

**SUPPLEMENTARY**  
**(SEC DLMS/COSEM OBIS CODE**  
**SPECIFICATION)**  
**FOR**  
**ELECTRONIC REVENUE CT AND CT/VT**  
**METER**  
**(40-SDMS-02A REV. 9.1)**

[September 2022]

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The optimization is not finalized and this specification  
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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 <sup>rd</sup> 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)                                                                                   |
| 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)                                                                                              |



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| MODBUS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2012    | Modbus Application Specification Protocol Specification V1.1b3  |   |      |                                     |   |       |                                 |   |       |                                             |   |     |                       |   |     |                                                                 |   |      |                                       |   |         |                                                          |   |     |                                                         |   |      |                              |
| <p><b>1.3. Terminology</b></p> <p>Terminology not commonly included in the technical specifications registered in COMPANY or the standard specifications specified in the clause 1.4 are defined below.</p> <p><b>1.3.1. Client</b></p> <p>It indicates a device that requests data or service. A master station is generally referred to as client.</p> <p><b>1.3.2. Server</b></p> <p>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).</p> <p><b>1.3.3. Master</b></p> <p>It indicates a device that initializes and controls data flow.</p> <p><b>1.3.4. Slave</b></p> <p>It indicates a device responds to a request from a master; commonly referring to electricity meters.</p> <p><b>1.3.5. OSI 7 Layer</b></p> <p>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.</p> <p><b>1.4. List of Abbreviation</b></p> <table> <tr> <td>-</td><td>ACSE</td><td>Application Control Service Element</td></tr> <tr> <td>-</td><td>APDUs</td><td>Application Protocol Data Units</td></tr> <tr> <td>-</td><td>COSEM</td><td>COmpanion Specification for Energy Metering</td></tr> <tr> <td>-</td><td>CTT</td><td>Conformance Test Tool</td></tr> <tr> <td>-</td><td>DCE</td><td>Data Communication Equipment (Communication Interface or Modem)</td></tr> <tr> <td>-</td><td>DLMS</td><td>Device Language Message Specification</td></tr> <tr> <td>-</td><td>DLMS UA</td><td>Device Language Message Specification - User Association</td></tr> <tr> <td>-</td><td>DTE</td><td>Data Terminal Equipment (Computer, Terminal or Printer)</td></tr> <tr> <td>-</td><td>HDLC</td><td>High-level Data Link Control</td></tr> </table> |         |                                                                 | - | ACSE | Application Control Service Element | - | 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 |
| -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ACSE    | Application Control Service Element                             |   |      |                                     |   |       |                                 |   |       |                                             |   |     |                       |   |     |                                                                 |   |      |                                       |   |         |                                                          |   |     |                                                         |   |      |                              |
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|   |           |                                                |
|---|-----------|------------------------------------------------|
| - | 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.

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).

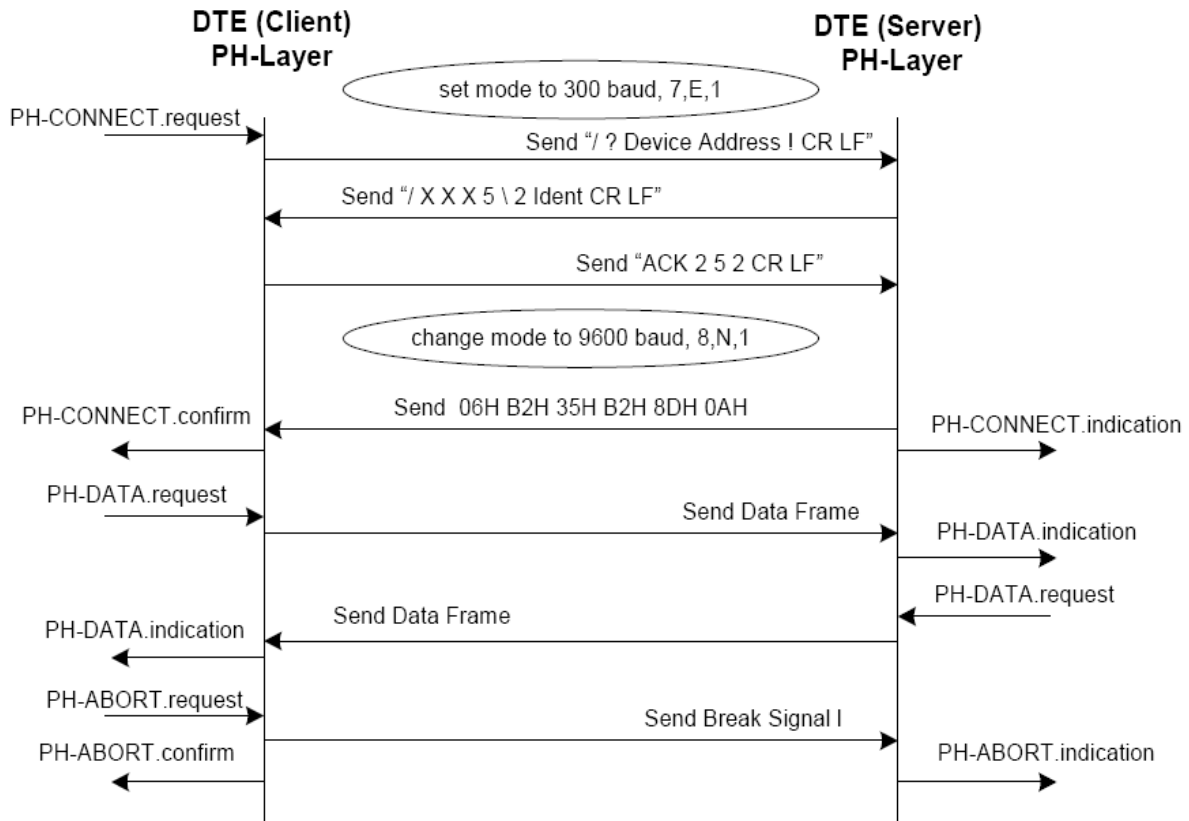


Figure 1 – Data link connection from IEC 62056-21 mode E

## 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 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.

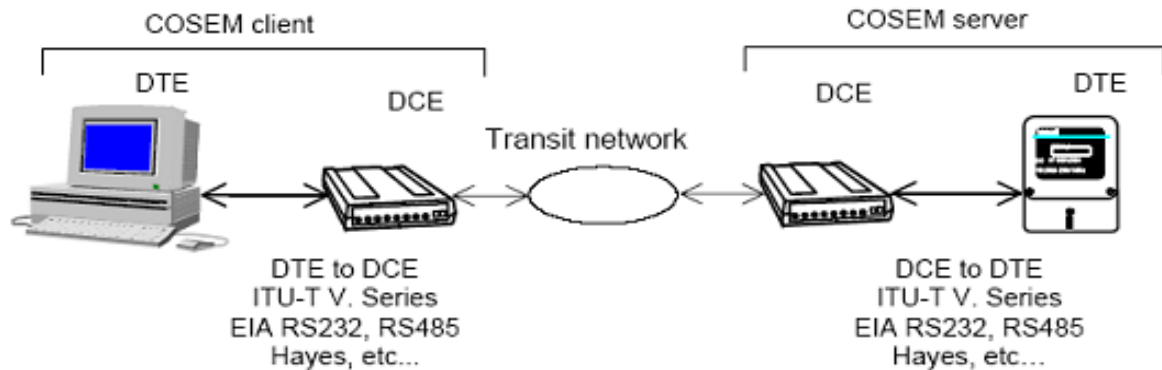


Figure 2 – Typical PSTN Configuration

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).

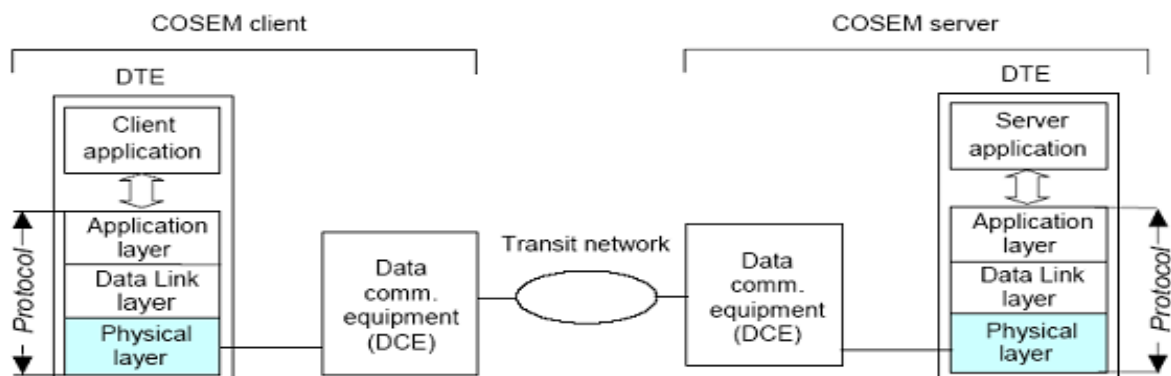


Figure 3 – The location of the physical layer

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.


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**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**

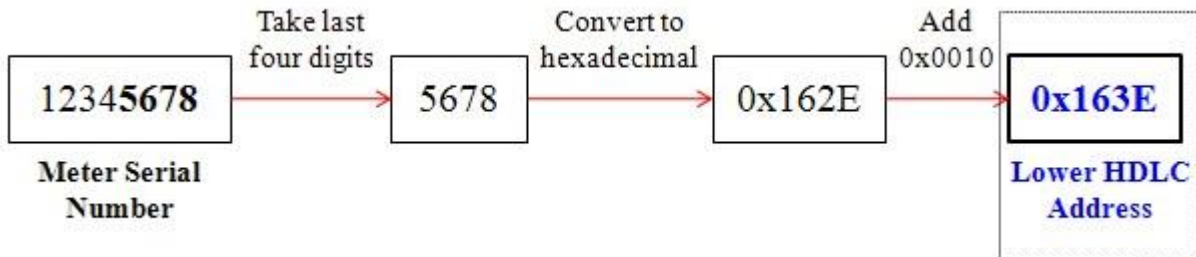
In the 3-layer, connection-oriented, HDLC-based communications profile for Automatic Meter Reading (AMR) defined in the COSEM standard (IEC 62056), each server (meter) is identified by server HDLC addresses in Data link Layer. In this specification, the server HDLC address field has four bytes. The server 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<br>(Physical Device Address) | 0x0010 ~ 0x3FFE |


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**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.
- 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 mode E. 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



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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.

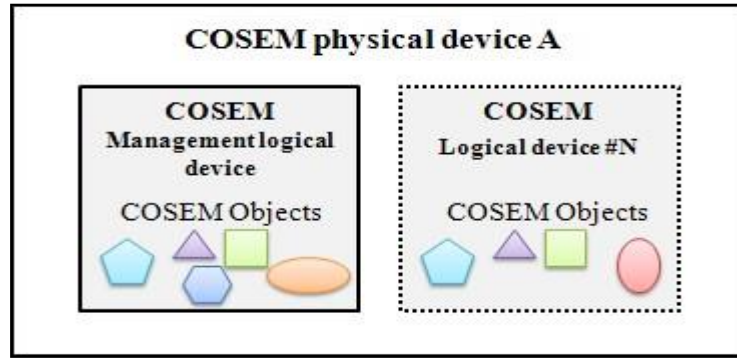


Figure 5 – The COSEM server model

## 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-02A 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.

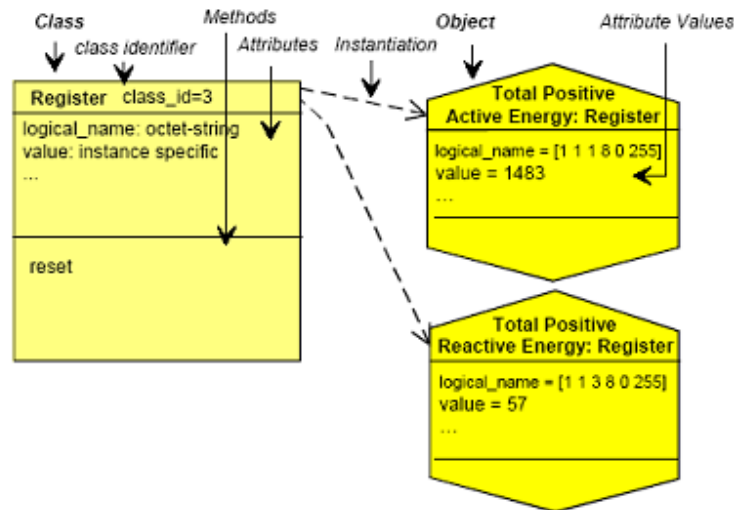


Figure 6 – An interface class and its instances

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



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in the “Association LN” object.

#### 5.4. Classification of Application Association (AA)

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                     |

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


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(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 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.<br>(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]

### 6.1. Energy



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| Classification                                        | OBIS code |   |    |   |   |           | Interface Class                             |
|-------------------------------------------------------|-----------|---|----|---|---|-----------|---------------------------------------------|
|                                                       | A         | B | C  | D | E | F         |                                             |
| Total Energy Register                                 | 1         | 0 | c  | 8 | 0 | 255<br>VZ | Register<br>(Class id=3, version: 0)        |
| TOU Energy Register<br>(e = 1 ~ 8)                    | 1         | 0 | c  | 8 | e | 255<br>VZ | Register<br>(Class id=3, version: 0)        |
| Energy Register<br>(Current value from last<br>reset) | 1         | 0 | c  | 9 | 0 | 255<br>VZ | Register<br>(Class id=3, version: 0)        |
| Energy profile                                        | 1         | 0 | 98 | 1 | 1 | 255<br>VZ | Profile Generic<br>(Class id=7, version: 1) |
| EOB Data Profile                                      | 1         | 0 | 98 | 1 | 2 | 255<br>VZ | Profile Generic<br>(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 |
| 5   | $\sum Li$ Reactive energy (QI)              | 1.0.5.8.0.255 |
| 6   | $\sum Li$ Reactive energy (QII)             | 1.0.6.8.0.255 |
| 7   | $\sum Li$ Reactive energy (QIII)            | 1.0.7.8.0.255 |



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| No. | Total Energy Registers                                | OBIS Code      |
|-----|-------------------------------------------------------|----------------|
| 8   | $\sum$ Li Reactive energy (QIV)                       | 1.0.8.8.0.255  |
| 9   | $\sum$ Li Import apparent energy (QI+QIV)             | 1.0.9.8.0.255  |
| 10  | $\sum$ Li Export apparent energy (QII+QIII)           | 1.0.10.8.0.255 |
| 11  | $\sum$ Li Active energy (abs(QI+QIV)+(abs(QII+QIII))) | 1.0.15.8.0.255 |
| 12  | L1 Import active energy (QI+QIV)                      | 1.0.21.8.0.255 |
| 13  | L1 Export active energy (QII+QIII)                    | 1.0.22.8.0.255 |
| 14  | L1 Import reactive energy (QI+QII)                    | 1.0.23.8.0.255 |
| 15  | L1 Export reactive energy (QIII+QIV)                  | 1.0.24.8.0.255 |
| 16  | L1 Reactive energy (QI)                               | 1.0.25.8.0.255 |
| 17  | L1 Reactive energy (QII)                              | 1.0.26.8.0.255 |
| 18  | L1 Reactive energy (QIII)                             | 1.0.27.8.0.255 |
| 19  | L1 Reactive energy (QIV)                              | 1.0.28.8.0.255 |
| 20  | L1 Import apparent energy (QI+QIV)                    | 1.0.29.8.0.255 |
| 21  | L1 Export apparent energy (QII+QIII)                  | 1.0.30.8.0.255 |
| 22  | L2 Import active energy (QI+QIV)                      | 1.0.41.8.0.255 |
| 23  | L2 Export active energy (QII+QIII)                    | 1.0.42.8.0.255 |
| 24  | L2 Import reactive energy (QI+QII)                    | 1.0.43.8.0.255 |
| 25  | L2 Export reactive energy (QIII+QIV)                  | 1.0.44.8.0.255 |
| 26  | L2 Reactive energy (QI)                               | 1.0.45.8.0.255 |
| 27  | L2 Reactive energy (QII)                              | 1.0.46.8.0.255 |
| 28  | L2 Reactive energy (QIII)                             | 1.0.47.8.0.255 |
| 29  | L2 Reactive energy (QIV)                              | 1.0.48.8.0.255 |
| 30  | L2 Import apparent energy (QI+QIV)                    | 1.0.49.8.0.255 |
| 31  | L2 Export apparent energy (QII+QIII)                  | 1.0.50.8.0.255 |
| 32  | L3 Import active energy (QI+QIV)                      | 1.0.61.8.0.255 |
| 33  | L3 Export active energy (QII+QIII)                    | 1.0.62.8.0.255 |
| 34  | L3 Import reactive energy (QI+QII)                    | 1.0.63.8.0.255 |
| 35  | L3 Export reactive energy (QIII+QIV)                  | 1.0.64.8.0.255 |
| 36  | L3 Reactive energy (QI)                               | 1.0.65.8.0.255 |



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| No. | Total Energy Registers               | OBIS Code      |
|-----|--------------------------------------|----------------|
| 37  | L3 Reactive energy (QII)             | 1.0.66.8.0.255 |
| 38  | L3 Reactive energy (QIII)            | 1.0.67.8.0.255 |
| 39  | L3 Reactive energy (QIV)             | 1.0.68.8.0.255 |
| 40  | L3 Import apparent energy (QI+QIV)   | 1.0.69.8.0.255 |
| 41  | L3 Export apparent energy (QII+QIII) | 1.0.70.8.0.255 |

## 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)<br>Unit: Active energy = 30 [Wh],<br>Reactive energy = 32 [varh],<br>Apparent energy = 31 [VAh] |                           | R   | R   | R   |

\* 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 12 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-02A).

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

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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', ' $\sum Li$ ' means 'Aggregate (L1+L2+L3)'.

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



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## 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)<br>Unit:<br>Active energy = 30 [Wh],<br>Reactive energy = 32 [varh],<br>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<br>(Current value from last<br>Demand-reset) | 1         | 0 | c | 9 | 0 | 255<br>VZ | Register<br>(Class id=3, version: 0) |

\* '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)'.

| 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 |

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## 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)<br>Unit:<br>Active energy = 30 [Wh],<br>Reactive energy = 32 [varh],<br>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.

