

NRS 049:2016

Edition 2

ADVANCED METERING INFRASTRUCTURE REQUIREMENT FOR SMART METERING SYSTEM

This document is not a South African National Standard



This rationalized user specification is issued by
the Technical Governance Department, Eskom,
on behalf of the
User Group given in the foreword
and is not a standard as contemplated in the Standards Act, 1993 (Act No. 29 of 1993).

Table of changes

Change No.	Date	Text affected

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NRS 049:2016

Foreword

NRS 049 is a consolidated version of, and replaces, the earlier drafts of NRS 049 Part 1 and Part 2. It was prepared on behalf of the steering committee of the NRS Association and approved by it for use by supply authorities. Certain devices specified in this specification might require type approval by the Independent Communications Authority of South Africa (ICASA). In such cases, compliance with the relevant regulations of the Electronic communications, 2005 (Act No. 36 of 2005) is required.

Government Notice No. R773, Compulsory norms and standards for reticulation services, was issued under the Electricity Regulation Act, 2006 (Act No. 4, 2006), on 18 July 2008. This notice, amended by Government Notice No. 1190 dated 17 September 2008, introduces regulations that require electricity licensees to install “smart systems” that are required to have advanced metering and load management capabilities. This specification is intended to cover the requirements for such systems.

This specification was prepared by a working group which, at the time of publication of this edition, comprised the following members:

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Introduction

Metering systems have evolved from simple meters, through automated meter reading (AMR) and advanced metering infrastructure (AMI) into state of the art smart metering systems.

With the advent of decreasing component costs, increasing processing capacity and advancing communications inter-connectivity, both in the private and public domain, the paradigm has gradually shifted towards system architectures with distributed functions having local processing power and intelligence, thus affording devices to behave in smarter ways.

NRS 049 presents an "open standard" reference architecture, which means that each entity within the metering system presents a standard interface and a standard semantic. Utilities are thus in a position to optionally and selectively specify any part of the system, or an integration of selected parts into sub-systems, while still adhering to the standard interfaces.

It carefully considers the hardware architecture and function clusters against the following criteria:

- a) life cycle cost distribution of core functions with high utilisation versus optional functions with low utilisation;
- b) reliability and life span of system entities;
- c) mitigation of risk of critical failure and breach of security;
- d) flexibility and extensibility for future proofing;
- e) open international standardisation of core functions;
- f) interoperability and interchange-ability of hardware devices.

The core functions (metering, accounting and load control) are embodied in the Meter.

The customer interface unit offers basic functions to support the Meter operations with optional extensions providing variable degrees of complexity, functionality and cost.

The choice of DLMS/COSEM as the application layer protocol ensures semantic interoperability, flexibility and device interchange ability.

Open international standards supported by formal certification bodies ensures quality of devices and multiple supplier selection, which prevents utility lock-in and stimulates competitive pricing.

Standardising on the "route-over" Network protocol ensures routing capability independent of the lower communications layers. This allows efficient mesh network deployment and compatibility with "internet of things" (IoT) technology using internet protocol addressing.

IEEE standards for the data link and physical layer protocols ensure seamless integration for radio frequency and power line carrier mixed networks.

Functional user requirements are specified in terms of use cases that may be selectively deployed in order to meet particular business objectives. The use cases in turn are supported by abstract function definitions specified in terms of standard DLMS/COSEM interface classes and instantiated objects.

Particular requirements for devices and equipment are specified by reference to international open standards for type testing and conformance certification by recognised certification bodies, thus ensuring quality, reliability and robustness in the application domain.

Attention is drawn to the fact that some of the normatively referenced specifications may require membership to the following organisations in order to gain access to such specifications, compliance certification services and other services:

- a) DLMS user association: www.dlms.com
- b) Flag association: www.dlms.com/flag
- c) STS association: www.sts.org.za

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ADVANCED METERING INFRASTRUCTURE — REQUIREMENTS FOR SMART METERING SYSTEMS

1. Scope

NRS 049 covers the entire smart metering system from the enterprise level down to the end device and addresses the following aspects:

- a) consideration is given to the entire smart metering infrastructure from a systems perspective, defining a communication reference architecture, from which sub-systems may be derived for implementation;
- b) it allows the identification of specific functionalities and use cases in order to realize particular business objectives;
- c) it specifies communications interfaces by reference to open international standards, thus ensuring interoperability and interchange-ability of equipment within the bounds of the system;
- d) the reference model is extensible to allow for future expansion and integration of developing new technologies;
- e) the architecture is modelled on the standard network framework as described in IEC 62056-1-0 and allows several network topologies such as mesh, star and peer-to-peer;
- f) the communication interfaces are modelled on the open systems interconnect protocol stack;

NOTE The application layer is based on the DLMS/COSEM IEC 62056 suite and also allows a variety of international open standard lower layer communication interfaces to be implemented.

- g) connectivity and routing ability is ensured at the open systems interconnect network layer, allowing IPv6 addressing and "route-over" (RPL) routing protocols;

NOTE The interest of RPL is to offer a consistent pure networking architecture in line with IP architecture and forward integration of new developing technologies such as the internet of things (IoT).

- h) several devices and systems are identified and considered;
 - i) enterprise system,
 - ii) vending system ,
 - iii) point of sale,
 - iv) 3rd party system,
 - v) head end system,
 - vi) network gateway,
 - vii) kiosk controller,
 - viii) meter,
 - ix) customer interface unit,
 - x) hand-held unit,
 - xi) appliance control device,
 - xii) auxiliary meter interface for water or gas meter,
 - xiii) integration of mobile phone, GSM, internet technologies and private networks, and
 - xiv) home automation system, such as electric vehicle, energy storage and embedded generation.
- j) type test requirements for devices are based on existing standards such as SANS 1524, IEC 62052 series, IEC 62053 series, IEC 62054 series, IEC 62055 series and IEC 62056 series;
- k) guidance to purchasers is given in informative Annex B.

Requirements for devices that are installed outside of buildings and not inside a protective enclosure are not in the scope of this specification.

Health and safety issues are not in the scope of this specification, which are dealt with in other appropriate regulatory instruments.

Developing standards that have not yet matured are given in informative Annex A as being suitable for adoption in a future edition of this specification.

Detailed requirements are covered in NRS 049 only for the network gateway, meter, customer interface unit and appliance control device. The other entities are out of scope.

For the sake of clarity, the enterprise resource planning system, head-end system, vending system and point of sale are defined as separate entities, but in practice these may be integrated into one or more systems depending on the specific installation requirements. However, the interface requirements remain the same for each functionality.

The Ea interface does not offer the same functionality as the G1 and G2 interfaces. The enterprise resource planning system will therefore not be able to perform all the actions that the head-end system is capable of.

In this edition of the specification the account is located in the meter when configured in prepayment mode. When the meter is configured in post-payment mode, the meter behaves like a traditional billing meter with the account typically located in the traditional billing system.

A single device meter has the customer interface unit functionality integrated into the meter, whereas a multi-device installation (e.g. split meter) may have the customer interface unit as a separate device. Both cases are covered in this specification.

Interfaces to internet and global system for mobile communication for transferring the STS 20 digit token carrier from the point of sale to the Meter are considered, but these are not covered in detail.

Interfaces to internet and global system for mobile communication for transferring messages from the head-end system to the meter are considered, but these not covered in detail.

Social media platforms are out of scope.

A standard interface for the NG to the kiosk controller is provided, but the detail of the kiosk controller is not covered in this specification.

Some details in clauses 4.2; 4.4.22, 4.4.28, 5.1, 5.6, 6.3.3, 6.3.12, 6.4.3, D.1, and E.1 are not covered in this edition of NRS 049, but shall be covered in a national companion specification with full participation of industry:

For a future edition of this specification, the following detailed requirements are to be defined by industry:

- a) PDU syntax of the P1c NFC interface;
- b) EA11 encryption algorithm of the P1c STS interface;
- c) interface Vd between POS and internet;
- d) interface Ve between POS and GSM;
- e) alternative interface Cb between NG and meter;
- f) interface Mb between CIU and auxiliary meter;
- g) interface H2 between Meter and HAS;
- h) interface H3 between NG and HAS;
- i) interface H5a between HES, internet and mobile phone;
- j) interface H5b between HES and GSM;
- k) details of use case CreditExportEnergyLocal;
- l) details of use case ReduceDemandByCriticalPeakPriceControl;
- m) detailed design for credit export energy tariff;

- n) detailed design for credit critical peak pricing tariff;
- o) detailed design for Kiosk monitoring and control function;
- p) authentication requirements for kiosk management;
- q) detailed design of COSEM objects for Kiosk management;
- r) physical layer for K1 interface;
- s) metering parameters for water and gas meters;
- t) mounting requirements for 3 phase DIN rail meters; and
- u) mounting requirements for DIN rail network gateways.

2. Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 7856:2013, *Code of practice for special design and other features of alternating current watthour meters for active energy (MID accuracy classes A and B) for use in the UK.*

IEC 61968-6, *Application integration at electric utilities — System interfaces for distribution management — Part 6: Interfaces for maintenance and construction.*

IEC 61968-8, *Application integration at electric utilities — System interfaces for distribution management — Part 8: Interfaces for customer operations.*

IEC 61968-9, *Application integration at electric utilities — System interfaces for distribution management — Part 9: Interfaces for meter reading and control.*

IEC 62052-11, *Electricity metering equipment (ac) — General requirements, tests and test conditions — Part 11: Metering equipment.*

IEC 62052-21, *Electricity metering equipment (ac) — general requirements, tests and test conditions — Part 21: Tariff and load control equipment.*

IEC 62053-52, *Electricity metering equipment (AC) — Particular requirements — Part 52: Symbols.*

IEC 62055-21 TR, *Electricity metering — Payment systems — Part 21: framework for standardization.*

IEC 62055-41: *Electricity metering — Payment systems — Part 41: Standard transfer specification (STS) - Application layer protocol for one-way token carrier systems.*

NOTE IEC 62055-41Ed3 is currently under development and it will replace the following standards when it is published in 2016. In the mean time all references to IEC 62055-41 shall refer to those listed below:

- a) IEC 62055-41 Ed2, Electricity metering - Payment systems - Part 41: Standard transfer specification (STS) - Application layer protocol for one-way token carrier systems
- b) STS 202-1, Addendum to IEC 62055-41 - Electricity metering payment systems –Currency Token
- c) STS 202-2, Addendum to IEC62055- 41: Standard transfer specification (STS) – Common Coded PAN for 2 and 4 Digit Manufacturer Codes
- d) STS 202-3, Addendum to IEC62055- 41: Payment Systems - Standard Transfer Specification (STS) - Cryptographic enhancements

IEC 62055-51, *Electricity metering — Payment systems — Part 51: Standard transfer specification (STS) - Physical layer protocol for one-way numeric and magnetic card token carriers.*

IEC 62056-1-0, *Electricity metering data exchange — Part 1-0: Smart metering standardization framework.*

IEC 62056-4-7, *Electricity metering — Data exchange for meter reading, tariff and load control— Part 47: COSEM transport layers for IPv4 networks.*

IEC 62056-5-3, *Electricity Data Exchange — The DLMS/COSEM suite — Part 5-3: DLMS/COSEM application layer*.

NOTE IEC 62056-5-3 Ed3 is currently under development and is expected to be published in March 2017, at which time it will become normative. In the mean time all references to IEC 62056-5-3 shall refer to the DLMS UA Green Book Ed 8 (see Bibliography).

IEC 62056-6-1, *Electricity metering data exchange — The DLMS/COSEM suite — Part 6-1: Object identification system (OBIS)*.

NOTE IEC 62056-6-1 Ed3 is currently under development and is expected to be published in March 2017, at which time it will become normative. In the mean time all references to IEC 62056-6-1 shall refer to the DLMS UA Blue Book Ed 12 (see Bibliography).

IEC 62056-6-2, *Electricity metering data exchange — The DLMS/COSEM suite — Part 6-2: COSEM interface classes*.

NOTE IEC 62056-6-2 Ed3 is currently under development and is expected to be published in March 2017, at which time it will become normative. In the mean time all references to IEC 62056-6-2 shall refer to the DLMS UA Blue Book Ed 12 (see Bibliography).

