0.1.6.1.255	0	0
11	$\sum$ Li Export active power (QII+QIII) [Tariff 1]	1.0.2.6.1.255	0	0



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No.	Capture_objects	Logical_name	Attribute_index	Data_index
12	$\sum$ Li Import reactive power (QI+QII) [Tariff 1]	1.0.3.6.1.255	0	0
13	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 1]	1.0.4.6.1.255	0	0
14	$\sum$ Li Reactive power (QI) [Tariff 1]	1.0.5.6.1.255	0	0
15	$\sum$ Li Reactive power (QIV) [Tariff 1]	1.0.8.6.1.255	0	0
16	$\sum$ Li Import apparent power (QI+QIV) [Tariff 1]	1.0.9.6.1.255	0	0
17	$\sum$ Li Export apparent power (QII+QIII) [Tariff 1]	1.0.10.6.1.255	0	0
18	$\sum$ Li Import active power (QI+QIV) [Tariff 2]	1.0.1.6.2.255	0	0
19	$\sum$ Li Export active power (QII+QIII) [Tariff 2]	1.0.2.6.2.255	0	0
20	$\sum$ Li Import reactive power (QI+QII) [Tariff 2]	1.0.3.6.2.255	0	0
21	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 2]	1.0.4.6.2.255	0	0
22	$\sum$ Li Reactive power (QI) [Tariff 2]	1.0.5.6.2.255	0	0
23	$\sum$ Li Reactive power (QIV) [Tariff 2]	1.0.8.6.2.255	0	0
24	$\sum$ Li Import apparent power (QI+QIV) [Tariff 2]	1.0.9.6.2.255	0	0
25	$\sum$ Li Export apparent power (QII+QIII) [Tariff 2]	1.0.10.6.2.255	0	0
26	$\sum$ Li Import active power (QI+QIV) [Tariff 3]	1.0.1.6.3.255	0	0
27	$\sum$ Li Export active power (QII+QIII) [Tariff 3]	1.0.2.6.3.255	0	0
28	$\sum$ Li Import reactive power (QI+QII) [Tariff 3]	1.0.3.6.3.255	0	0
29	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 3]	1.0.4.6.3.255	0	0
30	$\sum$ Li Reactive power (QI) [Tariff 3]	1.0.5.6.3.255	0	0
31	$\sum$ Li Reactive power (QIV) [Tariff 3]	1.0.8.6.3.255	0	0
32	$\sum$ Li Import apparent power (QI+QIV) [Tariff 3]	1.0.9.6.3.255	0	0
33	$\sum$ Li Export apparent power (QII+QIII) [Tariff 3]	1.0.10.6.3.255	0	0
Sufficient memory space for adding registers #34 ~ 73 (at least) shall be available (Tariff 4 ~ 8 shall be available to be added).				
4) “buffer”: Contains a sequence of entries. Each entry contains values of the captured objects 5) “capture_period”: Period to record (0: No automatic capture) 6) “sort_method”: Storage method (FIFO: first input first output) 7) “sort_object”: Default (FIFO: first input first output)				



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- 8) "entries_in_use": Number of entries that are stored into "buffer" (double long unsigned: 6)
- 9) "profile_entries": Maximum number of entries that can be stored into "buffer" (double long unsigned: 6)
- 10) The Maximum demand profile data capture and store at least three historical data.

6.2.4. Cumulative maximum demand registers

Before being Demand reset or EOB reset or Manual reset, the maximum demand value is added to the sum of all the previous maximum demand, and this data is the cumulative maximum demand.

The cumulative maximum demand registers hold the cumulative sum of the maximum demand values. These registers are captured into the object "Cumulative maximum demand profile" on a monthly basis or manual demand-reset. The monthly capture process is triggered by the "Monthly EOB Action Schedule" object (OBIS: 0.0.15.0.0.255).

When demand-reset is occurred, these registers are captured into the object "Cumulative maximum demand profile", but these registers are NOT set to zero.

1) OBIS codes of the cumulative maximum demand register objects

* 'Li' in each energy type notation indicates the phase of the input source. 'L1' means 'Phase 1', 'L2' means 'Phase 2', 'L3' means 'Phase 3', $\sum Li$ means 'Aggregate'.

No.	Cumulative Maximum Demand Type	OBIS Code
1	$\sum Li$ Import active power (QI+QIV) [Total]	1.0.1.2.0.255
2	$\sum Li$ Export active power (QII+QIII) [Total]	1.0.2.2.0.255
3	$\sum Li$ Import reactive power (QI+QII) [Total]	1.0.3.2.0.255
4	$\sum Li$ Export reactive power (QIII+QIV) [Total]	1.0.4.2.0.255
5	$\sum Li$ Reactive power (QI) [Total]	1.0.5.2.0.255
6	$\sum Li$ Reactive power (QIV) [Total]	1.0.8.2.0.255
7	$\sum Li$ Import apparent power (QI+QIV) [Total]	1.0.9.2.0.255
8	$\sum Li$ Export apparent power (QII+QIII) [Total]	1.0.10.2.0.255
9	$\sum Li$ Import active power (QI+QIV) [Tariff 1]	1.0.1.2.1.255
10	$\sum Li$ Export active power (QII+QIII) [Tariff 1]	1.0.2.2.1.255
11	$\sum Li$ Import reactive power (QI+QII) [Tariff 1]	1.0.3.2.1.255



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No.	Cumulative Maximum Demand Type	OBIS Code
12	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 1]	1.0.4.2.1.255
13	$\sum$ Li Reactive power (QI) [Tariff 1]	1.0.5.2.1.255
14	$\sum$ Li Reactive power (QIV) [Tariff 1]	1.0.8.2.1.255
15	$\sum$ Li Import apparent power (QI+QIV) [Tariff 1]	1.0.9.2.1.255
16	$\sum$ Li Export apparent power (QII+QIII) [Tariff 1]	1.0.10.2.1.255
17	$\sum$ Li Import active power (QI+QIV) [Tariff 2]	1.0.1.2.2.255
18	$\sum$ Li Export active power (QII+QIII) [Tariff 2]	1.0.2.2.2.255
19	$\sum$ Li Import reactive power (QI+QII) [Tariff 2]	1.0.3.2.2.255
20	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 2]	1.0.4.2.2.255
21	$\sum$ Li Reactive power (QI) [Tariff 2]	1.0.5.2.2.255
22	$\sum$ Li Reactive power (QIV) [Tariff 2]	1.0.8.2.2.255
23	$\sum$ Li Import apparent power (QI+QIV) [Tariff 2]	1.0.9.2.2.255
24	$\sum$ Li Export apparent power (QII+QIII) [Tariff 2]	1.0.10.2.2.255
25	$\sum$ Li Import active power (QI+QIV) [Tariff 3]	1.0.1.2.3.255
26	$\sum$ Li Export active power (QII+QIII) [Tariff 3]	1.0.2.2.3.255
27	$\sum$ Li Import reactive power (QI+QII) [Tariff 3]	1.0.3.2.3.255
28	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 3]	1.0.4.2.3.255
29	$\sum$ Li Reactive power (QI) [Tariff 3]	1.0.5.2.3.255
30	$\sum$ Li Reactive power (QIV) [Tariff 3]	1.0.8.2.3.255
31	$\sum$ Li Import apparent power (QI+QIV) [Tariff 3]	1.0.9.2.3.255
32	$\sum$ Li Export apparent power (QII+QIII) [Tariff 3]	1.0.10.2.3.255
Sufficient memory space for adding registers #33 ~ 72 (at least) shall be available (Tariff 4 ~ 8 shall be available to be added).		

2) Attributes description of the object "Register"

Register		Class_id = 3, version = 0
Attributes	Data type & Description	Access right



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		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	long64-unsigned	-	R	R	R
3. scaler_unit	Scaler: 0 (integer) Unit: Active power = 27 [W], Reactive power = 29 [var], Apparent power = 28 [VA]	-	R	R	R

6.2.5. Cumulative maximum demand profile

The maximum demand registers are captured into the object “Cumulative maximum demand profile” on a monthly basis. The monthly capture process is triggered by the “Monthly EOB Action Schedule” object (OBIS: 0.0.15.0.0.255).

1) OBIS code of cumulative maximum demand profile

* For reading a part of elements stored in buffer, use method “entry_descriptor” of selective access.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Cumulative maximum demand profile	1	0	98	1	4	255 VZ	Profile Generic (Class id=7, version: 1)

2) Attributes description of the object “Profile Generic”

Profile generic		Class_id = 7, version = 1			
Attributes	Data type & Description	Access right			
		A.1	A. 2	A. 3	A. 4
1. logical_name	octet-string	R	R	R	R
2. buffer	array	R	R	R	R
3. capture_objects	array (See below table)	R	R	R	R/W
4. capture_period	double-long-unsigned (0: No automatic capture)	-	-	R	R
5. sort_method	Enum: FIFO (first in first out)	-	-	R	R



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6. sort_object	No object to sort by (Default)	-	-	R	R
7. entries_in_use	double-long-unsigned	-	R	R	R
8. profile_entries	double-long-unsigned (default: 3)	-	-	R	R

3) Capture_objects description of the object “Profile Generic”

* When the attribute_index is zero (0), it means all public attributes of the object are captured.

No.	Capture_objects	Logical_name	Attribute_index	Data_index
1	Current date/time	0.0.1.0.0.255	2	0
2	$\sum$ Li Import active power (QI+QIV) [Total]	1.0.1.2.0.255	0	0
3	$\sum$ Li Export active power (QII+QIII) [Total]	1.0.2.2.0.255	0	0
4	$\sum$ Li Import reactive power (QI+QII) [Total]	1.0.3.2.0.255	0	0
5	$\sum$ Li Export reactive power (QIII+QIV) [Total]	1.0.4.2.0.255	0	0
6	$\sum$ Li Reactive power (QI) [Total]	1.0.5.2.0.255	0	0
7	$\sum$ Li Reactive power (QIV) [Total]	1.0.8.2.0.255	0	0
8	$\sum$ Li Import apparent power (QI+QIV) [Total]	1.0.9.2.0.255	0	0
9	$\sum$ Li Export apparent power (QII+QIII) [Total]	1.0.10.2.0.255	0	0
10	$\sum$ Li Import active power (QI+QIV) [Tariff 1]	1.0.1.2.1.255	0	0
11	$\sum$ Li Export active power (QII+QIII) [Tariff 1]	1.0.2.2.1.255	0	0
12	$\sum$ Li Import reactive power (QI+QII) [Tariff 1]	1.0.3.2.1.255	0	0
13	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 1]	1.0.4.2.1.255	0	0
14	$\sum$ Li Reactive power (QI) [Tariff 1]	1.0.5.2.1.255	0	0
15	$\sum$ Li Reactive power (QIV) [Tariff 1]	1.0.8.2.1.255	0	0
16	$\sum$ Li Import apparent power (QI+QIV) [Tariff 1]	1.0.9.2.1.255	0	0
17	$\sum$ Li Export apparent power (QII+QIII) [Tariff 1]	1.0.10.2.1.255	0	0
18	$\sum$ Li Import active power (QI+QIV) [Tariff 2]	1.0.1.2.2.255	0	0
19	$\sum$ Li Export active power (QII+QIII) [Tariff 2]	1.0.2.2.2.255	0	0



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No.	Capture_objects	Logical_name	Attribute_index	Data_index
20	$\sum$ Li Import reactive power (QI+QII) [Tariff 2]	1.0.3.2.2.255	0	0
21	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 2]	1.0.4.2.2.255	0	0
22	$\sum$ Li Reactive power (QI) [Tariff 2]	1.0.5.2.2.255	0	0
23	$\sum$ Li Reactive power (QIV) [Tariff 2]	1.0.8.2.2.255	0	0
24	$\sum$ Li Import apparent power (QI+QIV) [Tariff 2]	1.0.9.2.2.255	0	0
25	$\sum$ Li Export apparent power (QII+QIII) [Tariff 2]	1.0.10.2.2.255	0	0
26	$\sum$ Li Import active power (QI+QIV) [Tariff 3]	1.0.1.2.3.255	0	0
27	$\sum$ Li Export active power (QII+QIII) [Tariff 3]	1.0.2.2.3.255	0	0
28	$\sum$ Li Import reactive power (QI+QII) [Tariff 3]	1.0.3.2.3.255	0	0
29	$\sum$ Li Export reactive power (QIII+QIV) [Tariff 3]	1.0.4.2.3.255	0	0
30	$\sum$ Li Reactive power (QI) [Tariff 3]	1.0.5.2.3.255	0	0
31	$\sum$ Li Reactive power (QIV) [Tariff 3]	1.0.8.2.3.255	0	0
32	$\sum$ Li Import apparent power (QI+QIV) [Tariff 3]	1.0.9.2.3.255	0	0
33	$\sum$ Li Export apparent power (QII+QIII) [Tariff 3]	1.0.10.2.3.255	0	0
Sufficient memory space for adding registers #34 ~ 73 (at least) shall be available (Tariff 4 ~ 8 shall be available to be added).				

- 4) “buffer”: Contains a sequence of entries. Each entry contains values of the captured objects
- 5) “capture_period”: Period to record (0: No automatic capture)
- 6) “sort_method”: Storage method (FIFO: first input first output)
- 7) “sort_object”: Default (FIFO: first input first output)
- 8) “entries_in_use”: Number of entries that are stored into “buffer” “profile_entries”: Maximum number of entries that can be stored into “buffer”
- 9) The Cumulative maximum demand profile data capture and store at least three historical data.

6.3. Power Factor

- 1) OBIS codes of the power factor objects

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
$\sum$ Li Average import power factor (Current billing period average)	1	0	13	0	e	255 VZ	Register (Class id=3, version: 0)



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Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
$\sum$ Li Current average import power factor (demand period)	1	0	13	4	0	255	Register (Class id=3, version: 0)
$\sum$ Li Last average import power factor (demand period)	1	0	13	5	0	255	Register (Class id=3, version: 0)
$\sum$ Li Average export power factor (Current billing period average)	1	0	84	0	e	255 VZ	Register (Class id=3, version: 0)
$\sum$ Li Current average export power factor (demand period)	1	0	84	4	0	255	Register (Class id=3, version: 0)
$\sum$ Li Last average export power factor (demand period)	1	0	84	5	0	255	Register (Class id=3, version: 0)

- ※ Refer to VZ of OBIS CODE “F” group in IEC 62056-6-1 A3.
- ※ All VZ tables shall support up to VZ-3 (at least previous three (3) months EOB data).
- ※ VZ shall use Modulo-100: after VZ=99, VZ shall be zero (0) (VZ=0).
- ※ VZ means billing period counter (form Vorwertzahler in German).

The ‘E’ code value in the OBIS code indicates tariff period as described below.

E	0	1	2	3	4	5	6	7	8
Tariff Period	Total	Tariff 1	Tariff 2	Tariff 3	Tariff 4	Tariff 5	Tariff 6	Tariff 7	Tariff 8

2) Attributes description of the object “Register”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		A. 1	A. 2	A. 3	A. 4
1. logical_name	octet-string	R	R	R	R
2. value	double-long	R	R	R	R
3. scaler_unit	Scaler: -3 (integer) Unit: 255 (unitless)	R	R	R	R

6.4. Load Profile

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6.4.1. Load Profile Data

The load profile data are modeled by the “Profile Generic” IC (Class id=7, version: 1).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Load Profile	1	0	99	1	0	255	Profile Generic (Class id=7, version: 1)

1) Attributes description of the object “Profile Generic”

* For reading a part of elements stored in buffer, use method “entry_descriptor” of selective access.

Profile generic		Class_id = 7, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. buffer	Array	-	R	R	R
3. capture_objects	array (See below table)	-	R	R	R/W
4. capture_period	double-long-unsigned [unit: sec] Programmable (default: 1,800)	-	R	R	R
5. sort_method	enum (Default: (1) FIFO (first in first out))	-	-	R	R
6. sort_object	No object to sort by (Default)	-	-	R	R
7. entries_in_use	double-long-unsigned	-	R	R	R
8. profile_entries	double-long-unsigned (shall be equal to or larger than 4320)	-	-	R	R

2) Capture_objects description of the object “Profile Generic”

Capture_objects	Logical_name	Attribute_index	Data_index
Current date/time	0.0.1.0.0.255	2	0
Status Information	0.0.96.5.0.255	2	0
$\sum$ Li Import active power (QI+QIV)	1.0.1.4.0.255	2	0
$\sum$ Li Import reactive power (QI+QII)	1.0.3.4.0.255	2	0



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Capture_objects	Logical_name	Attribute_index	Data_index
$\sum$ Li Import apparent power (QI+QIV)	1.0.9.4.0.255	2	0
$\sum$ Li Reactive power (QI) [Total]	1.0.5.4.0.255	2	0
$\sum$ Li Export active power (QII+QIII) [Total]	1.0.2.4.0.255	2	0
$\sum$ Li Export reactive power (QIII+QIV) [Total]	1.0.4.4.0.255	2	0
$\sum$ Li Export apparent power (QII+QIII) [Total]	1.0.10.4.0.255	2	0
$\sum$ Li Reactive power (QIV) [Total]	1.0.8.4.0.255	2	0
Current Import Average Power Factor	1.0.13.4.0.255	2	0
Current Export Average Power Factor	1.0.84.4.0.255	2	0
At least two more channels from Demand Register shall be available.			

[Note]

1. The Load Profile object captures the attribute 2 “current_average_value” of the demand registers (1.0.c.4.0.255) in above table capture. It means that in every scheduled capture time the Load Profile object captures the current average value of each demand register first, after that, the demand registers store the current average values into last average value (attribute 3).
2. Likewise the Load Profile object captures the current average power factor value before the meter stores it into the last average power factor register.

6.4.2. Load Profile Interval

This object holds the interval recording duration for the load profile.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Load Profile Interval	1	0	0	8	4	255	Register

1) Attributes description of the object “Load Profile Interval”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R



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2. value	unsigned Programmable among 5, 15, 30, 60 minutes and default value is 30 minutes.	-	R	R/W	R/W
3. scaler_unit	scaler: 0 (integer) unit: 28 [minute]	-	R	R	R

[Note]

Date and Time Data type should be octet string [9] in this document.

6.5. Status Information

This object is used to show the status information and be captured by the profile object.

- 1) OBIS code of the status information object

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Status Information	0	0	96	5	0	255	Data

- 2) Attributes description of the object "Data"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	bit-string (5 bytes) (shows the conditions during the load profile recording period, if any status shown in table below is triggered, a bit for the condition will be set to 1)	-	R	R	R

* Bit mapping table of the attribute "value" of the object.

Byte	MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB
------	-----	------	------	------	------	------	------	-----



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Byte 0	Auto Reset	Power failure	Time change	Manual Reset	EOB Reset	No Energy Storage Device	Voltage cut	Configuration program change
Byte 1	Sag / Well	Wrong cable connection	Temperature	DST	Magnetic tamp	Current tariff		
Byte 2	Auto reset by pass a date (or a month)	Auto reset by internal clock schedule	Auto reset by command via the communication interfaces	Auto reset by time/date change	Auto reset by program change	Over current	Top cover	Terminal cover
Byte 3	Reserved	Reserved	EOB reset by pass a month	EOB reset by internal clock schedule	EOB reset by command via the communication interfaces	EOB reset by time/date change	EOB reset by program change	Reserved
Byte 4	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

[Note]

1. Auto Reset, Manual Reset, EOB Reset (Refer to Clause 9.2 “Reset Function and Historical Data Recording” of 40-SDMS-02A Rev.09 (SCHEDULE B – Attachment II – CT and CTVT Meter Specifications) (for more detailed information about Reset)
2. This object is used to show the meter’s status (during the last LP period) caused by those events in above table and be captured into the profile object. The Bit mapping table shall be cleared automatically at the end of every load profile interval.
3. Current Tariff Bit Setting: 0 – Tariff 1, 1 – Tariff 2, 2 – Tariff 3, 3 – Tariff 4, 4 – Tariff 5, 5 – Tariff 6, 6 – Tariff 7, 7 – Tariff 8.
4. DST (Daylight Saving Time) Bit Setting: when DST time is changed (start/end).

6.6. Instantaneous Quality Registers and Internal Maximum Registers

The instantaneous quality registers and internal maximum registers are modeled by the “Register” IC (Class id=3, version: 0) and “Extended Register” IC (Class id=4, version: 0) each.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	



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Instantaneous quality register	1	0	c	7	0	255	Register (Class id=3, version: 0)
Internal maximum register	1	0	c	6	0	255	Extended Register (Class id=4, version: 0)

1) OBIS codes of the instantaneous quality register and internal maximum register objects.

* 'Li' in each energy type notation indicates the phase of the input source. 'L1' means 'Phase 1', 'L2' means 'Phase 2', 'L3' means 'Phase 3', 'ΣLi' means 'Aggregate'.

Energy Type	OBIS Code
ΣLi Instantaneous import active power (QI+QIV)	1.0.1.7.0.255
ΣLi Instantaneous export active power (QII+QIII)	1.0.2.7.0.255
ΣLi Instantaneous import reactive power (QI+QII)	1.0.3.7.0.255
ΣLi Instantaneous export reactive power (QIII+QIV)	1.0.4.7.0.255
ΣLi Instantaneous reactive power (QI)	1.0.5.7.0.255
ΣLi Instantaneous reactive power (QIV)	1.0.8.7.0.255
ΣLi Instantaneous import apparent power (QI+QIV)	1.0.9.7.0.255
ΣLi Instantaneous export apparent power (QII+QIII)	1.0.10.7.0.255
ΣLi Instantaneous import power factor	1.0.13.7.0.255
ΣLi Instantaneous export power factor	1.0.84.7.0.255
Instantaneous supply frequency	1.0.14.7.0.255
L1 Instantaneous current	1.0.31.7.0.255
L1 Instantaneous voltage	1.0.32.7.0.255
L1 Instantaneous import power factor	1.0.33.7.0.255
L2 Instantaneous current	1.0.51.7.0.255
L2 Instantaneous voltage	1.0.52.7.0.255
L2 Instantaneous import power factor	1.0.53.7.0.255
L3 Instantaneous current	1.0.71.7.0.255
L3 Instantaneous voltage	1.0.72.7.0.255
L3 Instantaneous import power factor	1.0.73.7.0.255
Internal L1 Voltage Maximum	1.0.32.6.0.255



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Energy Type	OBIS Code
Internal L2 Voltage Maximum	1.0.52.6.0.255
Internal L3 Voltage Maximum	1.0.72.6.0.255
Internal L1 Current Maximum	1.0.31.6.0.255
Internal L2 Current Maximum	1.0.51.6.0.255
Internal L3 Current Maximum	1.0.71.6.0.255
L1-L2 Instantaneous voltage	1.0.130.7.0.255
L2-L3 Instantaneous voltage	1.0.131.7.0.255
L3-L1 Instantaneous voltage	1.0.132.7.0.255

* Internal Li Voltage/Current Maximum Register shall be reset at every EOB.

2) Attributes description of the object "Register"

a) Active power

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned	-	R	R	R
3. scaler_unit	Scaler: 0 (integer) Unit: 27 [W]	-	R	R	R

b) Reactive power

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned	-	R	R	R
3. scaler_unit	Scaler: 0 (integer) Unit: 29 [var]	-	R	R	R



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c) Apparent power

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned	-	R	R	R
3. scaler_unit	Scaler: 0 (integer) Unit: 28 [VA]	-	R	R	R

d) Power factor

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long	-	R	R	R
3. scaler_unit	Scaler: -4 (integer) Unit: 255 (unitless)	-	R	R	R

e) Supply frequency

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	unsigned16	-	R	R	R
3. scaler_unit	Scaler: -2 (integer) Unit: 44 [Hz]	-	R	R	R

f) Current

Register	Class_id = 3, version = 0
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Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned	-	R	R	R
3. scaler_unit	Scaler: -3 (integer) Unit: 33 [Ampere]	-	R	R	R

g) Voltage

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned	-	R	R	R
3. scaler_unit	Scaler: -3 (integer) Unit: 35 [Voltage]	-	R	R	R

3) Attributes description of the object "Extended Register"

a) Voltage Maximum

Register		Class_id = 4, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned	-	R	R	R
3. scaler_unit	Scaler: -3 (integer) Unit: 35 [Voltage]	-	R	R	R
4. status	bit-string (def. = 0)	-	R	R	R
5. capture_time	date_time[9] (OCTET STRING (SIZE(12)))	-	R	R	R

b) Current Maximum



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Register		Class_id = 4, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned	-	R	R	R
3. scaler_unit	Scaler: -3 (integer) Unit: 33 [Ampere]	-	R	R	R
4. status	bit-string (def. = 0)	-	R	R	R
5. capture_time	date_time[9] (OCTET STRING (SIZE(12)))	-	R	R	R

6.7. TOU/EOB-control Objects

TOU/EOB control objects are used for handling of various tariff structures in the meter. They consist of “Activity Calendar”, “Tariffication Script Table”, “Tariff Register Activation”, “Special Days Table”, “End of Billing (EOB) Single Action Schedule”, “EOB Script Table” and “Clock” objects.