**[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<br>VZ | Profile Generic<br>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<br>(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<br>(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   | $\sum Li$ Import active energy (QI+QIV)               | 1.0.1.8.0.255  | 0               | 0          |
| 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          |



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| No. | Capture_objects                         | Logical_name   | Attribute_index | Data_index |
|-----|-----------------------------------------|----------------|-----------------|------------|
| 15  | $\Sigma$ Li Average export power factor | 1.0.84.0.0.255 | 0               | 0          |
| 16  | L1 Import active energy (QI+QIV)        | 1.0.21.8.0.255 | 0               | 0          |
| 17  | L1 Export active energy (QII+QIII)      | 1.0.22.8.0.255 | 0               | 0          |
| 18  | L1 Import reactive energy (QI+QII)      | 1.0.23.8.0.255 | 0               | 0          |
| 19  | L1 Export reactive energy (QIII+QIV)    | 1.0.24.8.0.255 | 0               | 0          |
| 20  | L1 Reactive energy (QI)                 | 1.0.25.8.0.255 | 0               | 0          |
| 21  | L1 Reactive energy (QII)                | 1.0.26.8.0.255 | 0               | 0          |
| 22  | L1 Reactive energy (QIII)               | 1.0.27.8.0.255 | 0               | 0          |
| 23  | L1 Reactive energy (QIV)                | 1.0.28.8.0.255 | 0               | 0          |
| 24  | L1 Import apparent energy (QI+QIV)      | 1.0.29.8.0.255 | 0               | 0          |
| 25  | L1 Export apparent energy (QII+QIII)    | 1.0.30.8.0.255 | 0               | 0          |
| 26  | L2 Import active energy (QI+QIV)        | 1.0.41.8.0.255 | 0               | 0          |
| 27  | L2 Export active energy (QII+QIII)      | 1.0.42.8.0.255 | 0               | 0          |
| 28  | L2 Import reactive energy (QI+QII)      | 1.0.43.8.0.255 | 0               | 0          |
| 29  | L2 Export reactive energy (QIII+QIV)    | 1.0.44.8.0.255 | 0               | 0          |
| 30  | L2 Reactive energy (QI)                 | 1.0.45.8.0.255 | 0               | 0          |
| 31  | L2 Reactive energy (QII)                | 1.0.46.8.0.255 | 0               | 0          |
| 32  | L2 Reactive energy (QIII)               | 1.0.47.8.0.255 | 0               | 0          |
| 33  | L2 Reactive energy (QIV)                | 1.0.48.8.0.255 | 0               | 0          |
| 34  | L2 Import apparent energy (QI+QIV)      | 1.0.49.8.0.255 | 0               | 0          |
| 35  | L2 Export apparent energy (QII+QIII)    | 1.0.50.8.0.255 | 0               | 0          |
| 36  | L3 Import active energy (QI+QIV)        | 1.0.61.8.0.255 | 0               | 0          |
| 37  | L3 Export active energy (QII+QIII)      | 1.0.62.8.0.255 | 0               | 0          |
| 38  | L3 Import reactive energy (QI+QII)      | 1.0.63.8.0.255 | 0               | 0          |
| 39  | L3 Export reactive energy (QIII+QIV)    | 1.0.64.8.0.255 | 0               | 0          |
| 40  | L3 Reactive energy (QI)                 | 1.0.65.8.0.255 | 0               | 0          |
| 41  | L3 Reactive energy (QII)                | 1.0.66.8.0.255 | 0               | 0          |
| 42  | L3 Reactive energy (QIII)               | 1.0.67.8.0.255 | 0               | 0          |
| 43  | L3 Reactive energy (QIV)                | 1.0.68.8.0.255 | 0               | 0          |



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| No. | Capture_objects                                        | Logical_name   | Attribute_index | Data_index |
|-----|--------------------------------------------------------|----------------|-----------------|------------|
| 44  | L3 Import apparent energy (QI+QIV)                     | 1.0.69.8.0.255 | 0               | 0          |
| 45  | L3 Export apparent energy (QII+QIII)                   | 1.0.70.8.0.255 | 0               | 0          |
| 46  | $\sum$ Li Import active energy (QI+QIV) [Tariff 1]     | 1.0.1.8.1.255  | 0               | 0          |
| 47  | $\sum$ Li Export active energy (QII+QIII) [Tariff 1]   | 1.0.2.8.1.255  | 0               | 0          |
| 48  | $\sum$ Li Import reactive energy (QI+QII) [Tariff 1]   | 1.0.3.8.1.255  | 0               | 0          |
| 49  | $\sum$ Li Export reactive energy (QIII+QIV) [Tariff 1] | 1.0.4.8.1.255  | 0               | 0          |
| 50  | $\sum$ Li Reactive energy (QI) [Tariff 1]              | 1.0.5.8.1.255  | 0               | 0          |
| 51  | $\sum$ Li Reactive energy (QIV) [Tariff 1]             | 1.0.8.8.1.255  | 0               | 0          |
| 52  | $\sum$ Li Import apparent energy (QI+QIV) [Tariff 1]   | 1.0.9.8.1.255  | 0               | 0          |
| 53  | $\sum$ Li Export apparent energy (QII+QIII) [Tariff 1] | 1.0.10.8.1.255 | 0               | 0          |
| 54  | $\sum$ Li Average import power factor [Tariff 1]       | 1.0.13.0.1.255 | 0               | 0          |
| 55  | $\sum$ Li Average export power factor [Tariff 1]       | 1.0.84.0.1.255 | 0               | 0          |
| 56  | $\sum$ Li Import active energy (QI+QIV) [Tariff 2]     | 1.0.1.8.2.255  | 0               | 0          |
| 57  | $\sum$ Li Export active energy (QII+QIII) [Tariff 2]   | 1.0.2.8.2.255  | 0               | 0          |
| 58  | $\sum$ Li Import reactive energy (QI+QII) [Tariff 2]   | 1.0.3.8.2.255  | 0               | 0          |
| 59  | $\sum$ Li Export reactive energy (QIII+QIV) [Tariff 2] | 1.0.4.8.2.255  | 0               | 0          |
| 60  | $\sum$ Li Reactive energy (QI) [Tariff 2]              | 1.0.5.8.2.255  | 0               | 0          |
| 61  | $\sum$ Li Reactive energy (QIV) [Tariff 2]             | 1.0.8.8.2.255  | 0               | 0          |
| 62  | $\sum$ Li Import apparent energy (QI+QIV) [Tariff 2]   | 1.0.9.8.2.255  | 0               | 0          |
| 63  | $\sum$ Li Export apparent energy (QII+QIII) [Tariff 2] | 1.0.10.8.2.255 | 0               | 0          |
| 64  | $\sum$ Li Average import power factor [Tariff 2]       | 1.0.13.0.2.255 | 0               | 0          |
| 65  | $\sum$ Li Average export power factor [Tariff 2]       | 1.0.84.0.2.255 | 0               | 0          |
| 66  | $\sum$ Li Import active energy (QI+QIV) [Tariff 3]     | 1.0.1.8.3.255  | 0               | 0          |
| 67  | $\sum$ Li Export active energy (QII+QIII) [Tariff 3]   | 1.0.2.8.3.255  | 0               | 0          |
| 68  | $\sum$ Li Import reactive energy (QI+QII) [Tariff 3]   | 1.0.3.8.3.255  | 0               | 0          |
| 69  | $\sum$ Li Export reactive energy (QIII+QIV) [Tariff 3] | 1.0.4.8.3.255  | 0               | 0          |
| 70  | $\sum$ Li Reactive energy (QI) [Tariff 3]              | 1.0.5.8.3.255  | 0               | 0          |
| 71  | $\sum$ Li Reactive energy (QIV) [Tariff 3]             | 1.0.8.8.3.255  | 0               | 0          |
| 72  | $\sum$ Li Import apparent energy (QI+QIV) [Tariff 3]   | 1.0.9.8.3.255  | 0               | 0          |



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| No.                                                                                                                                     | Capture_objects                                  | Logical_name   | Attribute_index | Data_index |
|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------|-----------------|------------|
| 73                                                                                                                                      | ΣLi Export apparent energy (QII+QIII) [Tariff 3] | 1.0.10.8.3.255 | 0               | 0          |
| 74                                                                                                                                      | ΣLi Average import power factor [Tariff 3]       | 1.0.13.0.3.255 | 0               | 0          |
| 75                                                                                                                                      | ΣLi Average export power factor [Tariff 3]       | 1.0.84.0.3.255 | 0               | 0          |
| The sufficient memory space for adding registers #76 ~ 125 (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).

- 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<br>VZ | Profile Generic<br>(Class id=7, version:<br>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<br>(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<br>(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 |      |
| 5                                                              | Energy Profile                                                            | 1.0.98.1.1.255            | 2               | Last entry |      |
| 6                                                              | $\sum$ Li Import active energy (QI+QIV)<br>[current billing period]       | 1.0.1.9.0.255             | 0               | 0          |      |
| 7                                                              | $\sum$ Li Import reactive energy (QI+QII)<br>[current billing period]     | 1.0.3.9.0.255             | 0               | 0          |      |
| 8                                                              | $\sum$ Li Import apparent energy (QI+QIV)<br>[current billing period]     | 1.0.9.9.0.255             | 0               | 0          |      |
| 9                                                              | $\sum$ Li Export active energy (QII+QIII)<br>[current billing period]     | 1.0.2.9.0.255             | 0               | 0          |      |
| 10                                                             | $\sum$ Li Export reactive energy (QIII+QIV)<br>[current billing period]   | 1.0.4.9.0.255             | 0               | 0          |      |
| 11                                                             | $\sum$ Li Export apparent energy (QII+QIII)<br>[current billing period]   | 1.0.10.9.0.255            | 0               | 0          |      |
| 12                                                             | $\sum$ Li Average import power factor<br>(Current billing period average) | 1.0.13.0.e.255            | 0               | 0          |      |



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| No. | Capture_objects                                                     | Logical_name   | Attribute_index | Data_index |
|-----|---------------------------------------------------------------------|----------------|-----------------|------------|
| 13  | ΣLi Average export power factor<br>(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"

## 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<br>(Class id=5, version: 0)   |
| Maximum demand register | 1         | 0 | c | 6 | e | 255<br>VZ | Extended Register<br>(Class id=4, version: 0) |



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

#### 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 |



|                                             |                              |
|---------------------------------------------|------------------------------|
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| No.                                                                                                                              | Demand Type                                           | OBIS Code      |
|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------|
| 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  |
| 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”



|                                             |                              |
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| 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)<br>Unit: Active power = 27 [W],<br>Reactive power = 29 [var],<br>Apparent power = 28 [VA] |                           | R    | R    | R    |
| 5. status                | Bit-string (default = 0)                                                                                      |                           | R    | R    | R    |
| 6. capture_time          | date_time (octet-string<br>(size(12)))                                                                        |                           | R    | R    | R    |
| 7. start_time_current    | date_time (octet-string<br>(size(12)))                                                                        |                           | R    | R    | R    |
| 8. period                | double-long-unsigned<br>(default: 300 seconds)                                                                |                           | R    | R/W  | R/W  |
| 9. number_of_periods     | long-unsigned<br>(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’, ‘ $\Sigma$ Li’ means ‘Aggregate’.

| No. | Maximum Demand Type                              | OBIS Code     |
|-----|--------------------------------------------------|---------------|
| 1   | $\Sigma$ Li Import active power (QI+QIV) [Total] | 1.0.1.6.0.255 |



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



|                                             |                              |
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| No.                                                                                                                                | Maximum Demand Type                                   | OBIS Code      |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------|
| 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”

| 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)<br>Unit:<br>Active power = 27 [W],<br>Reactive power = 29 [var],<br>Apparent power = 28 [VA] |                           | R    | R    | R    |
| 4. status         | bit-string                                                                                                       |                           | R    | R    | R    |
| 5. capture_time   | date_time[9]<br>(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<br>VZ | Profile Generic<br>(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<br>(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<br>(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          |
| 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          |



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| No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Capture_objects                                       | Logical_name   | Attribute_index | Data_index |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------|-----------------|------------|
| 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<br>5) "capture_period": Period to record (0: No automatic capture)<br>6) "sort_method": Storage method (FIFO: first input first output)<br>7) "sort_object": Default (FIFO: first input first output)<br>8) "entries_in_use": Number of entries that are stored into "buffer" (double long unsigned: 6)<br>9) "profile_entries": Maximum number of entries that can be stored into "buffer" (double long unsigned:<br>10) The Maximum demand profile data capture and store at least three historical data. |                                                       |                |                 |            |



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#### 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’,  $3\sum Li$  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  |
| 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 |



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| No.                                                                                                                                | Cumulative Maximum Demand Type                        | OBIS Code      |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------|
| 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              |      |      |      |
|                 |                                                                                                               | A. 1                      | 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)<br>Unit: Active power = 27 [W],<br>Reactive power = 29 [var],<br>Apparent power = 28 [VA] | -                         | R    | R    | R    |

## 6.2.5. Cumulative maximum demand profile

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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<br>(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<br>(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<br>(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.



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| 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          |
| 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          |



|                                             |                              |
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| No.                                                                                                                                | Capture_objects                                       | Logical_name   | Attribute_index | Data_index |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------|-----------------|------------|
| 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) |
| $\sum$ 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).

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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)<br>Unit: 255 (unitless) | R                         | R    | R    | R    |

## 6.4. Load Profile

## 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<br>(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    |



|                                             |                              |
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| Profile generic    |                                                                   | Class_id = 7, version = 1 |      |      |      |
|--------------------|-------------------------------------------------------------------|---------------------------|------|------|------|
| Attributes         | Data type & Description                                           | Access right              |      |      |      |
|                    |                                                                   |                           | A. 2 | A. 3 | A. 4 |
| 3. capture_objects | array (See below table)                                           |                           | R    | R    | R/W  |
| 4. capture_period  | double-long-unsigned [unit: sec]<br>Programmable (default: 1,800) |                           | R    | R    | R    |
| 5. sort_method     | enum<br>(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<br>(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          |
| $\Sigma$ Li Import active power (QI+QIV)             | 1.0.1.4.0.255  | 2               | 0          |
| $\Sigma$ Li Import reactive power (QI+QII)           | 1.0.3.4.0.255  | 2               | 0          |
| $\Sigma$ Li Import apparent power (QI+QIV)           | 1.0.9.4.0.255  | 2               | 0          |
| $\Sigma$ Li Reactive power (QI) [Total]              | 1.0.5.4.0.255  | 2               | 0          |
| $\Sigma$ Li Export active power (QII+QIII) [Total]   | 1.0.2.4.0.255  | 2               | 0          |
| $\Sigma$ Li Export reactive power (QIII+QIV) [Total] | 1.0.4.4.0.255  | 2               | 0          |
| $\Sigma$ Li Export apparent power (QII+QIII) [Total] | 1.0.10.4.0.255 | 2               | 0          |
| $\Sigma$ 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).

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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    |
| 2. value        | unsigned<br>Programmable among 5, 15,<br>30, 60 minutes and default<br>value is 30 minutes. |                           | R    | R/W  | R/W  |
| 3. scaler_unit  | scaler: 0 (integer)<br>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"



|                                             |                              |
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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 (5 bytes)<br>(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                          |
|--------|---------------------------------------|---------------------------------------|--------------------------------------------------------|--------------------------------------|-------------------------------------------------------|-------------------------------|-----------------------------|------------------------------|
| 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 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.

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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.

**[Note]** The secondary values (of CT and VT) of instantaneous quality registers such as power, voltage, and current shall be stored in each register.

| Classification                 | OBIS code |   |   |   |   |     | Interface Class                               |
|--------------------------------|-----------|---|---|---|---|-----|-----------------------------------------------|
|                                | A         | B | C | D | E | F   |                                               |
| Instantaneous quality register | 1         | 0 | c | 7 | 0 | 255 | Register<br>(Class id=3, version: 0)          |
| Internal maximum register      | 1         | 0 | c | 6 | 0 | 255 | Extended Register<br>(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’, ‘ $\Sigma$ Li’ means ‘Aggregate’.

| Energy Type                                                | OBIS Code      |
|------------------------------------------------------------|----------------|
| $\Sigma$ Li Instantaneous import active power (QI+QIV)     | 1.0.1.7.0.255  |
| $\Sigma$ Li Instantaneous export active power (QII+QIII)   | 1.0.2.7.0.255  |
| $\Sigma$ Li Instantaneous import reactive power (QI+QII)   | 1.0.3.7.0.255  |
| $\Sigma$ Li Instantaneous export reactive power (QIII+QIV) | 1.0.4.7.0.255  |
| $\Sigma$ Li Instantaneous reactive power (QI)              | 1.0.5.7.0.255  |
| $\Sigma$ Li Instantaneous reactive power (QIV)             | 1.0.8.7.0.255  |
| $\Sigma$ Li Instantaneous import apparent power (QI+QIV)   | 1.0.9.7.0.255  |
| $\Sigma$ Li Instantaneous export apparent power (QII+QIII) | 1.0.10.7.0.255 |
| $\Sigma$ Li Instantaneous import power factor              | 1.0.13.7.0.255 |
| $\Sigma$ Li 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 |



|                                             |                              |
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| Energy Type                                      | OBIS Code       |
|--------------------------------------------------|-----------------|
| 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 (VT secondary value) | 1.0.32.6.0.255  |
| Internal L2 Voltage Maximum (VT secondary value) | 1.0.52.6.0.255  |
| Internal L3 Voltage Maximum (VT secondary value) | 1.0.72.6.0.255  |
| Internal L1 Current Maximum (CT secondary value) | 1.0.31.6.0.255  |
| Internal L2 Current Maximum (CT secondary value) | 1.0.51.6.0.255  |
| Internal L3 Current Maximum (CT secondary value) | 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)<br>Unit: 27 [W] |                           | R    | R    | R    |

b) Reactive power

| 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: 0 (integer)<br>Unit: 29 [var] |              | R    | R    | R    |

## 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)<br>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)<br>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)<br>Unit: 44 [Hz] |                           | R    | R    | R    |