IEC/TS 62056-6-9, *Electricity metering data exchange — Part 6-9: Mapping between the Common Information Model message profiles (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and protocols*.

IEC 62056-7-6, *Electricity metering data exchange — The DLMS/COSEM suite — Part 7-6: The 3-layer, connection-oriented HDLC based communication profile*.

IEC 62056-8-20, *Electricity metering data exchange — The DLMS/COSEM suite — Part 8-20: Mesh communication profile for neighbourhood networks*.

NOTE IEC 62056-8-20 is currently at DTS stage and is expected to be published in August 2016.

IEC/TS 62056-9-1, *Electricity metering data exchange — The DLMS/COSEM suite — Part 9-1: Communication profile using web-services to access a DLMS/COSEM server via a COSEM Access Service (CAS)*.

IEC 62056-9-7, *Electricity metering data exchange — The DLMS/COSEM suite — Part 9-7: Communication profile for TCP-UDP/IP networks*.

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

IEC 62056-46, *Electricity metering — Data exchange for meter reading, tariff and load control— Part 46: Data link layer using HDLC protocol*.

IEEE 802.11, *IEEE Standard for Information technology — Telecommunications and information exchange between systems local and metropolitan area networks — Specific requirements Part 11: Wireless LAN medium access control (MAC) and physical layer (PHY) specifications*.

IEEE 802.15.4e-2012, *Part 15.4: Low-rate wireless personal area networks (LR-WPANs) Amendment 1: MAC sublayer*.

IEEE 802.15.4g-2012, *Part 15.4: Low-rate wireless personal area networks (LR-WPANs) Amendment 3: Physical layer (PHY) Specifications for low-data-rate, wireless, smart metering utility networks*.

IEEE 1901.2 2013, *Standard for low-frequency (less than 500 kHz) narrowband power line communications for smart grid applications*.

ISO/IEC 14443-1, *Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 1: Physical characteristics*.

ISO/IEC 14443-2, *Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 2: Radio frequency power and signal interface.*

ISO/IEC 14443-3, *Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 3: Initialization & anticollision.*

NRS 096-1, *Electricity metering — Ancillary specifications — Part 1: The sealing of electricity meters.*

IETF RFC 768, *User Datagram Protocol Edited by J. Postel. August 1980.*

IETF RFC 2460, *Internet Protocol, Version 6 (Ipv6) Specification.*

IETF RFC 4944, *Transmission of IPv6 Packets over IEEE 802.15.4 Networks.*

IETF RFC 6282-2011, *Compression format for IPv6 datagrams over IEEE 802.15.4-based networks.*

IETF RFC 6550, *IPv6 routing protocol for low-power and lossy networks.*

SANS 164-1, *Plug and socket-outlet systems for household and similar purposes for use in South Africa — Part 1: Conventional system, 16 A 250 V a.c.*

SANS 474/NRS 057, *Code of practice for electricity metering.*

SANS 1524-1, *Electricity payment systems — Part 1: Payment meters.*

SANS 1524-1-1, *Electricity payment systems — Part 1-1: Mounting and terminal requirements for payment meters.*

SANS 1524-6-10, *Electricity payment systems Part 6-10: Interface standards — Online vending server — Vending clients.*

SANS 10142-1, *Wiring of premises – Part 1: Low voltage installations.*

STS 101-2, *Standard transfer specification — Physical layer protocol for a two-way virtual token carrier for remote connection over DLMS/COSEM.*

NIST SP800-56Ar2, *Special publication 800-56A Revision 2 - Recommendation for pair-wise key-establishment schemes using discrete logarithm cryptography.*

NIST SP800-90A, *Deterministic random bit generator validation system (DRBGVS).*

ITU-T Recommendation X.509 (10/2012), *Information technology — Open systems interconnection — The directory: Public-key and attribute certificate frameworks.*

ITU-T Recommendation X.509 Corrigendum 2 (04/2016), *Information technology — Open systems Interconnection — The directory: Public-key and attribute certificate frameworks.*

FIPS PUB 140-2, *Security requirements for cryptographic modules.*

ISO 13491-1, *Financial services — Secure cryptographic devices (retail) — Part 1: Concepts, requirements and evaluation methods.*

PCI-HSM, *Payment card industry (PCI) hardware security module (HSM) security requirements.*

3. Terms, definitions and abbreviations

For the purposes of this document, the terms and definitions given in IEC 62056-5-3, IEC 62056-6-1, IEC 62056-6-2, IEC 62055-21, IEC 62055-31, IEC 62055-41, SANS 1524-1 and the following apply.