The “Activity Calendar” object provides a list of scheduled actions, following the classical way of calendar based schedules by defining season, month, week, day profile. The “Activity Calendar” object activates certain scripts defined in the “Tariffication Script Table” object. The activated script in the “Tariffication Script Table” object writes a “mask_list” attribute which is used to bind groups of registers to various tariff schemes. “The “Special Days Table” objects are used for defining special dates such as regular or irregular holidays. On such special days, the day script specified in the “Special Days Table” overrides the normal day script specified in the “Activity Calendar”. The diagram below shows the relational behavior of these objects.

The “Single Action Schedule” object is used for executing periodic actions within the meter (regular/irregular meter reading). This object specifies the time of day on which the EOB script is executed. The actions of the EOB script are specified in the “EOB Script Table”. The diagram below shows the relational behavior of these objects.

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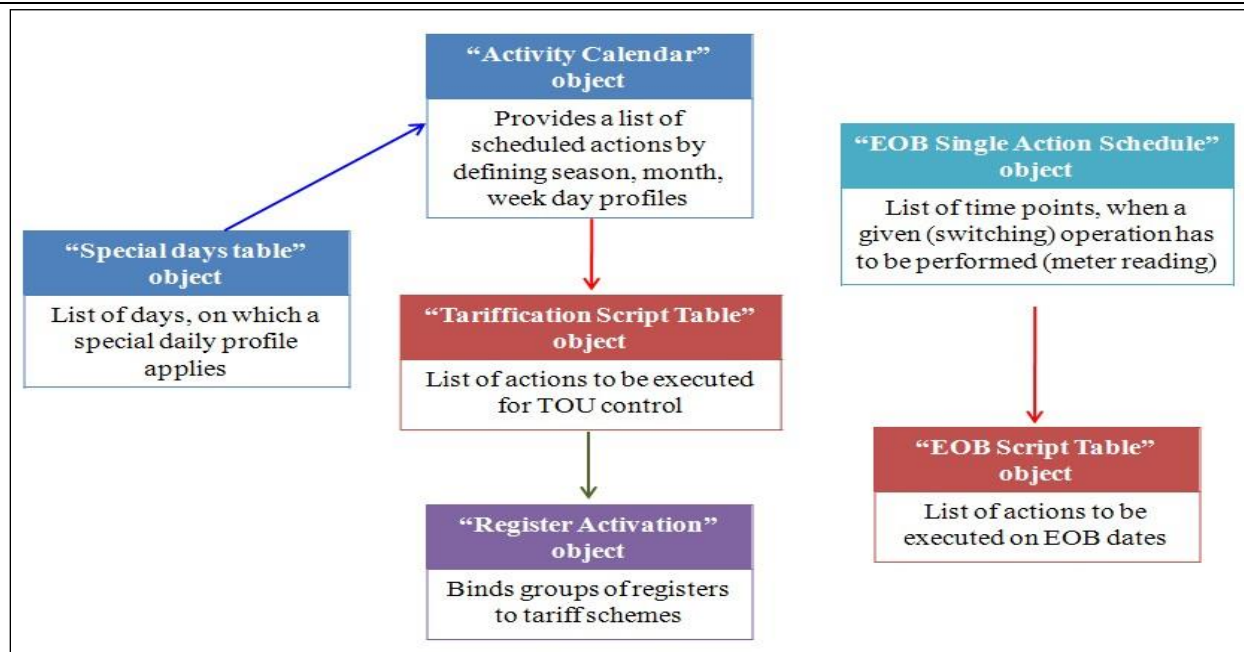


Figure 7 - Relational diagram of TOU/EOB-control objects

6.7.1. Activity Calendar / Tariffication Script Table / Tariff Register Activation

The "Activity Calendar" object is modeled by the "Activity Calendar" IC (Class id: 20, version: 0).
 The "Tariffication Script Table" object is modeled by the "Script Table" IC (Class id: 9, version: 0).
 The "Tariffication Register Activation" object is modeled by the "Register Activation" IC (Class id: 6, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Activity Calendar	0	0	13	0	0	255	Activity Calendar (Class id: 20, version: 0)
Tariffication Script Table	0	0	10	0	100	255	Script Table (Class id: 9, version: 0)
Tariff Register Activation	0	0	14	0	0	255	Register Activation (Class id: 6, version: 0)

1) Attributes description of the object "Activity Calendar"

Activity calendar		Class_id = 20, version = 0
Attributes	Data type &	Access right



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	Description	-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. calendar_name_active	octet-string (see below)	-	R	R	R
3. season_profile_active	array (see below)	-	R	R	R
4. week_profile_active	array (see below)	-	R	R	R
5. day_profile_active	array (see below)	-	R	R	R
6. calendar_name_passive	octet-string (see below)	-	R	R/W	R/W
7. season_profile_passive	array (see below)	-	R	R/W	R/W
8. week_profile_passive	array (see below)	-	R	R/W	R/W
9. day_profile_passive	array (see below)	-	R	R/W	R/W
10. activate_passive_calendar_time	octet-string (see below)	-	R	R/W	R/W
Methods					
1. activate_passive_calendar	integer (0)	-	-	A	A

a) Attribute “calendar_name_active”

- Contains an identifier, which is descriptive to the set of scripts, which are activated by the object.
- “calendar_name”: The identifier of a set of activity schedules (octet-string [9] (Size: 1 byte)). “calendar_name” uses BCD coded data (available range: 00 ~ 99).

b) Attribute “season_profile_active”

- Contains an array of seasons defined by their starting date and a specific week_profile to be executed. The list is sorted according to “season_start”.
- “season_profile_name”: The identifier of a list of seasons (octet-string [9] (Size: 1 byte)). “season_profile_name” uses BCD coded data (available range: 00 ~ 99).
- “season_start” defines the starting time of the season. (date_time [9] (Size: 12 bytes))
- “week_name” defines the “week_profile” active in this season.

c) Attribute “week_profile_table_active”

- Contains an array of week_profiles to be used in the different seasons. For each week_profile, the day_profile for every day of a week is identified.



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- “week_profile_name” is: The identifier of a list of seasons (octet-string [9] (Size: 1 byte)). “week_profile_name” uses BCD coded data (available range: 00 ~ 99).
- “Monday” defines the day profile valid on Monday (day_id, unsigned [17]).
- “Tuesday” defines the day profile valid on Tuesday (day_id, unsigned [17]).
- “Wednesday” defines the day profile valid on Wednesday (day_id, unsigned [17]).
- “Thursday” defines the day profile valid on Thursday (day_id, unsigned [17]).
- “Friday” defines the day profile valid on Friday (day_id, unsigned [17]).
- “Saturday” defines the day profile valid on Saturday (day_id, unsigned [17]).
- “Sunday” defines the day profile valid on Sunday (day_id, unsigned [17]).

d) Attribute “day_profile_table_active”

- Contains an array of day_profile, identified by their day_id. For each day_profile, a list of scheduled actions is defined by a script to be executed and the corresponding activation time (start_time). The list is sorted according to start_time.
- “day_id” is a used defined identifier, identifying the current day_profile. It uses BCD coded data (unsigned [8], available range: 00 ~ 99).
- “start_time” defines the time when the script is to be executed (time [27] (Size: 4 bytes))
- “script_logical_name” defines the logical name of the “Tariffication Script Table” object (OBIS code: 0.0.10.0.100.255).
- “script_selector” defines the script_identifier of the script to be executed.

e) Attribute “calendar_name_passive”: This attribute is a reserved calendar set to be replaced with “calendar_name_active”. This attribute will be activated by the method “activate_passive_calendar”.

f) Attribute “season_profile_passive”: This attribute is a reserved calendar set to be replaced with “season_profile_active”. This attribute will be activated by the method “activate_passive_calendar”.

g) Attribute “week_profile_table_passive”: This attribute is a reserved calendar set to be replaced with “week_profile_table_active”. This attribute will be activated by the method “activate_passive_calendar”.

h) Attribute “day_profile_table_passive”: This attribute is a reserved calendar set to be replaced with “day_profile_table_active”. This attribute will be activated by the method “activate_passive_calendar”.

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i) Attribute “activate_passive_calendar_time”

- Defines the time when the object itself calls the method “activate_passive_calendar” (date_time [9] (Size: 12 bytes)).

j) Method description: “activate_passive_calendar”

- This method copies all attributes called ..._passive to the corresponding attributes called ..._active (integer: 0).

k) Number of profile_table

- Number of “season” in a “season_profile”: 8 ("season_profile_name": 0~7)
- Number of “week_profile” in a “week_profile_table”: 8 ("week_profile_name": 0~7)
- Number of “day_profile” in a “day_profile_table”: 8 ("day_id": 0~7), where “day_schedule” in a “day_profile” has 10.

2) Attributes description of the object “Tariffication Script Table”

Script table		Class_id = 9, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. scripts	array (see below)	-	R	R	R
Methods					
1. execute	long-unsigned	-	-	-	-

a) Attribute “scripts”

- The attribute “scripts” consists of the “script_identifier” (long-unsigned [18]) and the “actions” (array). When a certain “script_identifier” is referenced by the “script_selector” element of the attribute “day_profile_table_active” of the “Activity Calendar” object, the corresponding “actions” (array) is executed. The script_selectors and their designated purposes are specified in the table below.



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Script_selector (two bytes)	Meaning
0x0001	Tariff 1 activation
0x0002	Tariff 2 activation
0x0003	Tariff 3 activation
0x0004	Tariff 4 activation
0x0005	Tariff 5 activation
0x0006	Tariff 6 activation
0x0007	Tariff 7 activation
0x0008	Tariff 8 activation

- Each script which is identified by the script selectors triggers each tariff register to be activated using the object “Tariff Register Activation (Register Activation)”, which is specified in the following clause.

3) Attributes description of the object “Tariff Register Activation”

4)

Register activation		Class_id =6, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. register_assignment	array (see below)	-	R	R	R
3. mask_list	array (see below)	-	R	R	R
4. active_mask	octet-string	-	R	R	R

a) Attribute “register_assignment”

- Specifies an ordered list of COSEM objects assigned to the “Register Activation” object. [array: (class_id: long-unsigned), (logical_name: octet-string)]
- This attribute holds all the TOU-related objects such as energy, maximum demand, and power factor. These objects are identified by an array of indices (e.g. the first object is referenced by index 1, the second object by index 2, ...).

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b) Attribute “mask_list”

- Specifies a list of register activation masks. Each entry (mask) is identified by its mask_name.
- “mask_name”: identifies “index_list” which refers to the registers assigned to the mask (octet-string [9], size(2 bytes))

Mask_name (two bytes)	Activated registers
0x0001	Total & Tariff 1
0x0002	Total & Tariff 2
0x0003	Total & Tariff 3
0x0004	Total & Tariff 4
0x0005	Total & Tariff 5
0x0006	Total & Tariff 6
0x0007	Total & Tariff 7
0x0008	Total & Tariff 8

c) Attribute “active_mask”

- Specifies the currently active mask, which is identified by the “mask_name” (octet-string [9], size (2 bytes))

d) Method “add_register”

- Adds one more register to the attribute “register_assignment”. The new register is added at the end of the array.

e) Method “add_mask”

- Adds another mask to the attribute “mask_list”. If there exists already a mask with the same name, the existing mask will be overwritten by the new mark.

f) Method “delete_mask”



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- Deletes a mask from the attribute “mask_list”. The mask is defined by its mask_name.

6.7.2. Special Days Table

The “Special Days Table” object is modeled by the “Special Days Table” IC (Class id: 11, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Special Days Table	0	0	11	0	0	255	Special Days Table (Class id: 11, version: 0)

1) Attributes description of the object “Special Days Table”

Script table		Class_id = 11, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. entries	array (see below)	-	R	R	R
Methods					
1. insert	structure {index: long-unsigned, specialday_date: octet-string, day_id: unsigned}	-	-	A	A
2. delete	long-unsigned	-	-	A	A

a) “entries”

- Specifies a special day identifier for a given date.
- “index” is a sequence number of the entries.
- “specialday_date” designates the year / month / date of the special day (date, octet-string [26], size (5 bytes)).
- “day_id” indicates the day_profile to be applied with reference to the attribute “day_profile_active” of the object “Activity Calendar”.
- A part of the “date” elements in the “specialday_date” may have wildcards (e.g. 0xFF or 0xFFFF) for repeating special days like New Year’s Day.


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- The regular holidays (e.g. 'New Year's Day') are expressed by using wildcards in the "specialday_date" as mentioned above. The irregular holidays (e.g. 'Ramadan') are registered by specifying 'year', 'month', 'day of month', 'day of week' of the "specialday_date".

b) The number of "spec_day_entry"

- Regular holiday "spec_day_entry": 20 ("index": 0~19, first ~ 20th)
- Irregular holiday "spec_day_entry": 400 ("index": 20~419, 20years*20 /year, 21th ~ 420th)

c) "insert" method

- Inserts a new entry in the table.

d) "delete" method

- Deletes an entry in the table.

6.7.3. End of Billing (EOB) Single Action Schedule / EOB Script Table

The "Monthly End of Billing (EOB) Single Action Schedule" and "Daily Single Action Schedule" objects are modeled by the "Single Action Schedule" IC (Class id: 22, version: 0). This object is used for the execution of periodic actions within a meter, such as regular or irregular date/time.

The "EOB Script Table" object is modeled by the "Script Table" IC (Class id: 9, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Monthly EOB Action Schedule	0	0	15	0	0	255	Single Action Schedule (Class id: 22, version: 0)
Daily Single Action Schedule	0	0	15	1	0	255	Single Action Schedule (Class id: 22, version: 0)
EOB Script Table	0	0	10	0	1	255	Script Table (Class id: 9, version: 0)

1) Attributes description of the object "Monthly EOB Action Schedule"
Single action schedule
Class_id = 22, version = 0



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Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. executed_script	script (see below)	-	R	R/W	R/W
3. type	enum (see below)	-	R	R	R/W
4. execution_time	array (see below)	-	R	R	R/W

a) Attribute “executed_script”

- Contains the logical name of the “Script Table” and the script selector of the script to be executed.
- “script_logical_name”: The OBIS code of the object “EOB Script Table” (0.0.10.0.1.255)
- “script_selector” defines the script_identifier of the script to be executed. (Default value for “script_selector”: 0x0001 [Auto Reset, Demand Reset])

b) Attribute “type”

- Type=1: size of execution_time=1, wildcard in date allowed.
- Type=2: size of execution_time=n, all time values are the same, wildcards in date are not allowed.
- Type=3: size of execution_time=n, all time values are the same, wildcards in date are allowed.
- Type=4: size of execution_time=n, all time values may be different, wildcards in date are not allowed.
- Type=5: size of execution_time=n, all time values may be different, wildcards in date are allowed.
- Default: Type=1

c) Attribute “execution_time”

- Specifies the time of day the script is executed (quantity of execution_time: 1).
- The attribute has an array of “execution_time_date” elements. The “execution_time_date” elements consist of “time” and “date”.



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- “time”: time [27], octet-string (size: 4 bytes)
- “date”: date [26], octet-string (size: 5 bytes)
- As a default setting (regular billing date), an “execution_time_date” element shall be configured as below.
[“time” is set to “00,00,00,00” (00h:00m:00s) and “date” is set to “FF,FF,FF,01,FF” (1st day of every month).]

2) Attributes description of the object “Daily Single Action Schedule”

Single action schedule		Class_id = 22, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. executed_script	script (see below)	-	R	R/W	R/W
3. type	enum (see below)	-	R	R	R/W
4. execution_time	array (see below)	-	R	R	R/W

a) Attribute “executed_script”

- Contains the logical name of the “Script Table” and the script selector of the script to be executed.
- “script_logical_name”: The OBIS code of the object “EOB Script Table” (0.0.10.0.1.255)
- “script_selector” defines the script_identifier of the script to be executed.
(Default value for “script_selector”: 0x0002 [Auto Reset])

b) Attribute “type”

- Type=1: size of execution_time=1, wildcard in date allowed.
- Type=2: size of execution_time=n, all time values are the same, wildcards in date are not allowed.
- Type=3: size of execution_time=n, all time values are the same, wildcards in date are allowed.
- Type=4: size of execution_time=n, all time values may be different, wildcards in date are not allowed.

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- Type=5: size of execution_time=n, all time values may be different, wildcards in date are allowed.
- Default: Type=1

c) Attribute “execution_time”

- Specifies the time of day the script is executed (quantity of execution_time: 1).
- The attribute has an array of “execution_time_date” elements. The “execution_time_date” elements consist of “time” and “date”.
- “time”: time [27], octet-string (size: 4 bytes)
- “date”: date [26], octet-string (size: 5 bytes)
- As a default setting, an “execution_time_date” element shall be configured as below. [“time” is set to “17,00,00,00” (23h:00m:00s) and “date” is set to “FF,FF,FF,FF,FF” (every day).]

3) Attributes description of the object “EOB Script Table”

Script table		Class_id = 9, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. scripts	array (see below)	-	R	R	R
Methods					
1. execute	long-unsigned	-	A	A	A

a) Attribute “scripts”

- The attribute “scripts” consists of the “script_identifier” (long-unsigned [18]) and the “actions” (array). When a certain “script_identifier” is referenced by the “script_selector” element of the attribute “executed_script” of the “EOB Single Action Schedule” object, the corresponding “actions” (array) is executed. The script_selectors and their designated purposes are specified in the table below.

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Script_selector (two bytes)	Meaning
0x0000	Do Nothing
0x0001	Meter reading (EOB Reset: Auto + Demand)
0x0002	Meter reading (Auto Reset)
0x0003	Meter reading (Demand Reset)

[Note] These script_selectors above are commonly used by both “Monthly EOB Action Schedule” and “Daily Single Action Schedule” objects. These script_selectors are also used for switching the meter reset mode between Internal Clock (Automatic) Reset and Manual Reset. The following table shows the different cases when those two action schedule objects use each combination of script_selectors.

Script_selector		Meter Mode
Monthly EOB Action Schedule	Daily Single Action Schedule	
0x0000	0x0000	Manual Reset enabled (Internal Clock (Automatic) Reset disabled) ※ Note: In this mode when the manual reset button is pressed, the EOB Reset (Auto + Demand) shall be performed.
0x0001 [Default]	0x0002 [Default]	Internal Clock (Automatic) Reset and On-command Reset enabled (Manual Reset disabled)
Other combinations		Selective Reset Mode selection

6.7.4. Current Date/Time (Clock)

The “Current Date/Time” object is modeled by the “Clock” IC (Class id: 8, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Current Date/Time (Clock)	0	0	1	0	0	255	Clock (Class id: 8, version: 0)



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1) Attributes description of the object “Clock”

Clock		Class_id = 8, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. time	date_time [9] (OCTET STRING SIZE(12))	-	R	R/W	R/W
3. time_zone	long (unit: minute)	-	R	R/W	R/W
4. status	unsigned	-	R	R	R
5. daylight_savings_begin	date_time [9] (OCTET STRING SIZE(12))	-	R	R/W	R/W
6. daylight_savings_end	date_time [9] (OCTET STRING SIZE(12))	-	R	R/W	R/W
7. daylight_savings_deviation	integer (unit: minute)	-	R	R/W	R/W
8. daylight_savings_enabled	boolean (TRUE: DST enabled, FALSE: DST disabled)	-	R	R/W	R/W
9. clock_base	enum	-	R	R	R

a) Attribute “time” is represented by the form “date_time” (octet-string [9], size(12 bytes)) as described below.

Attribute	Type	Meaning
Year	long unsigned [18]	Year
Month	unsigned [17]	Month
Day of month	unsigned [17]	Day
Day of week	unsigned [17]	a day of week 1: Monday, 2: Tuesday, 3: Wednesday 4: Thursday, 5: Friday, 6: Saturday 7: Sunday
Hour	unsigned [17]	Hour



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Attribute	Type	Meaning
Minute	unsigned [17]	Minute
Second	unsigned [17]	Second
Hundreds of second	unsigned [17]	1/100 second
Time Deviation of daylight savings	integer [15]	Time deviation to be applied when daylight savings begin [unit: minute]
Clock status	unsigned [17]	Clock status [refer to 4.4 of IEC62056-6-2]

b) The “time_zone”: Deviation of local time to GMT in minutes (long: 16). [default = 180]

* GMT: Greenwich Mean Time

c) Attribute “status”: Clock status (integer [15]). The status bits are defined as follows.

Bit 0	Invalid value
Bit 1	Doubtful value
Bit 2	Different clock base
Bit 3	Invalid clock status
Bit 4	Reserved
Bit 5	Reserved
Bit 6	Reserved
Bit 7	Daylight saving active

d) Attribute “daylight_savings_begin”: defines the local switch date and time when the local time has to be deviated from the normal time (date_time, octet-string (size(12))).

e) Attribute “daylight_savings_end”: defines the local switch date and time when the local time has to return to the normal time (date_time, octet-string (size(12))).

f) Attribute “daylight_savings_deviation”: contains the number of minutes by which the daylight_savings_deviation in generalized time must be corrected at daylight savings begin (integer [15]).

g) Attribute “daylight_savings_enabled”: contains the status of DST activation. (boolean



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[3], TRUE = DST enabled, FALSE = DST disabled).

6.7.5. Date/Time for Display

The “Date/Time for display” objects are modeled by the “Data” IC (Class id: 1, version: 0). These objects are used only for LCD display of the meter.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Time for display	1	0	0	9	1	255	Data (Class id: 1, version: 0)
Date for display	1	0	0	9	2	255	Data (Class id: 1, version: 0)

1) Attributes description of the object “Data”

Clock		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	octet-string (see below)	-	R	R	R

- a) Attribute “value” of the object “Time for display” is represented by the form “time” (OCTET STRING SIZE(4)) as described below.

Attribute	Type	Meaning
Hour	unsigned [17]	Hour
Minute	unsigned [17]	Minute
Second	unsigned [17]	Second
Hundreds of second	unsigned [17]	1/100 second

- b) Attribute “value” of the object “Date for display” is represented by the form “date” (OCTET STRING SIZE(5)) as described below.



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Attribute	Type	Meaning
Year	long unsigned [18]	Year
Month	unsigned [17]	Month
Day of month	unsigned [17]	Day
Day of week	unsigned [17]	a day of week 1: Monday, 2: Tuesday, 3: Wednesday 4: Thursday, 5: Friday, 6: Saturday 7: Sunday

6.8. Meter Information

6.8.1. Basic Information

The objects defined in this clause are used to hold basic information of the meter.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Meter serial number	0	0	96	1	0	255	Data (Class id: 1, version: 0)
Meter model	0	0	96	1	1	255	Data (Class id: 1, version: 0)
SEC item number	0	0	96	1	2	255	Data (Class id: 1, version: 0)
Firmware version	1	0	0	2	0	255	Data (Class id: 1, version: 0)

1) Attributes description of the object "Meter serial number"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	visible-string (size: 8 bytes) Manufacturer shall assign a series of ASCII-coded characters which represent the meter serial number.	-	R	R	R



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2) Attributes description of the object “Meter model”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	visible-string (size: 8 bytes) Manufacturer shall assign a series of ASCII-coded characters which represent the meter model.	-	R	R	R

3) Attributes description of the object “SEC item number”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	visible-string (size: 9 bytes) Manufacturer shall assign a series of ASCII-coded characters which represent the SEC item number.	-	R	R	R

- The value of “SEC item number” and its description is below:

SEC Item No.	Short Description
908402208	METER:ELECTRICAL SERVICE,ELECTRONIC REVENUE WHOLE-CURRENT,133/230/400VVAC,3PH,60HZ,10 (100)A with communication module
908402207	METER:ELECTRICAL SERVICE,ELECTRONIC REVENUE WHOLE-CURRENT,133/230/400VAC,3PH,60HZ,20 (160)A with communication module

4) Attributes description of the object “Firmware version”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			



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		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	visible-string (size: 16 bytes) Firmware version (see below)	-	R	R	R

- The “value” is formatted as below.