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## f) 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    |
| 2. value        | double-long-unsigned                      |                           | R    | R    | R    |
| 3. scaler_unit  | Scaler: -3 (integer)<br>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)<br>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)<br>Unit: 35 [Voltage] |                           | R    | R    | R    |
| 4. status       | bit-string (def. = 0)                      |                           | R    | R    | R    |
| 5. capture_time | date_time[9]<br>(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)<br>Unit: 33 [Ampere] |                           | R    | R    | R    |
| 4. status       | bit-string (def. = 0)                     |                           | R    | R    | R    |
| 5. capture_time | date_time[9]<br>(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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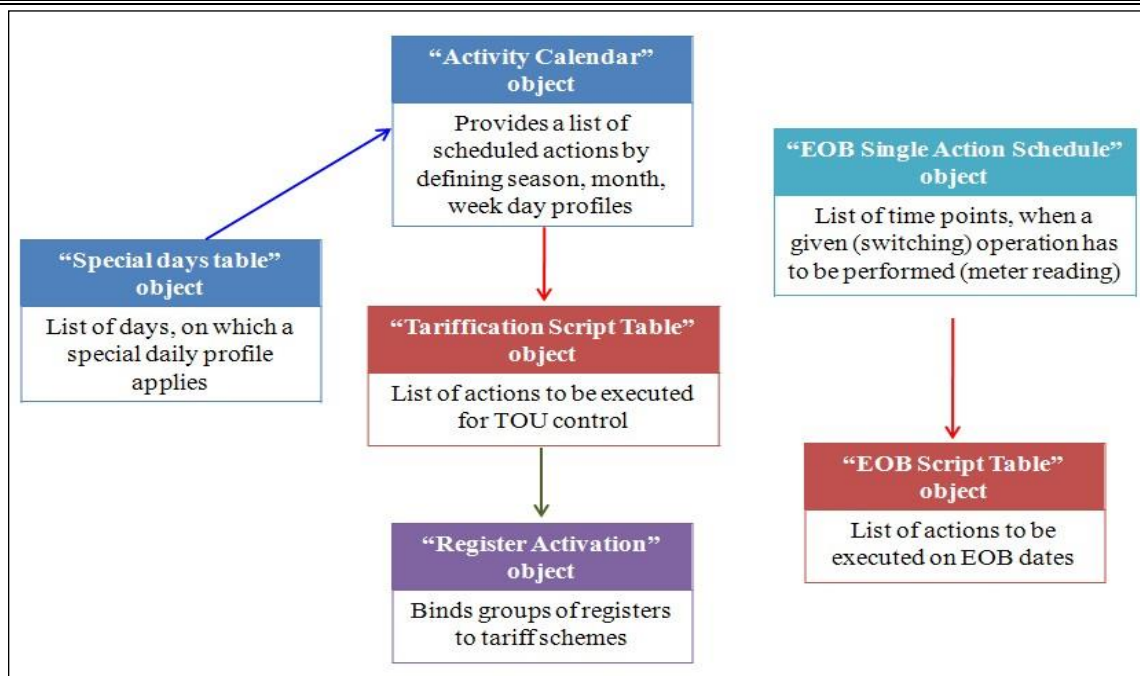


Figure 7 - Relational diagram of TOU/EOB-control objects

## 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<br>(Class id: 20, version: 0)  |
| Tariffication Script Table | 0         | 0 | 10 | 0 | 100 | 255 | Script Table<br>(Class id: 9, version: 0)        |
| Tariff Register Activation | 0         | 0 | 14 | 0 | 0   | 255 | Register Activation<br>(Class id: 6, version: 0) |

## 1) Attributes description of the object "Activity Calendar"

| Activity calendar |                         | Class_id = 20, 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. 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 |
| <b>Methods</b>                     |                          |  |   |     |     |
| 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.
- “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]).



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- “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”.

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)).

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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    |
| <b>Methods</b>  |                         |                           |      |      |      |
| 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.

| Script_selector (two bytes) | Meaning             |
|-----------------------------|---------------------|
| 0x0001                      | Tariff 1 activation |
| 0x0002                      | Tariff 2 activation |
| 0x0003                      | Tariff 3 activation |
| 0x0004                      | Tariff 4 activation |



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|        |                     |
|--------|---------------------|
| 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”

| 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, ...).

#### 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    |



|                                             |                              |
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| Mask_name (two bytes) | Activated registers |
|-----------------------|---------------------|
| 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”

- 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<br>(Class id: 11, version: 0) |

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## 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    |
| <b>Methods</b>  |                                                                                            |                            |      |      |      |
| 1. insert       | structure<br>{index: long-unsigned,<br>specialday_date: octet-string,<br>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.
- 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.

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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<br>(Class id: 22, version: 0) |
| Daily Single Action Schedule | 0         | 0 | 15 | 1 | 0 | 255 | Single Action Schedule<br>(Class id: 22, version: 0) |
| EOB Script Table             | 0         | 0 | 10 | 0 | 1 | 255 | Script Table<br>(Class id: 9, version: 0)            |

## 1) Attributes description of the object “Monthly EOB 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.


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(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”.
- “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” (1<sup>st</sup> 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  |



|                                             |                              |
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## 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.
- 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 |



|                                             |                              |
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|                 |                   |  |   |   |   |
|-----------------|-------------------|--|---|---|---|
| 1. logical_name | octet-string      |  | R | R | R |
| 2. scripts      | array (see below) |  | R | R | R |
| <b>Methods</b>  |                   |  |   |   |   |
| 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.

| Script_selector (two bytes) | Meaning                                     |
|-----------------------------|---------------------------------------------|
| 0x0000                      | Do Nothing                                  |
| 0x0001                      | Meter reading<br>(EOB Reset: Auto + Demand) |
| 0x0002                      | Meter reading<br>(Auto Reset)               |
| 0x0003                      | Meter reading<br>(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<br>Action Schedule | Daily Single<br>Action Schedule |                                                                                                                                                                                        |
| 0x0000                         | 0x0000                          | Manual Reset enabled<br>(Internal Clock (Automatic) Reset disabled)<br>⊗ Note: In this mode when the manual reset button is pressed, the EOB Reset (Auto + Demand) shall be performed. |
| 0x0001<br>[Default]            | 0x0002<br>[Default]             | Internal Clock (Automatic) Reset and On-command Reset enabled<br>(Manual Reset disabled)                                                                                               |

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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<br>(Class id: 8, version: 0) |

## 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<br>(TRUE: DST enabled,<br>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   |

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| Attribute                          | Type          | Meaning                                                                                                  |
|------------------------------------|---------------|----------------------------------------------------------------------------------------------------------|
| Day of month                       | unsigned [17] | Day                                                                                                      |
| Day of week                        | unsigned [17] | a day of week<br>1: Monday, 2: Tuesday, 3: Wednesday<br>4: Thursday, 5: Friday, 6: Saturday<br>7: Sunday |
| Hour                               | unsigned [17] | Hour                                                                                                     |
| 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.

|              |                        |
|--------------|------------------------|
| <b>Bit 0</b> | Invalid value          |
| <b>Bit 1</b> | Doubtful value         |
| <b>Bit 2</b> | Different clock base   |
| <b>Bit 3</b> | Invalid clock status   |
| <b>Bit 4</b> | Reserved               |
| <b>Bit 5</b> | Reserved               |
| <b>Bit 6</b> | Reserved               |
| <b>Bit 7</b> | 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)) ).

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- 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 [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<br>(Class id: 1, version: 0) |
| Date for display | 1         | 0 | 0 | 9 | 2 | 255 | Data<br>(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<br>1: Monday, 2: Tuesday, 3: Wednesday<br>4: Thursday, 5: Friday, 6: Saturday<br>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<br>(Class id: 1, version: 0) |
| Meter model         | 0         | 0 | 96 | 1 | 1 | 255 | Data<br>(Class id: 1, version: 0) |
| SEC item number     | 0         | 0 | 96 | 1 | 2 | 255 | Data<br>(Class id: 1, version: 0) |
| Firmware version    | 1         | 0 | 0  | 2 | 0 | 255 | Data<br>(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)<br>Manufacturer shall assign a series of ASCII-coded characters which represent the meter serial number. |                           | R    | R    | R    |

#### 2) Attributes description of the object "Meter model"



|                                             |                              |
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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        | visible-string (size: 8 bytes)<br>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)<br>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                                                                                                   |
|--------------|---------------------------------------------------------------------------------------------------------------------|
| 908402205    | METER:ELECTRICAL SERVICE,ELECTRONIC REVENUE, CT-VT OPERATED,110VAC,3PH,60HZ,1.5 (6)A with communication module      |
| 908402206    | METER:ELECTRICAL SERVICE,ELECTRONIC REVENUE, CT OPERATED,133/230/400VAC,3PH,60HZ,1.5 (6)A with communication module |

4) Attributes description of the object “Firmware version”

| 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)<br>Firmware version (see below) |                           | R    | R    | R    |

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- 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<br>(Class id: 3, version: 0) |
| Metrological LED (reactive energy) | 1         | 0 | 0 | 3 | 1 | 255 | Register<br>(Class id: 3, version: 0) |
| CT ratio (numerator)               | 1         | 0 | 0 | 4 | 2 | 255 | Data<br>(Class id: 1, version: 0)     |
| VT ratio (numerator)               | 1         | 0 | 0 | 4 | 3 | 255 | Data<br>(Class id: 1, version: 0)     |
| CT ratio (denominator)             | 1         | 0 | 0 | 4 | 5 | 255 | Data<br>(Class id: 1, version: 0)     |
| VT ratio (denominator)             | 1         | 0 | 0 | 4 | 6 | 255 | Data<br>(Class id: 1, version: 0)     |
| Nominal voltage                    | 1         | 0 | 0 | 6 | 0 | 255 | Register<br>(Class id: 3, version: 0) |
| Nominal current                    | 1         | 0 | 0 | 6 | 1 | 255 | Register<br>(Class id: 3, version: 0) |
| Nominal frequency                  | 1         | 0 | 0 | 6 | 2 | 255 | Register<br>(Class id: 3, version: 0) |



|                                             |                              |
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|                                    |   |   |    |   |   |     |                                       |
|------------------------------------|---|---|----|---|---|-----|---------------------------------------|
| Maximum current                    | 1 | 0 | 0  | 6 | 3 | 255 | Register<br>(Class id: 3, version: 0) |
| Metrological LED (apparent energy) | 1 | 0 | 0  | 3 | 2 | 255 | Register<br>(Class id: 3, version: 0) |
| Tariff Program ID                  | 0 | 0 | 96 | 1 | 3 | 255 | Data<br>(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<br>Meter constant for active energy |                           | R    | R    | R    |
| 3. scaler_unit  | scaler: -3 (integer)<br>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<br>Meter constant for reactive energy |                           | R    | R    | R    |
| 3. scaler_unit  | scaler: -3 (integer)<br>unit: 46 [1/varh]                  |                           | R    | R    | R    |

## 3) Attributes description of the object “CT ratio (numerator)”

| 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/W  | R/W  |

## 4) Attributes description of the object “VT ratio (numerator)”



|                                             |                              |
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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        | double-long-unsigned    |                           | R    | R/W  | R/W  |

5) Attributes description of the object “CT ratio (denominator)”

| 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/W  | R/W  |

6) Attributes description of the object “VT ratio (denominator)”

| 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/W  | R/W  |

7) Attributes description of the object “Nominal 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        | long_unsigned                             |                           | R    | R    | R    |
| 3. scaler_unit  | scaler: 0 (integer)<br>unit: 35 (voltage) |                           | R    | R    | R    |

[Note]:- With Voltage Adaptation the SM automatically configures its nominal voltage.

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



|                                             |                              |
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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                             |                           | R    | R    | R    |
| 3. scaler_unit  | scaler: -1 (integer)<br>unit: 33 (ampere) |                           | R    | R    | R    |

9) 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)<br>unit: 44 (hertz) |                           | R    | R    | R    |

10) Attributes description of the object “Metrological LED (apparent 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<br>Meter constant for apparent energy |                           | R    | R    | R    |
| 3. scaler_unit  | scaler: -3 (integer)<br>unit: 47 [1/VAh]                   |                           | R    | R    | R    |

11) 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    |

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|          |                        |  |   |     |     |
|----------|------------------------|--|---|-----|-----|
| 2. value | octet-string (8 bytes) |  | R | R/W | R/W |
|----------|------------------------|--|---|-----|-----|

**[Note]**

1. Tariff (TOU) Program ID: e.g.) 14AC0001 [14 (Year 2014), A type (B, 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<br>(class id: 1, version: 0) |
| Measurement algorithm for active energy   | 1         | 0 | 0 | 11 | 2 | 255 | Data<br>(class id: 1, version: 0) |
| Measurement algorithm for reactive power  | 1         | 0 | 0 | 11 | 3 | 255 | Data<br>(class id: 1, version: 0) |
| Measurement algorithm for reactive energy | 1         | 0 | 0 | 11 | 4 | 255 | Data<br>(class id: 1, version: 0) |
| Measurement algorithm for apparent power  | 1         | 0 | 0 | 11 | 5 | 255 | Data<br>(class id: 1, version: 0) |
| Measurement algorithm for apparent energy | 1         | 0 | 0 | 11 | 6 | 255 | Data<br>(class id: 1, version: 0) |
| Measurement algorithm for power factor    | 1         | 0 | 0 | 11 | 7 | 255 | Data<br>(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              |      |      |      |
|                 |                               |                           | 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 |



|                                             |                              |
|---------------------------------------------|------------------------------|
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## 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 |

## 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, |

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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<br>(class id: 3, version: 0) |
| Current over limit duration                  | 1         | 0 | 11 | 44 | 0   | 255 | Register<br>(class id: 3, version: 0) |
| Voltage under limit threshold                | 1         | 0 | 12 | 31 | 0   | 255 | Register<br>(class id: 3, version: 0) |
| Voltage under limit duration                 | 1         | 0 | 12 | 43 | 0   | 255 | Register<br>(class id: 3, version: 0) |
| $\sum$ Li PF under limit threshold<br>import | 1         | 0 | 13 | 31 | 0   | 255 | Register<br>(class id: 3, version: 0) |
| $\sum$ Li PF under limit threshold<br>export | 1         | 0 | 13 | 31 | 128 | 255 | Register<br>(class id: 3, version: 0) |
| Bypass limit threshold                       | 0         | 0 | 96 | 53 | 32  | 255 | Register<br>(class id: 3, version: 0) |
| Voltage THD limit<br>threshold(Upper)        | 1         | 0 | 12 | 46 | 0   | 255 | Register<br>(class id: 3, version: 0) |
| Voltage THD limit<br>threshold(Low)          | 1         | 0 | 12 | 46 | 1   | 255 | Register<br>(class id: 3, version: 0) |
| Current THD limit<br>threshold(Upper)        | 1         | 0 | 11 | 46 | 0   | 255 | Register<br>(class id: 3, version: 0) |
| Current THD limit<br>threshold(Low)          | 1         | 0 | 11 | 46 | 1   | 255 | Register<br>(class id: 3, version: 0) |
| THD over limit duration                      | 1         | 0 | 14 | 46 | 0   | 255 | Register<br>(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: 4000] |                           | R    | R/W  | R/W  |



|                                             |                              |
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|                |                                                                           |  |   |   |   |
|----------------|---------------------------------------------------------------------------|--|---|---|---|
| 3. scaler_unit | scaler: -1 (integer)<br>unit: 56 (Percentage)<br>※ 100% = Nominal 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)<br>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    |
| 2. value        | long-unsigned [default: 5000]                                               |                           | R    | R/W  | R/W  |
| 3. scaler_unit  | scaler: -2 (integer)<br>unit: 56 (Percentage)<br>※ 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)<br>unit: 6 (minute) |                           | R    | R    | R    |

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



|                                             |                              |
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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 [default: 0]                                                         |                           | R    | R/W  | R/W  |
| 3. scaler_unit                                                                        | Scaler: -4 (integer)<br>Unit: 255 (unitless)                              |                           | R    | R    | R    |
| 6) 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    |
| 2. value                                                                              | long [default: 0]                                                         |                           | R    | R/W  | R/W  |
| 3. scaler_unit                                                                        | Scaler: -4 (integer)<br>Unit: 255 (unitless)                              |                           | R    | R    | R    |
| 7) Attributes description of the objects “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:100]                                        |                           | R    | R/W  | R/W  |
| 3. scaler_unit                                                                        | Scaler: -1 (integer)<br>Unit: 56 [Percentage]<br>※ 100% = Nominal current |                           | R    | R    | R    |
| 8) Attributes description of the objects “Voltage THD limit threshold(Upper)”         |                                                                           |                           |      |      |      |



|                                             |                              |
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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        | double-long-unsigned [default: 6 10]         |                           | R    | R/W  | R/W  |
| 3. scaler_unit  | Scaler: 0 (integer)<br>Unit: 56 (Percentage) |                           | R    | R    | R    |

9) Attributes description of the objects “Voltage 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: 2 0]          |                           | R    | R/W  | R/W  |
| 3. scaler_unit  | Scaler: 0 (integer)<br>Unit: 56 (Percentage) |                           | R    | R    | R    |

10) 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)<br>Unit: 56 (Percentage) |                           | R    | R    | R    |

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



|                                             |                              |
|---------------------------------------------|------------------------------|
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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        | double-long-unsigned [default: 0]            |                           | R    | R/W  | R/W  |
| 3. scaler_unit  | Scaler: 0 (integer)<br>Unit: 56 (Percentage) |                           | R    | R    | R    |

12) Attributes description of the objects “THD 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: 1]              |                           | R    | R/W  | R/W  |
| 3. scaler_unit  | Scaler: 0 (integer)<br>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<br>(class id: 1, version: 0) |
| Storage Device Failure Date/Time      | 0         | 1 | 94 | 96 | 2 | 255 | Data<br>(class id: 1, version: 0) |
| Storage Device Voltage                | 0         | 0 | 96 | 6  | 3 | 255 | Data<br>(class id: 3, version: 0) |

1) Attributes description of the objects “Data”



|                                             |                              |
|---------------------------------------------|------------------------------|
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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    |

## 2) Attributes description of the objects "Storage Device 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. scaler_unit  | scaler: -2 (integer)<br>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<br>(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<br>[byte] | Order | Type                                                                                                                                                                                                                     |
| Cause for last Auto Reset                                                | 1              | 1     | bit 6: reserved<br>bit 5: pass a date (or a month)<br>bit 4: by internal clock schedule<br>bit 3: on command via the communication interfaces<br>bit 2: by date/time change<br>bit 1: program change<br>bit 0: reserved  |
| Cause for last Demand Reset                                              | 1              | 2     | bit 6: reserved<br>bit 5: pass a month<br>bit 4: by internal clock schedule<br>bit 3: on command via the communication interfaces<br>bit 2: by date/time change<br>bit 1: program change<br>bit 0: by manual push-button |
| Duration of prohibiting<br>“Manual reset” after<br>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<br>(class id: 1, version: 0) |
| Number of available billing periods | 1         | 0 | 0 | 1 | 1 | 255 | Data<br>(class id: 1, version: 0) |

**1) Attributes description of the objects “Data”**

| 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        | 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<br>(class id: 1, version: 0) |
| Time stamp of the last billing period<br>(last reset) | 1         | 0 | 0 | 1 | 2 | VZ  | Data<br>(class id: 1, version: 0) |
| Time of the most recent billing<br>(for display)      | 1         | 0 | 0 | 9 | 6 | 255 | Data<br>(class id: 1, version: 0) |
| Date of the most recent billing<br>(for display)      | 1         | 0 | 0 | 9 | 7 | 255 | Data<br>(class id: 1, version: 0) |

- 1) 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    |

- 2) 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              |      |      |      |
|            |                         |                           | A. 2 | A. 3 | A. 4 |



|                                             |                              |
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|                 |                                  |  |   |   |   |
|-----------------|----------------------------------|--|---|---|---|
| 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<br>(class id: 1, version: 0) |
| Test Display List   | 0         | 0 | 21 | 0 | 2 | 255 | Data<br>(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 |
| 1. logical_name | octet-string            |                           | R    | R    | R    |
| 2. value        | array (see below)       |                           | R    | R/W  | R/W  |

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## 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.