3.1 Terms and definitions

import energy: energy that flows from the network to the customer's load

export energy: energy generated on the customer's side that flows into the network

ERPS: a collective term for all systems outside of the HES that communicate with meters or other end devices via the HES, for example: outage management system, asset management system, customer information system, load control system, meter data management system, demand response system, etc

HES: in general the central communications and configuration command centre of the metering system located at the top of the hierarchy of equipment deployed within the metering system

auxiliary meter: a water or gas meter

multi-device installation: see IEC 62055-31 3.1.5

client: a DLMS/COSEM Client as defined in IEC 62056-5-3

NOTE This would be any device in NRS049 to which this role is assigned

server: a DLMS/COSEM Server as defined in IEC 62056-5-3

NOTE This would be any device in NRS049 to which this role is assigned

3.2 Abbreviations

3G: 3rd Generation

ACD: Appliance Control Device

APDU: Application Protocol Data Unit

BS: British Standard

CA: Certificate Authority

CAS: COSEM Access Service

CB: Certification Body

CIU: Customer Interface Unit

COSEM: Companion Specification for Energy Metering

CSD: Circuit Switched Data

DHCPv6: Dynamic Host Configuration Protocol version 6

DIN: Deutsches Institut für Normung (German Institute for Standardisation)

DLMS: Device Language Message Specification

DLMS UA: DLMS User Association

DRN: Decoder Reference Number

EA: Encryption Algorithm

ERPS: Enterprise Resource Planning System

GPRS: General Packet Radio Service

GSM: Global System for Mobile Communications

HAS: Home Automation System

HDLC: High-Level Data Link Control

HES: Head-End System

HHU: Hand Held Unit

HLS: High Level Security

HSM: Hardware Secure Module

HTTP: Hypertext Transfer Protocol

IC: Interface Class

ICASA: Independent Communications Authority of South Africa

IEEE: Institute of Electrical and Electronics Engineers

IoT: Internet Of Things

IPv4: Internet Protocol version 4

IPv6: Internet Protocol version 6
KRN: Key Revision Number
KT: Key Type
L_{IN}: Line In
LNAP: Local Network Access Point
L_{OUT}: Line Out
LTE: Long-Term Evolution
MAC: Media Access Control
Mbus: Meter Bus
MS: Metering System
NFCR: Near Field Communication Reader
NG: Network Gateway
NN: Neighbourhood Network
NNAP: Neighbourhood Network Access Point
NRS: National Rationalised Specification
NTC: Numeric Token Carrier
OSI: Open Systems Interconnect
PCD: Proximity Coupling Device
PDU: Protocol Data Unit
PICC: Proximity Card
PLC: Power Line Carrier
POS: Point Of Sale
Q: Quadrant
RBAC: Role-based Access Control
RF: Radio Frequency
RFC: Request for Comments (Internet Engineering Task Force document)
RPL: IPv6 Routing Protocol for Low-Power and Lossy Networks
SANS: South African National Standard
SGC: Supply Group Code
STS: Standard Transfer Specification
TCP: Transport Control Protocol
TI: Tariff Index
TID: Token Identifier
TLS: Transport Layer Security
TOU: Time Of Use
UC: Utilisation Category
UDP: User Datagram Protocol
VAC: Volts AC
VS: Vending System
VTC: Virtual Token Carrier

4. Communication requirements

4.1 Network reference architecture

The network reference architecture shown in Figure 1 complies with the requirements given in IEC 62056-1-0.

Network entities and interfaces shown in blue are still under development in the international standards arena, these will be defined in a future edition of this specification (see Annex A for guidance on preferred developing standards for future consideration).

The entities shown in brown are industry standard networks, which are out of scope of this specification.