Byte	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Char	P	X	X	X	X		Y	Y	Y	Y	-	M	M	-	D	D

- XXX.X: Version number
- YYYY: Year
- MM: Month
- DD: Day
- P: Provider
- Byte 11 means ‘space’.

[Note] The format of “Firmware version” value may be different from different manufacturers. The format shown above is recommended by COMPANY, but the different format of the firmware version may be acceptable.

6.8.2. Metrological parameters

The objects defined in this clause are used to hold metrological parameters of the meter.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Metrological LED (active energy)	1	0	0	3	0	255	Register (Class id: 3, version: 0)
Metrological LED (reactive energy)	1	0	0	3	1	255	Register (Class id: 3, version: 0)
Nominal voltage	1	0	0	6	0	255	Register (Class id: 3, version: 0)
Nominal current	1	0	0	6	1	255	Register (Class id: 3, version: 0)
Nominal frequency	1	0	0	6	2	255	Register (Class id: 3, version: 0)



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Maximum current	1	0	0	6	3	255	Register (Class id: 3, version: 0)
Metrological LED (apparent energy)	1	0	0	3	2	255	Register (Class id: 3, version: 0)
Tariff Program ID	0	0	96	1	3	255	Data (Class id: 1, version: 0)

1) Attributes description of the object “Metrological LED (active energy)”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned Meter constant for active energy	-	R	R	R
3. scaler_unit	scaler: -3 (integer) unit: 45 [1/Wh]	-	R	R	R

2) Attributes description of the object “Metrological LED (reactive energy)”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned Meter constant for reactive energy	-	R	R	R
3. scaler_unit	scaler: -3 (integer) unit: 46 [1/varh]	-	R	R	R

3) Attributes description of the objects “Nominal current” and “Maximum current”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R



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2. value	long_unsigned	-	R	R	R
3. scaler_unit	scaler: -1 (integer) unit: 33 (ampere)	-	R	R	R

4) Attributes description of the object “Nominal frequency”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	long_unsigned	-	R	R	R
3. scaler_unit	scaler: -2 (integer) unit: 44 (hertz)	-	R	R	R

5) Attributes description of the object “Tariff Program ID”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	octet-string (8 bytes)	-	R	R/W	R/W

6) Attributes description of the object “Nominal Voltage”

Data		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	long_unsigned	-	R	R	R
3. scalar unit	scalar: 0(integer) unit: 35(voltage)	-	R	R	R

7) Attributes description of the object “Metrological LED (apparent energy)”



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Data		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Double-long-unsigned Meter constant for apparent energy	-	R	R	R
3. scalar unit	scalar: -3(integer) unit: 47[1/Vah]	-	R	R	R

[Note]

1. Tariff (TOU) Program ID: e.g.) 14AC0001 [14 (Year 2014), A type (B, C, ...), C Commercial (Industrial, Residential, Governmental, ...), 0001 (0002, 0003, ...)].
2. Tariff Program ID shall be updated automatically as the Tariff Program is reprogrammed (or uploaded as a file) by DLMS clients (HHU, DCU or HES system, etc.). Also, manual update of Tariff Program and Tariff Program ID shall be configurable.
3. Default Tariff Program ID shall be 14AC0001.

6.8.3. Measurement algorithm

The measurement algorithm objects are modeled by the “Data” IC (class id: 1, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Measurement algorithm for active power	1	0	0	11	1	255	Data (class id: 1, version: 0)
Measurement algorithm for active energy	1	0	0	11	2	255	Data (class id: 1, version: 0)
Measurement algorithm for reactive power	1	0	0	11	3	255	Data (class id: 1, version: 0)
Measurement algorithm for reactive energy	1	0	0	11	4	255	Data (class id: 1, version: 0)
Measurement algorithm for power factor	1	0	0	11	7	255	Data (class id: 1, version: 0)

- 1) Attributes description of the objects “measurement algorithm for active power / energy”

Data		Class_id = 1, version = 0
Attributes	Data type & Description	Access right



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		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	enum (see below) [default: 2]	-	R	R	R

enum	Measurement algorithm
2	All harmonics of voltage and current are used

2) Attributes description of the objects “measurement algorithm for reactive power / energy”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	enum (see below) [default: 1]	-	R	R	R

enum	Measurement algorithm
1	(sum of) reactive power/energy of each phase, calculated from the fundamental of the per phase voltage and the per phase current

3) Attributes description of the objects “measurement algorithm for apparent power / energy

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R
2. value	enum (see below) [default: 14]		R	R	R

enum	Measurement algorithm
14	$S = \sum \sqrt{P^2 + Q^2}$, with P: all harmonics in U and I, and Q: only fundamental in U and I where P and Q are single phase quantities



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4) Attributes description of the objects “measurement algorithm for power factor”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	enum (see below) [default: 2]	-	R	R	R

enum	Measurement algorithm
2	True power factor, the power factor produced by the voltage and current including their harmonics. It may be calculated from apparent power and active power, including the harmonics

6.8.4. Threshold registers

The threshold registers are modeled by the “Register” IC (class id: 3, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Current over limit threshold	1	0	11	35	0	255	Register (class id: 3, version: 0)
Current over limit duration	1	0	11	44	0	255	Register (class id: 3, version: 0)
Voltage under limit threshold	1	0	12	31	0	255	Register (class id: 3, version: 0)
Voltage under limit duration	1	0	12	43	0	255	Register (class id: 3, version: 0)
$\sum$ Li PF under limit threshold import	1	0	13	31	0	255	Register (class id: 3, version: 0)
$\sum$ Li PF under limit threshold export	1	0	13	31	128	255	Register (class id: 3, version: 0)
Phase Neutral Bypass limit threshold	0	0	96	53	32	255	Register (class id: 3, version: 0)
Voltage THD limit threshold (Upper)	1	0	12	46	0	255	Register (class id: 3, version: 0)
Voltage THD limit threshold (Low)	1	0	12	46	1	255	Register (class id: 3, version: 0)



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Current THD limit threshold(Upper)	1	0	11	46	0	255	Register (class id: 3, version: 0)
Current THD limit threshold(Low)	1	0	11	46	1	255	Register (class id: 3, version: 0)
THD over limit duration	1	0	14	46	0	255	Register (class id: 3, version: 0)

1) Attributes description of the objects "Current over limit threshold"

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	long-unsigned [default: 1200]	-	R	R/W	R/W
3. scaler_unit	scaler: -1 (integer) unit: 56 (Percentage) ※ 100% = Maximum current	-	R	R	R

2) Attributes description of the objects "Current over limit duration"

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	unsigned [default: 3]	-	R	R/W	R/W
3. scaler_unit	scaler: 0 (integer) unit: 6 (minute)	-	R	R	R

3) Attributes description of the objects "Voltage under limit threshold"

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R



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2. value	long-unsigned [default: 5000]	-	R	R/W	R/W
3. scaler_unit	scaler: -2 (integer) unit: 56 (Percentage) ※ 100% = Reference Voltage	-	R	R	R

4) Attributes description of the objects “Voltage under limit duration”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	unsigned [default: 1]	-	R	R/W	R/W
3. scaler_unit	scaler: 0 (integer) unit: 6 (minute)	-	R	R	R

5) Attributes description of the objects “ $\sum$ Li PF under limit threshold import”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	long [default: 0]	-	R	R/W	R/W
3. scaler_unit	Scaler: -4 (integer) Unit: 255 (unitless)	-	R	R	R

1) Attributes description of the objects “ $\sum$ Li PF under limit threshold export”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R



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2. value	long [default: 0]		R	R/W	R/W
3. scaler_unit	Scaler: -4 (integer) Unit: 255 (unitless)		R	R	R

2) Attributes description of the objects "Phase Neutral Bypass limit threshold"

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R
2. value	double-long-unsigned [default: 300]		R	R/W	R/W
3. scaler_unit	Scaler: -1 (integer) Unit: 56 [Percentage] ※ 100% = Nominal current		R	R	R

3) Attributes description of the objects "Voltage THD limit threshold(Upper)"

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R
2. value	double-long-unsigned [default: 10]		R	R/W	R/W
3. scaler_unit	Scaler: 0 (integer) Unit: 56 (Percentage)		R	R	R

4) Attributes description of the objects "Voltage THD limit threshold (Low)"

Register	Class_id = 3, version = 0
----------	---------------------------



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Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R
2. value	double-long-unsigned [default: 0]		R	R/W	R/W
3. scaler_unit	Scaler: 0 (integer) Unit: 56 (Percentage)		R	R	R

5) Attributes description of the objects “Current THD limit threshold(Upper)”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R
2. value	double-long-unsigned [default: 10]		R	R/W	R/W
3. scaler_unit	Scaler: 0 (integer) Unit: 56 (Percentage)		R	R	R

6) Attributes description of the objects “Current THD limit threshold(Low)”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R
2. value	double-long-unsigned [default: 0]		R	R/W	R/W
3. scaler_unit	Scaler: 0 (integer) Unit: 56 (Percentage)		R	R	R

7) Attributes description of the objects “THD over limit duration”



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Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R
2. value	long-unsigned [default: 1]		R	R/W	R/W
3. scaler_unit	Scaler: 0 (integer) Unit: 6 [Minute]		R	R	R

6.8.5. Storage Device Information

The Storage Device information objects (Storage Device installation date/time, Storage Device failure date/time) are modeled by the “Data” IC (class id: 1, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Storage Device Installation Date/Time	0	0	96	6	5	255	Data (class id: 1, version: 0)
Storage Device Failure Date/Time	0	1	94	96	2	255	Data (class id: 1, version: 0)
Storage Device Voltage	0	0	96	6	3	255	Data (class id: 3, version: 0)

1) Attributes description of the objects “Data”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Date_time[9] (OCTET STRING SIZE(12))	-	R	R	R

1) Attributes description of the objects “Storage Device Voltage”



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Data		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R
2. value	long_unsigned		R	R	R
3. scaler_unit	scaler: -2 (integer) unit: 35 (voltage)		R	R	R

6.8.6. Meter reading parameter

The meter reading parameter object is modeled by the “Data” IC (class id: 1, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Meter reading parameter	0	96	15	128	0	255	Data (class id: 1, version: 0)

1) Attributes description of the objects “Data”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	octet-string (size (6 bytes))	-	R	R/W	R/W

a) Parameter mapping table for the attribute “value”



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Meanings	Data Type		
	Size [byte]	Order	Type
Cause for last Auto Reset	1	1	bit 6: reserved bit 5: pass a date (or a month) bit 4: by internal clock schedule bit 3: on command via the communication interfaces bit 2: by date/time change bit 1: program change bit 0: reserved
Cause for last Demand Reset	1	2	bit 6: reserved bit 5: pass a month bit 4: by internal clock schedule bit 3: on command via the communication interfaces bit 2: by date/time change bit 1: program change bit 0: by manual push-button
Duration of prohibiting "Manual reset" after previous demand reset	4	3	Unit: second (default: 300)

[Note]

1. Program (configuration) change: change of TOU, DST, EOB, LP, etc.
2. The reset conditions for last Auto (Demand) Reset shall be configurable as below:
 - Initial allowed condition settings: Auto Reset (0011 1110), Demand Reset (0011 1110).

6.8.7. Billing Period Value

The billing period value objects are modeled by the "Data" IC (class id: 1, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Billing period counter (VZ)	1	0	0	1	0	255	Data (class id: 1, version: 0)
Number of available billing periods	1	0	0	1	1	255	Data (class id: 1, version: 0)

1) Attributes description of the objects "Data"

Data	Class_id = 1, version = 0
-------------	----------------------------------



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Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	unsigned	-	R	R	R

[Note] The meter shall retain at least three (3) historically registered EOB data (With F = 0...99, F = 255 identifies the current billing period).

6.8.8. Time Stamp of the Billing Period

The time stamp of the billing period objects are modeled by the "Data" IC (class id: 1, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Time stamp of the current billing period	1	0	0	1	2	255	Data (class id: 1, version: 0)
Time stamp of the last billing period (last reset)	1	0	0	1	2	VZ	Data (class id: 1, version: 0)
Time of the most recent billing (for display)	1	0	0	9	6	255	Data (class id: 1, version: 0)
Date of the most recent billing (for display)	1	0	0	9	7	255	Data (class id: 1, version: 0)

- Attributes description of the objects "Time stamp of the most recent billing period" and "Time stamp of the billing period (last reset)"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Date_time (OCTET STRING SIZE(12))	-	R	R	R

- Attributes description of the objects "Time of the most recent billing (for display)"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			



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		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Date [26] (OCTET STRING SIZE(5))	-	R	R	R

3) Attributes description of the objects “Date of the most recent billing (for display)”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Date_time [9] (OCTET STRING SIZE(5))	-	R	R	R

6.9. Objects regarding Meter Operation

6.9.1. Display List

The display list objects are used to hold the lists of displayed items on each display mode (normal display mode, test display mode). The display list objects are modeled by the “Data” IC (class id: 1, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Normal Display List	0	0	21	0	1	255	Data (class id: 1, version: 0)
Test Display List	0	0	21	0	2	255	Data (class id: 1, version: 0)

[Note] These Display List objects are necessary in order for engineers to edit the items to be displayed on the meter’s LCD. However different implementation of the attribute description and value type of these objects presented here can be proposed by manufacturers and submitted for COMPANY’s review and approval.

1) Attributes description of the objects “Display List”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4



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1. logical_name	octet-string	-	R	R	R
2. value	array (see below)	-	R	R/W	R/W

b) Attribute “value” of the object “Display List”

- The attribute “value” is an array of structures: The array is composed of following elements.

Attribute “value”	Data type
Display item 1	Structure
Display item 2	Structure
Display item 3	Structure
:	:
Display item n	Structure

- The structure of the display items is:

array display_item_element

display_item_element ::= structure

```
{
class_id:                long-unsigned,
logical_name:            octet-string of 6 bytes in hex,
attribute_number:        unsigned,
display_date_time:       octet-string of 6 bytes in hex
}
```

c) Number of display items

- The number of display items shall be programmable. At least one item shall be displayed in the meter display. Therefore, the minimum number of display item shall be one. If there are no display items, the number of display item equals to zero. Default display values are as below lists: Normal Display List and Test Display List.

d) Normal Display List

- The default display items of the normal display mode consist of the minimum items as specified in the table below.



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Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
OBIS code (6 byte)						Attribute number	Index number

* Notation Description in below table

- “B1 ~ B8”: Byte 1 ~ Byte 8

* Byte8 (B8) is Index number and the Description is below;

- “1” means DD/MM/YYYY

- “6” means HH:MM:SS

Normal Display List

No	Contents to display	Item to display (8 Bytes)							
		B1	B2	B3	B4	B5	B6	B7	B8
1	ΣLi Import active energy (QI+QIV) [Total]	1	0	1	8	0	255	2	0
2	ΣLi Import active energy (QI+QIV) [Rate1]	1	0	1	8	1	255	2	0
3	ΣLi Import active energy (QI+QIV) [Rate2]	1	0	1	8	2	255	2	0
4	ΣLi Import active energy (QI+QIV) [Rate3]	1	0	1	8	3	255	2	0
5	ΣLi Import active energy (QI+QIV) [Rate4]	1	0	1	8	4	255	2	0
6	Time	1	0	0	9	1	255	2	0
7	Date	1	0	0	9	2	255	2	0
8	ΣLi Import active energy (QI+QIV)(for a current billing period)	1	0	1	9	0	255	2	0
9	ΣLi Import reactive energy (QI+QII)(for a current billing period)	1	0	3	9	0	255	2	0



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Normal Display List									
No	Contents to display	Item to display (8 Bytes)							
		B1	B2	B3	B4	B5	B6	B7	B8
10	Σ Li Import apparent energy (QI+QIV)(for a current billing period)	1	0	9	9	0	255	2	0
11	L1 Instantaneous voltage	1	0	32	7	0	255	2	0
12	L2 Instantaneous voltage	1	0	52	7	0	255	2	0
13	L3 Instantaneous voltage	1	0	72	7	0	255	2	0
14	L1 Instantaneous current	1	0	31	7	0	255	2	0
15	L2 Instantaneous current	1	0	51	7	0	255	2	0
16	L3 Instantaneous current	1	0	71	7	0	255	2	0
17	L1 Instantaneous power factor	1	0	33	7	0	255	2	0
18	L2 Instantaneous power factor	1	0	53	7	0	255	2	0
19	L3 Instantaneous power factor	1	0	73	7	0	255	2	0
20	Σ Li Instantaneous power factor	1	0	13	7	0	255	2	0
21	Σ Li Average Power Factor [Total](for a current billing period)	1	0	13	0	0	255	2	0
22	Σ Li Average Power Factor [Rate 1](for a current billing period)	1	0	13	0	1	255	2	0
23	Σ Li Average Power Factor [Rate 2](for a current billing period)	1	0	13	0	2	255	2	0



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Normal Display List									
No	Contents to display	Item to display (8 Bytes)							
		B1	B2	B3	B4	B5	B6	B7	B8
24	Σ Li Average Power Factor [Rate 3](for a current billing period)	1	0	13	0	3	255	2	0
25	Σ Li Average Power Factor [Rate 4](for a current billing period)	1	0	13	0	4	255	2	0
26	Instantaneous supply frequency	1	0	14	7	0	255	2	0
27	Meter serial number	0	0	96	1	0	255	2	0
28	Firmware version	1	0	0	2	0	255	2	0
29	Σ Li Instantaneous import active power (QI+QIV)	1	0	1	7	0	255	2	0
30	Σ Li Instantaneous import reactive power (QI+QII)	1	0	3	7	0	255	2	0
31	Σ Li Instantaneous import apparent power (QI+QIV)	1	0	9	7	0	255	2	0
32	Σ Li Import active average demand (QI+QIV)	1	0	1	4	0	255	2	0
33	Σ Li Import reactive average demand (QI+QII)	1	0	3	4	0	255	2	0
34	Σ Li Import apparent average demand (QI+QIV)	1	0	9	4	0	255	2	0
35	Σ Li Import active maximum demand (QI+QIV)	1	0	1	6	0	255	2	0
36	Date of Σ Li import active maximum demand(QI+QIV)	1	0	1	6	0	255	5	1
37	Time of Σ Li import active maximum demand(QI+QIV)	1	0	1	6	0	255	5	6



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Normal Display List									
No	Contents to display	Item to display (8 Bytes)							
		B1	B2	B3	B4	B5	B6	B7	B8
38	Σ Li Import reactive maximum demand (QI+QII)	1	0	3	6	0	255	2	0
39	Date of Σ Li import reactive maximum demand(QI+QII)	1	0	3	6	0	255	5	1
40	Time of Σ Li import reactive maximum demand(QI+QII)	1	0	3	6	0	255	5	6
41	Σ Li Import apparent maximum demand (QI+QIV)	1	0	9	6	0	255	2	0
42	Date of Σ Li import apparent maximum demand (QI+QIV)	1	0	9	6	0	255	5	1
43	Time of Σ Li import apparent maximum demand (QI+QIV)	1	0	9	6	0	255	5	6
44	Σ Li Import reactive energy (QI+QII) [Total]	1	0	3	8	0	255	2	0
45	Σ Li Import reactive energy (QI+QII) [Rate1]	1	0	3	8	1	255	2	0
46	Σ Li Import reactive energy (QI+QII) [Rate2]	1	0	3	8	2	255	2	0
47	Σ Li Import reactive energy (QI+QII) [Rate3]	1	0	3	8	3	255	2	0
48	Σ Li Import reactive energy (QI+QII) [Rate4]	1	0	3	8	4	255	2	0
49	Σ Li Import apparent energy (QI+QIV) [Total]	1	0	9	8	0	255	2	0
50	Σ Li Import apparent energy (QI+QIV) [Rate1]	1	0	9	8	1	255	2	0
51	Σ Li Import apparent energy (QI+QIV) [Rate2]	1	0	9	8	2	255	2	0



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Normal Display List

No	Contents to display	Item to display (8 Bytes)							
		B1	B2	B3	B4	B5	B6	B7	B8
52	Σ Li Import apparent energy (QI+QIV) [Rate3]	1	0	9	8	3	255	2	0
53	Σ Li Import apparent energy (QI+QIV) [Rate4]	1	0	9	8	4	255	2	0
54	Billing period counter (VZ)	1	0	0	1	0	255	2	0
55	Load profile interval	1	0	99	1	0	255	4	0
56	Time stamp of the most recent billing	1	0	0	9	6	255	2	0
57	Date stamp of the most recent billing	1	0	0	9	7	255	2	0
58	Energy Storage Device installation date	0	0	96	6	5	255	2	1

e) Test Display List

- The default display items of the test display mode consist of the minimum items as specified in the table below.