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



|                                             |                              |
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- The displayed items for CT-operated meter and CT/VT-operated meter are different (e.g. VT ratio is not applicable to CT-operated meter).

\* Notation Description in below table

- "B1 ~ B8": Byte 1 ~ Byte 8
- "C": applied to CT-operated meter
- "CV": applied CT/VT-operated meter

\* 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) |    |    |    |    |     |    |    |
| C                   | CV |                                                                             | B1                        | B2 | B3 | B4 | B5 | B6  | B7 | B8 |
| 1                   | 1  | $\sum Li$ Import active energy (QI+QIV) [Total]                             | 1                         | 0  | 1  | 8  | 0  | 255 | 2  | 0  |
| 2                   | 2  | $\sum Li$ Import active energy (QI+QIV) [Rate1]                             | 1                         | 0  | 1  | 8  | 1  | 255 | 2  | 0  |
| 3                   | 3  | $\sum Li$ Import active energy (QI+QIV) [Rate2]                             | 1                         | 0  | 1  | 8  | 2  | 255 | 2  | 0  |
| 4                   | 4  | $\sum Li$ Import active energy (QI+QIV) [Rate3]                             | 1                         | 0  | 1  | 8  | 3  | 255 | 2  | 0  |
| 5                   | 5  | $\sum Li$ Import active energy (QI+QIV) [Rate4]                             | 1                         | 0  | 1  | 8  | 5  | 255 | 2  | 0  |
| 6                   | 6  | Time                                                                        | 1                         | 0  | 0  | 9  | 1  | 255 | 2  | 0  |
| 7                   | 7  | Date                                                                        | 1                         | 0  | 0  | 9  | 2  | 255 | 2  | 0  |
| 8                   | 8  | $\sum Li$ Import active energy (QI+QIV)<br>(for a current billing period)   | 1                         | 0  | 1  | 9  | 0  | 255 | 2  | 0  |
| 9                   | 9  | $\sum Li$ Import reactive energy (QI+QII)<br>(for a current billing period) | 1                         | 0  | 3  | 9  | 0  | 255 | 2  | 0  |
| 10                  | 10 | $\sum Li$ Import apparent energy (QI+QIV)<br>(for a current billing period) | 1                         | 0  | 9  | 9  | 0  | 255 | 2  | 0  |



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| Normal Display List |    |                                                                                   |                           |    |     |    |    |     |    |    |
|---------------------|----|-----------------------------------------------------------------------------------|---------------------------|----|-----|----|----|-----|----|----|
| No                  |    | Contents to display                                                               | Item to display (8 Bytes) |    |     |    |    |     |    |    |
| C                   | CV |                                                                                   | B1                        | B2 | B3  | B4 | B5 | B6  | B7 | B8 |
| 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  |
| -                   | 11 | L1-L2 Instantaneous voltage                                                       | 1                         | 0  | 130 | 7  | 0  | 255 | 2  | 0  |
| -                   | 12 | L2-L3 Instantaneous voltage                                                       | 1                         | 0  | 131 | 7  | 0  | 255 | 2  | 0  |
| -                   | 13 | L3-L1 Instantaneous voltage                                                       | 1                         | 0  | 132 | 7  | 0  | 255 | 2  | 0  |
| 14                  | 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                  | 15 | L3 Instantaneous current                                                          | 1                         | 0  | 71  | 7  | 0  | 255 | 2  | 0  |
| 17                  | 16 | L1 Instantaneous import power factor                                              | 1                         | 0  | 33  | 7  | 0  | 255 | 2  | 0  |
| 18                  | -  | L2 Instantaneous import power factor                                              | 1                         | 0  | 53  | 7  | 0  | 255 | 2  | 0  |
| 19                  | 17 | L3 Instantaneous import power factor                                              | 1                         | 0  | 73  | 7  | 0  | 255 | 2  | 0  |
| 20                  | 18 | $\sum L_i$ Instantaneous import power factor                                      | 1                         | 0  | 13  | 7  | 0  | 255 | 2  | 0  |
| 21                  | 19 | $\sum L_i$ Average import Power Factor [Total]<br>(for a current billing period)  | 1                         | 0  | 13  | 0  | 0  | 255 | 2  | 0  |
| 22                  | 20 | $\sum L_i$ Average Import power factor [Rate 1]<br>(for a current billing period) | 1                         | 0  | 13  | 0  | 1  | 255 | 2  | 0  |



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| Normal Display List |    |                                                                                  |                           |    |    |    |    |     |    |    |
|---------------------|----|----------------------------------------------------------------------------------|---------------------------|----|----|----|----|-----|----|----|
| No                  |    | Contents to display                                                              | Item to display (8 Bytes) |    |    |    |    |     |    |    |
| C                   | CV |                                                                                  | B1                        | B2 | B3 | B4 | B5 | B6  | B7 | B8 |
| 23                  | 21 | $\sum Li$ Average Import power factor [Rate 2]<br>(for a current billing period) | 1                         | 0  | 13 | 0  | 2  | 255 | 2  | 0  |
| 24                  | 22 | $\sum Li$ Average Import power factor [Rate 3]<br>(for a current billing period) | 1                         | 0  | 13 | 0  | 3  | 255 | 2  | 0  |
| 25                  | 23 | $\sum Li$ Average Import power factor [Rate 4]<br>(for a current billing period) | 1                         | 0  | 13 | 0  | 5  | 255 | 2  | 0  |
| 26                  | 24 | Instantaneous supply frequency                                                   | 1                         | 0  | 14 | 7  | 0  | 255 | 2  | 0  |
| 27                  | 25 | Meter serial number                                                              | 0                         | 0  | 96 | 1  | 0  | 255 | 2  | 0  |
| 28                  | 26 | Firmware version                                                                 | 1                         | 0  | 0  | 2  | 0  | 255 | 2  | 0  |
| 29                  | 27 | CT ratio (numerator)                                                             | 1                         | 0  | 0  | 4  | 2  | 255 | 2  | 0  |
|                     | 28 | VT ratio (numerator)                                                             | 1                         | 0  | 0  | 4  | 3  | 255 | 2  | 0  |
| 30                  | 29 | CT ratio (denominator)                                                           | 1                         | 0  | 0  | 4  | 5  | 255 | 2  | 0  |
|                     | 30 | VT ratio (denominator)                                                           | 1                         | 0  | 0  | 4  | 6  | 255 | 2  | 0  |
| 31                  | 31 | $\sum Li$ Instantaneous import active power<br>(QI+QIV)                          | 1                         | 0  | 1  | 7  | 0  | 255 | 2  | 0  |
| 32                  | 32 | $\sum Li$ Instantaneous import reactive power<br>(QI+QII)                        | 1                         | 0  | 3  | 7  | 0  | 255 | 2  | 0  |
| 33                  | 33 | $\sum Li$ Instantaneous import apparent power<br>(QI+QIV)                        | 1                         | 0  | 9  | 7  | 0  | 255 | 2  | 0  |
| 34                  | 34 | $\sum Li$ Import active average demand<br>(QI+QIV)                               | 1                         | 0  | 1  | 4  | 0  | 255 | 2  | 0  |
| 35                  | 35 | $\sum Li$ Import reactive average demand<br>(QI+QII)                             | 1                         | 0  | 3  | 4  | 0  | 255 | 2  | 0  |



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| Normal Display List |    |                                                           |                           |    |    |    |    |     |    |    |
|---------------------|----|-----------------------------------------------------------|---------------------------|----|----|----|----|-----|----|----|
| No                  |    | Contents to display                                       | Item to display (8 Bytes) |    |    |    |    |     |    |    |
| C                   | CV |                                                           | B1                        | B2 | B3 | B4 | B5 | B6  | B7 | B8 |
| 36                  | 36 | $\sum Li$ Import apparent average demand (QI+QIV)         | 1                         | 0  | 9  | 4  | 0  | 255 | 2  | 0  |
| 37                  | 37 | $\sum Li$ Import active maximum demand (QI+QIV)           | 1                         | 0  | 1  | 6  | 0  | 255 | 2  | 0  |
| 38                  | 38 | Date of $\sum Li$ import active maximum demand (QI+QIV)   | 1                         | 0  | 1  | 6  | 0  | 255 | 5  | 1  |
| 39                  | 39 | Time of $\sum Li$ import active maximum demand (QI+QIV)   | 1                         | 0  | 1  | 6  | 0  | 255 | 5  | 6  |
| 40                  | 40 | $\sum Li$ Import reactive maximum demand (QI+QII)         | 1                         | 0  | 3  | 6  | 0  | 255 | 2  | 0  |
| 41                  | 41 | Date of $\sum Li$ import reactive maximum demand (QI+QII) | 1                         | 0  | 3  | 6  | 0  | 255 | 5  | 1  |
| 42                  | 42 | Time of $\sum Li$ import reactive maximum demand (QI+QII) | 1                         | 0  | 3  | 6  | 0  | 255 | 5  | 6  |
| 43                  | 43 | $\sum Li$ Import apparent maximum demand (QI+QIV)         | 1                         | 0  | 9  | 6  | 0  | 255 | 2  | 0  |
| 44                  | 44 | Date of $\sum Li$ import apparent maximum demand (QI+QIV) | 1                         | 0  | 9  | 6  | 0  | 255 | 5  | 1  |
| 45                  | 45 | Time of $\sum Li$ import apparent maximum demand (QI+QIV) | 1                         | 0  | 9  | 6  | 0  | 255 | 5  | 6  |
| 46                  | 46 | $\sum Li$ Import reactive energy (QI+QII) [Total]         | 1                         | 0  | 3  | 8  | 0  | 255 | 2  | 0  |
| 47                  | 47 | $\sum Li$ Import reactive energy (QI+QII) [Rate1]         | 1                         | 0  | 3  | 8  | 1  | 255 | 2  | 0  |
| 48                  | 48 | $\sum Li$ Import reactive energy (QI+QII) [Rate2]         | 1                         | 0  | 3  | 8  | 2  | 255 | 2  | 0  |
| 49                  | 49 | $\sum Li$ Import reactive energy (QI+QII) [Rate3]         | 1                         | 0  | 3  | 8  | 3  | 255 | 2  | 0  |
| 50                  | 50 | $\sum Li$ Import reactive energy (QI+QII) [Rate4]         | 1                         | 0  | 3  | 8  | 5  | 255 | 2  | 0  |



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| Normal Display List |    |                                                      |                           |    |    |    |    |     |    |    |
|---------------------|----|------------------------------------------------------|---------------------------|----|----|----|----|-----|----|----|
| No                  |    | Contents to display                                  | Item to display (8 Bytes) |    |    |    |    |     |    |    |
| C                   | CV |                                                      | B1                        | B2 | B3 | B4 | B5 | B6  | B7 | B8 |
| 51                  | 51 | $\sum Li$ Import apparent energy (QI+QIV)<br>[Total] | 1                         | 0  | 9  | 8  | 0  | 255 | 2  | 0  |
| 52                  | 52 | $\sum Li$ Import apparent energy (QI+QIV)<br>[Rate1] | 1                         | 0  | 9  | 8  | 1  | 255 | 2  | 0  |
| 53                  | 53 | $\sum Li$ Import apparent energy (QI+QIV)<br>[Rate2] | 1                         | 0  | 9  | 8  | 2  | 255 | 2  | 0  |
| 54                  | 54 | $\sum Li$ Import apparent energy (QI+QIV)<br>[Rate3] | 1                         | 0  | 9  | 8  | 3  | 255 | 2  | 0  |
| 55                  | 55 | $\sum Li$ Import apparent energy (QI+QIV)<br>[Rate4] | 1                         | 0  | 9  | 8  | 5  | 255 | 2  | 0  |
| 56                  | 56 | Billing period counter (VZ)                          | 1                         | 0  | 0  | 1  | 0  | 255 | 2  | 0  |
| 57                  | 57 | Load profile interval                                | 1                         | 0  | 99 | 1  | 0  | 255 | 4  | 0  |
| 58                  | 58 | Time stamp of the most recent billing                | 1                         | 0  | 0  | 9  | 6  | 255 | 2  | 0  |
| 59                  | 59 | Date stamp of the most recent billing                | 1                         | 0  | 0  | 9  | 7  | 255 | 2  | 0  |
| 60                  | 60 | 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.
- The displayed items for CT-operated meter and CT/VT-operated meter are different (e.g. VT ratio is not applicable to CT-operated meter).

\* Notation Description in below table

- "B1 ~ B8": Byte 1 ~ Byte 8
- "C": applied to CT-operated meter
- "CV": applied CT/VT-operated meter



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

- "1" means DD/MM/YYYY

- "6" means HH:MM:SS

| Test Display List |    |                                                                               |                           |    |    |    |    |     |    |    |
|-------------------|----|-------------------------------------------------------------------------------|---------------------------|----|----|----|----|-----|----|----|
| No                |    | Contents to display                                                           | Item to display (8 Bytes) |    |    |    |    |     |    |    |
| C                 | CV |                                                                               | B1                        | B2 | B3 | B4 | B5 | B6  | B7 | B8 |
| 1                 | 1  | $\Sigma$ Li Export active energy (QI+QIV) [Total]                             | 1                         | 0  | 2  | 8  | 0  | 255 | 2  | 0  |
| 2                 | 2  | $\Sigma$ Li Export active energy (QI+QIV) [Rate1]                             | 1                         | 0  | 2  | 8  | 1  | 255 | 2  | 0  |
| 3                 | 3  | $\Sigma$ Li Export active energy (QI+QIV) [Rate2]                             | 1                         | 0  | 2  | 8  | 2  | 255 | 2  | 0  |
| 4                 | 4  | $\Sigma$ Li Export active energy (QI+QIV) [Rate3]                             | 1                         | 0  | 2  | 8  | 3  | 255 | 2  | 0  |
| 5                 | 5  | $\Sigma$ Li Export active energy (QI+QIV) [Rate4]                             | 1                         | 0  | 2  | 8  | 4  | 255 | 2  | 0  |
| 6                 | 6  | $\Sigma$ Li Import active energy (QI+QIV) [Total]                             | 1                         | 0  | 1  | 8  | 0  | 255 | 2  | 0  |
| 7                 | 7  | $\Sigma$ Li Import active energy (QI+QIV) [Rate1]                             | 1                         | 0  | 1  | 8  | 1  | 255 | 2  | 0  |
| 8                 | 8  | $\Sigma$ Li Import active energy (QI+QIV) [Rate2]                             | 1                         | 0  | 1  | 8  | 2  | 255 | 2  | 0  |
| 9                 | 9  | $\Sigma$ Li Import active energy (QI+QIV) [Rate3]                             | 1                         | 0  | 1  | 8  | 3  | 255 | 2  | 0  |
| 10                | 10 | $\Sigma$ Li Import active energy (QI+QIV) [Rate4]                             | 1                         | 0  | 1  | 8  | 4  | 255 | 2  | 0  |
| 11                | 11 | Time                                                                          | 1                         | 0  | 0  | 9  | 1  | 255 | 2  | 0  |
| 12                | 12 | Date                                                                          | 1                         | 0  | 0  | 9  | 2  | 255 | 2  | 0  |
| 13                | 13 | $\Sigma$ Li Import active energy (QI+QIV)<br>(for a current billing period)   | 1                         | 0  | 1  | 9  | 0  | 255 | 2  | 0  |
| 14                | 14 | $\Sigma$ Li Import reactive energy (QI+QII)<br>(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) |    |     |    |    |     |    |    |
| C                 | CV |                                                                               | B1                        | B2 | B3  | B4 | B5 | B6  | B7 | B8 |
| 15                | 15 | $\sum Li$ Import apparent energy (QI+QIV)<br>(for a current billing period)   | 1                         | 0  | 9   | 9  | 0  | 255 | 2  | 0  |
| 16                | 16 | $\sum Li$ Export active energy (QII+QIII)<br>(for a current billing period)   | 1                         | 0  | 2   | 9  | 0  | 255 | 2  | 0  |
| 17                | 17 | $\sum Li$ Export reactive energy (QIII+QIV)<br>(for a current billing period) | 1                         | 0  | 4   | 9  | 0  | 255 | 2  | 0  |
| 18                | 18 | $\sum Li$ Export apparent energy (QII+QIII)<br>(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  |
| -                 | 19 | L1-L2 Instantaneous voltage                                                   | 1                         | 0  | 130 | 7  | 0  | 255 | 2  | 0  |
| -                 | 20 | L2-L3 Instantaneous voltage                                                   | 1                         | 0  | 131 | 7  | 0  | 255 | 2  | 0  |
| -                 | 21 | L3-L1 Instantaneous voltage                                                   | 1                         | 0  | 132 | 7  | 0  | 255 | 2  | 0  |
| 22                | 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                | 23 | L3 Instantaneous current                                                      | 1                         | 0  | 71  | 7  | 0  | 255 | 2  | 0  |
| 25                | 24 | L1 Instantaneous import power factor                                          | 1                         | 0  | 33  | 7  | 0  | 255 | 2  | 0  |
| 26                | -  | L2 Instantaneous import power factor                                          | 1                         | 0  | 53  | 7  | 0  | 255 | 2  | 0  |