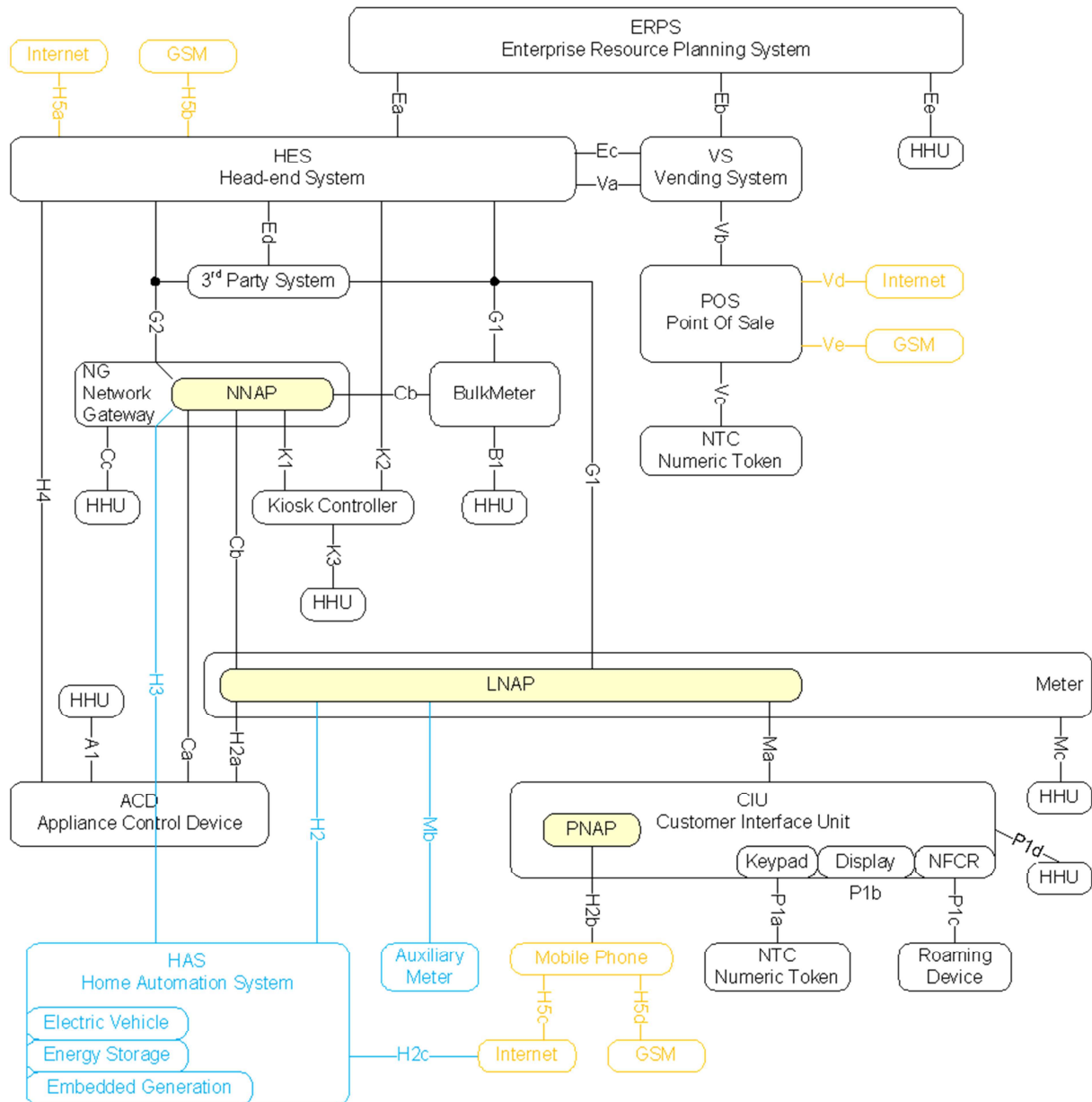


Figure 1 — Network reference architecture

The NG performs the role of the NNAP as defined in IEC 62056-1-0, which performs the routing between G2, K1, Cb, Ca and H3.

The meter performs the role of the LNAP as defined in IEC 62056-1-0, which performs the routing

between Cb, Ma, Mb, H2, H2a or G1, Ma, Mb, H2, H2a.