* Notation Description in below table

- “B1 ~ B8”: Byte 1 ~ Byte 8

* Byte8 (B8) is Index number and the Description is below;

- “1” means DD/MM/YYYY
- “6” means HH:MM:SS



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Test Display List									
No	Contents to display	Item to display (8 Bytes)							
		B1	B2	B3	B4	B5	B6	B7	B8
1	Σ Li Export active energy (QI+QIV) [Total]	1	0	2	8	0	255	2	0
2	Σ Li Export active energy (QI+QIV) [Rate1]	1	0	2	8	1	255	2	0
3	Σ Li Export active energy (QI+QIV) [Rate2]	1	0	2	8	2	255	2	0
4	Σ Li Export active energy (QI+QIV) [Rate3]	1	0	2	8	3	255	2	0
5	Σ Li Export active energy (QI+QIV) [Rate4]	1	0	2	8	4	255	2	0
6	Σ Li Import active energy (QI+QIV) [Total]	1	0	1	8	0	255	2	0
7	Σ Li Import active energy (QI+QIV) [Rate1]	1	0	1	8	1	255	2	0
8	Σ Li Import active energy (QI+QIV) [Rate2]	1	0	1	8	2	255	2	0
9	Σ Li Import active energy (QI+QIV) [Rate3]	1	0	1	8	3	255	2	0
10	Σ Li Import active energy (QI+QIV) [Rate4]	1	0	1	8	4	255	2	0
11	Time	1	0	0	9	1	255	2	0
12	Date	1	0	0	9	2	255	2	0
13	Σ Li Import active energy (QI+QIV)(for a current billing period)	1	0	1	9	0	255	2	0
14	Σ Li Import reactive energy (QI+QII)(for a current billing period)	1	0	3	9	0	255	2	0



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Test Display List									
No	Contents to display	Item to display (8 Bytes)							
		B1	B2	B3	B4	B5	B6	B7	B8
15	Σ Li Import apparent energy (QI+QIV) (for a current billing period)	1	0	9	9	0	255	2	0
16	Σ Li Export active energy (QII+QIII)(for a current billing period)	1	0	2	9	0	255	2	0
17	Σ Li Export reactive energy (QIII+QIV)(for a current billing period)	1	0	4	9	0	255	2	0
18	Σ Li Export apparent energy (QII+QIII)(for a current billing period)	1	0	10	9	0	255	2	0
19	L1 Instantaneous voltage	1	0	32	7	0	255	2	0
20	L2 Instantaneous voltage	1	0	52	7	0	255	2	0
21	L3 Instantaneous voltage	1	0	72	7	0	255	2	0
22	L1 Instantaneous current	1	0	31	7	0	255	2	0
23	L2 Instantaneous current	1	0	51	7	0	255	2	0
24	L3 Instantaneous current	1	0	71	7	0	255	2	0
25	L1 Instantaneous power factor	1	0	33	7	0	255	2	0
26	L2 Instantaneous power factor	1	0	53	7	0	255	2	0
27	L3 Instantaneous power factor	1	0	73	7	0	255	2	0
28	Σ Li Instantaneous power factor	1	0	13	7	0	255	2	0



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Test Display List									
No	Contents to display	Item to display (8 Bytes)							
		B1	B2	B3	B4	B5	B6	B7	B8
29	Σ Li Average Power Factor [Total](for a current billing period)	1	0	13	0	0	255	2	0
30	Σ Li Average Power Factor [Rate 1](for a current billing period)	1	0	13	0	1	255	2	0
31	Σ Li Average Power Factor [Rate 2](for a current billing period)	1	0	13	0	2	255	2	0
32	Σ Li Average Power Factor [Rate 3](for a current billing period)	1	0	13	0	3	255	2	0
33	Σ Li Average Power Factor [Rate 4](for a current billing period)	1	0	13	0	4	255	2	0
34	Instantaneous supply frequency	1	0	14	7	0	255	2	0
35	Meter serial number	0	0	96	1	0	255	2	0
36	Firmware version	1	0	0	2	0	255	2	0
37	Σ Li Instantaneous import active power (QI+QIV)	1	0	1	7	0	255	2	0
38	Σ Li Instantaneous import reactive power (QI+QII)	1	0	3	7	0	255	2	0
39	Σ Li Instantaneous import apparent power (QI+QIV)	1	0	9	7	0	255	2	0
40	Σ Li Import active average demand (QI+QIV)	1	0	1	4	0	255	2	0
41	Σ Li Import reactive average demand (QI+QII)	1	0	3	4	0	255	2	0
42	Σ Li Import apparent average demand (QI+QIV)	1	0	9	4	0	255	2	0



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Test Display List									
No	Contents to display	Item to display (8 Bytes)							
		B1	B2	B3	B4	B5	B6	B7	B8
43	Σ Li Import active maximum demand (QI+QIV)	1	0	1	6	0	255	2	0
44	Date of Σ Li import active maximum demand(QI+QIV)	1	0	1	6	0	255	5	1
45	Time of Σ Li import active maximum demand(QI+QIV)	1	0	1	6	0	255	5	6
46	Σ Li Import reactive maximum demand (QI+QIV)	1	0	3	6	0	255	2	0
47	Date of Σ Li import reactive maximum demand (QII+QIII)	1	0	3	6	0	255	5	1
48	Time of Σ Li import reactive maximum demand (QII+QIII)	1	0	3	6	0	255	5	6
49	Σ Li Import apparent maximum demand (QI+QIV)	1	0	9	6	0	255	2	0
50	Date of Σ Li import apparent maximum demand (QI+QIV)	1	0	9	6	0	255	5	1
51	Time of Σ Li import apparent maximum demand (QI+QIV)	1	0	9	6	0	255	5	6
52	Σ Li Import reactive energy (QI+QII) [Total]	1	0	3	8	0	255	2	0
53	Σ Li Import reactive energy (QI+QII) [Rate1]	1	0	3	8	1	255	2	0
54	Σ Li Import reactive energy (QI+QII) [Rate2]	1	0	3	8	2	255	2	0
55	Σ Li Import reactive energy (QI+QII) [Rate3]	1	0	3	8	3	255	2	0
56	Σ Li Import reactive energy (QI+QII) [Rate4]	1	0	3	8	4	255	2	0



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Test Display List									
No	Contents to display	Item to display (8 Bytes)							
		B1	B2	B3	B4	B5	B6	B7	B8
57	Σ Li Import apparent energy (QI+QIV) [Total]	1	0	9	8	0	255	2	0
58	Σ Li Import apparent energy (QI+QIV) [Rate1]	1	0	9	8	1	255	2	0
59	Σ Li Import apparent energy (QI+QIV) [Rate2]	1	0	9	8	2	255	2	0
60	Σ Li Import apparent energy (QI+QIV) [Rate3]	1	0	9	8	3	255	2	0
61	Σ Li Import apparent energy (QI+QIV) [Rate4]	1	0	9	8	4	255	2	0
62	Σ Li Export reactive energy (QIII+QIV) [Total]	1	0	4	8	0	255	2	0
63	Σ Li Export reactive energy (QIII+QIV) [Rate1]	1	0	4	8	1	255	2	0
64	Σ Li Export reactive energy (QIII+QIV) [Rate2]	1	0	4	8	2	255	2	0
65	Σ Li Export reactive energy (QIII+QIV) [Rate3]	1	0	4	8	3	255	2	0
66	Σ Li Export reactive energy (QIII+QIV) [Rate4]	1	0	4	8	4	255	2	0
67	Σ Li Export apparent energy (QI+QIV) [Total]	1	0	10	8	0	255	2	0
68	Σ Li Export apparent energy (QI+QIV) [Rate1]	1	0	10	8	1	255	2	0
69	Σ Li Export apparent energy (QI+QIV) [Rate2]	1	0	10	8	2	255	2	0
70	Σ Li Export apparent energy (QI+QIV) [Rate3]	1	0	10	8	3	255	2	0



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Test Display List

No	Contents to display	Item to display (8 Bytes)							
		B1	B2	B3	B4	B5	B6	B7	B8
71	Σ Li Export apparent energy (QI+QIV) [Rate4]	1	0	10	8	4	255	2	0
72	Billing period counter (VZ)	1	0	0	1	0	255	2	0
73	Load profile interval	1	0	99	1	0	255	4	0
74	Time stamp of the most recent billing	1	0	0	9	6	255	2	0
75	Date stamp of the most recent billing	1	0	0	9	7	255	2	0
76	Storage Device installation date	1	0	96	6	5	255	2	1

6.9.2. Meter display control

The meter display control objects are used to setting and reading the meter's display (LCD) operation mode.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
LCD time-to-return to default screen	0	1	94	96	22	255	Data (class id: 1, version: 0)
LCD auto scroll time	0	1	94	96	23	255	Data (class id: 1, version: 0)
LCD night off option	0	1	94	96	24	255	Data (class id: 1, version: 0)
Start-stop time setting of LCD night off	0	96	94	96	25	255	Data (class id: 1, version: 0)

1) Attributes description of the objects "LCD time-to-return to default screen"

Data	Class_id = 1, version = 0
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Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Unsigned (value in seconds) [default: 10, programmable range: 1-255]	-	R	R/W	R/W

2) Attributes description of the objects "LCD auto scroll time"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Unsigned (value in seconds) [default: 2, programmable range: 1 -255]	-	R	R/W	R/W

3) Attributes description of the objects "LCD night off option"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Boolean [default: True = Enabled, False = Disabled (default)]	-	R	R/W	R/W

[Note] By using this option the LCD will be OFF from 08:00 PM to 04:00 AM, during this OFF time if any Push Button pressed, it shall be ON for a period of 5 minutes.

4) Attributes description of the objects "start-stop time setting of LCD night off"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			



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		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	visual-string (size (4 byte))	-	R	R/W	R/W

[Note] The start/stop time of LCD OFF shall be configurable. The default value of start time and stop time (08:00 PM to 04:00 AM) shall be set as “2004”.

6.9.3. Remote output relay control

The remote output relay control object is modeled by the “Disconnect control” IC (class id: 70, version: 0). This object manages operation methods of the output relay to which the magnetic switch is connected. The relay disconnection control object is modeled by the “script table” IC (class id: 9, version: 0) and the object controls the action of the meter output relay. The other objects are modeled by the “Data” IC (class id: 1, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Disconnect control (Output relay control)	0	0	96	3	10	255	Disconnect control (class id: 70, version: 0)
Disconnect control Script table	0	0	10	0	106	255	Script table (class id: 9, version: 0)
State of output relay control signals (ON/OFF)	0	0	96	3	2	255	Data (class id: 1, version: 0)
Selection of the input control signals	0	96	94	96	8	255	Data (class id: 1, version: 0)
Auto recovery operation times of current over limit	0	96	94	96	9	255	Data (class id: 1, version: 0)
Auto recovery times setting of current over limit	0	96	94	96	10	255	Data (class id: 1, version: 0)
Release times of current over limit setting	0	96	94	96	11	255	Data (class id: 1, version: 0)

* Disconnect and reconnect can be requested:

- Remotely, via a communication channel: remote_disconnect, remote_reconnect;
- Manually, using e.g. a push button: manual_disconnect, manual_reconnect;
- Locally, by a function of the meter using over current limiter: local_disconnect, local_reconnect.

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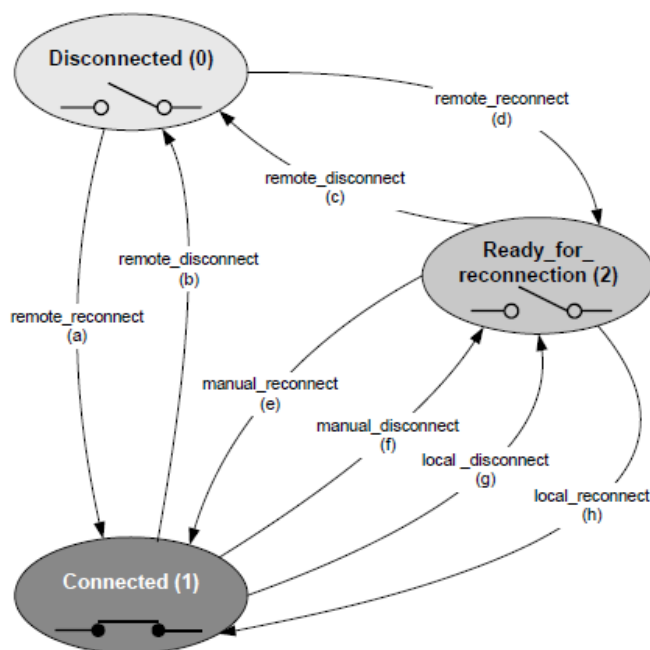


Figure 8 – State Diagram of the Disconnect Control Object

control _mode	Disconnection				Reconnection			
	Remote		Manual	Local	Remote		Manual	Local
enum:	(b)	(c)	(f)	(g)	(a)	(d)	(e)	(h)
(0)	–	–	–	–	–	–	–	–
(1)	x	x	x	x	–	x	x	–
(2)	x	x	x	x	x	–	x	–
(3)	x	x	–	x	–	x	x	–
(4)	x	x	–	x	x	–	x	x
(5)	x	x	x	x	–	x	x	x
(6)	x	x	–	x	–	x	x	x
NOTE 3 In Mode (0) the disconnect control object is always in 'connected' state.								
NOTE 4 Local disconnection is always possible unless the corresponding trigger is inhibited.								

Relay control mode table

[Note]:

Local (h) in reconnection is added as superseding to DLMS control mode table.



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1) Attributes description of the object “Disconnect control”

2) Attributes description of the object “Disconnect control”

Disconnect control		Class_id = 70, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. output_state	Boolean [TRUE = Closed, FALSE = Open]	-	R	R	R
3. control_state	Enum (0) Disconnected, (1) Connected, (2) Ready_for_reconnection	-	R	R	R
4. control_mode	Enum (4) Disconnection: Remote (b, c), local (g) Reconnection: Remote (a), manual (e), local (h)	-	-	R/W	R/W
Methods					
1. remote_disconnect()		-	-	A	A
2. remote_reconnect()		-	-	A	A

3) Attributes description of the object “Script table”

Script table		Class_id = 9, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. scripts	array (see below)	-	-	-	R
Methods					
1. execute	long-unsigned	-	-	-	-

a) The method (execute) of the object “Disconnect control script table” is triggered by

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script_identifier (long-unsigned: 18). The script_identifier is designated as the following table.

Script_identifier (two bytes)	Execution
0x0001	Relay trigger (Disconnect)
0x0010	Relay trigger (Reconnect)

4) Attributes description of the object "State of output relay control signals (ON/OFF)"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	boolean [TRUE = Closed, FALSE = Open]	-	R	R/W	R/W

[Note] Output relay state transition table, before and after the remote commands as below:

Before command		Command	After command		Remark
Disconnect Relay Control	Relay Output State		Disconnect Relay Control	Relay Output State	
Connected	Close	Remote disconnect	Disconnected	Open	-
Connected	Close	Remote reconnect	Connected	Close	Error msg
Connected	Open	Abnormal status (Meter should not be in this state)			
Disconnected	Open	Remote disconnect	Disconnected	Open	Error msg
Disconnected	Open	Remote reconnect	Ready for Reconnection	Open	-
Disconnected	Close	Abnormal status (Meter should not be in this state)			
Ready for Reconnection	Open	Remote disconnect	Disconnected	Open	-
Ready for Reconnection	Open	Remote reconnect	Ready for Reconnection	Open	Error msg



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Ready for Reconnection	Close	Abnormal status (Meter should not be in this state)
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5) Attributes description of the object "Selection of the input control signals"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	unsigned (default: 3)	-	R	R/W	R/W

* "value" " value = 0: Disable all(Remotely, Manually, Locally & Current over limit threshold), value = 1: Current over limit threshold only, value = 2: Remote & manual only, value = 3:Enable all(Remotely, Manually, Locally and Current over limit threshold), value = 4: Reserved.

[Note]

Selection of input control signals does not have any impact on opening and closing of relay due to high temperature relay operations.

6) Attributes description of the object "Auto Recovery Operation Times of current over limit"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Long unsigned	-	R	R	R

* "Value" is the number of times counted when the current value goes beyond the current over limit threshold. "Auto Recovery Operation Times of current over limit" is the number of events of the real operation.

7) Attributes description of the object "Auto Recovery Times Setting of current over limit"

Data	Class_id = 1, version = 0
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Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Long unsigned	-	R	R/W	R/W

* “Value” is the auto recovery times setting which will limit the auto recovery operation up to the setting value [default: one (1) value setting range: 0 ~ 1000]. If the auto recovery operations go beyond the setting value, the output relay shall be disconnected (not operated any more before resetting). Value 0 = no limitation of the auto recovery times

For Example: - If auto recovery times setting of current over limit setting value is three, the output relay will operate 3 times before permanent disconnection on the fourth time.

[Note]: -

- 1.If the auto recovery times setting of current over limit setting value is configured, the relay shall return to connected state.
2. After operation of note 1, the “Auto Recovery Operation Times of current over limit” shall set to Zero value.

8) Attributes description of the object “Release Times of Current Over Limit Setting”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Long unsigned	-	R	R	R

* “Value” is “the Number of Release Times of Current Over Limit Setting” counted, whenever “Auto recovery times setting of current over limit” is released. In this case, the current over limit function shall be released.

6.9.4. Commands for meter operation

The commands for meter operation objects hold the lists of executed scripts for meter operational commands. The objects are modeled by the “Script Table” IC (class id: 9, version: 0).

The “Global Meter Reset” object is used for resetting the meter in one command. The ‘reset’ in this context means ‘to set all values of registers and internal memories to their default values. The default

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values for attributes of all objects are zero values in most cases unless the default values are set to specific values in this specification.

The “Meter Program Configuration” objects is used for configuring (reading, deleting, reserving and deleting) the meter program. The ‘program’ in this context indicates the sets of meter parameters, schedules, etc. In this clause, the list of items in the ‘program’ is specified.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Global Meter Reset	0	0	10	0	0	255	Script Table (class id: 9, version: 0)
Reset configuration word	0	0	96	52	75	255	Data (class id: 1, version: 0)
Meter Program Configuration	0	1	94	96	10	255	Script Table (class id: 9, version: 0)
Meter Program Configuration Status	0	1	94	96	11	255	Data (class id: 1, version: 0)

1) Attributes description of the objects “Global Meter Reset”

Script table		Class_id = 9, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. scripts	array (see below)	-	R	R	R
Methods					
1. execute	long-unsigned	-	-	-	A

a) “script_identifier” for Global Meter Reset

- Holds a list of meter operational commands, where “script_identifier” of the “scripts” identifies the commands to be executed. Each script identifier and the corresponding command are specified in the tables below.
- It works as a command to reset the meter, initializing metering data and meter configuration such as the regular date for reading or TOU.

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- In order to allow the selection and editing of the Parameters which have to be included in the Global Meter Reset command, it is mandatory to include the “delete” method (as defined in the DLMS UA Blue Book) in all these parameters. Parameters to be included can be checked in as depicted in the WC Meter Specification Last Version

2) Attributes description of the objects “Reset configuration word”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R
2. value	Double_long_unsigned		R	R/W	R/W

Set the Reset configuration word before execute Global Meter Reset , execute only the items that have been configured in the Reset configuration word.

Reset configuration word for Global Meter Reset	
Bit	Meaning
0	Energy registers are cleared
1	Energy profile data are cleared.
2	Maximum demand profile data are cleared.
3	EOB profile data are cleared.
4	Load Profile data are cleared.
5	All Event Logs, status information and GPS data register are cleared.
6	All Special Days are cleared.
7	All Maximum RMS registers are cleared.
8	Meter Configuration files are set to their default.
9	Top Cover open on LCD display “OPENED” Cleared.
10	Daily and Monthly Single Actions are set to their default.

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Reset configuration word for Global Meter Reset

Bit	Meaning
11	Demand registers parameters are set to their default.
12	Meter reading parameters are set to their default.
13	All threshold registers are set to their default.
14	Normal and Test Display Lists are set to their default.
15	All HDLC and Optical Communication parameters are set to their default.
16	RTC data is kept the current Date & Time (no initialization).
17	CT Open detection is disabled (This is used for CT/VT meter, while WC meter do not carry out this)
18	All relay parameters are set to their default.
19	Reserved
20	Reserved
21	Reserved
22	Reserved
23	Reserved
24	TOUs (tariff) are kept.
25	Average, maximum and THD values (currents, voltages) are cleared
26	Reserved
27	Reserved
28	Reserved
29	Reserved
30	Reserved
31	Reserved



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3) Attributes description of the objects “Meter Program Configuration”

Script table		Class_id = 9, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. scripts	array (see below)	-	R	R	R
Methods					
1. execute	long-unsigned	-	-	A	A

a) “script_identifier” for Meter Program Configuration

Script_identifier for Meter Program Configuration	
Script_identifier (2 bytes)	Meaning
0x0001	Meter program download mode
0x0002	Activating Passive meter program
0x0003	Reading Active meter program
0x0004	Reserving activation of Passive meter program
0x0005	Reading Passive meter program
0x0006	Deleting Passive meter program
0x0007	Normal operation mode
0x0008	Reserved
0x0009	Reserved
0x0010	Reserved

A. Meter program download mode

- It is a command to inform the meter of the beginning of download mode of the meter program such as the regular date for reading or TOU, and the meter program will be input to meter after giving this command. After this command the clients (HHU,



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DCU or HES Server) can send the "set command (or download program)" to the meters, and accordingly the meters accept and apply the register's setting values into the registers.

B. Activating Passive meter program

- It is a command to activate a meter program which has been downloaded to the meter. If this command is given after downloading a meter program, the meter will run by the meter program recently downloaded. After this command, the meters will run by the newly applied setting values (or the downloaded program).

C. Reading Active meter program

- It is a command to direct the meter to begin the reading mode of the currently running meter program (e.g. TOU or the regular date for reading). After issuing this command, a client can read out the currently running meter program from meter.

D. Reserving activation of Passive meter program

- It is a command to reserve the activation of new meter program (currently downloaded but not activated yet). If this command is issued after downloading a new meter program, the downloaded meter program will be activated at the designated date.

E. Reading Passive meter program

- It is a command to direct the meter to begin the reading mode of the Passive (reserved) meter program (e.g. TOU, the regular date for reading), the Passive meter program is readable from meter after issuing this command.

F. Deleting Passive meter program

- It is a command to delete the Passive (reserved) meter program.

G. Normal operation mode

- It is a command to turn the meter back into the normal operation mode.

b) Procedure for Meter Configuration programming

- ① The user sends a script to make the meter in download mode.
- ② The user starts sending the setting in the above table where each one is independent from each other.
- ③ If any loose of current HDLC session, the user should send the Meter Download Mode script again after the new HDLC connection established and he can continue or start from beginning.
- ④ The Order of the Messages is not required but Setting ALL MSG is required except



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special days object which is optional.

- ⑤ Confirm the setting done by putting the Mode to Reading Passive Meter Program and start reading the same OBIS.
- ⑥ The meter will check the accuracy of the settings at:
 - i. When the user send Immediate activation Method MSG
 - ii. When the user send next Program time/Date
- ⑦ And if any problem in the data the meter will do the below action:
 - i. The Meter will reject the WHOLE Passive setting and will keep the active as it is.
 - ii. The Meter keeps the Passive Setting in the EEPROM Memory for user checking.
- ⑧ The Activation with Reserving activation of Passive Meter Program will be used with DATE/TIME of NEXT METER PROGRAM CHANGE Object (0.0.96.2.6.255).

c) List of meter configuration sets

[Note] The file format of a meter program related meter configuration sets shall be specified during the development phase of the field management software for meters by the Contractor and provided to COMPANY for Approval.

No	Description	Related Object	OBIS Code
1	Threshold Value	Current over limit threshold	1.0.11.35.0.255
		Current over limit duration	1.0.11.44.0.255
		Voltage under limit threshold	1.0.12.31.0.255
		Voltage under limit duration	1.0.12.43.0.255
2	Remote output relay control	Disconnect control	0.0.96.3.10.255
3	Regular/irregular date for meter reading	EOB single action schedule	0.0.15.0.0.255
4	Meter reading parameter	Meter reading parameter	0.0.15.128.0.255
5	Load profile interval	Load profile interval	1.0.0.8.4.255
6	Passive calendar name	Activity Calendar	0.0.13.0.0.255
7	Passive season profile name		
8	Passive week profile name		



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No	Description	Related Object	OBIS Code
9	Passive day profile name		
10	Regular and Irregular Holidays	Special Days Table	0.0.11.0.0.255
11	Display List	Normal display list	0.0.21.0.1.255
		Test display list	0.0.21.0.2.255
12	Remote output relay control	Selection of the input control signals	0.96.94.96.8.255
13	Remote output relay control	Auto recovery times setting of current over limit	0.96.94.96.10.255

[Note]

- After setting the meter to be in Download Mode only, the meter will accept the list of thirteen (13) OBISs (parameters) described in the above table and these thirteen OBISs (parameters) should not be writeable/configurable outside download mode. Also, individual setting of the thirteen (13) OBISs' shall be possible. Download mode shall be capable of modifying all the parameters including the 13 parameters mentioned in the above table. Any Parameters configured outside of thirteen parameters mentioned above under download mode shall be activated immediately.
- Any change in load profile interval shall automatically change the demand integration period and vice versa.

d) Attribute description of the object "Meter Program Configuration Status"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Enum (see below)	-	R	R	R

Enum	Description
1	Meter program download mode
2	Activating Passive meter program



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3	Reading Active meter program
4	Reserving activation of Passive meter program
5	Reading Passive meter program
6	Deleting Passive meter program
7	Normal operation mode
8	Reserved
9	Reserved
10	Reserved

6.9.5. Number/time of meter program change

The number/time of meter program change objects are modeled by the “Data” IC (class id: 1, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Number of meter program changes	0	0	96	2	0	255	Data (class id: 1, version: 0)
Date/Time of last meter program change	0	0	96	2	1	255	Data (class id: 1, version: 0)
Date/Time of next meter program change	0	0	96	2	6	255	Data (class id: 1, version: 0)

a) Attribute description of the objects “Number of meter program change”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	long-unsigned	-	R	R	R

b) Attribute description of the objects “Date/Time of last meter program change”



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Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Date_time[9] (OCTET STRING SIZE(12))	-	R	R	R

- c) Attribute description of the objects “Date/Time of next meter program change”
- The object “Date/Time of next meter program change” holds the next date and time for activating the reserved meter program mentioned in Clause 6.9.3.