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| Test Display List |    |                                                                                  |                           |    |    |    |    |     |    |    |  |
|-------------------|----|----------------------------------------------------------------------------------|---------------------------|----|----|----|----|-----|----|----|--|
| No                |    | Contents to display                                                              | Item to display (8 Bytes) |    |    |    |    |     |    |    |  |
| C                 | CV |                                                                                  | B1                        | B2 | B3 | B4 | B5 | B6  | B7 | B8 |  |
| 27                | 25 | L3 Instantaneous import power factor                                             | 1                         | 0  | 73 | 7  | 0  | 255 | 2  | 0  |  |
| 28                | 26 | $\sum Li$ Instantaneous import power factor                                      | 1                         | 0  | 13 | 7  | 0  | 255 | 2  | 0  |  |
| 29                | 27 | $\sum Li$ Average Import power factor [Total]<br>(for a current billing period)  | 1                         | 0  | 13 | 0  | 0  | 255 | 2  | 0  |  |
| 30                | 28 | $\sum Li$ Average Import power factor [Rate 1]<br>(for a current billing period) | 1                         | 0  | 13 | 0  | 1  | 255 | 2  | 0  |  |
| 31                | 29 | $\sum Li$ Average Import power factor [Rate 2]<br>(for a current billing period) | 1                         | 0  | 13 | 0  | 2  | 255 | 2  | 0  |  |
| 32                | 30 | $\sum Li$ Average Import power factor [Rate 3]<br>(for a current billing period) | 1                         | 0  | 13 | 0  | 3  | 255 | 2  | 0  |  |
| 33                | 31 | $\sum Li$ Average Import power factor [Rate 4]<br>(for a current billing period) | 1                         | 0  | 13 | 0  | 4  | 255 | 2  | 0  |  |
| 34                | 32 | Instantaneous supply frequency                                                   | 1                         | 0  | 14 | 7  | 0  | 255 | 2  | 0  |  |
| 35                | 33 | Meter serial number                                                              | 0                         | 0  | 96 | 1  | 0  | 255 | 2  | 0  |  |
| 36                | 34 | Firmware version                                                                 | 1                         | 0  | 0  | 2  | 0  | 255 | 2  | 0  |  |
| 37                | 35 | CT ratio (numerator)                                                             | 1                         | 0  | 0  | 4  | 2  | 255 | 2  | 0  |  |
|                   | 36 | VT ratio (numerator)                                                             | 1                         | 0  | 0  | 4  | 3  | 255 | 2  | 0  |  |
| 38                | 37 | CT ratio (denominator)                                                           | 1                         | 0  | 0  | 4  | 5  | 255 | 2  | 0  |  |
|                   | 38 | VT ratio (denominator)                                                           | 1                         | 0  | 0  | 4  | 6  | 255 | 2  | 0  |  |
| 39                | 39 | $\sum Li$ Instantaneous import active power<br>(QI+QIV)                          | 1                         | 0  | 1  | 7  | 0  | 255 | 2  | 0  |  |



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| Test Display List |    |                                                             |                           |    |    |    |    |     |    |    |
|-------------------|----|-------------------------------------------------------------|---------------------------|----|----|----|----|-----|----|----|
| No                |    | Contents to display                                         | Item to display (8 Bytes) |    |    |    |    |     |    |    |
| C                 | CV |                                                             | B1                        | B2 | B3 | B4 | B5 | B6  | B7 | B8 |
| 40                | 40 | $\sum Li$ Instantaneous import reactive power (QI+QII)      | 1                         | 0  | 3  | 7  | 0  | 255 | 2  | 0  |
| 41                | 41 | $\sum Li$ Instantaneous import apparent power (QI+QIV)      | 1                         | 0  | 9  | 7  | 0  | 255 | 2  | 0  |
| 42                | 42 | $\sum Li$ Import active average demand (QI+QIV)             | 1                         | 0  | 1  | 4  | 0  | 255 | 2  | 0  |
| 43                | 43 | $\sum Li$ Import reactive average demand (QI+QII)           | 1                         | 0  | 3  | 4  | 0  | 255 | 2  | 0  |
| 44                | 44 | $\sum Li$ Import apparent average demand (QI+QIV)           | 1                         | 0  | 9  | 4  | 0  | 255 | 2  | 0  |
| 45                | 45 | $\sum Li$ Import active maximum demand (QI+QIV)             | 1                         | 0  | 1  | 6  | 0  | 255 | 2  | 0  |
| 46                | 46 | Date of $\sum Li$ import active maximum demand (QI+QIV)     | 1                         | 0  | 1  | 6  | 0  | 255 | 5  | 1  |
| 47                | 47 | Time of $\sum Li$ import active maximum demand (QI+QIV)     | 1                         | 0  | 1  | 6  | 0  | 255 | 5  | 6  |
| 48                | 48 | $\sum Li$ Import reactive maximum demand (QI+QIV)           | 1                         | 0  | 3  | 6  | 0  | 255 | 2  | 0  |
| 49                | 49 | Date of $\sum Li$ import reactive maximum demand (QII+QIII) | 1                         | 0  | 3  | 6  | 0  | 255 | 5  | 1  |
| 50                | 50 | Time of $\sum Li$ import reactive maximum demand (QII+QIII) | 1                         | 0  | 3  | 6  | 0  | 255 | 5  | 6  |
| 51                | 51 | $\sum Li$ Import apparent maximum demand (QI+QIV)           | 1                         | 0  | 9  | 6  | 0  | 255 | 2  | 0  |
| 52                | 52 | Date of $\sum Li$ import apparent maximum demand (QI+QIV)   | 1                         | 0  | 9  | 6  | 0  | 255 | 5  | 1  |
| 53                | 53 | Time of $\sum Li$ import apparent maximum demand (QI+QIV)   | 1                         | 0  | 9  | 6  | 0  | 255 | 5  | 6  |
| 54                | 54 | $\sum Li$ Import reactive energy (QI+QII) [Total]           | 1                         | 0  | 3  | 8  | 0  | 255 | 2  | 0  |



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| Test Display List |    |                                                     |                           |    |    |    |    |     |    |    |  |
|-------------------|----|-----------------------------------------------------|---------------------------|----|----|----|----|-----|----|----|--|
| No                |    | Contents to display                                 | Item to display (8 Bytes) |    |    |    |    |     |    |    |  |
| C                 | CV |                                                     | B1                        | B2 | B3 | B4 | B5 | B6  | B7 | B8 |  |
| 55                | 55 | $\sum$ Li Import reactive energy (QI+QII) [Rate1]   | 1                         | 0  | 3  | 8  | 1  | 255 | 2  | 0  |  |
| 56                | 56 | $\sum$ Li Import reactive energy (QI+QII) [Rate2]   | 1                         | 0  | 3  | 8  | 2  | 255 | 2  | 0  |  |
| 57                | 57 | $\sum$ Li Import reactive energy (QI+QII) [Rate3]   | 1                         | 0  | 3  | 8  | 3  | 255 | 2  | 0  |  |
| 58                | 58 | $\sum$ Li Import reactive energy (QI+QII) [Rate4]   | 1                         | 0  | 3  | 8  | 4  | 255 | 2  | 0  |  |
| 59                | 59 | $\sum$ Li Import apparent energy (QI+QIV) [Total]   | 1                         | 0  | 9  | 8  | 0  | 255 | 2  | 0  |  |
| 60                | 60 | $\sum$ Li Import apparent energy (QI+QIV) [Rate1]   | 1                         | 0  | 9  | 8  | 1  | 255 | 2  | 0  |  |
| 61                | 61 | $\sum$ Li Import apparent energy (QI+QIV) [Rate2]   | 1                         | 0  | 9  | 8  | 2  | 255 | 2  | 0  |  |
| 62                | 62 | $\sum$ Li Import apparent energy (QI+QIV) [Rate3]   | 1                         | 0  | 9  | 8  | 3  | 255 | 2  | 0  |  |
| 63                | 63 | $\sum$ Li Import apparent energy (QI+QIV) [Rate4]   | 1                         | 0  | 9  | 8  | 4  | 255 | 2  | 0  |  |
| 64                | 64 | $\sum$ Li Export reactive energy (QIII+QIV) [Total] | 1                         | 0  | 4  | 8  | 0  | 255 | 2  | 0  |  |
| 65                | 65 | $\sum$ Li Export reactive energy (QIII+QIV) [Rate1] | 1                         | 0  | 4  | 8  | 1  | 255 | 2  | 0  |  |
| 66                | 66 | $\sum$ Li Export reactive energy (QIII+QIV) [Rate2] | 1                         | 0  | 4  | 8  | 2  | 255 | 2  | 0  |  |
| 67                | 67 | $\sum$ Li Export reactive energy (QIII+QIV) [Rate3] | 1                         | 0  | 4  | 8  | 3  | 255 | 2  | 0  |  |
| 68                | 68 | $\sum$ Li Export reactive energy (QIII+QIV) [Rate4] | 1                         | 0  | 4  | 8  | 4  | 255 | 2  | 0  |  |
| 69                | 69 | $\sum$ Li Export apparent energy (QI+QIV) [Total]   | 1                         | 0  | 10 | 8  | 0  | 255 | 2  | 0  |  |



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| Test Display List |    |                                                      |                           |    |    |    |    |     |    |    |
|-------------------|----|------------------------------------------------------|---------------------------|----|----|----|----|-----|----|----|
| No                |    | Contents to display                                  | Item to display (8 Bytes) |    |    |    |    |     |    |    |
| C                 | CV |                                                      | B1                        | B2 | B3 | B4 | B5 | B6  | B7 | B8 |
| 70                | 70 | $\sum$ Li Export apparent energy (QI+QIV)<br>[Rate1] | 1                         | 0  | 10 | 8  | 1  | 255 | 2  | 0  |
| 71                | 71 | $\sum$ Li Export apparent energy (QI+QIV)<br>[Rate2] | 1                         | 0  | 10 | 8  | 2  | 255 | 2  | 0  |
| 72                | 72 | $\sum$ Li Export apparent energy (QI+QIV)<br>[Rate3] | 1                         | 0  | 10 | 8  | 3  | 255 | 2  | 0  |
| 73                | 73 | $\sum$ Li Export apparent energy (QI+QIV)<br>[Rate4] | 1                         | 0  | 10 | 8  | 4  | 255 | 2  | 0  |
| 74                | 74 | Billing period counter (VZ)                          | 1                         | 0  | 0  | 1  | 0  | 255 | 2  | 0  |
| 75                | 75 | Load profile interval                                | 1                         | 0  | 99 | 1  | 0  | 255 | 4  | 0  |
| 76                | 76 | Time stamp of the most recent billing                | 1                         | 0  | 0  | 9  | 6  | 255 | 2  | 0  |
| 77                | 77 | Date stamp of the most recent billing                | 1                         | 0  | 0  | 9  | 7  | 255 | 2  | 0  |
| 78                | 78 | Storage Device installation date                     | 0                         | 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<br>(class id: 1, version: 0) |
| LCD auto scroll time                 | 0         | 1  | 94 | 96 | 23 | 255 | Data<br>(class id: 1, version: 0) |
| LCD night off option                 | 0         | 1  | 94 | 96 | 24 | 255 | Data<br>(class id: 1, version: 0) |
| Start-stop time of LCD night off     | 0         | 96 | 94 | 96 | 25 | 255 | Data<br>(class id: 1, version: 0) |



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## 1) Attributes description of the objects “LCD time-to-return to default screen”

| 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)<br>[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)<br>[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<br>[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 of LCD night off”

| 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        | 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<br>(Output relay control)           | 0         | 0  | 96 | 3  | 10  | 255 | Disconnect control<br>(class id: 70, version: 0) |
| Disconnect control Script table                        | 0         | 0  | 10 | 0  | 106 | 255 | Script table<br>(class id: 9, version: 0)        |
| State of output relay control<br>signals (ON/OFF)      | 0         | 0  | 96 | 3  | 2   | 255 | Data<br>(class id: 1, version: 0)                |
| Selection of the input control<br>signals              | 0         | 96 | 94 | 96 | 8   | 255 | Data<br>(class id: 1, version: 0)                |
| Auto recovery operation times<br>of current over limit | 0         | 96 | 94 | 96 | 9   | 255 | Data<br>(class id: 1, version: 0)                |
| Auto recovery times setting of<br>current over limit   | 0         | 96 | 94 | 96 | 10  | 255 | Data<br>(class id: 1, version: 0)                |
| Release times of current over<br>limit setting         | 0         | 96 | 94 | 96 | 11  | 255 | Data<br>(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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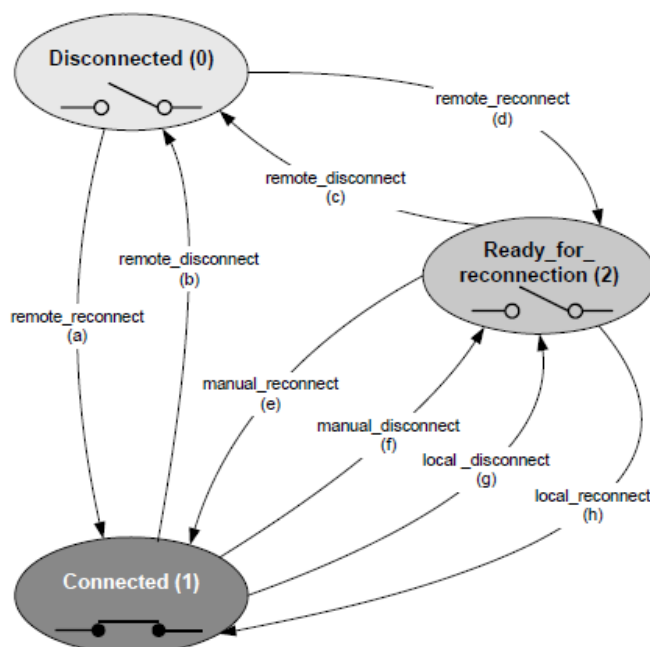


Figure 8 – State Diagram of the Disconnect Control Object

| 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.

1) 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 |  |



|                                             |                              |
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|                        |                                                                                                              |  |   |     |     |
|------------------------|--------------------------------------------------------------------------------------------------------------|--|---|-----|-----|
| 1. logical_name        | octet-string                                                                                                 |  | R | R   | R   |
| 2. output_state        | Boolean<br>[TRUE = Closed, FALSE = Open]                                                                     |  | R | R   | R   |
| 3. control_state       | Enum<br>(0) Disconnected,<br>(1) Connected,<br>(2) Ready_for_reconnection                                    |  | R | R   | R   |
| 4. control_mode        | Enum (4)<br>Disconnection: Remote (b, c),<br>local (g)<br>Reconnection: Remote (a),<br>manual (e), local (h) |  | - | R/W | R/W |
| <b>Methods</b>         |                                                                                                              |  |   |     |     |
| 1. remote_disconnect() |                                                                                                              |  | - | A   | A   |
| 2. remote_reconnect()  |                                                                                                              |  | - | A   | A   |

## 2) 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    |
| <b>Methods</b>  |                         |                           |      |      |      |
| 1. execute      | long-unsigned           |                           | -    | -    | -    |

- a) The method (execute) of the object "Disconnect control script table" is triggered by 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)  |

## 3) 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              |



|                                             |                              |
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|                 |                                          |  | A. 2 | A. 3 | A. 4 |
|-----------------|------------------------------------------|--|------|------|------|
| 1. logical_name | octet-string                             |  | R    | R    | R    |
| 2. value        | boolean<br>[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 |
| Ready for Reconnection   | Close              | Abnormal status (Meter should not be in this state) |                          |                    |           |

4) 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,

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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.

## 5) 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.

## 6) Attributes description of the object "Auto recovery times setting 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/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.

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## 7) 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        | 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 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<br>(class id: 9, version: 0) |
| Reset configuration word           | 0         | 0 | 96 | 52 | 75 | 255 | Data<br>(class id: 1, version: 0)         |
| Meter Program Configuration        | 0         | 1 | 94 | 96 | 10 | 255 | Script Table<br>(class id: 9, version: 0) |
| Meter Program Configuration Status | 0         | 1 | 94 | 96 | 11 | 255 | Data<br>(class id: 1, version: 0)         |



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## 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    |
| <b>Methods</b>  |                         |                           |      |      |      |
| 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.
- 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 CT VT 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.



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| 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.                                                  |
| 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 ( <b>This is used for CT/VT meter, while WC meter do not carry out this</b> ) |
| 18                                              | All relay parameters are set to their default.                                                              |
| 19                                              | Reserved                                                                                                    |
| 20                                              | Reserved                                                                                                    |
| 21                                              | Reserved                                                                                                    |
| 22                                              | Reserved                                                                                                    |
| 23                                              | Reserved                                                                                                    |
| 24                                              | TOUs (tariff) are kept.                                                                                     |



|                                             |                              |
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| Reset configuration word for Global Meter Reset |                                                                  |
|-------------------------------------------------|------------------------------------------------------------------|
| Bit                                             | Meaning                                                          |
| 25                                              | Average, maximum and THD values (currents, voltages) are cleared |
| 26                                              | Reserved                                                         |
| 27                                              | Reserved                                                         |
| 28                                              | Reserved                                                         |
| 29                                              | Reserved                                                         |
| 30                                              | Reserved                                                         |
| 31                                              | Reserved                                                         |

### 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    |
| <b>Methods</b>  |                         |                           |      |      |      |
| 1. execute      | long-unsigned           |                           | -    | A    | A    |

#### a) “script\_identifier” for Meter Program Configuration

| Script_identifier for Meter Program Configuration |                                               |
|---------------------------------------------------|-----------------------------------------------|
| Script_identifier<br>(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                |

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|        |                       |
|--------|-----------------------|
| 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, 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


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- 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 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 he user send Immediate activation Method MSG
  - ii. When he 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  |



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| No | Description                    | Related Object                                    | OBIS Code         |
|----|--------------------------------|---------------------------------------------------|-------------------|
| 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      |                                                   |                   |
| 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.
  - 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    |

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| Enum | Description                                   |
|------|-----------------------------------------------|
| 1    | Meter program download mode                   |
| 2    | Activating Passive meter program              |
| 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<br>(class id: 1, version: 0) |
| Date/Time of last meter program change | 0         | 0 | 96 | 2 | 1 | 255 | Data<br>(class id: 1, version: 0) |
| Date/Time of next meter program change | 0         | 0 | 96 | 2 | 6 | 255 | Data<br>(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<br>(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    |
| 2. value        | unsigned [8]<br>value = 1: Tariff 1, value = 2: Tariff 2<br>value = 3: Tariff 3, value = 4: Tariff 4<br>value = 5: Tariff 5, value = 6: Tariff 6 |                           | R    | R    | R    |

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value = 7: Tariff 7, value = 8: Tariff 8

## 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<br>(class id: 1, version: 0) |
| Error Register 2  | 0         | 0 | 97 | 97 | 1 | 255 | Data<br>(class id: 1, version: 0) |
| Error Register 3  | 0         | 0 | 97 | 97 | 2 | 255 | Data<br>(class id: 1, version: 0) |
| Error Register 4  | 0         | 0 | 97 | 97 | 3 | 255 | Data<br>(class id: 1, version: 0) |
| Error Register 5  | 0         | 0 | 97 | 97 | 4 | 255 | Data<br>(class id: 1, version: 0) |
| Error Register 6  | 0         | 0 | 97 | 97 | 5 | 255 | Data<br>(class id: 1, version: 0) |
| Error Register 7  | 0         | 0 | 97 | 97 | 6 | 255 | Data<br>(class id: 1, version: 0) |
| Error Register 8  | 0         | 0 | 97 | 97 | 7 | 255 | Data<br>(class id: 1, version: 0) |
| Error Register 9  | 0         | 0 | 97 | 97 | 8 | 255 | Data<br>(class id: 1, version: 0) |
| Error Register 10 | 0         | 0 | 97 | 97 | 9 | 255 | Data<br>(class id: 1, version: 0) |