The CIU provides an optional private network access point with an interface H2b for connection with the customer's home devices such as a mobile phone or computer. Devices connected to PNAP do not have direct access to the LNAP, but uses the CIU as proxy.

In the special case where the CIU is fully integrated into the meter then Ma practically falls away, but the Meter shall still support interfaces H2a, H2, Mb and H2b, as well as interfaces P1a, P1b and P1c, depending on the device interface configuration given in Table 1 and Table 2.

The default configuration for devices is given in Table 1.

For the special case where the CIU is integrated in the Meter, the configuration is given in Table 2.

Table 1 — Default device interface requirements

1	2	3	4
Device	Minimum	Optional	Future
Meter	Cb, Ma, Mc, H2a	G1	Mb, H2
CIU	Ma, P1a, P1b	H2b	P1c
ACD	Ca, H2a, A1	H4	
NG	Ca, Cb, Cc, G2, K1		H3
HES	H4, G1, G2, K2, Va	Ea, Ec, H5a, H5b	Ed
VS	Va, Vb	Ec, Eb	
POS	Vb, Vc	Ve, Vd	
Kiosk Controller	K1, K3	K2	

Table 2 — Special case when CIU is integrated in the meter

1	2	3	4
Device	Minimum	Optional	Future
Meter	Cb, H2a, P1a, P1b, Mc	G1, H2b	H2, Mb, P1c

Interface requirements are given in 4.4.

Entity relationships are as follows:

- a) the relationship between HES: NG is many:many;
- b) the relationship between HES: Meter is many:many;
- c) the relationship between HES: ACD is many:many;
- d) the relationship between HES: KioskController is many:many;
- e) the relationship between HES: BulkMeter is many:many;
- f) the relationship between NG: ACD is 1:many;
- g) the relationship between NG: Meter is 1:many;
- h) the relationship between NG: BulkMeter is 1:1;
- i) the relationship between NG: KioskController is 1:many;
- j) the relationship between Meter: IU is 1:1;
- k) the relationship between Meter: ACD is 1:many;
- l) the relationship between Meter: Auxiliary Meter is 1: many;
- m) the relationship between Meter: HAS is 1:1;
- n) the relationship between CIU: Mobile Phone is 1:many;
- o) the relationship between Keypad: NTC is 1:many;
- p) the relationship between NFCR: Roaming Device is 1:many;
- q) the relationship between HHU: KioskController is many:many;
- r) the relationship between HHU: NG is many:many;
- s) the relationship between HHU: BulkMeter is many:many;
- t) the relationship between HHU: Meter is many:many; and
- u) the relationship between HHU: ACD is many:many.

4.2 Network routing

Routing shall take place in the OSI Layer 3 of the interface stack using IPv6 addressing and RPL routing protocol where specified in 4.4.

Each router shall provide DHCPv6 services to the downstream router or device.

The following detail shall be defined in a national companion specification:

- a) IP address mapping schema;
- b) sub-net addressing;
- c) ICMPv6 automatic discovery (stateless address auto configuration instead of DHCPv6);
- d) static or dynamic routing;
- e) default route;
- f) tail drop policy;
- g) auto-reconnect policy to handle dropped connections; and
- h) firewall.

4.3 Network topologies

Figure 2 shows the typical network topologies constrained by physical location of the devices and may vary depending on the population/premises density.