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Date_time[9] (OCTET STRING SIZE(12))	-	R	R/W	R/W

6.9.6. Current active tariff

The current active tariff object is modeled by the “Data” IC (class id: 1, version: 0). This object holds the current active tariff period number (TOU number).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Current tariff	0	0	96	14	0	255	Data (class id: 1, version: 0)

- 1) Attribute description of the objects “Current active tariff”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R



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2. value	unsigned [8] value = 1: Tariff 1, value = 2: Tariff 2 value = 3: Tariff 3, value = 4: Tariff 4 value = 5: Tariff 5, value = 6: Tariff 6 value = 7: Tariff 7, value = 8: Tariff 8	-	R	R	R
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6.9.7. Error Registers

The error registers are modeled by the “Data” IC (class id: 1, version: 0). These objects are used for self-diagnosis purposes and being recorded into the event logs. The error registers have to be defined together with the vendor

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Error Register 1	0	0	97	97	0	255	Data (class id: 1, version: 0)
Error Register 2	0	0	97	97	1	255	Data (class id: 1, version: 0)
Error Register 3	0	0	97	97	2	255	Data (class id: 1, version: 0)
Error Register 4	0	0	97	97	3	255	Data (class id: 1, version: 0)
Error Register 5	0	0	97	97	4	255	Data (class id: 1, version: 0)
Error Register 6	0	0	97	97	5	255	Data (class id: 1, version: 0)
Error Register 8	0	0	97	97	7	255	Data (class id: 1, version: 0)
Error Register 9	0	0	97	97	8	255	Data (class id: 1, version: 0)
Error Register 10	0	0	97	97	9	255	Data (class id: 1, version: 0)

[Note] The EventNotification function shall be activated by error registers above. Thus, when the errors defined in those error registers occur, the meter shall trigger the ‘Push script table’ (refer to Section 6.11 Push objects) to send the events to client without receiving request.

1) Attribute description of the objects “Error registers”



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Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	bit-string	-	R	R	R

2) Bit-wise status mapping of the attribute “value” of each object

[Note]

1. In event of relevant status, the corresponding bit will be set to 1 in binary system. When the error event is resolved, the corresponding bit is returned to zero.
2. These error registers are captured into the “Event Log” objects (Interface Class: Profile generic) whenever their status is changed (set to ‘1’ and return to zero).
3. Each bit of Error Registers shall detect each error state separately (sharing the same sensor is not acceptable).

a) Error Register 1

MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB
-	GPS location changed	GMR	Password changed	Meter initialization	Low/Failure Storage Device	Memory error	Clock initialization

b) Error Register 2

MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB
-	Current Missing (L3)	Current Missing (L2)	Current Missing (L1)	Missing neutral line connection	Voltage cut (L3)	Voltage cut (L2)	Voltage cut (L1)

[Note]

1. If the meter has three normal voltage values with all "0" current phase values (a certain threshold value, e.g. under 0.001A), then the meter shall not make any Current Missing event (no energy consumption). In case, any one or two current phases have some current values (e.g. over starting current) and the other current phase (s) have "0" current phase values (e.g. under starting current) with normal voltage values, then the meter shall make Current Missing event (s) to the "0" current phase (s) using its internal program.

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2. The range of Voltage Cut is 0V ~ below 30V.

c) Error Register 3

MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB
Top cover open	Terminal cover open	Phase and neutral wire swapped (L3)	Phase and neutral wire swapped (L2)	Phase and neutral wire swapped (L1)	Reverse current (L3)	Reverse current (L2)	Reverse current (L1)

d) Error Register 4

MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB
$\sum$ Li PF under limit threshold export	$\sum$ Li PF under limit threshold import	Low voltage (L3)	Low voltage (L2)	Low voltage (L1)	Over current (L3)	Over current (L2)	Over current (L1)

[Note] 1. The duration of $\sum$ Li PF under limit threshold (bit 6) is same as LP/Demand period.

2. The range of Low Voltage is 30V ~ Threshold value.

e) Error Register 5

MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB
Wrong password tried (3 times)	Magnetic interference detected	Phase-neutral bypassing (L3-N)	Phase-neutral bypassing (L2-N)	Phase-neutral bypassing (L1-N)	Phase sequence reversal (L1-L2)	Phase sequence reversal (L1-L3)	Phase sequence reversal (L2-L3)

f) Error Register 6

MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB
-	Harmonics Limit (current)	Swell limit	Sag limit	Harmonics Limit (voltage)	Maximum current	Output relay disconnected	Temperature over limit

g) Error Register 8



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MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB
-	-	Top cover restored	Terminal cover restored	Voltage cut (L3) restored	Voltage cut (L2) restored	Voltage cut (L1) restored	Memory error restored

h) Error Register 9

MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB
-	-	-	-	Output relay Reconnected	Phase-neutral bypassing (L3-N) restored	Phase-neutral bypassing (L2-N) restored	Phase-neutral bypassing (L1-N) restored

i) Error Register 10

MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB
ECB Tripped	ECB Connected	ECB Disconnected	ECB Manual	ECB Auto	ECB Tampered	ECB Tamper restored	ECB Malfunction

[Note] 1. ECB Tampered: - wire cut (RS-485 and Wire cut will be detected by both ECB & meter,
 2. ECB Malfunction: - The ECB Electrical or Electronic circuit and motor are not working.
 3. Voltage Cut logic (less than 100V) shall be handled by meter. e.g if ECB has less than 100V and meter has instantaneous voltage more than 100 V, then ECB Tampered bit 1.

6.9.8. Number of Events

These objects are defined to represent number information of meter events. These objects are not access directly, but recorded into the event logs.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Number of power failures (in all three phases)	0	0	96	7	0	255	Data (class id: 1, version: 0)
Number of power failures (Phase L1)	0	0	96	7	1	255	Data (class id: 1, version: 0)



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Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Number of power failures (Phase L2)	0	0	96	7	2	255	Data (class id: 1, version: 0)
Number of power failures (Phase L3)	0	0	96	7	3	255	Data (class id: 1, version: 0)
Number of power restore (in all three phases)	0	1	94	96	3	255	Data (class id: 1, version: 0)
Number of power restore (Phase L1)	0	1	94	96	4	255	Data (class id: 1, version: 0)
Number of power restore (Phase L2)	0	1	94	96	5	255	Data (class id: 1, version: 0)
Number of power restore (Phase L3)	0	1	94	96	6	255	Data (class id: 1, version: 0)
Number of clock change	0	0	96	11	1	255	Data (class id: 1, version: 0)
Number of EOB reset	0	0	96	11	2	255	Data (class id: 1, version: 0)
Number of manual reset	0	0	96	11	3	255	Data (class id: 1, version: 0)
Number of auto-reset	0	0	96	11	4	255	Data (class id: 1, version: 0)
Number of Current Missing	0	0	96	11	5	255	Data (class id: 1, version: 0)
Number of top cover open	0	0	96	11	6	255	Data (class id: 1, version: 0)
Number of terminal cover open	0	0	96	11	7	255	Data (class id: 1, version: 0)
Number of phase-neutral swap	0	0	96	11	8	255	Data (class id: 1, version: 0)
Number of reverse current	0	0	96	11	9	255	Data (class id: 1, version: 0)
Number of magnetic interference tampering	0	0	96	11	10	255	Data (class id: 1, version: 0)
Number of phase-neutral bypassing	0	0	96	15	0	255	Data (class id: 1, version: 0)
Number of phase sequence reversal	0	0	96	15	1	255	Data (class id: 1, version: 0)
Number of neutral line missing	1	0	91	40	0	255	Data (class id: 1, version: 0)



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Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Number of voltage cut	1	0	12	40	0	255	Data (class id: 1, version: 0)
Number of password changes	0	0	96	15	2	255	Data (class id: 1, version: 0)
Number of state change of output relay control signals	0	96	96	4	1	255	Data (class id: 1, version: 0)
Number of selection of the input control signals	0	96	96	4	2	255	Data (class id: 1, version: 0)
Number of auto recovery operation times of current over limit	0	96	96	4	3	255	Data (class id: 1, version: 0)
Number of auto recovery times setting of current over limit	0	96	96	4	4	255	Data (class id: 1, version: 0)
Number of current over limit release	0	96	96	4	5	255	Data (class id: 1, version: 0)
Number of abnormal temperature	0	96	96	4	6	255	Data (class id: 1, version: 0)
Number of maximum current	0	96	96	4	7	255	Data (class id: 1, version: 0)
Number of harmonics limit(voltage)	0	0	96	57	91	255	Data (class id: 1, version: 0)
Number of Harmonics limit(current)	0	0	96	57	90	255	Data (class id: 1, version: 0)
Number of Sag limit	0	96	12	32	0	255	Data (class id: 1, version: 0)
Number of Swell limit	0	96	12	36	0	255	Data (class id: 1, version: 0)
Number of Global Meter Reset	0	96	94	96	15	255	Data (class id: 1, version: 0)
Number of wrong cable connection	0	96	94	96	16	255	Data (class id: 1, version: 0)

1) Attribute description of the objects "Number of ..."

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4



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1. logical_name	octet-string	-	-	R	R
2. value	long-unsigned [18]	-	-	R	R

[Note]

All values of “Number of ...” shall be reset after the last EOB reset on 1st day January of each year.

6.9.9. Data Transport Security Mode

The Data Transport Security function Enable/Disable Mode object is modeled by the “Data” IC (class id: 1, version: 0). This object is setting and reading the meter’s status whether the Data Transport Security function is enabled or disabled.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Data Transport Security Mode	0	1	94	96	12	255	Data (class id: 1, version: 0)

1) Attribute description of the objects “Data Transport Security Mode”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Boolean [TRUE = Enabled, FALSE = Disabled (default)]	-	R	R/W	R/W

6.9.10. Information security related objects

Instances of the IC “Security setup” – see 4.4.7 of DLMS Bluebook – are used to set up the message security features. For each Association object, there is one Security setup object managing security within that AA. See 5.4.4 and 5.4.5. Value group E numbers the instances.

Invocation counter objects hold the invocation counter element of the initialization vector. They are instances of the IC “Data”. The value in value group B identifies the communication channel.

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Instances of the IC “Data protection” – see 4.4.9 of DLMS Bluebook – are used to apply / remove protection on COSEM data, i.e. sets of attributes values, method invocation and return parameters. Value group E numbers the instances.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Security Setup	0	0	43	0	e	255	Push setup (class id: 64, version: 0)
Invocation Counter	0	b	43	1	e	255	Data (class id: 1, version: 0)
Data Protection	0	0	43	2	e	255	Data Protection (class id: 30, version: 0)

1) Attributes description of the objects “Security Setup”

Security Setup		Class_id = 64, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. security_policy	enum (default: 0)	-	R	R/W	R/W
3. security_suite	Enum (default: 0)	-	R	R/W	R/W
4. client_system_title	octet_string	-	R	R/W	R/W
5. server_system_title	octet_string	-	-	R	R
Methods					
1. security_activate	m	-	-	A	A
2. global_key_transfer	m	-	-	A	A

2) Attribute description of the objects “Invocation Counter”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		Public	A. 2	A. 3	A. 4
1. logical_name	octet-string	R	R	R	R



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2. value	long-unsigned	R	R	R/W	R/W
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[Note]

1. Value of "e": A2=2, A3=3, A4=4, A5=5
2. The maximum number of invocations is $2^{32}-1$
3. After reaching its max value, the reset method should be defined by HES provider.

3) Attributes description of the objects "Data Protection"

Security Setup		Class_id = 30, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. protection_buffer	octet_string	-	-	R	R/W
3. protection_object_list	array	-	-	R	R/W
4. protection_paramenter_get	array	-	-	R	R/W
5. protection_paramenter_set	array	-	-	R	R/W
6. required_protection	enum	-	-	R	R/W
Methods					
1. get_protected_attribute (data)	m	-	-	-	-
2. set_protected_attribute (data)	m	-	-	-	-
3. invoke_protected_method (data)	m	-	-	-	-

[Note] The detail attributes and methods data of Security-related OBIS codes, including detail technical specifications and Security Events shall be proposed and implemented by the Vendor. The proposed detail technical specifications shall be approved by COMPANY.

6.9.11. Temperature over limit threshold

The Residue Price object is modeled by the "Register" IC (class id: 3, version: 0).

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Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Temperature over limit threshold	0	96	128	35	0	255	Register (class id: 3, version: 0)
Temperature over limit duration	0	96	128	35	1	255	Register (class id: 3, version: 0)

1) Attributes description of the object "Temperature over limit threshold"

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	long-unsigned [default: 65]	-	R	R/W	R/W
3. scaler_unit	scaler: 0 (integer) Unit: 9 [temperature, °C]	-	R	R	R

2) Attributes description of the object "Temperature over limit duration"

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	long-unsigned [default: 5]	-	R	R/W	R/W
3. scaler_unit	scaler: 0 (integer) Unit: 7 [second, time]	-	R	R	R

6.9.12. Average Voltages and Currents

The average voltages and currents profile data are modeled by the "Profile Generic" IC (Class id=7, version: 1).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	



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Average Voltages and Currents Profile	1	96	99	13	0	255	Profile Generic (Class id=7, version: 1)
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1) Attributes description of the object “Average Voltages and Currents Profile”

* For reading a part of elements stored in buffer, use method “entry_descriptor” of selective access.

Profile generic		Class_id = 7, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. buffer	array	-	R	R	R
3. capture_objects	array (See below table)	-	R	R	R/W
4. capture_period	double-long-unsigned [unit: minute] Programmable (default: 15)	-	R	R	R
5. sort_method	enum (Default: (1) FIFO (first in first out))	-	-	R	R
6. sort_object	No object to sort by (Default)	-	-	R	R
7. entries_in_use	double-long-unsigned	-	R	R	R
8. profile_entries	double-long-unsigned [larger than 288: 15 minutes, three (3) days, (record 96 per one (1) day)]	-	-	R	R

2) Capture_objects description of the object “Average Voltages and Currents Profile”

Capture_objects	Logical_name	Attribute_index	Data_index
Current date/time	0.0.1.0.0.255	2	0
R-N Phase average voltage	1.0.32.128.0.255	2	0
R Phase instantaneous voltage THD	1.0.32.7.124.255	2	0
R Phase voltage THD	1.63.32.24.124.255	2	0
R Phase average current	1.0.31.5.0.255	2	0
R Phase current THD	1.63.31.24.124.255	2	0
Y-N Phase average voltage	1.0.52.128.0.255	2	0
Y Phase instantaneous voltage THD	1.0.52.7.124.255	2	0
Y Phase voltage THD	1.63.52.24.124.255	2	0



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Capture_objects	Logical_name	Attribute_index	Data_index
Y Phase average current	1.0.51.5.0.255	2	0
Y Phase current THD	1.63.51.24.124.255	2	0
B-N Phase average voltage	1.0.72.128.0.255	2	0
B Phase instantaneous voltage THD	1.0.72.7.124.255	2	0
B Phase voltage THD	1.63.72.24.124.255	2	0
B Phase average current	1.0.71.5.0.255	2	0
B Phase current THD	1.63.71.24.124.255	2	0

[Note]

1. The Average Voltages and Currents Profile object captures “the attribute 2” of each register in above table (capture objects).
2. Capture_period shall be as per the “Average Voltages and Currents Profile Interval”
- 3) Attributes description of the objects average voltages, instantaneous voltage THDs and average currents.

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned	-	R	R/W	R/W
3. scaler_unit	[Ampere] Scaler: -3 (integer), Unit: 33 [A] [Voltage] Scaler: -3 (integer), Unit: 35 [V] [Voltage & Current THD] Scaler: 0 (integer), Unit: 56 [%, percentage]	-	R	R	R

6.9.13. Average Voltages and Currents Profile Interval

This object holds the interval recording duration for the average voltages and currents profile.



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Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Average Voltages and Currents Profile Interval	1	96	128	0	12	255	Register
1) Attributes description of the object “Average Voltages and Currents Profile Interval”							
Register					Class_id = 3, version = 0		
Attributes	Data type & Description	Access right					
		-	A. 2	A. 3	A. 4		
1. logical_name	octet-string	-	R	R	R		
2. value	unsigned default value: 15 minutes (configurable among 5, 15, 30, 60 minutes)	-	R	R/W	R/W		
3. scaler_unit	scaler: 0 (integer) unit: 6 [minute, time]	-	R	R	R		
6.9.14. Sag Setting Value							
The sag setting value data is modeled by the “Register” IC (Class id=3, version: 0).							
Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Sag setting Lower Limit value	1	96	12	31	0	255	Register (Class id=3, version: 0)
Sag setting Upper Limit value	1	96	12	32	0	255	Register (Class id=3, version: 0)
1) Attributes description of the object “Sag setting value”							
Register					Class_id = 3, version = 0		
Attributes	Data type & Description	Access right					
		-	A. 2	A. 3	A. 4		
1. logical_name	octet-string	-	R	R	R		
2. value	unsigned	-	R	R/W	R/W		



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3. scaler_unit	scaler: 0 (integer) unit: 56 [%, percentage]	-	R	R	R
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6.9.15. Sag Setting Time

The sag setting time data is modeled by the “Register” IC (Class id=3, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Sag setting Time	1	96	12	33	0	255	Register (Class id=3, version: 0)

1) Attributes description of the object “Sag setting time”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Unsigned (default: 5 seconds) (configurable among 1, 5, 10, 15, 30, 60 seconds)	-	R	R/W	R/W
3. scaler_unit	scaler: 0 (integer) unit: 7 [second, time]	-	R	R	R

6.9.16. Swell Setting Value

The swell setting value data is modeled by the “Register” IC (Class id=3, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Swell setting Lower Limit value	1	96	12	36	0	255	Register (Class id=3, version: 0)
Swell setting Upper Limit value	1	96	12	35	0	255	Register (Class id=3, version: 0)

1) Attributes description of the object “Swell setting value”

Register	Class_id = 3, version = 0
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Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	unsigned	-	R	R/W	R/W
3. scaler_unit	scaler: 0 (integer) unit: 56 [%, percentage]	-	R	R	R

6.9.17. Swell Setting Time

The swell setting time data is modeled by the “Register” IC (Class id=3, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Swell setting Time	1	96	12	37	0	255	Register (Class id=3, version: 0)

1) Attributes description of the object “Swell setting time”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	Unsigned (default: 5 seconds) (configurable among 1, 5, 10, 15, 30, 60 seconds)	-	R	R/W	R/W
3. scaler_unit	scaler: 0 (integer) unit: 7 [second, time]	-	R	R	R

6.9.18. Magnetic Interference Detection Time

The swell setting time data is modeled by the “Register” IC (Class id=3, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	



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Magnetic Interference Detection Time	1	96	128	0	3	255	Register (Class id=3, version: 0)
---	---	----	-----	---	---	-----	--------------------------------------

1) Attributes description of the object “Magnetic Interference Detection Time”

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-unsigned	-	R	R/W	R/W
3. scaler_unit	scaler: 0 (integer) unit: 7 [second, time]	-	R	R	R

6.9.19. Instantaneous Values Profile

The instantaneous values profile data are modeled by the “Profile Generic” IC (Class id=7, version: 1).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Instantaneous Profile	1	96	98	128	0	255	Profile Generic (Class id=7, version: 1)

1) Attributes description of the object “Instantaneous values profile”

* For reading a part of elements stored in buffer, use method “entry_descriptor” of selective access.

Profile generic		Class_id = 7, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. buffer	array	-	R	R	R
3. capture_objects	array (See below table)	-	R	R	R/W



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Profile generic		Class_id = 7, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
4. capture_period	Double-long-unsigned (0: No automatic capture)	-	R	R	R
5. sort_method	Enum (Default: (1) FIFO (first in first out))	-	-	R	R
6. sort_object	No object to sort by (Default)	-	-	R	R
7. entries_in_use	double-long-unsigned	-	R	R	R
8. profile_entries	double-long-unsigned [maximum entry: 1]	-	-	R	R

2) Capture_objects description of the object “Instantaneous values Profile”

Capture_objects	Logical_name	Attribute_index	Data_index
Current date/time	0.0.1.0.0.255	2	0
R Phase instantaneous current	1.0.31.7.0.255	2	0
R Phase instantaneous voltage	1.0.32.7.0.255	2	0
R Phase instantaneous voltage THD	1.0.32.7.124.255	2	0
R Phase instantaneous power factor	1.0.33.7.0.255	2	0
R Phase voltage-current phase angle	1.0.81.7.40.255	2	0
Y Phase instantaneous current	1.0.51.7.0.255	2	0
Y Phase instantaneous voltage	1.0.52.7.0.255	2	0
Y Phase instantaneous voltage THD	1.0.52.7.124.255	2	0
Y Phase instantaneous power factor	1.0.53.7.0.255	2	0
Y Phase voltage-current phase angle	1.0.81.7.51.255	2	0
B Phase instantaneous current	1.0.71.7.0.255	2	0
B Phase instantaneous voltage	1.0.72.7.0.255	2	0
B Phase instantaneous voltage THD	1.0.72.7.124.255	2	0
B Phase instantaneous power factor	1.0.73.7.0.255	2	0
B Phase voltage-current phase angle	1.0.81.7.62.255	2	0



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Capture_objects	Logical_name	Attribute_index	Data_index
Phase angle of voltage R phase and voltage Y phase	1.0.81.7.10.255	2	0
Phase angle of voltage Y phase and voltage B phase	1.0.81.7.21.255	2	0
Phase angle of voltage B phase and voltage R phase	1.0.81.7.2.255	2	0
Current temperature	0.0.96.9.0.255	2	0

[Note] The Instantaneous Values Profile object captures “the attribute 2” of each register in above table (capture objects).

- 3) Attributes description of the objects of instantaneous currents, voltages, voltage THDs, power factor, phase angles and temperature.

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	double-long-signed	-	R	R/W	R/W
3. scaler_unit	[Ampere] Scaler: -3 (integer), Unit: 33 (A) [Voltage] Scaler: -3 (integer), Unit: 35 (V) [Voltage THD] Scaler: 0 (integer), Unit: 56 (% percentage) [Power Factor] Scaler: -3 (integer), Unit: 255 (unitless) [Phase Angle] Scaler: 0 (integer), Unit: 8 (°, degree) [Temperature] Scaler: 0 (integer), Unit: 9 (°C, degree- celsius)	-	R	R	R

6.9.20. Security Association Event



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The Security Association Event Code data is modeled by the “Data” IC (Class id=1, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Security Association Event	0	96	99	98	19	255	Data (Class id=1, version: 0)

1) Attributes description of the object “Security Association Event”.

Register		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	visual-string (size (4 byte))	-	R	R/W	R/W

[Note]

- The value shall be separated higher 2 bytes (security event code) and low 2 bytes (security error code). The value of Security Association Event shall be configured as “high two bytes (01) + low two bytes (81)”, i.e.) “0181”.

Security event code	Security error code
01- Access Security Error	00 -A2-Authentication mechanism_name_error
	01- A2 -password_error
	02- A2 -HLS_authentication_error
	03 -A3-Authentication mechanism_name_error
	04- A3 -password_error
	05- A3 -HLS_authentication_error
	06 -A4-Authentication mechanism_name_error
	07- A4 -password_error
	08- A4 -HLS_authentication_error
	09 -A5-Authentication mechanism_name_error
	10- A5 -password_error
	11- A5 -HLS_authentication_error
02-Transport Security Error	00 -A2 -Decryption Error
	01 -A3 -Decryption Error
	02 -A4 -Decryption Error
	03 -A5 -Decryption Error



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03-Security parameter change	00- MK change
	01 - A2 EK change
	02 - A2 AK change
	03 - A2 BK change
	04 - A2 password change
	05 - A3 EK change
	06 - A3 AK change
	07 - A3 BK change
	08 - A3 password change
	09 - A4 EK change
	10 - A4 AK change
	11 - A4 BK change
	12 - A4 password change
	13 - A5 EK change
	14 - A5 AK change
	15 - A5 BK change
	16 - A5 password change
04- Security mode was changed from LLS to HLS	01 - A2 Nothing to Authentication
	02 - A2 Nothing to Encryption
	03 - A2 Nothing to Authentication and Encryption
	04 - A3 Nothing to Authentication
	05 - A3 Nothing to Encryption
	06 - A3 Nothing to Authentication and Encryption
	07 - A4 Nothing to Authentication
	08 - A4 Nothing to Encryption
	09 - A4 Nothing to Authentication and Encryption
	10 - A5 Nothing to Authentication
	11 - A5 Nothing to Encryption
	12 - A5 Nothing to Authentication and Encryption
05- Security mode was changed from HLS to LLS	01 - A2 Authentication to Nothing
	02 - A2 Encryption to Nothing
	03 - A2 Authentication and Encryption to Nothing
	04 - A3 Authentication to Nothing
	05 - A3 Encryption to Nothing
	06 - A3 Authentication and Encryption to Nothing
	07 - A4 Authentication to Nothing
	08 - A4 Encryption to Nothing
	09 - A4 Authentication and Encryption to Nothing
	10 - A5 Authentication to Nothing



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06- Invocation counter is reach to maximum value (ie.4294967295).	11 - A5 Encryption to Nothing
	12 - A5 Authentication and Encryption to Nothing
	01: optical channel of Association 2
	02: RS485(GPRS port) channel of Association 2
	03: IHD port channel of Association 2
	04: optical channel of Association 3
	05: RS485(GPRS port) channel of Association 3
	06: IHD port channel of Association3
	07: optical channel of Association 4
	08: RS485(GPRS port) channel of Association 4
	09: IHD port channel of Association 4
	10: optical channel of Association 5
07- The invocation counter is mismatched during the communication (the invocation counter of software is less than the Invocation counter in the meter).	11: RS485(GPRS port) channel of Association 5
	12: IHD port channel of Association 5
08- The parameter of "Data transport security mode" was changed.	01: GUEK mode
	02: GBK mode
	00: enable to disable
	01: disable to enable

6.10. Event Log

The event log profiles are modeled by the "Profile Genetic" IC (class id: 7, version: 1).