**[Note]**

The Event Notification 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”

| 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        | 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 | CT Open (L3) | CT Open (L2) | CT Open (L1) | Missing neutral line connection | Voltage cut (L3) | Voltage cut (L2) | Voltage cut (L1) |

**[Note]**

1. The Current Missing MSB is used for CT/VT (3P/3W) meter only instead of bit6, bit5, bit4 and bit3. The MSB bit shall be set to 1 when the current flow of 1 or 2 phases is not measured for more than Sixteen (16) seconds.
2. The range of Voltage Cut is 0V ~ below 30V.
3. 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 CT Open 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 CT Open event (s) to the "0" current phase (s) using its internal program.

c) Error Register 3

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| 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                    |
|-------------------------------------------|---------------------------|-------------|-----------|---------------------------|-----------------|---------------------------|------------------------|
| Overload Apparent Power(I mport & Export) | Harmonics Limit (current) | Swell limit | Sag limit | Harmonics Limit (voltage) | Maximum current | Output relay disconnected | Temperature over limit |

## g) Error Register 7

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



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|   |   |   |   |   |                    |                    |                    |
|---|---|---|---|---|--------------------|--------------------|--------------------|
| - | - | - | - | - | CT<br>Bypass<br>L3 | CT<br>Bypass<br>L2 | CT<br>Bypass<br>L1 |
|---|---|---|---|---|--------------------|--------------------|--------------------|

## h) Error Register 8

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

## i) Error Register 9

| MSB | bit6                     | bit5                        | bit4                        | bit3                        | bit2                                                 | bit1                                                 | LSB                                                  |
|-----|--------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
| -   | CT Bypass<br>L3 restored | CT<br>Bypass L2<br>restored | CT Bypass<br>L1<br>restored | Output relay<br>Reconnected | Phase-<br>neutral<br>bypassing<br>(L3-N)<br>restored | Phase-<br>neutral<br>bypassing<br>(L2-N)<br>restored | Phase-<br>neutral<br>bypassing<br>(L1-N)<br>restored |

## j) Error Register 9

| MSB            | bit6             | bit5                    | bit4          | bit3     | bit2            | bit1                      | LSB                |
|----------------|------------------|-------------------------|---------------|----------|-----------------|---------------------------|--------------------|
| ECB<br>Tripped | ECB<br>Connected | ECB<br>Disconnec<br>ted | ECB<br>Manual | ECB Auto | ECP<br>Tampered | ECB<br>Tamper<br>Restored | ECB<br>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.



|                                             |                              |
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| Classification                                    | OBIS code |   |    |    |    |     | Interface Class                   |
|---------------------------------------------------|-----------|---|----|----|----|-----|-----------------------------------|
|                                                   | A         | B | C  | D  | E  | F   |                                   |
| Number of power failures<br>(in all three phases) | 0         | 0 | 96 | 7  | 0  | 255 | Data<br>(class id: 1, version: 0) |
| Number of power failures<br>(Phase L1)            | 0         | 0 | 96 | 7  | 1  | 255 | Data<br>(class id: 1, version: 0) |
| Number of power failures<br>(Phase L2)            | 0         | 0 | 96 | 7  | 2  | 255 | Data<br>(class id: 1, version: 0) |
| Number of power failures<br>(Phase L3)            | 0         | 0 | 96 | 7  | 3  | 255 | Data<br>(class id: 1, version: 0) |
| Number of power restore<br>(in all three phases)  | 0         | 1 | 94 | 96 | 3  | 255 | Data<br>(class id: 1, version: 0) |
| Number of power restore<br>(Phase L1)             | 0         | 1 | 94 | 96 | 4  | 255 | Data<br>(class id: 1, version: 0) |
| Number of power restore<br>(Phase L2)             | 0         | 1 | 94 | 96 | 5  | 255 | Data<br>(class id: 1, version: 0) |
| Number of power restore<br>(Phase L3)             | 0         | 1 | 94 | 96 | 6  | 255 | Data<br>(class id: 1, version: 0) |
| Number of clock change                            | 0         | 0 | 96 | 11 | 1  | 255 | Data<br>(class id: 1, version: 0) |
| Number of EOB reset                               | 0         | 0 | 96 | 11 | 2  | 255 | Data<br>(class id: 1, version: 0) |
| Number of manual reset                            | 0         | 0 | 96 | 11 | 3  | 255 | Data<br>(class id: 1, version: 0) |
| Number of auto-reset                              | 0         | 0 | 96 | 11 | 4  | 255 | Data<br>(class id: 1, version: 0) |
| Number of Current Missing                         | 0         | 0 | 96 | 11 | 5  | 255 | Data<br>(class id: 1, version: 0) |
| Number of top cover open                          | 0         | 0 | 96 | 11 | 6  | 255 | Data<br>(class id: 1, version: 0) |
| Number of terminal cover open                     | 0         | 0 | 96 | 11 | 7  | 255 | Data<br>(class id: 1, version: 0) |
| Number of phase-neutral swap                      | 0         | 0 | 96 | 11 | 8  | 255 | Data<br>(class id: 1, version: 0) |
| Number of reverse current                         | 0         | 0 | 96 | 11 | 9  | 255 | Data<br>(class id: 1, version: 0) |
| Number of magnetic interference<br>tampering      | 0         | 0 | 96 | 11 | 10 | 255 | Data<br>(class id: 1, version: 0) |
| Number of phase-neutral bypassing                 | 0         | 0 | 96 | 15 | 0  | 255 | Data<br>(class id: 1, version: 0) |
| Number of phase sequence reversal                 | 0         | 0 | 96 | 15 | 1  | 255 | Data<br>(class id: 1, version: 0) |
| Number of neutral line missing                    | 1         | 0 | 91 | 40 | 0  | 255 | Data<br>(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<br>(class id: 1, version: 0) |
| Number of password changes                                    | 0         | 0  | 96 | 15 | 2  | 255 | Data<br>(class id: 1, version: 0) |
| Number of state change of output relay control signals        | 0         | 96 | 96 | 4  | 1  | 255 | Data<br>(class id: 1, version: 0) |
| Number of selection of the input control signals              | 0         | 96 | 96 | 4  | 2  | 255 | Data<br>(class id: 1, version: 0) |
| Number of auto recovery operation times of current over limit | 0         | 96 | 96 | 4  | 3  | 255 | Data<br>(class id: 1, version: 0) |
| Number of auto recovery times setting of current over limit   | 0         | 96 | 96 | 4  | 4  | 255 | Data<br>(class id: 1, version: 0) |
| Number of current over limit release                          | 0         | 96 | 96 | 4  | 5  | 255 | Data<br>(class id: 1, version: 0) |
| Number of abnormal temperature                                | 0         | 96 | 96 | 4  | 6  | 255 | Data<br>(class id: 1, version: 0) |
| Number of maximum current                                     | 0         | 96 | 96 | 4  | 7  | 255 | Data<br>(class id: 1, version: 0) |
| Number of harmonics limit(voltage)                            | 0         | 0  | 96 | 57 | 91 | 255 | Data<br>(class id: 1, version: 0) |
| Number of Harmonics limit(current)                            | 0         | 0  | 96 | 57 | 90 | 255 | Data<br>(class id: 1, version: 0) |
| Number of Sag limit                                           | 0         | 96 | 12 | 32 | 0  | 255 | Data<br>(class id: 1, version: 0) |
| Number of Swell limit                                         | 0         | 96 | 12 | 36 | 0  | 255 | Data<br>(class id: 1, version: 0) |
| Number of Global Meter Reset                                  | 0         | 96 | 94 | 96 | 15 | 255 | Data<br>(class id: 1, version: 0) |
| Number of wrong cable connection                              | 0         | 96 | 94 | 96 | 16 | 255 | Data<br>(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 |
| 1. logical_name | octet-string            |                           | -    | R    | R    |
| 2. value        | long-unsigned [18]      |                           | -    | R    | R    |

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**[Note]**

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

## 6.9.9. CT Bypass Detection Mode

The CT Bypass Detection 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 CT Bypass Detection function is enabled or disabled

| Classification           | OBIS code |   |    |    |   |     | Interface Class                   |
|--------------------------|-----------|---|----|----|---|-----|-----------------------------------|
|                          | A         | B | C  | D  | E | F   |                                   |
| CT Bypass Detection Mode | 0         | 1 | 94 | 96 | 8 | 255 | Data<br>(class id: 1, version: 0) |

## 1) Attribute description of the objects “CT Bypass Detection 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<br>[TRUE= Enabled,<br>FALSE = Disabled(default)] |                           | R    | R/W  | R/W  |

## 6.9.10. CT Open Detection Mode

The CT Open Detection 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 CT Open Detection function is enabled or disabled.

| Classification         | OBIS code |   |    |    |   |     | Interface Class                   |
|------------------------|-----------|---|----|----|---|-----|-----------------------------------|
|                        | A         | B | C  | D  | E | F   |                                   |
| CT Open Detection Mode | 0         | 1 | 94 | 96 | 7 | 255 | Data<br>(class id: 1, version: 0) |

## 1) Attribute description of the objects “CT Open Detection Mode”

| 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        | Boolean<br>[TRUE = Enabled,<br>FALSE = Disabled (default)] |              | R    | R/W  | R/W  |

**[Note]** CT Open Detection Mode is applied for CT meter only.

#### 6.9.11. Data Transport Security Mode

The Data Transport Security function Enable/Disable Mode object is modeled by the “Data” IC (class id: 1, version: 0) and their OBIS code are “0.0.94.96.12.255”. 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<br>(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<br>[TRUE = Enabled,<br>FALSE = Disabled (default)] |                           | R    | R/W  | R/W  |

#### 6.9.12. 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<br>(class id: 64, version: 0)      |
| Invocation Counter | 0         | b | 43 | 1 | e | 255 | Data<br>(class id: 1, version: 0)             |
| Data Protection    | 0         | 0 | 43 | 2 | e | 255 | Data Protection<br>(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    |
| <b>Methods</b>         |                         |                            |      |      |      |
| 1. security_activate   | m                       | -                          | -    | A    | A    |
| 2. global_key_transfer | m                       | -                          | -    | A    | A    |

[Note]:

Value of "e": A2=2, A3=3, A4=4, A5=5

## 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 |
|----------|---------------|---|---|-----|-----|

**[Note]**

- Value of "e": A2=2, A3=3, A4=4, A5=5
- The maximum number of invocations is  $2^{32}-1$
- 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  |
| <b>Methods</b>                    |                         |                            |      |      |      |
| 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.

## 6.9.13. 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<br>(class id: 3, version: 0) |
| Temperature over limit duration  | 0         | 96 | 128 | 35 | 1 | 255 | Register<br>(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)<br>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)<br>Unit: 7 [second, time] |                           | R    | R    | R    |

## 6.9.14. 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   |                                             |
| Average Voltages and Currents Profile | 1         | 96 | 99 | 13 | 0 | 255 | Profile Generic<br>(Class id=7, version: 1) |

## 1) Attributes description of the object "Average Voltages and Currents Profile"



|                                             |                              |
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\* 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]<br>Programmable (default: 15)                                     |                           | R    | R    | R    |
| 5. sort_method     | enum<br>(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<br>[larger than 288: 15 minutes, three (3)<br>days, (record 96 per one (1) day)] |                           | -    | R    | R    |

2) Capture\_objects description of the object “Average Voltages and Currents Profile” for CT meter

| 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          |
| 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          |

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| Capture_objects                   | Logical_name       | Attribute_index | Data_index |
|-----------------------------------|--------------------|-----------------|------------|
| 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          |

3) Capture\_objects description of the object “Average Voltages and Currents Profile” for CTVT meter

| Capture_objects                   | Logical_name       | Attribute_index | Data_index |
|-----------------------------------|--------------------|-----------------|------------|
| Current date/time                 | 0.0.1.0.0.255      | 2               | 0          |
| R-Y Phase average voltage         | 1.0.124.128.0.255  | 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          |
| B-Y Phase average voltage         | 1.0.125.128.0.255  | 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]**

- The Average Voltages and Currents Profile object captures “the attribute 2” of each register in above table (capture objects).
- Capture\_period shall be as per the “Average Voltages and Currents Profile Interval”
- 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    |



|                                             |                              |
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|                |                                                                                                                                                                                  |  |   |     |     |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|-----|-----|
| 2. value       | double-long-unsigned                                                                                                                                                             |  | R | R/W | R/W |
| 3. scaler_unit | [Ampere]<br>Scaler: -3 (integer), Unit: 33 [A]<br>[Voltage]<br>Scaler: -3 (integer), Unit: 35 [V]<br>[Voltage & Current THD]<br>Scaler: 0 (integer), Unit: 56 [%,<br>percentage] |  | R | R   | R   |

## 6.9.15. Average Voltages and Currents Profile Interval

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

| Classification                                    | OBIS code |    |     |   |    |     | Interface Class |
|---------------------------------------------------|-----------|----|-----|---|----|-----|-----------------|
|                                                   | A         | B  | C   | D | E  | F   |                 |
| Average Voltages and<br>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<br>default value: 15 minutes<br>(configurable among 5, 15, 30, 60<br>minutes) |                           | R    | R/W  | R/W  |
| 3. scaler_unit  | scaler: 0 (integer)<br>unit: 6 [minute, time]                                          |                           | R    | R    | R    |

## 6.9.16. 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<br>value | 1         | 96 | 12 | 31 | 0 | 255 | Register<br>(Class id=3, version: 0) |
| Sag setting Upper Limit<br>value | 1         | 96 | 12 | 32 | 0 | 255 | Register<br>(Class id=3, version: 0) |

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## 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  |
| 3. scaler_unit  | scaler: 0 (integer)<br>unit: 56 [%, percentage] |                           | R    | R    | R    |

## 6.9.17. 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<br>(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)<br>(configurable among 1, 5, 10, 15,<br>30, 60 seconds) |                           | R    | R/W  | R/W  |
| 3. scaler_unit  | scaler: 0 (integer)<br>unit: 7 [second, time]                                         |                           | R    | R    | R    |

## 6.9.18. 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 |                 |

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|                                 |   |    |    |    |   |     |                                      |
|---------------------------------|---|----|----|----|---|-----|--------------------------------------|
| Swell setting Lower Limit value | 1 | 96 | 12 | 36 | 0 | 255 | Register<br>(Class id=3, version: 0) |
| Swell setting Upper Limit value | 1 | 96 | 12 | 35 | 0 | 255 | Register<br>(Class id=3, version: 0) |

## 1) Attributes description of the object "Swell 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  |
| 3. scaler_unit  | scaler: 0 (integer)<br>unit: 56 [%, percentage] |                           | R    | R    | R    |

## 6.9.19. 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<br>(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)<br>(configurable among 1, 5, 10, 15, 30, 60 seconds) |                           | R    | R/W  | R/W  |
| 3. scaler_unit  | scaler: 0 (integer)<br>unit: 7 [second, time]                                      |                           | R    | R    | R    |



|                                             |                              |
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## 6.9.20. 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   |                                      |
| Magnetic Interference<br>Detection Time | 1         | 96 | 128 | 0 | 3 | 255 | Register<br>(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)<br>unit: 7 [second, time] |                           | R    | R    | R    |

## 6.9.21. 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<br>(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    |



|                                             |                              |
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| Profile generic    |                                                   | Class_id = 7, version = 1 |      |      |      |
|--------------------|---------------------------------------------------|---------------------------|------|------|------|
| Attributes         | Data type & Description                           | Access right              |      |      |      |
|                    |                                                   |                           | A. 2 | A. 3 | A. 4 |
| 2. buffer          | array                                             |                           | R    | R    | R    |
| 3. capture_objects | array (See below table)                           |                           | R    | R    | R/W  |
| 4. capture_period  | Double-long-unsigned<br>(0: No automatic capture) |                           | R    | R    | R    |
| 5. sort_method     | Enum<br>(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<br>[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          |
| Phase angle of voltage R phase and voltage Y phase | 1.0.81.7.10.255  | 2               | 0          |

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| Capture_objects                                    | Logical_name    | Attribute_index | Data_index |
|----------------------------------------------------|-----------------|-----------------|------------|
| 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]<br>Scaler: -3 (integer), Unit: 33 (A)<br>[Voltage]<br>Scaler: -3 (integer), Unit: 35 (V)<br>[Voltage THD]<br>Scaler: 0 (integer), Unit: 56 (% , percentage)<br>[Power Factor]<br>Scaler: -3 (integer), Unit: 255 (unitless)<br>[Phase Angle]<br>Scaler: 0 (integer), Unit: 8 (°, degree)<br>[Temperature]<br>Scaler: 0 (integer), Unit: 9 (°C, degree-celsius) |                           | R    | R    | R    |