These profile generic objects for event logging capture their capture_objects whenever any event defined in this clause occurs. The specific methods for capturing those capture_objects on an event basis shall be implemented by manufacturers.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Event log (Power failure)	1	0	99	97	0	255	Profile Generic (class id: 7, version: 1)
Event log (Power restore)	1	0	99	98	2	255	Profile Generic (class id: 7, version: 1)
Event log (Time change: from time)	1	0	99	98	3	255	Profile Generic (class id: 7, version: 1)
Event log (Time change: to time)	1	0	99	98	4	255	Profile Generic (class id: 7, version: 1)



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Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Event log (EOB reset)	1	0	99	98	5	255	Profile Generic (class id: 7, version: 1)
Event log (Manual reset)	1	0	99	98	6	255	Profile Generic (class id: 7, version: 1)
Event log (Auto-reset)	1	0	99	98	7	255	Profile Generic (class id: 7, version: 1)
Event log (Meter configuration change)	1	0	99	98	8	255	Profile Generic (class id: 7, version: 1)
Event Log (Communication port log)	1	0	99	98	9	255	Profile Generic (class id: 7, version: 1)
Event log (Storage Device /Memory)	1	0	99	98	10	255	Profile Generic (class id: 7, version: 1)
Event log (Power line cut)	1	0	99	98	11	255	Profile Generic (class id: 7, version: 1)
Event log (Tamper 1)	1	0	99	98	12	255	Profile Generic (class id: 7, version: 1)
Event log (Tamper 2)	1	0	99	98	13	255	Profile Generic (class id: 7, version: 1)
Event log (Current/voltage limit violation)	1	0	99	98	14	255	Profile Generic (class id: 7, version: 1)
Event Log (Output relay control)	1	0	99	98	15	255	Profile Generic (class id: 7, version: 1)
Event Log (Password changes)	1	0	99	98	16	255	Profile Generic (class id: 7, version: 1)
State of output relay control signals (ON/OFF)	1	96	99	98	12	255	Profile Generic (class id: 7, version: 1)
Selection of the input control signals	1	96	99	98	2	255	Profile Generic (class id: 7, version: 1)
Auto recovery operation times of current over limit	1	96	99	98	3	255	Profile Generic (class id: 7, version: 1)
Auto recovery times setting of current over limit	1	96	99	98	4	255	Profile Generic (class id: 7, version: 1)
Current over limit release	1	96	99	98	13	255	Profile Generic (class id: 7, version: 1)
Event log (Temperature over limit)	1	96	99	98	6	255	Profile Generic (class id: 7, version: 1)
Maximum current	1	96	99	98	7	255	Profile Generic



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Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
							(class id: 7, version: 1)
Harmonics (THD) Voltage limit	0	0	99	98	24	255	Profile Generic (class id: 7, version: 1)
Harmonics (THD) Current limit	0	0	99	98	23	255	Profile Generic (class id: 7, version: 1)
Sag limit	1	96	99	10	1	255	Profile Generic (class id: 7, version: 1)
Swell limit	1	96	99	10	2	255	Profile Generic (class id: 7, version: 1)
Security association Event	1	96	99	98	19	255	Profile Generic (class id: 7, version: 1)
Display Roll-Over to Zero Event	1	96	99	98	20	255	Profile Generic (class id: 7, version: 1)
Firmware Event log	1	96	99	98	11	255	Profile Generic (class id: 7, version: 1)
GPS Data	1	0	99	98	17	255	Profile Generic (class id: 7, version: 1)
ECB Data	1	0	99	98	18	255	Profile Generic (class id: 7, version: 1)

1) Attributes description of the objects "Profile Generic"

Profile generic		Class_id = 7, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. buffer	array	-	R	R	R
3. capture_objects	array (See below table)	-	R	R	R
4. capture_period	double-long-unsigned (0: No automatic capture)	-	-	R	R
5. sort_method	enum: FIFO (first in first out)	-	-	R	R
6. sort_object	No object to sort by (Default)	-	-	R	R
7. entries_in_use	double-long-unsigned	-	R	R	R



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Profile generic		Class_id = 7, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
8. profile_entries	double-long-unsigned	-	-	R	R

a) “capture_object” of each event log profiles

Classification	Capture_objects	OBIS code	Interface class	Attribute index
Event Log (Power failure)	Current date/time	0.0.1.0.0.255	Clock	2
	Number of power failure (in all three phases)	0.0.96.7.0.255	Data	2
	Number of power failure (phases L1)	0.0.96.7.1.255	Data	2
	Number of power failure (phases L2)	0.0.96.7.2.255	Data	2
	Number of power failure (phases L3)	0.0.96.7.3.255	Data	2
Event Log (Power restore)	Current date/time	0.0.1.0.0.255	Clock	2
	Number of power restore (in all three phases)	0.1.94.96.3.255	Data	2
	Number of power restore (phases L1)	0.1.94.96.4.255	Data	2
	Number of power restore (phases L2)	0.1.94.96.5.255	Data	2
	Number of power restore (phases L3)	0.1.94.96.6.255	Data	2
Event Log (Time before change)	Current date/time	0.0.1.0.0.255	Clock	2
	Number of clock change	0.0.96.11.1.255	Data	2
Event Log (Time after change)	Current date/time	0.0.1.0.0.255	Clock	2
	Number of clock change	0.0.96.11.1.255	Data	2
Event Log (EOB reset)	Current date/time	0.0.1.0.0.255	Clock	2
	Number of EOB reset	0.0.96.11.2.255	Data	2
Event Log (Manual reset)	Current date/time	0.0.1.0.0.255	Clock	2
	Number of manual reset	0.0.96.11.3.255	Data	2



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Classification	Capture_objects	OBIS code	Interface class	Attribute index
Event Log (Auto Reset)	Current date/time	0.0.1.0.0.255	Clock	2
	Number of Auto Reset	0.0.96.11.4.255	Data	2
Event Log (Meter configuration change)	Current date/time	0.0.1.0.0.255	Clock	2
	Number of meter program change	0.0.96.2.0.255	Data	2
Event Log (Communication port log)	Current date/time	0.0.1.0.0.255	Clock	2
	Number of optical port connection/disconnection	0.0.96.12.1.255	Data	2
	Communication port status change	0.0.96.12.4.255	Data	2
Event Log (Storage Device /Memory,meter init, password change ,GMR)	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 1	0.0.97.97.0.255	Data	2
Event Log (Power line cut)	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 2	0.0.97.97.1.255	Data	2
	Number of CT Open (or Current Missing)	0.0.96.11.5.255	Data	2
	Number of neutral line missing	1.0.91.40.0.255	Data	2
	Number of Current missing	0.0.96.11.5.255	Data	2
	Number of voltage cut	1.0.12.40.0.255	Data	2
Event Log (Tamper 1)	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 3	0.0.97.97.2.255	Data	2
	Number of top cover open	0.0.96.11.6.255	Data	2
	Number of terminal cover open	0.0.96.11.7.255	Data	2
	Number of phase-neutral swap	0.0.96.11.8.255	Data	2
	Number of reverse current	0.0.96.11.9.255	Data	2



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Classification	Capture_objects	OBIS code	Interface class	Attribute index
Event Log (Tamper 2)	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 5	0.0.97.97.4.255	Data	2
	Number of phase-neutral bypassing	0.0.96.15.0.255	Data	2
	Number of phase sequence reversal	0.0.96.15.1.255	Data	2
	Number of magnetic interference tampering	0.0.96.11.10.255	Data	2
Event log (Current/voltage/ Power Factor limit violation)	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 4	0.0.97.97.3.255	Data	2
Event Log (Output relay control)	Current date/time	0.0.1.0.0.255	Clock	2
	Disconnect control	0.0.96.3.10.255	Disconnect control	2
	instantaneous import active power)	1.0.1.7.0.255	Data	2
	Release times of current over limit setting	0.96.94.96.11.255	Data	2
Event Log (Password changes)	Current date/time	0.0.1.0.0.255	Clock	2
	Number of password changes	0.0.96.15.2.255	Data	2
	Current Association	0.0.40.0.0.255	Association LN	3
State of output relay control signals (ON/OFF)	Current date/time	0.0.1.0.0.255	Clock	2
	State of output relay control signals (ON/OFF)	0.0.96.3.2.255	Data	2
Selection of the input control signals	Current date/time	0.0.1.0.0.255	Clock	2
	Selection of the input control signals	0.96.94.96.8.255	Data	2
Auto recovery	Current date/time	0.0.1.0.0.255	Clock	2



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Classification	Capture_objects	OBIS code	Interface class	Attribute index
operation times of current over limit	Auto recovery operation times of current over limit	0.96.94.96.9.255	Data	2
Auto recovery times setting of current over limit	Current date/time	0.0.1.0.0.255	Clock	2
	Auto recovery times setting of current over limit	0.96.94.96.10.255	Data	2
Current over limit release	Current date/time	0.0.1.0.0.255	Clock	2
	Release times of current over limit setting	0.96.94.96.11.255	Data	2
Event Log (Temperature over limit)	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 6	0.0.97.97.5.255	Data	2
	Current Temperature	0.0.96.9.0.255	Data	2
	Number of abnormal temperature	0.96.96.4.6.255	Data	2
Event Log (Maximum current)	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 6	0.0.97.97.5.255	Data	2
	Number of Maximum current	0.96.96.4.7.255	Data	2
Event Log (Harmonics Limit (voltage))	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 6	0.0.97.97.5.255	Data	2
	Number of Harmonics Limit (voltage)	0.0.96.57.91.255	Data	2
Event Log (Sag limit)	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 6	0.0.97.97.5.255	Data	2
	Number of Sag limit	0.96.12.32.0.255	Data	2



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Classification	Capture_objects	OBIS code	Interface class	Attribute index
Event Log (Swell limit)	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 6	0.0.97.97.5.255	Data	2
	Number of Swell limit	0.96.12.36.0.255	Data	2
Event Log (Harmonics Limit (current))	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 6	0.0.97.97.5.255	Data	2
	Number of Harmonics Limit (current)	0.0.96.57.90.255	Data	2
Event Log (Security association)	Current date/time	0.0.1.0.0.255	Clock	2
	Security association Event	0.96.99.98.19.255	Data	2
Event Log (Display Roll-Over to Zero)	Current date/time	0.0.1.0.0.255	Clock	2
	Number of Roll-Over to Zero	0.0.96.11.11.255	Data	2
Firmware event log	Current date/time	0.0.1.0.0.255	Clock	2
	Firmware status	0.96.99.98.30.255	Data	2
GPS Data event log	Current date/time	0.0.1.0.0.255	Clock	2
	Error register 1	0.0.97.97.0.255	Data	2
	GPS Data	0.0.97.97.25.255	Data	2
ECB event log	Current date/time	0.0.1.0.0.255	Clock	2
	ECB data	0.0.97.97.10.255	Data	2
Firmware Status Definition	Upgrade Begin			1
	Upgrade success			4
	Verify failed			32
	Activation Failed			64

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[Note]

1. In case of Security Association Event, the event shall be logged up to maximum 255 events (FIFO).
2. Event Log (CT Bypass) is used for both CT & CTVT meter.
3. For Temperature Event Log- New event logs shall be recorded when Temperature over Limit Threshold Value is crossed and also with every '1' one degree rise in Temperature beyond Threshold Value.

WC Critical Events (Alarms & High Priority Events) List

Sr.#	Meter Data	Error registers	Push
1	Clock initialization	Error Register 1	Yes
2	Memory Error	Error Register 1	Yes
3	Low/Failure Storage Device	Error Register 1	
4	Meter initialization	Error Register 1	
5	Password Changed	Error Register 1	
6	Global meter reset	Error Register 1	
7	Voltage cut L1	Error Register 2	Yes
8	Voltage cut L2	Error Register 2	Yes
9	Voltage cut L3	Error Register 2	Yes
10	Missing neutral line connection	Error Register 2	
11	Current Missing	Error Register 2	
12	Reverse current L1	Error Register 3	
13	Reverse current L2	Error Register 3	
14	Reverse current L3	Error Register 3	
15	Phase and neutral wire swapped L1	Error Register 3	
16	Phase and neutral wire swapped L2	Error Register 3	
17	Phase and neutral wire swapped L3	Error Register 3	
18	Terminal cover open	Error Register 3	Yes
19	Top cover open	Error Register 3	Yes
20	Over current L1	Error Register 4	Yes
21	Over current L2	Error Register 4	Yes
22	Over current L3	Error Register 4	Yes
23	Low voltage L1	Error Register 4	
24	Low voltage L2	Error Register 4	
25	Low voltage L3	Error Register 4	
26	PF under limit threshold import	Error Register 4	
27	PF under limit threshold export	Error Register 4	



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WC Critical Events (Alarms & High Priority Events) List			
Sr.#	Meter Data	Error registers	Push
28	Phase sequence reversal L1	Error Register 5	
29	Phase sequence reversal L2	Error Register 5	
30	Phase sequence reversal L3	Error Register 5	
31	Phase-neutral bypassing L1	Error Register 5	Yes
32	Phase-neutral bypassing L2	Error Register 5	Yes
33	Phase-neutral bypassing L3	Error Register 5	Yes
34	Magnetic interference detected	Error Register 5	
35	Wrong password tried (3 times)	Error Register 5	
36	Temperature over limit	Error Register 6	
37	Output relay disconnected	Error Register 6	Yes
38	Maximum current	Error Register 6	
39	Harmonics Limit voltage	Error Register 6	
40	Sag limit	Error Register 6	
41	Swell limit	Error Register 6	
42	Harmonics Limit current	Error Register 6	
43	Top cover restored	Error Register 8	Yes
44	Terminal cover restored	Error Register 8	Yes
45	Voltage cut (L3) restored	Error Register 8	Yes
46	Voltage cut (L2) restored	Error Register 8	Yes
47	Voltage cut (L1) restored	Error Register 8	Yes
48	Memory error restored	Error Register 8	Yes
49	Output relay Reconnected	Error Register 9	Yes
50	Phase-neutral bypassing (L3-N) restored	Error Register 9	Yes
51	Phase-neutral bypassing (L2-N) restored	Error Register 9	Yes
52	Phase-neutral bypassing (L2-N) restored	Error Register 9	Yes
53	Phase-neutral bypassing (L1-N) restored	Error Register 9	Yes
54	ECB Tripped	Error Register 10	Yes
55	ECB Manual	Error Register 10	Yes
56	ECB Tampered	Error Register 10	Yes
57	ECB Malfunction	Error Register 10	Yes
58	ECB Connected	Error Register 10	Yes
59	ECB Disconnected	Error Register 10	Yes
60	ECB Tamper restored	Error Register 10	Yes

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[Note]

1. Above table represents the Alarms that needs to be pushed for WC meters via Alarm Filter Methodology. Communication Module and DCU alarms will be dealt separately and are not part of this document.

Alarm Filters :

Alarms filter function shall be as defined in DLMS Blue book. HES system or PC software can **configure** the Meter to push only required alarms remotely and locally.

5.4.2 Error registers, alarm registers and alarm filters – Abstract

Table 30 – OBIS codes for error registers, alarm registers and alarm filters – Abstract

Error registers, alarm registers and alarm filters – 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	

NOTE The information to be included in the error objects is not defined in this document.

Class	OBIS	Attribute	Name	Type	Length
1	0.0.97.98.11.255	2	Error register 1 alarm filter	bit_string	8
1	0.0.97.98.12.255	2	Error register 2 alarm filter	bit_string	8
1	0.0.97.98.13.255	2	Error register 3 alarm filter	bit_string	8
1	0.0.97.98.14.255	2	Error register 4 alarm filter	bit_string	8
1	0.0.97.98.15.255	2	Error register 5 alarm filter	bit_string	8
1	0.0.97.98.16.255	2	Error register 6 alarm filter	bit_string	8
1	0.0.97.98.18.255	2	Error register 8 alarm filter	bit_string	8
1	0.0.97.98.19.255	2	Error register 9 alarm filter	bit_string	8
1	0.0.97.98.20.255	2	Error register 10 alarm filter	bit_string	8

[Note]

The Bit in Filter corresponds to the Bit in Error register. The Bit position is set 1, it means to enable, otherwise the Bit position is set 0, it means to disable.



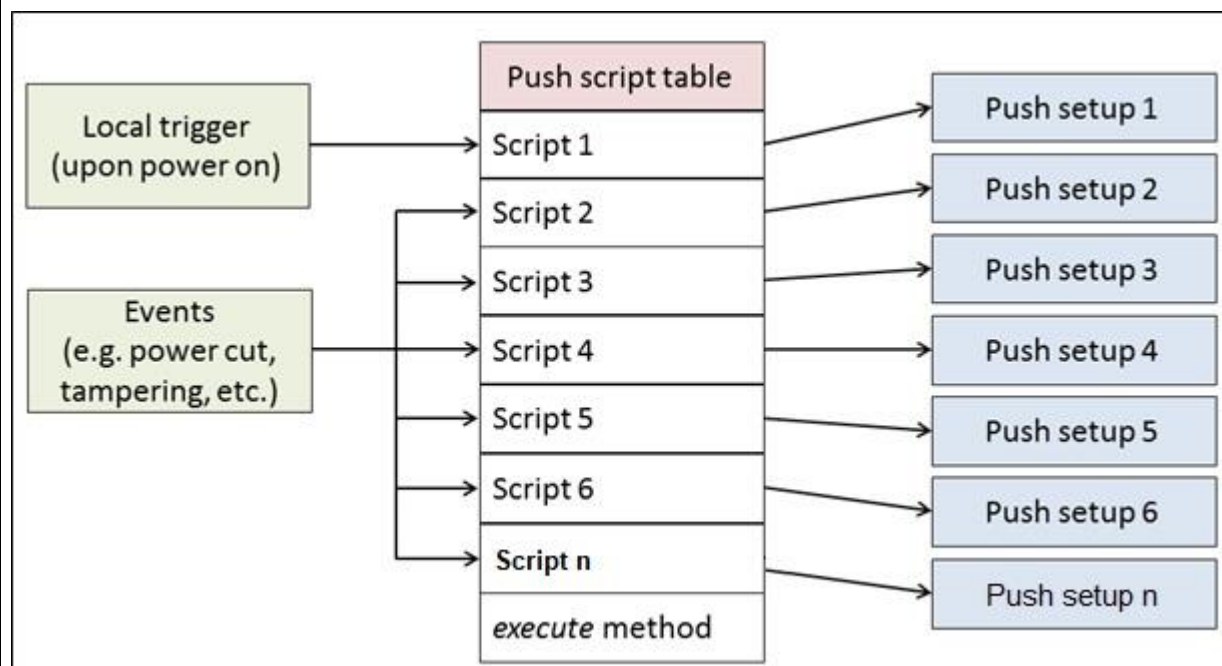
6.11. Push objects

The push objects are used when some DLMS messages can be ‘pushed’ to a destination without being explicitly requested.

The core element of modelling the push operation is the “Push setup” IC. The *push_object_list* attribute contains a list of references to COSEM object attributes to be pushed.

The local trigger (e.g. upon power on) and event trigger (e.g. error registers in Section 6.9.7) call a script entry in a Push “Script table” object which invokes then the push method of the related “Push setup” object.

e.g.) The push operation explained above is depicted in diagram below:



The "Push setup" IC contains a list of references to COSEM object attributes to be pushed. It also contains the push destination and method as well as the communication time windows and the handling of retries. And the “Push script table” object is used for activating the push setup objects by various triggers.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Push setup 1	0	1	25	9	0	255	Push setup (class id: 40, version: 0)



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Push setup 2	0	2	25	9	0	255	Push setup (class id: 40, version: 0)
Push setup 3	0	3	25	9	0	255	Push setup (class id: 40, version: 0)
Push setup 4	0	4	25	9	0	255	Push setup (class id: 40, version: 0)
Push setup 5	0	5	25	9	0	255	Push setup (class id: 40, version: 0)
Push setup 6	0	6	25	9	0	255	Push setup (class id: 40, version: 0)
Push setup 7	0	7	25	9	0	255	Push setup (class id: 40, version: 0)
Push setup 8							
Push setup 9	0	9	25	9	0	255	Push setup (class id: 40, version: 0)
Push setup 10	0	10	25	9	0	255	Push setup (class id: 40, version: 0)
Push setup 11	0	11	25	9	0	255	Push setup (class id: 40, version: 0)
Push setup 12	0	12	25	9	0	255	Push setup (class id: 40, version: 0)
Push script table	0	0	10	0	108	255	Script table (class id: 9, version: 0)

1) Attributes description of the objects "Push setup"

Push setup		Class_id = 40, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. push_object_list	array (see below)	-	-	R	R/W
3. send_destination_and_method	structure	-	-	R	R/W
4. communication_window	array (default: array [0])	-	-	R	R/W
5. randomization_start_interval	long-unsigned (default: 10 [sec])	-	-	R/W	R/W
6. number_of_retries	unsigned	-	-	R/W	R/W



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	(default: 3)				
7. repetition_delay	long_unsigned (default: 5 [sec])	-	-	R	R/W
Methods					
1. push (data)	m	-	-	-	-

[Note] If the values of both randomization_start_interval and number_of_retry are set (written) to zero (0), it means that the Push Setup shall be disabled automatically by the meter.

a) Attribute “push_object_list”

The objects which are pushed to COSEM clients are defined in this attribute.

```
array      object_definition
object_definition ::= structure
{
    class_id:    long-unsigned,
    logical_name: octet-string,
    attribute_index: integer,
    data_index:  long-unsigned
}
```

The objects to be pushed by each “push setup” object shall be configurable. However the default set is shown below:

‘Push setup’ object	Member of array (structure)				
	Object name	class_id	logical_name	attribute_index	data_index
Push setup 1	COSEM logical device name	1	0.0.42.0.0.255	2	0
Push setup 2	Error Register 1	1	0.0.97.97.0.255	2	0
Push setup 3	Error Register 2	1	0.0.97.97.1.255	2	0
Push setup 4	Error Register 3	1	0.0.97.97.2.255	2	0
Push setup 5	Error Register 4	1	0.0.97.97.3.255	2	0
Push setup 6	Error Register 5	1	0.0.97.97.4.255	2	0
Push setup 7	Error Register 6	1	0.0.97.97.5.255	2	0



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'Push setup' object	Member of array (structure)				
	Object name	class_id	logical_name	attribute_index	data_index
Push setup 8					
Push setup 9	Error Register 8	1	0.0.97.97.7.255	2	0
Push setup 10	Error Register 9	1	0.0.97.97.8.255	2	0
Push setup 11	GPS Data	1	0.0.97.97.9.255	2	0
Push setup 12	ECB Data	1	0.0.97.97.10.255	2	0

b) Attribute "send_destination_and_method"

Contains the destination address where the data specified by the *push_object_list* has to be sent, as well as the sending method.

send_destination_and_method ::= structure

```
{
    transport_service: transport_service_type,
    destination:      octet-string,
    message:          message_type
}
```

Element	Default value
transport_service	(5) HDLC
destination	0x03
message	(0) A-XDR encoded xDLMS APDU

2) Attributes description of the objects "Push script table"

Script table		Class_id = 9, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R



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2. scripts	array (see below)	-	R	R	R/W
Methods					
1. execute	long-unsigned	-	-	A	A

a) Description of 'scripts' attribute for Push script table

Script_identifier	actions				
	service_id	class_id	logical_name	index	parameter
0x0001	(2)	40	0.1.25.9.0.255	1	0
0x0002	(2)	40	0.2.25.9.0.255	1	0
0x0003	(2)	40	0.3.25.9.0.255	1	0
0x0004	(2)	40	0.4.25.9.0.255	1	0
0x0005	(2)	40	0.5.25.9.0.255	1	0
0x0006	(2)	40	0.6.25.9.0.255	1	0
0x0007	(2)	40	0.7.25.9.0.255	1	0
0x0008	(2)	40	0.8.25.9.0.255	1	0
0x0009	(2)	40	0.9.25.9.0.255	1	0
0x00010	(2)	40	0.10.25.9.0.255	1	0
0x00011	(2)	40	0.11.25.9.0.255	1	0
0x00012	(2)	40	0.12.25.9.0.255	1	0

[Note]

1. The meter will push "Push setup 1" three times and if during this the auto registration is not acknowledged then the meter will again push "push setup 1" after 24 hours for 3 times. This process will continue till the meter will get acknowledgement from HES.
2. The meter shall know which alarm(s) currently occurred and handle the frame of error register(s) accordingly, filter out the historically sent alarm(s) of error register(s) while pushing the currently occurred alarm(s).