## 6.9.22. Security Association Event

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

| Classification | OBIS code | Interface Class |
|----------------|-----------|-----------------|
|----------------|-----------|-----------------|



|                                             |                              |
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|                            | A | B  | C  | D  | E  | F   |                                  |
|----------------------------|---|----|----|----|----|-----|----------------------------------|
| Security Association Event | 0 | 96 | 99 | 98 | 19 | 255 | Data<br>(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                   |
| 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                          |



|                                             |                              |
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|                                                                      |                                                  |
|----------------------------------------------------------------------|--------------------------------------------------|
|                                                                      | 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<br>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<br>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                |
|                                                                      | 11 - A5 Encryption to Nothing                    |
|                                                                      | 12 - A5 Authentication and Encryption to Nothing |
| 06- Invocation counter is reach to<br>maximum value (ie.4294967295). | 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            |



|                                             |                              |
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|                                                                                                                                                          |                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
|                                                                                                                                                          | 10: optical channel of Association 5          |
|                                                                                                                                                          | 11: RS485(GPRS port) channel of Association 5 |
|                                                                                                                                                          | 12: IHD port 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). | 01: GUEK mode                                 |
|                                                                                                                                                          | 02: GBK mode                                  |
| 08- The parameter of "Data transport security mode" was changed.                                                                                         | 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) |
| 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                              | 1         | 0 | 99 | 98 | 12 | 255 | Profile Generic                           |



|                                             |                              |
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| Classification                                         | OBIS code |    |    |    |    |     | Interface Class                              |
|--------------------------------------------------------|-----------|----|----|----|----|-----|----------------------------------------------|
|                                                        | A         | B  | C  | D  | E  | F   |                                              |
| (Tamper 1)                                             |           |    |    |    |    |     | (class id: 7, version: 1)                    |
| Event log<br>(Tamper 2)                                | 1         | 0  | 99 | 98 | 13 | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Event log<br>(Current /voltage limit<br>violation)     | 1         | 0  | 99 | 98 | 14 | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Event Log<br>(Output relay control)                    | 1         | 0  | 99 | 98 | 15 | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Event Log<br>(Password changes)                        | 1         | 0  | 99 | 98 | 16 | 255 | Profile Generic<br>(class id: 7, version: 1) |
| State of output relay control<br>signals (ON/OFF)      | 1         | 96 | 99 | 98 | 12 | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Selection of the input control<br>signals              | 1         | 96 | 99 | 98 | 2  | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Auto recovery operation<br>times of current over limit | 1         | 96 | 99 | 98 | 3  | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Auto recovery times setting<br>of current over limit   | 1         | 96 | 99 | 98 | 4  | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Current over limit release                             | 1         | 96 | 99 | 98 | 13 | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Event log(Temperature over<br>limit)                   | 1         | 96 | 99 | 98 | 6  | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Maximum current                                        | 1         | 96 | 99 | 98 | 7  | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Harmonics (THD) Voltage<br>limit                       | 0         | 0  | 99 | 98 | 24 | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Harmonics (THD) Current<br>limit                       | 0         | 0  | 99 | 98 | 23 | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Sag limit                                              | 1         | 96 | 99 | 10 | 1  | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Swell limit                                            | 1         | 96 | 99 | 10 | 2  | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Security association Event                             | 1         | 96 | 99 | 98 | 19 | 255 | Profile Generic<br>(class id: 7, version: 1) |
| Display Roll-Over to Zero<br>Event                     | 1         | 96 | 99 | 98 | 20 | 255 | Profile Generic (class<br>id: 7, version: 1) |
| Firmware Event log                                     | 1         | 96 | 99 | 98 | 11 | 255 | Profile Generic<br>(class id: 7, version: 1) |
| GPS Data                                               | 1         | 0  | 99 | 98 | 17 | 255 | Profile Generic<br>(class id: 7, version: 1) |



|                                             |                              |
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| Classification | OBIS code |   |    |    |    |     | Interface Class                              |
|----------------|-----------|---|----|----|----|-----|----------------------------------------------|
|                | A         | B | C  | D  | E  | F   |                                              |
| ECB Data       | 1         | 0 | 99 | 98 | 18 | 255 | Profile Generic<br>(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<br>(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                              |                           | -    | R    | R    |

## a) “capture\_object” of each event log profiles

| Classification               | Capture_objects                                  | OBIS code       | Interface class | Attribute index |
|------------------------------|--------------------------------------------------|-----------------|-----------------|-----------------|
| Event Log<br>(Power failure) | Current date/time                                | 0.0.1.0.0.255   | Clock           | 2               |
|                              | Number of power failure<br>(in all three phases) | 0.0.96.7.0.255  | Data            | 2               |
|                              | Number of power failure<br>(phases L1)           | 0.0.96.7.1.255  | Data            | 2               |
|                              | Number of power failure<br>(phases L2)           | 0.0.96.7.2.255  | Data            | 2               |
|                              | Number of power failure<br>(phases L3)           | 0.0.96.7.3.255  | Data            | 2               |
| Event Log<br>(Power restore) | Current date/time                                | 0.0.1.0.0.255   | Clock           | 2               |
|                              | Number of power restore<br>(in all three phases) | 0.1.94.96.3.255 | Data            | 2               |
|                              | Number of power restore<br>(phases L1)           | 0.1.94.96.4.255 | Data            | 2               |



|                                             |                              |
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| Classification                                                       | Capture_objects                                 | OBIS code       | Interface class | Attribute index |
|----------------------------------------------------------------------|-------------------------------------------------|-----------------|-----------------|-----------------|
|                                                                      | 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               |
| 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               |



|                                             |                              |
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| Classification                                                  | Capture_objects                             | OBIS code         | Interface class    | Attribute index |
|-----------------------------------------------------------------|---------------------------------------------|-------------------|--------------------|-----------------|
| Event Log<br>(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               |
| Event Log<br>(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<br>(Current/voltage/<br>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<br>(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<br>(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       | 0.0.96.3.2.255    | Data               | 2               |



|                                             |                              |
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| Classification                                      | Capture_objects                                     | OBIS code         | Interface class | Attribute index |
|-----------------------------------------------------|-----------------------------------------------------|-------------------|-----------------|-----------------|
|                                                     | (ON/OFF)                                            |                   |                 |                 |
| 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 operation times of current over limit | Current date/time                                   | 0.0.1.0.0.255     | Clock           | 2               |
|                                                     | 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<br>(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<br>(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<br>(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                                           | Current date/time                                   | 0.0.1.0.0.255     | Clock           | 2               |



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| Classification                              | Capture_objects                                    | OBIS code         | Interface class | Attribute index |
|---------------------------------------------|----------------------------------------------------|-------------------|-----------------|-----------------|
| (Sag limit)                                 | Error register 6                                   | 0.0.97.97.5.255   | Data            | 2               |
|                                             | Number of Sag limit                                | 0.96.12.32.0.255  | Data            | 2               |
| Event Log<br>(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<br>(Harmonics Limit<br>(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<br>(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<br>(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               |
| Event Log<br>(CT Bypass)                    | Current date/time                                  | 0.0.1.0.0.255     | Clock           | 2               |
|                                             | Number of CT Bypass<br>(CT bypass on all 3 phases) | 0.0.96.11.20.255  | Data            | 2               |
| Event Log<br>(Over load)                    | Current date/time                                  | 0.0.1.0.0.255     | Clock           | 2               |
|                                             | L1 import apparent power                           | 1.0.29.7.0.255    | Data            | 2               |
|                                             | L2 import apparent power                           | 1.0.49.7.0.255    | Data            | 2               |
|                                             | L3 import apparent power                           | 1.0.69.7.0.255    | Data            | 2               |
|                                             | L1 export apparent power                           | 1.0.30.7.0.255    | Data            | 2               |
|                                             | L2 export apparent power                           | 1.0.50.7.0.255    | Data            | 2               |



|                                             |                              |
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| Classification                | Capture_objects          | OBIS code         | Interface class | Attribute index |
|-------------------------------|--------------------------|-------------------|-----------------|-----------------|
|                               | L3 export apparent power | 1.0.70.7.0.255    | 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<br>Definition | Upgrade Begin            |                   | 1               |                 |
|                               | Upgrade success          |                   | 4               |                 |
|                               | Verify failed            |                   | 32              |                 |
|                               | Activation Failed        |                   | 64              |                 |

**[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.

**OVERLOAD:**

Over load threshold (class:3, obis:1.0.10.35.0.255): Default is 120%\*Un\*Imax

Over load duration (class:3, obis: 1.0.10.44.0.255): Default is 5 seconds

**Start condition:** - At least one phase import or export apparent power goes beyond over load threshold for more than over load duration.

**End condition:** - All phases import and export apparent power go below over load threshold for more than over load duration.

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## CT Critical Events (Alarms &amp; 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   | CT Open (L1)                      | Error Register 2 |      |
| 12   | CT Open (L2)                      | Error Register 2 |      |
| 13   | CT Open (L3)                      | Error Register 2 |      |
| 14   | Current Missing                   | Error Register 2 |      |
| 15   | Reverse current L1                | Error Register 3 |      |
| 16   | Reverse current L2                | Error Register 3 |      |
| 17   | Reverse current L3                | Error Register 3 |      |
| 18   | Phase and neutral wire swapped L1 | Error Register 3 |      |
| 19   | Phase and neutral wire swapped L2 | Error Register 3 |      |
| 20   | Phase and neutral wire swapped L3 | Error Register 3 |      |
| 21   | Terminal cover open               | Error Register 3 | Yes  |
| 22   | Top cover open                    | Error Register 3 | Yes  |
| 23   | Over current L1                   | Error Register 4 | Yes  |
| 24   | Over current L2                   | Error Register 4 | Yes  |
| 25   | Over current L3                   | Error Register 4 | Yes  |
| 26   | Low voltage L1                    | Error Register 4 |      |
| 27   | Low voltage L2                    | Error Register 4 |      |
| 28   | Low voltage L3                    | Error Register 4 |      |
| 29   | PF under limit threshold import   | Error Register 4 |      |
| 30   | PF under limit threshold export   | Error Register 4 |      |
| 31   | Phase sequence reversal L1        | Error Register 5 |      |
| 32   | Phase sequence reversal L2        | Error Register 5 |      |
| 33   | Phase sequence reversal L3        | Error Register 5 |      |
| 34   | Phase-neutral bypassing L1        | Error Register 5 | Yes  |
| 35   | Phase-neutral bypassing L2        | Error Register 5 | Yes  |
| 36   | Phase-neutral bypassing L3        | Error Register 5 | Yes  |
| 37   | Magnetic interference detected    | Error Register 5 |      |

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## CT Critical Events (Alarms &amp; High Priority Events) List

| Sr.# | Meter Data                              | Error registers   | Push |
|------|-----------------------------------------|-------------------|------|
| 38   | Wrong password tried (3 times)          | Error Register 5  |      |
| 39   | Temperature over limit                  | Error Register 6  |      |
| 40   | Output relay disconnected               | Error Register 6  | Yes  |
| 41   | Maximum current                         | Error Register 6  |      |
| 42   | Harmonics Limit voltage                 | Error Register 6  |      |
| 43   | Sag limit                               | Error Register 6  |      |
| 44   | Swell limit                             | Error Register 6  |      |
| 45   | Harmonics Limit current                 | Error Register 6  |      |
| 46   | Over load                               | Error Register 6  | Yes  |
| 47   | CT Bypass                               | Error Register 7  | Yes  |
| 48   | CT Bypass                               | Error Register 7  | Yes  |
| 49   | CT Bypass                               | Error Register 7  | Yes  |
| 50   | Top cover restored                      | Error Register 8  | Yes  |
| 51   | Terminal cover restored                 | Error Register 8  | Yes  |
| 52   | Voltage cut (L3) restored               | Error Register 8  | Yes  |
| 53   | Voltage cut (L2) restored               | Error Register 8  | Yes  |
| 54   | Voltage cut (L1) restored               | Error Register 8  | Yes  |
| 55   | Memory error restored                   | Error Register 8  | Yes  |
| 56   | Output relay Reconnected                | Error Register 9  | Yes  |
| 57   | Phase-neutral bypassing (L3-N) restored | Error Register 9  | Yes  |
| 58   | Phase-neutral bypassing (L2-N) restored | Error Register 9  | Yes  |
| 59   | Phase-neutral bypassing (L2-N) restored | Error Register 9  | Yes  |
| 60   | Phase-neutral bypassing (L1-N) restored | Error Register 9  | Yes  |
| 61   | ECB Tripped                             | Error Register 10 | Yes  |
| 62   | ECB Manual                              | Error Register 10 | Yes  |
| 63   | ECB Tampered                            | Error Register 10 | Yes  |
| 64   | ECB Malfunction                         | Error Register 10 | Yes  |
| 65   | ECB Connected                           | Error Register 10 | Yes  |
| 66   | ECB Disconnected                        | Error Register 10 | Yes  |
| 67   | ECB Tamper restored                     | Error Register 10 | Yes  |

**[Note]**

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

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**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     | 0.0.97.98.17.255 | 2         | Error register 7 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.

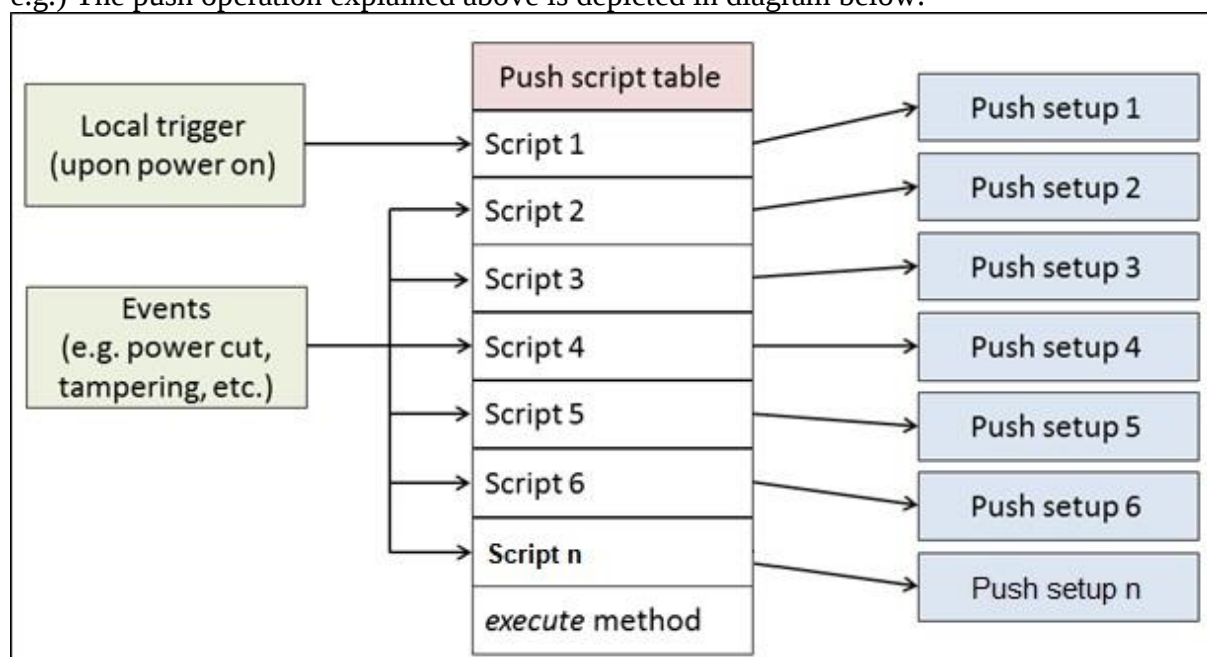
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The local trigger (e.g. upon power on) and event trigger (e.g. error registers in Section 6.9.7) call a script entry in a Push “Script table” object which invokes then the push method of the related “Push setup” object.

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<br>(class id: 40, version: 0) |
| Push setup 2   | 0         | 2 | 25 | 9 | 0 | 255 | Push setup<br>(class id: 40, version: 0) |
| Push setup 3   | 0         | 3 | 25 | 9 | 0 | 255 | Push setup<br>(class id: 40, version: 0) |
| Push setup 4   | 0         | 4 | 25 | 9 | 0 | 255 | Push setup<br>(class id: 40, version: 0) |
| Push setup 5   | 0         | 5 | 25 | 9 | 0 | 255 | Push setup<br>(class id: 40, version: 0) |
| Push setup 6   | 0         | 6 | 25 | 9 | 0 | 255 | Push setup<br>(class id: 40, version: 0) |



|                                             |                              |
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|                   |   |    |    |   |     |     |                                           |
|-------------------|---|----|----|---|-----|-----|-------------------------------------------|
| Push setup 7      | 0 | 7  | 25 | 9 | 0   | 255 | Push setup<br>(class id: 40, version: 0)  |
| Push setup 8      | 0 | 8  | 25 | 9 | 0   | 255 | Push setup<br>(class id: 40, version: 0)  |
| Push setup 9      | 0 | 9  | 25 | 9 | 0   | 255 | Push setup<br>(class id: 40, version: 0)  |
| Push setup 10     | 0 | 10 | 25 | 9 | 0   | 255 | Push setup<br>(class id: 40, version: 0)  |
| Push setup 11     | 0 | 11 | 25 | 9 | 0   | 255 | Push setup<br>(class id: 40, version: 0)  |
| Push setup 12     | 0 | 12 | 25 | 9 | 0   | 255 | Push setup<br>(class id: 40, version: 0)  |
| Push script table | 0 | 0  | 10 | 0 | 108 | 255 | Script table<br>(class id: 9, version: 0) |

## 4) 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<br>(default: array [0])        |                            | -    | R    | R/W  |
| 5. randomization_start_interval | long-unsigned<br>(default: 10 [sec]) |                            | -    | R/W  | R/W  |
| 6. number_of_retries            | unsigned<br>(default: 3)             |                            | -    | R/W  | R/W  |
| 7. repetition_delay             | long_unsigned<br>(default: 5 [sec])  |                            | -    | R    | R/W  |
| <b>Methods</b>                  |                                      |                            |      |      |      |
| 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.

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```

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’<br>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          |
| Push setup 8           | Error Register 7            | 1        | 0.0.97.97.6.255  | 2               | 0          |
| 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

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```
{
  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 |

## 5) Attributes description of the objects "Push script table"

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


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**[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. A COSEM logical device has one “Association LN” object for each AA the device is able to support. In this specification, since the 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<br>(class id: 15, version: 1) |
| Association LN #2   | 0         | 0 | 40 | 0 | 2 | 255 | Association LN<br>(class id: 15, version: 1) |
| Association LN #3   | 0         | 0 | 40 | 0 | 3 | 255 | Association LN<br>(class id: 15, version: 1) |
| Association LN #4   | 0         | 0 | 40 | 0 | 4 | 255 | Association LN<br>(class id: 15, version: 1) |
| Association LN #5   | 0         | 0 | 40 | 0 | 5 | 255 | Association LN<br>(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    |



|                                             |                              |
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| Association LN                                                                      |                              | Class_id = 15, version = 1 |      |      |      |
|-------------------------------------------------------------------------------------|------------------------------|----------------------------|------|------|------|
| Attributes                                                                          | Data type & Description      | Access right               |      |      |      |
|                                                                                     |                              |                            | A. 2 | A. 3 | A. 4 |
| 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    |
| <b>Specific methods</b>                                                             | <b>m/o</b>                   |                            |      |      |      |
| 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  |



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| Association LN                                                                      |                              | Class_id = 15, version = 1 |      |      |      |
|-------------------------------------------------------------------------------------|------------------------------|----------------------------|------|------|------|
| Attributes                                                                          | Data type & Description      | Access right               |      |      |      |
|                                                                                     |                              |                            | A. 2 | A. 3 | A. 4 |
| 8. association_status                                                               | enum (see below)             |                            | R    | R    | R    |
| 9. security_setup_reference                                                         | octet-string                 | -                          | R    | R    | R    |
| <b>Specific methods</b>                                                             | <b>m/o</b>                   |                            |      |      |      |
| 1. reply_to_HLS_authentication (data)                                               | m                            |                            |      |      |      |
| 2. change_HLS_secret (data)                                                         | m                            |                            |      |      |      |
| 3. add_object (data)                                                                | m                            |                            |      |      |      |
| 4. remove_object (data)                                                             | m                            |                            |      |      |      |
| 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    |
| <b>Specific methods</b>                                                             | <b>m/o</b>                   |                            |      |      |      |
| 1. reply_to_HLS_authentication (data)                                               | m                            |                            |      |      |      |
| 2. change_HLS_secret (data)                                                         | m                            |                            |      |      |      |
| 3. add_object (data)                                                                | m                            |                            |      |      |      |



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| Association LN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         | Class_id = 15, version = 1           |      |      |      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------------|------|------|------|
| Attributes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Data type & Description | Access right                         |      |      |      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                         |                                      | A. 2 | A. 3 | A. 4 |
| 4. remove_object (data)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | m                       |                                      |      |      |      |
| <p>a) Attribute “object_list”</p> <ul style="list-style-type: none"> <li>- 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. Refer to 5.12 of IEC 62056-6-2 for details.</li> <li>- In case of HLS authentications (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.</li> </ul> <p>b) Attribute “associated_partners_id”</p> <ul style="list-style-type: none"> <li>- 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. Refer to 5.12 of IEC 62056-6-2 for details.</li> <li>- The value of the client_SAP for each user group is described below.</li> </ul> |                         |                                      |      |      |      |
| User                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Association Index       | Client_SAP<br>(=Client HDLC Address) |      |      |      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                         | LLS                                  |      | HLS  |      |
| AMR Readers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Association 2           | 0x02                                 |      | 0x09 |      |
| Utility Engineers /<br>Management                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Association 3           | 0x03                                 |      | 0x0A |      |
| Management/SEC Lab                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Association 4           | 0x04                                 |      | 0x0B |      |
| Security Server                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Association 5           | 0x05                                 |      | 0x0C |      |



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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. Refer to 5.12 of IEC 62056-6-2 for details.

d) Attribute “xDLMS\_context\_info”

- Contains all the necessary information on the xDLMS context for the given association. Refer to 5.12 of IEC 62056-6-2 for details.

e) Attribute “authentication\_mechanism\_name”

- Contains the name of the authentication mechanism for the association. Refer to 5.12 of IEC 62056-6-2 for details.

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).

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.



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- 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<br>(class id: 17, version: 0) |

#### 1) Attributes description of the object “SAP Assignment”

| 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

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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<br>(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)<br>The byte configuration is below |                           | R    | R    | R    |

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

| byte<br>1                                            | byte<br>2 | byte<br>3 | byte<br>4    | byte<br>5 | byte<br>6     | byte<br>7 | byte<br>8 | byte<br>9                                    | byte<br>10 | byte<br>11 | byte<br>12 | byte<br>13 | byte<br>14 | byte<br>15 | byte<br>16 |
|------------------------------------------------------|-----------|-----------|--------------|-----------|---------------|-----------|-----------|----------------------------------------------|------------|------------|------------|------------|------------|------------|------------|
| Manufacturer<br>identifier<br>(issued by<br>DLMS UA) |           |           | Year<br>(xx) |           | Type<br>(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) 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).



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| Classification     | OBIS code |   |    |   |   |     | Interface Class                                    |
|--------------------|-----------|---|----|---|---|-----|----------------------------------------------------|
|                    | A         | B | C  | D | E | F   |                                                    |
| Optical port setup | 0         | 0 | 20 | 0 | 0 | 255 | IEC Local Port Setup<br>(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                 |                            | -    | -    | -    |
| 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<br>(class id: 23, version: 1) |
| RS485 HDLC setup   | 0         | 2 | 22 | 0 | 0 | 255 | IEC HDLC Setup<br>(class id: 23, version: 1) |

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



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| 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: 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                          |                                                                                      |                            |      |      |      |


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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.

#### 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<br>(class id: 1, version: 0) |
| Communication port status change                | 0         | 0 | 96 | 12 | 4 | 255 | Data<br>(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).



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| MSB | bit6 | bit5 | bit4 | bit3 | bit2 | bit1                                      | LSB                                        |
|-----|------|------|------|------|------|-------------------------------------------|--------------------------------------------|
| -   | -    | -    | -    | -    | -    | Serial port<br>connected/disconnecte<br>d | Optical port<br>connected/disconnecte<br>d |

\* 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 voltage 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          |             |



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|    |       |                                 |                |
|----|-------|---------------------------------|----------------|
| T3 | 0:00  | 1 Jan. to 31 Dec. All week days | Off-Peak Hours |
|    | 21:00 | 1 Jan. to 31 Dec. Friday        |                |

### 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<br>(class id: 22, version:<br>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<br>{ Longitude; Float64,<br>Latitude;Float64,<br>Date_time: octet-<br>string(size(12)),<br>} |                           |      |      |      |

#### [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 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)**


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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:

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


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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**

| 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**

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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     |
|                | 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         |
|--------|------------|------|-------------|
|        | Technology | 2G   | 2G          |
| Signal | Excellent  | >-85 | No standard |



|                                             |                              |
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|         |      |             |             |
|---------|------|-------------|-------------|
| Quality | 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

| Class | 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<br>4G_NB_PARA<br>4G_NB_PARA::= choice<br>{<br>See the following table for data information<br>};<br>PULL<br>- Used once during chipset FOTA upgrade.<br>- Collect NB/4G data – PULL frequency depends on SEC requirement |
| 1     | 0-0.96.99.2.255 | 2         | Network mode    | enum             | R:A2A3<br>RW:A4 A5 | PULL<br>Configuration parameter – not frequently read/written                                                                                                                                                                                         |
| 1     | 0-0.96.99.3.255 | 2         | R13_R14_switch  | Unsigned         | R:A2A3<br>RW:A4 A5 | PULL<br>Configuration parameter – not frequently read/written                                                                                                                                                                                         |
| 1     | 0-              | 2         | FOTA            | Octet string(Max | W:A4A5             | PULL                                                                                                                                                                                                                                                  |



|                                             |                              |
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| Class | OBIS              | attribute | Name                                                                        | Type          | Access Right       | Description                                                       |
|-------|-------------------|-----------|-----------------------------------------------------------------------------|---------------|--------------------|-------------------------------------------------------------------|
|       | 0.96.99.4.255     |           | address                                                                     | 120bytes)     |                    | Used once during chipset FOTA upgrade.                            |
| 3     | 0-0:96.57.38.255  | 2         | NB module Cell ID stabilization time                                        | Long Unsigned | R:A2A3<br>RW:A4 A5 | PULL<br><br>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<br>RW:A4 A5 | PULL<br><br>Configuration parameter – not frequently read/written |

[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   |



|                                             |                              |
|---------------------------------------------|------------------------------|
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| Sr | Parameters              | Data_ID | Data_Type                                                                                 | Length       | R/W | M/O |
|----|-------------------------|---------|-------------------------------------------------------------------------------------------|--------------|-----|-----|
| 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   |
| 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<br>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

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

Network Mode

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

| 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 |
|----------------|------|-----------------|
|----------------|------|-----------------|



|                                             |                              |
|---------------------------------------------|------------------------------|
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|                |   |   |    |    |   |     |      |
|----------------|---|---|----|----|---|-----|------|
| R13_R14 Switch | A | B | C  | D  | E | F   |      |
|                | 0 | 0 | 96 | 99 | 3 | 255 | Data |

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  |
| 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   |                 |
|                | 0    | 0 | 96 | 99 | 4 | 255 | Data            |

| 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<br>(Max 120 octets) | -                         | -  | -  | W  |

#### NB module Cell ID stabilization time



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

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,<br>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 |  |  |  |
|------------|-------------|---------------------------|--|--|--|
| Attributes | Data type & | Access right              |  |  |  |



|                                             |                              |
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|                 | Description                   | 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,<br>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 37, the second sim'ICCID :null

Table 2: 4G\_NB\_OTHER\_PARAMETERS



|                                             |                              |
|---------------------------------------------|------------------------------|
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| Class ID | OBIS                      | Attribute | Data Name                                   | Data type                                                                              | A4 | Note                                                                                                                                                 |
|----------|---------------------------|-----------|---------------------------------------------|----------------------------------------------------------------------------------------|----|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 45       | 0-<br>0:25.4.0.255        | 3         | PIN code                                    | /                                                                                      | RW | S: C1 01 C1 00 2D<br>00 00 19 04 00 FF<br>03 00 12 04 D2<br><br>R: C5 01 C1 00                                                                       |
| 45       | 0-<br>0:25.4.0.255        | 2         | APN                                         | /                                                                                      | RW | S: C1 01 C1 00 2D<br>00 00 19 04 00 FF<br>02 00 09 05 43 4D<br>4E 45 54<br><br>R: C5 01 C1 00                                                        |
| 44       | 0-<br>0:25.3.0.255        | 5         | APN user<br>name、APN<br>password            | /                                                                                      | RW | S: C1 01 C1 00 2C<br>00 00 19 03 00 FF<br>05 00 02 02 09 01<br>31 09 01 31<br><br>R: C5 01 C1 00"                                                    |
| 1        | *0-<br>0.94.98.19.2<br>55 | 2         | GPRS keep alive<br>time interval            | "{<br>.switch=enable<br>.ideal_time=60<br>.delay_retry_<br>interval_value=<br>10<br>}" | RW | "S: C1 01 C1 00 01<br>00 00 5E 62 13 FF<br>02 00 02 03 03 01<br>12 00 3C 12 00 0A<br><br>R: C5 01 C1 00"                                             |
| 41       | *0-<br>0:25.0.0.255       | 3         | IP_reference of<br>TCP-UDP<br>Configuration | octet-string                                                                           | RW | "{0.0.25.1.0.255}-<br>ipv4<br><br>{0.0.25.7.0.255}-<br>ipv6<br><br>IPv4 and IPv6 can<br>be switched by<br>setting to control the<br>network protocol |



|                                             |                              |
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| Class ID | OBIS             | Attribute | Data Name                        | Data type            | A4 | Note               |
|----------|------------------|-----------|----------------------------------|----------------------|----|--------------------|
|          |                  |           |                                  |                      |    | type of P2P module |
| 42       | *0-0:25.1.0.255  | 3         | IP_address of IPv4 Configuration | double_long_unsigned | R  | /                  |
| 48       | 0-0:25.7.0.255   | 4         | IP_address of IPv6 configuration | array (octet-string) | R  | /                  |
| 9        | 0-0:96.50.25.255 | 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 setup 1 | GPRS modem setup 1/APN                | 0.1.25.4.0.255 | 45    | 2    | R  | R/W | R/W |
|                    | 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 |


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**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<br>(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         |
| 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

Loginame: 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



|                                             |                              |
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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

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 30 3A 30 31 30 42 3A 38 36 41 37 3A 30 30 30 30 3A 30 30  
30 30 3A 30 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



|                                             |                              |
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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)

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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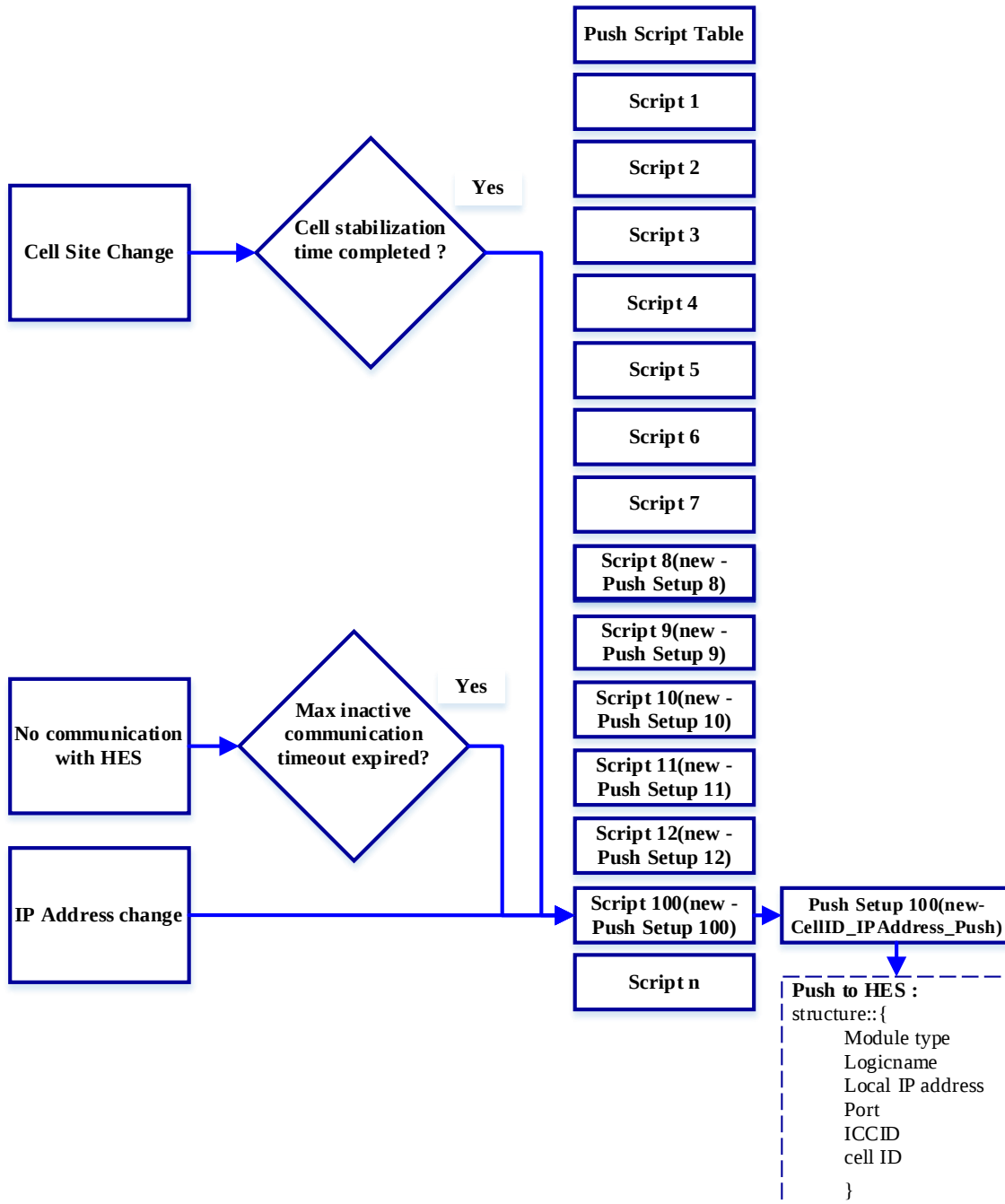


Figure 9 CellID\_IPAddress\_Push illustration

**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).

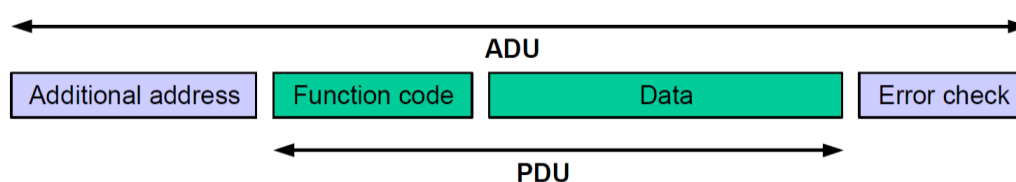


Figure 3: General MODBUS frame

**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.



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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.

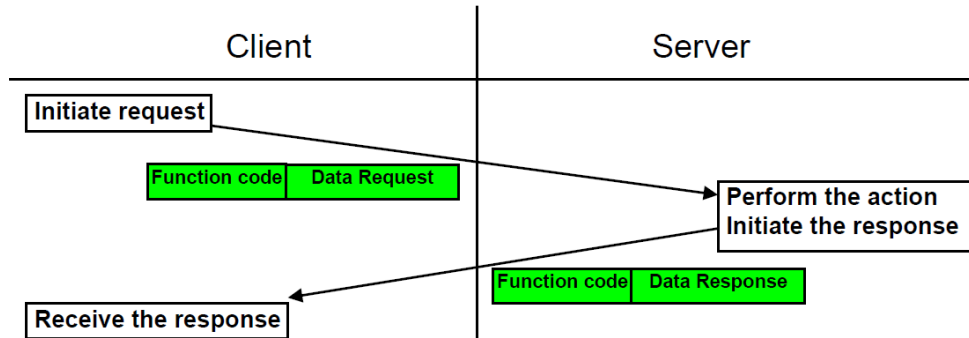


Figure 4: MODBUS transaction (error free)

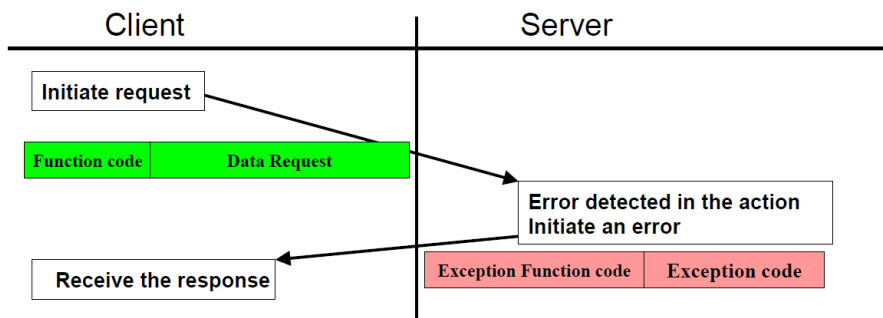


Figure 5: MODBUS transaction (exception response)

### 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

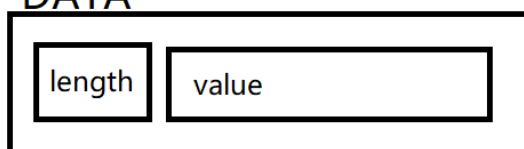
0x08-MEMORY PARITY ERROR

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

Tamper: 0x08

Auto mode: 0x10



|                                             |                              |
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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

01-OpenECB

XX XX-Error check

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**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

01-ECB

01-ECBStatus

00-Length Of Data

XX XX-Error check



|                                             |                              |
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**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

#### 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



|                                             |                              |
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**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

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


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**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

01-ECB

01-ECBStatus

01-Length Of Data

06-manual mode

XX XX-Error check

**12.3.9. Meter inquiry ECB status, ECB reply “ECB Serial Number”**
**Send:** 01 03 00 XX XX

01-ECB

03-ECBNum

00-Length Of Data

XX XX-Error check


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Receive: 01 03 01 10 XX XX XX XX XX XX XX XX XX XX XX XX  
XX XX XX XX

01-ECB

03-ECBNum

10-Length Of Data

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX -ECB serial Number

XX XX-Error check

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

**[Note]**

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

**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

01-ECB

02-ECB FW Version

10-Length Of Data


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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 ◆◆◆◆