6.12. Access Control and Management Objects**6.12.1. Association LN**

COSEM logical devices are able to establish Application Associations (AAs) within a COSEM context using LN (Logical Name) referencing, model the AAs through instances of the "Association LN" object. Refer to 5.3.2. of IEC 62056-6-2 for details. A COSEM logical device has one "Association LN" object for each AA the device is able to support. In this specification, since the



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four associations are defined,

The Association LN objects are modeled by the “Association LN” IC (class id: 15, version: 1).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Current Association	0	0	40	0	0	255	Association LN (class id: 15, version: 1)
Association LN #2	0	0	40	0	2	255	Association LN (class id: 15, version: 1)
Association LN #3	0	0	40	0	3	255	Association LN (class id: 15, version: 1)
Association LN #4	0	0	40	0	4	255	Association LN (class id: 15, version: 1)
Association LN #5	0	0	40	0	5	255	Association LN (class id: 15, version: 1)

* The “Association LN #n” objects are corresponding with the four associations which the management logical devices of the meter support (Association 2~4).

1) Attributes description of the object “Current Association”

Association LN		Class_id = 15, version = 1			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R
2. object_list	object_list_type (see below)		R	R	R
3. associated_partners_id	associated_partners_type		R	R	R
4. application_context_name	application_context_name		R	R	R
5. xDLMS_context_info	xDLMS_context_type		R	R	R
6. authentication_mechanism_name	mechanism_name		R	R	R
7. secret	octet-string		R/W	R/W	R/W
8. association_status	enum (see below)		R	R	R
9. security_setup_reference	octet-string	-	R	R	R
Specific methods	m/o				



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Association LN		Class_id = 15, version = 1			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. reply_to_HLS_authentication (data)	m				
2. change_HLS_secret (data)	m				
3. add_object (data)	m				
4. remove_object (data)	m				

2) Attributes description of the object “Association LN #2” and “Association LN #3”

Association LN		Class_id = 15, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. object_list	object_list_type (see below)	-	R	R	R
3. associated_partners_id	associated_partners_type	-	R	R	R
4. application_context_name	application_context_name	-	R	R	R
5. xDLMS_context_info	xDLMS_context_type	-	R	R	R
6. authentication_mechanism_name	mechanism_name	-	R	R	R
7. secret	octet-string		R/W	R/W	R/W
8. association_status	enum (see below)		R	R	R
9. security_setup_reference	octet-string	-	R	R	R
Specific methods	m/o				
1. reply_to_HLS_authentication (data)	m				
2. change_HLS_secret (data)	m				
3. add_object (data)	m				
4. remove_object (data)	m				



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3) Attributes description of the object “Association LN #4” and “Association LN #5”

Association LN		Class_id = 15, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. object_list	object_list_type (see below)	-	R	R	R
3. associated_partners_id	associated_partners_type	-	R	R	R
4. application_context_name	application_context_name	-	R	R	R
5. xDLMS_context_info	xDLMS_context_type	-	R	R	R
6. authentication_mechanism_name	mechanism_name	-	R	R	R
7. secret	octet-string		R	R/W	R/W
8. association_status	enum (see below)		R	R	R
9. security_setup_reference	octet-string	-	R	R	R
Specific methods	m/o				
1. reply_to_HLS_authentication (data)	m				
2. change_HLS_secret (data)	m				
3. add_object (data)	m				
4. remove_object (data)	m				

a) Attribute “object_list”

- Contains the list of visible COSEM objects with their class_id, version, logical name and the access rights to their attributes and methods within the given application association.
- In case of HLS authentication s (Assoc. 2, 3, 4 and 5), the Access Rights of each LLS association shall be the same of each HLS association with "authenticated" access mode respectively.

b) Attribute “associated_partners_id”


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- Contains the identifiers of the COSEM client and the COSEM server (logical device) application processes within the physical devices hosting these processes, which belong to the application association modeled by the “Association LN” object.
- The value of the client_SAP for each user group is described below.

User	Association Index	Client_SAP (=Client HDLC Address)	
		LLS	HLS
AMR Readers	Association 2	0x02	0x09
Utility Engineers / Management	Association 3	0x03	0x0A
Management/SEC Lab	Association 4	0x04	0x0B
Security Server	Association 5	0x05	0x0C

c) Attribute “application_context_name”

- In the COSEM environment, it is intended that an application context pre-exist and is referenced by its name during the establishment of an AA. This attribute contains the name of the application context for that association.

d) Attribute “xDLMS_context_info”

- Contains all the necessary information on the xDLMS context for the given association.

e) Attribute “authentication_mechanism_name”

- Contains the name of the authentication mechanism for the association.

CHOICE

```
{
  structure [2],
  //Data type: UNSIGNED8
  //Authorized value: 0 to 255
  //Default value: 0
  octet-string [9]
}
```

The authentication mechanism name is specified as an OBJECT IDENTIFIER in clause No.9.4.2.3.3 of the Green Book(7th Edition).



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The authentication_mechanism_name attribute includes the arc labels of the OBJECT IDENTIFIER.

No mechanism-name is required when no authentication is used.

f) Attribute “secret”

- Contains the secret for LLS authentication process (octet-string (size: 4~10 bytes)). Each secret for association 2, 3, 4 and 5 is to be provided by Contractor to COMPANY.
- LLS Association 3 (Access Right) can read/write the secret passwords for Assoc.2 and Assoc.3 (except for Assoc.4).
- LLS Association 4 (Access Right) can read/write the secret passwords for Assoc.2, Assoc.3 and Assoc.4 (Access Right of Association 5 will be the same Assoc.4).
- Contains the secret for HLS authentication process (octet-string (size: 4~10 bytes)). Each secret for association 2, 3, 4 and 5 is to be provided by Contractor to COMPANY.
- HLS Association 3 (Access Right) can read/write the secret passwords for Assoc.2 and Assoc.3 (except for Assoc.4).
- HLS Association 4 (Access Right) can read/write the secret passwords for Assoc.2, Assoc.3 and Assoc.4 (Access Right of Association 5 will be the same Assoc.4).
- Each HLS shall have the read / write Access Right for each LLS and lower level LLSs than its LLS.

g) “association_status”

- Indicates the current status of the association, which is modeled by the object.
- Enum: (0) non-associated, (1) association-pending, (2) associated

6.12.2. SAP Assignment

The SAP Assignment object is modeled by the “SAP Assignment” IC (class id: 17, version: 0).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
SAP Assignment	0	0	41	0	0	255	SAP Assignment (class id: 17, version: 0)

1) Attributes description of the object “SAP Assignment”



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SAP Assignment		Class_id = 17, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. SAP_assignment_list	asslist_type (see below)	-	R	R	R

a) Attribute “SAP_assignment_list”

- Contains the logical device name and its SAP address (server upper HDLC address)
- “SAP”: server logical device address (upper HDLC address) (long-unsigned [18])
- “logical_device_name”: octet-string (size(16 bytes))

6.12.3. COSEM logical device name

The COSEM logical device name object is modeled by the “Data” IC (class id: 1, version: 0). Each logical device of the meter has one instance of this object. However, since this specification does not specify the number of additional logical devices to be included in the meter, creating the “COSEM logical device name” objects are left to manufacturer.

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
COSEM logical device name	0	0	42	0	0	255	Data (class id: 1, version: 0)

1) Attributes description of the object “COSEM logical device name”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	visible-string (size: 16 bytes) The byte configuration is below	-	R	R	R

a) The byte configuration of the “value” is described below.



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byte 1	byte 2	byte 3	byte 4	byte 5	byte 6	byte 7	byte 8	byte 9	byte 10	byte 11	byte 12	byte 13	byte 14	byte 15	byte 16
Manufacturer identifier (issued by DLMS UA)			Year (xx)		Type (xxx)			Meter serial number (Octet-string: 8 bytes)							

- ✘ Manufactured Year uses the last two digit of the manufactured year of the meter. If the meter manufactured year is 2010, then 10 shall be used instead of xx.
- ✘ Meter Type uses the last three (3) digit of SEC Item No. If SEC Item No. is 908402101, then 101 shall be used instead of x.
e.g.) Meter ID: AEC1410100000001

6.13. Communications

6.13.1. Optical Port Setup

The Optical port setup object is modeled by the “IEC local port setup” IC (class id: 19, version: 1).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Optical port setup	0	0	20	0	0	255	IEC Local Port Setup (class id: 19, version: 1)

1) Attributes description of the objects “IEC Local Port Setup”

IEC Local Port Setup		Class_id = 19, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. default_mode	enum, default: (0)	-	R	R	R
3. default_baud	enum, default: (0) 300 baud	-	R	R	R
4. prop_baud	enum, default: (5) 9600 baud	-	R	R/W	R/W
5. response_time	enum, (0): 20 ms, (1): 200ms	-	R	R/W	R/W
6. device_addr	octet-string	-	R	R	R
7. pass_p1	octet-string	-	-	-	-



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IEC Local Port Setup		Class_id = 19, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
8. pass_p2	octet-string	-	-	-	-
9. pass_w5	octet-string	-	-	-	-

6.13.2. HDLC Setup

The Optical/RS485 HDLC Setup objects are modeled by the “IEC HDLC setup” IC (class id: 23, version: 1).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Optical HDLC setup	0	1	22	0	0	255	IEC HDLC Setup (class id: 23, version: 1)
RS485 HDLC setup	0	2	22	0	0	255	IEC HDLC Setup (class id: 23, version: 1)

1) Attributes description of the objects “Optical HDLC setup”

Profile generic		Class_id = 23, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. comm._speed	enum, default: (5) 9600 baud	-	R	R/W	R/W
3. window_size_transmit	unsigned (default: 1)	-	R	R/W	R/W
4. window_size_receive	unsigned (default: 1)	-	R	R/W	R/W
5. max_info_field_length_transmit	long-unsigned (default: 128)	-	R	R/W	R/W
6. max_info_field_length_receive	long-unsigned (default: 128)	-	R	R/W	R/W
7. inter_octet_time_out	long-unsigned (default: 25 ms)	-	R	R/W	R/W
8. inactivity_time_out	long-unsigned (default: 120 sec)	-	R	R/W	R/W



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Profile generic		Class_id = 23, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
9. device_address	long-unsigned (default: 0x0010)	-	R	R/W	R/W
2) Attributes description of the objects "RS485 HDLC setup"					
Profile generic		Class_id = 23, version = 1			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. comm._speed	enum, default: (5) 9600 baud	-	R	R/W	R/W
3. window_size_transmit	unsigned (default: 1)	-	R	R/W	R/W
4. window_size_receive	unsigned (default: 1)	-	R	R/W	R/W
5. max_info_field_length_transmit	long-unsigned (default: 128)	-	R	R/W	R/W
6. max_info_field_length_receive	long-unsigned (default: 128)	-	R	R/W	R/W
7. inter_octet_time_out	long-unsigned (default: 25 ms)	-	R	R/W	R/W
8. inactivity_time_out	long-unsigned (default: 120 sec)	-	R	R/W	R/W
9. device_address	long-unsigned (default: Physical address, refer to clause 3.2 for addressing scheme)	-	R	R/W	R/W
6.13.3. Other communications Setup					
Besides Optical Port and HDLC, other communications will be implemented using NAN (Near Area Network) technologies. Although the NAN technologies are not decided yet, each technology implemented in a meter will require their own objects and attributes. As long as the meter manufacturer provides technologies not specified in this document, the manufacturer shall provide the attributes description of the objects for the technologies implemented besides Optical Port and HDLC.					

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6.13.4. Communication Port Log

The communication port log objects are modeled by the “Data” IC (class id: 1, version: 0). These objects are used to record the number of communication port connection/disconnection and the time/date of communication port parameters change. And these objects are captured by the event log objects (profile generic objects).

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Number of optical port connection/disconnection	0	0	96	12	1	255	Data (class id: 1, version: 0)
Communication port status change	0	0	96	12	4	255	Data (class id: 1, version: 0)

1) Attribute description of the objects “Number of optical port connection”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	-	R	R
2. value	long-unsigned	-	-	R	R

2) Attribute description of the objects “Communication port status change”

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		-	A. 2	A. 3	A. 4
1. logical_name	octet-string	-	R	R	R
2. value	octet-string (1 byte)	-	R	R	R

* This object is captured into the “Event Log” objects (Interface Class: Profile generic) whenever their status is changed (set to ‘1’ and return to zero).

MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB
-	-	-	-	-	-	Serial port connected/disconnected	Optical port connected/disconnected



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* When the events of serial port and optical port connected, the corresponding bits (bit1, LSB) will be set to 1 in binary system. Then when the ports are disconnected, the corresponding bits will be reset to 0.

7. Conformance Test

To comply with the DLMS/COSEM specifications between static electronic meter for low storage device

measurement and communication modem, the certificate of “SEC-DLMS” must be acquired, and the conformance test shall be substituted by evaluation test record executed by an organization accredited by COMPANY. (That is to say, the accredited organization carries out the test on behalf of COMPANY.)

The procedure to get SEC-DLMS certificate and delivery:

- 1) The CTT certificate including detail adjoining reports.
- 2) The SEC-DLMS test certificate (or Type Test certificate) and detail adjoining reports.
- 3) The Vendor has to submit all Type Test Reports including DLMS CTT Certificate and SEC-DLMS test certificate.
- 4) The Company's Approval for Mass Production and Release of Shipment Certificate.
- 5) Then, Routine Test shall be performed for each delivery batch.

8. Tariff (TOU) Programs

The meter manufacturer shall provide the following TOU programs (Default is 8.1). Due to COMPANY's TOU policy change, if SEC requests new TOU program, then the manufacturer shall provide the requested one without additional charge to COMPANY. The followings are current COMPANY TOU programs:

8.1. Tariff Program ID (14AC0001) 01 as per 40-SDMS-02A Rev.07 (2014)

TOU	Start time	Start date	Remark
T1	12:00	1 Jan. to 31 Dec. Sat to Thursday	Peak Hours
T2	8:00	1 Jan. to 31 Dec. Sat to Thursday	Other Hours
	17:00	1 Jan. to 31 Dec. Sat to Thursday	
	9:00	1 Jan. to 31 Dec. Friday	
T3	0:00	1 Jan. to 31 Dec. All week days	Off-Peak Hours
	21:00	1 Jan. to 31 Dec. Friday	



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8.2. Tariff Program ID (13AC0001) as per 40-SDMS-02A Rev.06 (2013)

TOU	Start time	Start date	Remark
T1	12:00	1 Jan. to 31 Dec. Sat to Thursday	Peak Hours
T2	8:00	1 Jan. to 31 Dec. Sat to Thursday	Other Hours
	17:00	1 Jan. to 31 Dec. Sat to Thursday	
	9:00	1 Jan. to 31 Dec. Friday	
T3	0:00	1 Jan. to 31 Dec. All week days	Off-Peak Hours
	21:00	1 Jan. to 31 Dec. Friday	

8.3. Tariff Program ID (11AC0001) as per 40-SDMS-02A Rev.06 (2011)

TOU	Start time	Start date	Remark
T1	0:00	1-January to 30-April, All week days	Outside peak period
	0:00	1-October to 31-December, All week days	
T2	0:00	1 –May to 30-September. Sat to Thursday	Off-Peak Hours
	0:00	1 –May to 30-September. Friday	
	21:00	1 –May to 30-September. Friday	
T3	8:00	1 –May to 30-September. Sat to Thursday	Other Hours
	17:00	1 –May to 30-September. Sat to Thursday	
	9:00	1 –May to 30-September. Friday	
T4	12:00	1 –May to 30-September. Sat to Thursday	Peak Hours

9. Meter Firmware Upgrade Schedule

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
Image Activation Schedule	0	0	15	0	2	255	Data (class id: 22, version: 0)



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1) Attributes description of the object "Image Activation Schedule"

Single		Class_id = 22, version = 0			
Attributes	Data type & Description	Access right			
			A.2	A.3	A.4
1. logical_name	octet-string		R	R	R
2. executed_script	script		R	R	R
3. type	enum		R	R	R
4. execution_time	array		R	R/W	R/W

10. Global Positioning System (GPS data)

Classification	OBIS code						Interface Class
	A	B	C	D	E	F	
GPS data	0	0	97	97	25	255	(Class id: 1, version: 0)

1) Attributes description of the object "GPS Data"

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
			A. 2	A. 3	A. 4
1. logical_name	octet-string		R	R	R
2. entries	Structure		R	R	R
	structure {Longitude; Float64, Latitude;Float64, Date_time: octet- string(size(12)), }				



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[Note]

- 1 The meter shall acquire its coordinates once powered on and shall push GPS data (push setup 1
 1.1 On the midnight of first power on date or whatever the meter power on incase of power outage at midnight.
 1.2 GMR occurrence.

11. APPENDIX (A)**Protocol for reading 4G and NB Parameter**

The main parameters are as follows:

1. CSQ signal strength ONLY FOR 2G

CSQ indicates the RSSI strength, the value range is 0-31, the value is more the bigger, the signal is better.

Value less than 5, not working properly

5-10, connection establishment will be very difficult,

10-15, can be connected, but not necessarily stable,

More than 15 will be stable

If 99 appears, the channel is invalid

GSM/WCDMA/LTE/1XLTE:

$CSQ = (RSSI < \text{received signal strength DBM} > + 113) / 2$ (rounding down, 0-31 interval)

2. RSRP (Reference Signal Receiving Power)

RSRP is a key parameter representing the wireless signal strength, reflecting the path loss strength of the current channel, which is used for cell coverage measurement and cell selection / reselection.

Refer to Signal quality

3. RSRQ (Reference Signal Received Quality)

RSRQ refers to the signal-to-noise ratio and interference level of the current channel quality. It is not only related


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to the RE power of RS, but also related to the RE power of user data, and the interference of adjacent areas. Therefore, RSRQ changes with the network load and interference. The larger the network load, the greater the interference, and the smaller the RSRQ measurement value.

Refer to Signal quality

4. SNR (Signal Noise Ratio)

The ratio of signal power to noise power, the greater the ratio, the better

Refer to Signal quality

5. RSSI

RSSI (Received Signal Strength Indicator)

Refer to Signal quality

6. IMEI

IMEI (International Mobile Equipment Identity)

7. Network_mode

Network Mode	0	1	2	3	4	5	6
Description	Automatic Mode	4G network	3G network	2G network	LTE-CAT M	LTE-CAT NB	255 Automatic mode ,Default: 0

Saudi Arabia mainly uses 0, 3, 5

8. R13_R14_switch R13

R13, R14 switching, 0x5a: NB1 → R13 0XAA: Nb2 → R14 other values: NB2 → R14

9. err_status

In order to better reflect the network abnormal diagnosis, the definition is as follows:

Error status word:

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Bit 0 - module failed to initialize AT

Bit 1 - PIN code error

Bit 2 - SIM card detection failed

Bit 3 - network registration failed

Bit 4 -- PS registration error

Bit 5 -- PDP activation failed

Bit 6 –Bit15 reversed

10. ICCID

The definition of ICCID maintains the agreed definition mode

Structure

```
{  
    SIM1_ICCID    OCTET STRING  
    SIM2_ICCID    OCTET STRING  
};
```

If there is no second card, for example, the meter has only one card. The encoded value will be empty, (0x09 0x00)

11. PCI

The physical cell ID of the service cell, range: 0-503

12. CELL ID

4-byte (28-bit) service cell ID

13. Current Network_mode

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Network Mode	0	1	2	3	4	5	6
Description	No Network	4G network	3G network	2G network	LTE-CAT M	LTE-CAT NB	255 other

Remarks: Saudi Arabia is mainly 1, 3, 5

Signal quality bench mark

Below signal quality benchmark is currently agreed with the SMP installed SM Providers and Telecom service used. For other telecom providers involved if any changes are required would be incorporated once agreed accordingly..

NB- IoT:

		RSSI	RSRP(dbm)	RSRQ(db)	SINR(db)
Technology		NB	NB	NB	NB
Signal Quality	Excellent	>-X	>-85	>-12	>10
	Good	(-X to -Y)	-85 to -105	-12/-15	0/10
	Fair	(-Y to -Z)	-106 to -120	-15/-20	-10/0
	Low	<-Z	<-120	<-20	<-10

4G:

		RSSI	RSRP(dbm)	RSRQ(db)	SINR(db)
Technology		4G	4G	4G	4G
Signal Quality	Excellent	>-X	>-85	>-12	>10
	Good	(-X to -Y)	-85 to -100	-12/-15	0/10

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	Fair	(-Y to -Z)	-101 to -110	-15/-20	-10/0
	Low	<-Z	<-110	<-20	<-10

For 4G, HES shall use only RSSP and SNR values from the received “4G and NB Parameter(0-0.96.99.1.255)” data and arrive at signal quality based on above table given for 4G.

NOTE: For 4G, RSRP levels to be considered for coverage no use of the RSSI.

2G :

		RSSI	CSQ
Signal Quality	Technology	2G	2G
	Excellent	>-85	No standard
	Good	-85 to -95	No standard
	Fair	-95 to -110	No standard
	Low	<-110	No standard

For 2G, HES shall use only RSSI value from the received “4G and NB Parameter(0-0.96.99.1.255)” data and arrive at signal quality based on above table given for 2G.

OBIS definition

Classes	OBIS	attribute	Name	Type	Access Right	Description
1	0-0.96.99.1.255	2	4G&NB parameter	octet string	R: A2 to A5	4G&NB parameter Octet string 4G_NB_PARA 4G_NB_PARA::= choice { See the following table for data information };



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						PULL - Used once during chipset FOTA upgrade. - Collect NB/4G data – PULL frequency depends on SEC requirement
1	0-0.96.99.2.255	2	Network mode	enum	R:A2A3 RW:A4 A5	PULL Configuration parameter – not frequently read/written
1	0-0.96.99.3.255	2	R13_R14_switch	Unsigned	R:A2A3 RW:A4 A5	PULL Configuration parameter – not frequently read/written
1	0-0.96.99.4.255	2	FOTA address	Octet string(Max 120bytes)	W:A4A5	PULL Used once during chipset FOTA upgrade.
3	0-0:96.57.38.255	2	NB module Cell ID stabilization time	Long Unsigned	R:A2A3 RW:A4 A5	PULL Configuration parameter – not frequently read/written
3	0-0:96.57.114.255	2	The duration for which the NB module did not receive the HES system command	Long Unsigned	R:A2A3 RW:A4 A5	PULL Configuration parameter – not frequently read/written

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[NOTE]: FOTA upgrade will be initiated from HES side by sending the FOTA ADDRESS to the meter , then meter will send immediately to CM(Chipset Module) in order to CM communicate with the fota upgrade server & go throw with the upgrade process .

Table 1: 4G_NB_PARA

Sr	Parameters	Data_ID	Data_Type	Length	R/W	M/O
1	Err_status	1	long-unsigned	2	R	M
2	CSQ	2	unsigned	1	R	M
3	RSRP	3	long	2	R	M
4	RSRQ	4	Integer	1	R	M
5	SNR	5	Integer	1	R	M
6	RSSI	6	Integer	1	R	M
7	SC_pci	7	long-unsigned	2	R	M
8	SC_cellid	8	double-long-unsigned	4	R	M
9	IMEI	9	octet string	15	R	M



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10	ICCID	10	<pre> structure { SIM1_ICCID octet string SIM2_ICCID octet string }; </pre>		R	M
11	module_app_mcu_FW	11	OCTET STRING	Max 64 bytes	R	M
12	Module_chipsets_FW	12	octet string	Max 64 bytes	R	M
13	Current Network_mode	13	enum	1	R	M

Table 2: Other PARA

Notes:**1. M/O: M-Mandatory, O-optional**

1. For 4G module: CSQ required

For NB + 2G modules: RSRP, RSRQ, SNR, RSSI under NB mode, and CSQ in 2G mode are required

Network Mode

Classification	OBIS						Interface class
Network mode	A	B	C	D	E	F	
	0	0	96	99	2	255	Data

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Network Mode	0	1	2	3	4	5	6
Description	Auto Mode	4G network	3G network	2G network	LTE-CAT M	LTE-CAT NB	255 Automatic mode default: 0

Saudi Arabia Mainly uses 0, 3, 5

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		A1	A2	A3	A4
1. Logical Name	Octet string	-	R	R	R
2. Value	Enum	-	R	R	R/W

R13 R14 Switch

Classification	OBIS						Interface class
R13_R14 Switch	A	B	C	D	E	F	Data
	0	0	96	99	3	255	

R13, R14 switching, 0x5a: NB1 → R13 0XAA: Nb2 → R14 other values: NB2 → R14

Data		Class_id = 1, version = 0			
Attributes	Data type & Description	Access right			
		A1	A2	A3	A4



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1. Logical Name	Octet string	-	R	R	R
2. Value	Unsigned	-	R	R	R/W

FOTA Address

Classification	OBIS						Interface class
FOTA Address	A	B	C	D	E	F	Data
	0	0	96	99	4	255	

Data			Class_id = 1, version = 0			
Attributes	Data type & Description		Access right			
			A1	A2	A3	A4
1. Logical Name	Octet string		-	-	-	R
2. Value	Octet string (Max 120 octets)		-	-	-	W

NB module Cell ID stabilization time

Classification	OBIS						Interface class
	A	B	C	D	E	F	Register
NB Module Cell ID Stabilization time	0	0	96	57	38	255	

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After meter detects a Cell_ID change, it shall remain in same Cell_ID for the time specified in this object for the meter to trigger the CellID_IPAddress_Push. Default value would be 120 minutes.

Register		Class_id = 3, version = 0			
Attributes	Data type & Description	Access right			
		A1	A2	A3	A4
1- Logical Name	Octet string	-	R	R	R
2- Value	Long unsigned	-	R	R	R/W
3- Scaler Unit	Unit = minutes, scaler = 0	-	R	R	R

Max non communication push time limit

Classification	OBIS						Interface class
	A	B	C	D	E	F	
Max non communication push time limit	0	0	96	57	114	255	Register

This is the maximum time for meter and HES to remain non-communicating with each other. If this timeout expires, the meter shall automatically trigger the CellID_IPAddress_Push. Default value is 1440 minutes. Minimum value that can be configured is 60 minutes.

Register	Class_id = 3, version = 0
----------	---------------------------



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Attributes	Data type & Description	Access right			
		A1	A2	A3	A4
1- Logical Name	Octet string	-	R	R	R
2- Value	Long unsigned	-	R	R	R/W
3- Scaler Unit	Unit = minutes, scaler = 0	-	R	R	R

3. The protocol case

1) Read module parameter data example

Request APDU:

C0 01 81 00 01 00 00 60 63 01 FF 02 00

Response APDU:

C4 01 81 00

09 xx//type 09, length xx

0112 00 00 //error status : data_id 0x01, datatype 0x12, value 0x00

021110 //CSD: data_id 0x02, datatype 0x11, value 0x10

0310FF74 //RSRP: data_id 0x03, datatype 0x10, value 0Xff74

040f21//RSRQ: data_id 0x04, datatype 0x0f, value 0x21

050f22//SNR: data_id 0x05, datatype 0x0f, value 0x22

060f22//RSSI: data_id 0x06, datatype 0x0f, value 0x22

.....

0A02 02 09 14 38 39 38 36 30 32 42 36 31 31 31 39 43 30 31 34 32 37 31 37 09 00 // ICCID: data_id 0X0A, datatype 0x02, the first sim'ICCID 38 39 38 36 30 32 42 36 31 31 31 39 43 30 31 34 32 37 31

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37, the second sim' ICCID : null

Table 2: 4G_NB_OTHER_PARAMETERS

Class ID	OBIS	Attributes	Data Name	Data type	A4	Note
45	0-0:25.4.0.255	3	PIN code	/	RW	S: C1 01 C1 00 2D 00 00 19 04 00 FF 03 00 12 04 D2 R: C5 01 C1 00
45	0-0:25.4.0.255	2	APN	/	RW	S: C1 01 C1 00 2D 00 00 19 04 00 FF 02 00 09 05 43 4D 4E 45 54 R: C5 01 C1 00
44	0-0:25.3.0.255	5	APN user name、 APN password	/	RW	S: C1 01 C1 00 2C 00 00 19 03 00 FF 05 00 02 02 09 01 31 09 01 31 R: C5 01 C1 00"
1	*0-0.94.98.19.255	2	GPRS keep alive time interval	"{ .switch=enable .ideal_time=60 .delay_retry_ interval_value= 10 }"	RW	"S: C1 01 C1 00 01 00 00 5E 62 13 FF 02 00 02 03 03 01 12 00 3C 12 00 0A R: C5 01 C1 00"



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41	*0- 0:25.0.0.255	3	IP_reference of TCP-UDP Configuration	octet-string	RW	"{0.0.25.1.0.255}- ipv4 {0.0.25.7.0.255}- ipv6 IPv4 and IPv6 can be switched by setting to control the network protocol type of P2P module
42	*0- 0:25.1.0.255	3	IP_address of IPv4 Configuration	double_long_u nsigned	R	/
48	0- 0:25.7.0.255	4	IP_address of IPv6 configuration	array (octet- string)	R	/
9	0- 0:96.50.25.2 55	Execute	GPRS/NB Module command reset	long_unsigned	A	/

1) Attribute description of the APN:-

Category	Object Name	OBIS	Class	Attr	A2	A3	A4
GPRS modem setup	GPRS modem setup/APN	0.0.25.4.0.255	45	2	R	R/W	R/W
	GPRS modem setup/PIN_code			3	R	R/W	R/W
	GPRS modem setup/quality_of _service			4	R	R/W	R/W
GPRS modem	GPRS modem setup 1/APN	0.1.25.4.0.255	45	2	R	R/W	R/W



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setup 1	GPRS modem setup 1/PIN_code			3	R	R/W	R/W
	GPRS modem setup 1/quality_of_service			4	R	R/W	R/W

Note: *These obis can be used if client mode is valid with 4G module

Cell ID_IPAddress_Push

OBIS Code Definition:-

Classification	OBIS Code						Interface Class
	A	B	C	D	E	F	
CellID_IPAddress_PushSetup	0	100	25	9	0	255	Push setup (Class id:40, Version:0)

Attribute “push_object_list”

The objects which are pushed to COSEM clients are defined in this attribute. The objects to be pushed by “push setup IP” object cannot be configurable.

Object Name	Class_id	Logical_name	attribute_index	Data index
Module type	1	0.0.96.1.9.255	2	0
Logical Name	1	0-0:42.0.0.255	2	0
Local IP address	48	0-0:25.7.0.255	4	0
Port	41	0-0:25.0.0.255	2	0
ICCID	1	0-0.96.99.1.255	2	10



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Cell_ID	1	0-0.96.99.1.255	2	8
---------	---	-----------------	---	---

structure:: {

Module type: uint8, // 1-DCU, 2-NB meter, 3-HES, 4-4G, 6- ECCU

Logicname: oct-string,

Local IP address: oct-string,

Port: oct-string,

ICCID : structure,

cell ID: uint32,

}

As per DLMS Green book, Event Notification Request can contain only one cosem-attribute-descriptor as shown below.

EventNotificationRequest ::= SEQUENCE

{

time OCTET STRING OPTIONAL,

cosem-attribute-descriptor Cosem-Attribute-Descriptor,

attribute-value Data

}

Cosem-Attribute-Descriptor ::= SEQUENCE

{

class-id Cosem-Class-Id,

instance-id Cosem-Object-Instance-Id,

attribute-id Cosem-Object-Attribute-Id

}

In case of Push setup100, a single Cosem-Attribute-Descriptor will not be sufficient as Data comprise of six object attribute value. As a work around, the following Cosem-Attribute-Descriptor shall be used

Cosem-Attribute-Descriptor ::= SEQUENCE

{

class-id = 40,

instance-id = 0.100.25.9.0.255,

attribute-id = 2

}

Example

C2 //Event notification request


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01 0C 07 E5 01 0C 02 14 2E 04 00 00 00 00 //Timestamp

00 28 00 64 19 09 00 FF 02 //COSEM attribute descriptor

02 06 structure //Data

11 02 module type

09 10 57 53 45 32 30 32 30 38 30 37 31 38 36 34 31 38 logical device name

01 01 09 27 46 44 30 30 3A 30 30 30 3A 30 31 30 42 3A 38 36 41 37 3A 30 30 30 30 3A 30 30 30 3A 30 30 30 3A 30 30 30 31 local IP address

09 04 34 30 35 39 port

02 02 ICCID

09 14 38 39 39 36 36 34 31 35 32 30 31 31 33 31 31 30 35 31 39 38

09 00

06 02 9F 0D C8 cell id

Meter shall provide Get access for above mentioned attribute of Push setup 100 and it shall return details of all push capture objects.

Example

Get the attribute 2 of push setup100.

Request

C0 01 C1 00 28 00 64 19 09 00 FF 02 00

Response

C401C100

0106

020412000109060000600109FF0F02120000 module type (1,0.0.96.1.9.255,2,0)

0204120001090600002A0000FF0F02120000 logical device name (1,0.0.42.0.0.255,2,0)

020412003009060000190700FF0F04120000 local IP address(48,0.0.25.7.0.255,4,0)



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020412002909060000190000FF0F02120000 port(41,0.0.25.0.0.255,2,0)

020412000109060000606301FF0F0212000A ICCID(1,0.0.96.99.1.255,2,10)

020412000109060000606301FF0F02120008 cell id(1,0.0.96.99.1.255,2,8)

[Note]

The IP address should be whole 4 bytes in IPV6

For example: FD00:0000:0103:BD75:0000:0000:0000:0001

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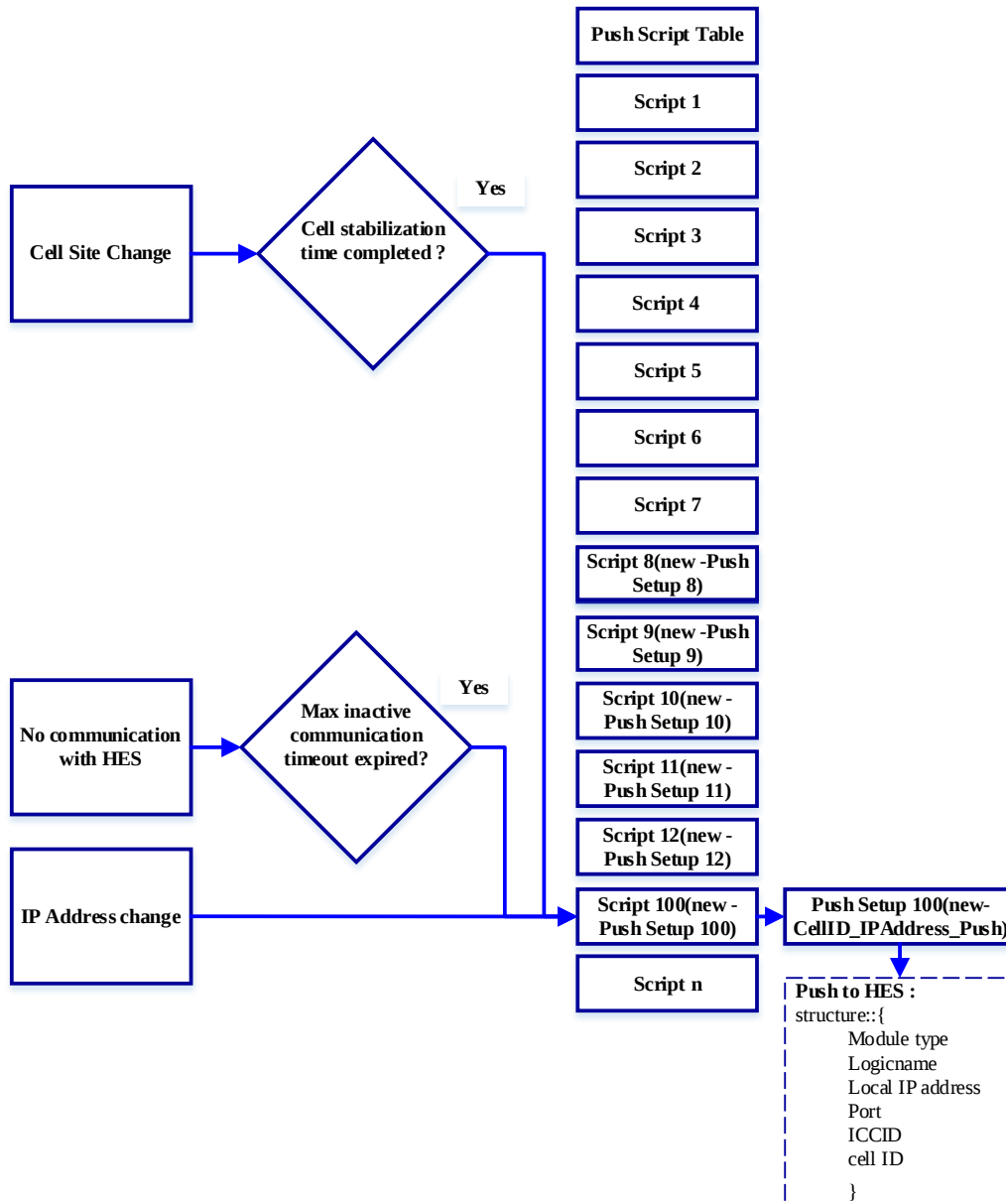


Figure 9 CellID_IPAddress_Push illustration



12. APPENDIX (B)

EXTERNAL CIRCUIT BREAKER COMMUNICATION PROTOCOL

12.1. GENERAL DESCRIPTION

12.1.1. Protocol Description

MODBUS is an application layer messaging protocol for client/server communication between devices connected on different types of buses or networks. The MODBUS protocol defines a simple protocol data unit (PDU) independent of the underlying communication layers. The mapping of MODBUS protocol on specific buses or network can introduce some additional fields on the application data unit (ADU).

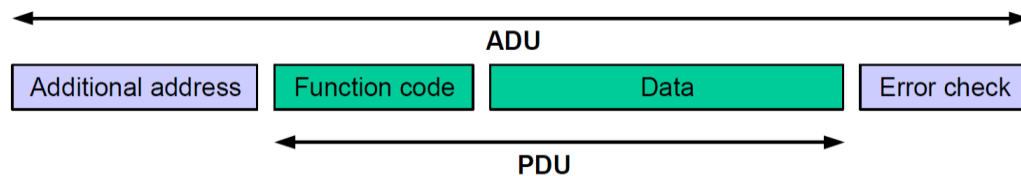


Figure 3: General MODBUS frame

Additional address:1Byte

Function code:1byte

Data: Length(1Byte)+value(length Bytes)

Error check:2 Bytes

When the server responds to the client, it uses the function code field to indicate either a normal (error- free) response or that some kind of error occurred (called an exception response). For a normal response, the server simply echoes to the request the original function code.



For an exception response, the server returns a code that is equivalent to the original function code from the request PDU with its most significant bit set to logic 1.

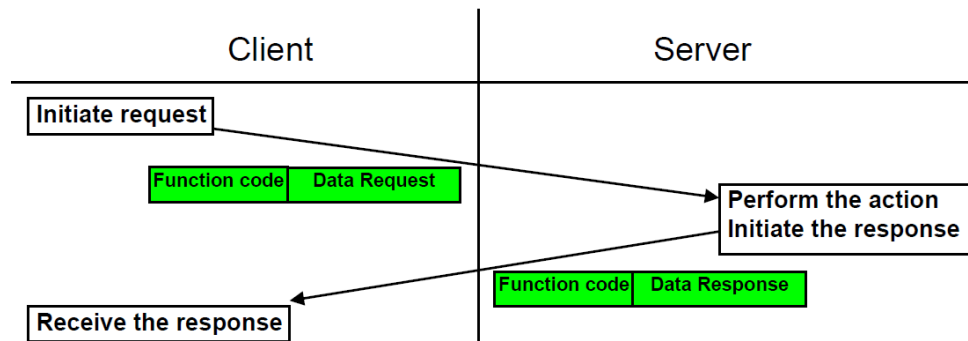


Figure 4: MODBUS transaction (error free)

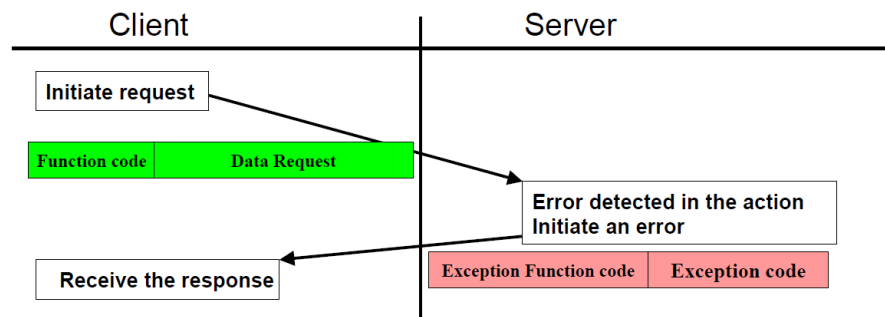


Figure 5: MODBUS transaction (exception response)

12.1.2. Additional address

Additional address is used to show server address (ECB address) , ECB default address : 0x01

12.1.3. Function Code

ECB Status: 0x01

ECB FW Version: 0x02

ECB Serial Number: 0x03

Meter Action: 0x05



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12.1.4. Exception Function Code

exception-function_code = [1 byte] MODBUS function code + 0x80

12.1.5. Exception Code

exception_code = [1 byte] MODBUS Exception Code Defined in below:

0x01-ILLEGAL FUNCTION

0x02-ILLEGAL DATA ADDRESS

0x03-ILLEGAL DATA VALUE

0x04-SERVER DEVICE FAILURE

0x05-ACKNOWLEDGE

0x06-SERVER DEVICE BUSY

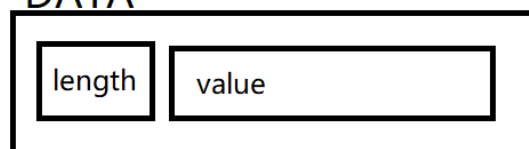
0x08-MEMORY PARITY ERROR

0x0A-GATEWAY PATH UNAVAILABLE

0x0B-GATEWAY TARGET DEVICE FAILED TO RESPOND

12.1.6. Data Structure

DATA



ECBStatus: length 1

{

Open: 0x01

Close: 0x02

Trip: 0x04



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Tamper: 0x08

Auto mode: 0x10

Manual mode: 0x20

}

MeterAction: length 1

{

OpenECB: 0x01

CloseECB: 0x02

12.2. MECHANISM

12.2.1. ECB registration with Smart Meter

Each ECB has unique 16 bit ID number. Meter will register ECB serial number.

12.2.2. Smart Meter send Command to ECB

After the meter receive command to control ECB, the meter will send the command to ECB by Smart Meter RS-485 port.

12.2.3. Meter inquiry ECB status

Smart Meter inquiry ECB status by communicating via RS-485 port every 10 seconds, and then Smart Meter can know ECB status is in open/close/trip/tamper etc.

12.2.4. Wire Cut Detection

If meter don't receive the status after 3 times (3*10 seconds) inquiry continuously, the Smart Meter will consider ECB Wire Cut / Connector removed.

12.3. EXAMPLES

12.3.1. Smart Meter send "OpenECB" Command to ECB

Send: 01 05 01 01 XX XX

01-ECB

05-MeterAction

01-Length Of Data

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01-OpenECB

XX XX-Error check

Receive: 01 05 00 XX XX

01-ECB

05-MeterAction

00-Length Of Data

XX XX-Error check

12.3.2. Meter send "CloseECB" command to ECB

Send: 01 05 01 02 XX XX

01-ECB

05-MeterAction

01-Length Of Data

02-OpenECB

XX XX-Error check

Receive: 01 05 00 XX XX

01-ECB

05-MeterAction

00-Length Of Data

XX XX-Error check

12.3.3. Meter inquiry ECB status, ECB reply "Open"

Send: 01 01 00 XX XX

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DATE: September 2022

01-ECB

01-ECBStatus

00-Length Of Data

XX XX-Error check

Receive: 01 01 01 01 XX XX

01-ECB

01-ECBStatus

01-Length Of Data

01-Open

XX XX-Error check

12.3.4. Meter inquiry ECB status, ECB reply "Close"

Send: 01 01 00 XX XX

01-ECB

01-ECBStatus

00-Length Of Data

XX XX-Error check

Receive: 01 01 01 02 XX XX

01-ECB

01-ECBStatus

01-Length Of Data

02-Close

XX XX-Error check

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12.3.5. Meter inquiry ECB status, ECB reply "Trip"

Send: 01 01 00 XX XX

01-ECB

01-ECBStatus

00-Length Of Data

XX XX-Error check

Receive: 01 01 01 03 XX XX

01-ECB

01-ECBStatus

01-Length Of Data

03-Trip

XX XX-Error check

12.3.6. Meter inquiry ECB status, ECB reply "Tamper"

Send: 01 01 00 XX XX

01-ECB

01-ECBStatus

00-Length Of Data

XX XX-Error check

Receive: 01 01 01 04 XX XX

01-ECB

01-ECBStatus

01-Length Of Data

SEC DISTRIBUTION MATERIALS
SPECIFICATION

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DATE: September 2022

04-Tamper

XX XX-Error check

12.3.7. Meter inquiry ECB status, ECB reply “Auto ”

Send: 01 01 00 XX XX

01-ECB

01-ECBStatus

00-Length Of Data

XX XX-Error check

Receive: 01 01 01 05 XX XX

01-ECB

01-ECBStatus

01-Length Of Data

05-auto mode

XX XX-Error check

12.3.8. Meter inquiry ECB status, ECB reply “Manual ”

Send: 01 01 00 XX XX

01-ECB

01-ECBStatus

00-Length Of Data

XX XX-Error check

Receive: 01 01 01 06 XX XX

XX XX-Error check

XX XX-Error check

byte 1	byte 2	byte 3	byte 4	byte 5	byte 6	byte 7	byte 8	byte 9	byte 10	byte 11	byte 12	byte 13	byte 14	byte 15	byte 16
Manufacturer identifier			Year (xx)		Type (xxx)			ECB serial number (Octet-string : 8 bytes)							

1. Each ECB has unique 16-bit ID number. Smart Meter will register ECB serial number.
2. The ECB and Smart Meter shall have the capability to cater all types of required functions and alarms. The mechanism to detect functions and alarms shall be prepared and submitted for COMPANY approval.

SEC DISTRIBUTION MATERIALS
SPECIFICATION

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DATE: September 2022

12.3.10. Meter inquiry "ECB FW Version"

Send: 01 02 00 XX XX

01-ECB

02-ECB FW Version

00-Length Of Data

XX XX-Error check

Receive: 01 02 10 XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX
XX XX

01-ECB

02-ECB FW Version

10-Length Of Data

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX -ECB FW Version

XX XX-Error check

Byte	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Char	P	X	X	X	X		Y	Y	Y	Y	-	M	M	-	D	D

- XXX.X: Version number
- YYYY: Year
- MM: Month
- DD: Day
- P: Provider
- Byte 11 means 'space'.

[Note] The format of "Firmware version" value may be different from different manufacturers. The format shown above is recommended by COMPANY, but the different format of the firmware version may be acceptable.

◆◆◆◆ END ◆◆◆◆