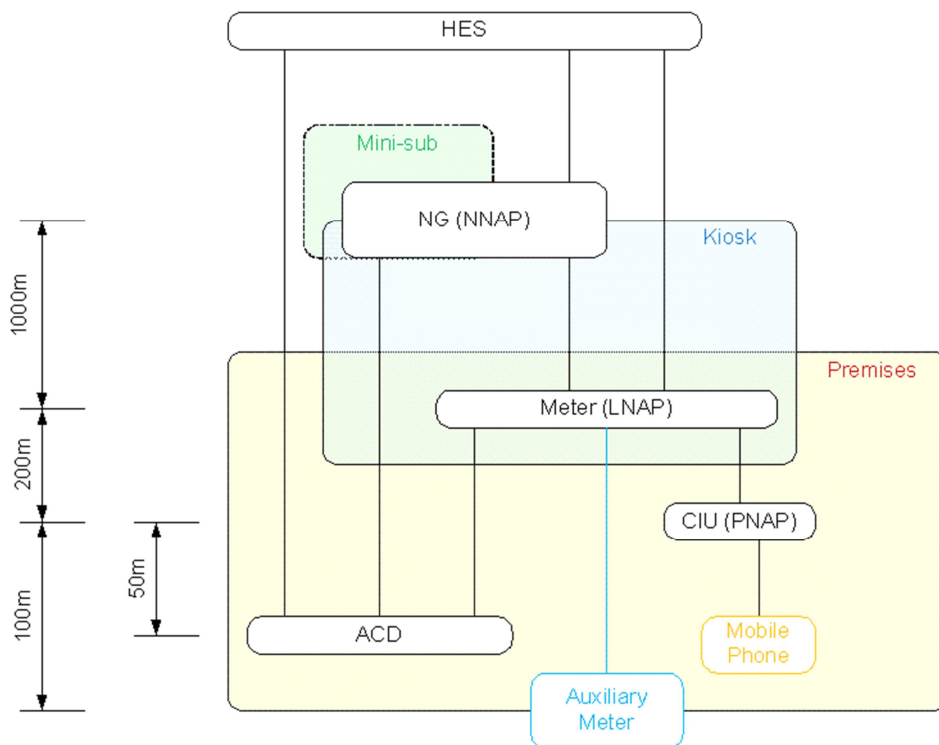


Figure 1 — Network topologies mapped to physical location

The meter may be located in the kiosk or on the premises.

The NG may be located in the mini-sub or in the kiosk or in neither of the two.

The auxiliary meter is typically located on the premises boundary.

Distances indicated are typical effective values and do not take any obstructions or actual communications media routing into consideration.

4.4 Standard interfaces

4.4.1 General

The interfaces are based on the interface reference model shown in figure 3 and complies with the requirements given in IEC 62056-1-0.

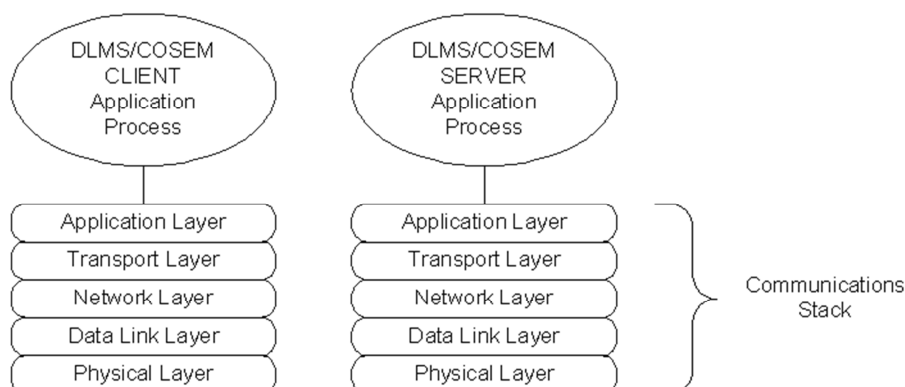


Figure 3 — Interface reference model

A client application process and server application process may exchange information by making use of the services of a supporting layered communications protocol stack.

The communications protocol stack is modelled on a collapsed open system interconnect stack comprising of application layer, transport layer, network layer, data link layer and physical layer.

Each interface shall comply with the requirements of the relevant standards as given in 4.4.

Where there is a choice between radio frequency and power line carrier in the physical layer, the field conditions will dictate which one to use. Relevant devices only need to support one or the other, but may optionally support both.

In order to provide a level of future-proofing, the modems for interfaces G1, G2 and H4 shall be modular and capable of being upgraded in the field.

4.4.2 Interface Ea between ERPS and HES

The interface specification is given in Table 3.

Table 3 — Ea interface specification

1	2	3
Protocol	Specification	Security
Application layer	IEC 61968-9 IEC 61968-6 IEC 61968-8 IEC 62056-6-9	by agreement
Transport layer	TCP/UDP	by agreement
Network layer	IPv4/IPv6	by agreement
Lower layers	by agreement	by agreement

4.4.3 Interface Eb between ERPS and VS

The interface specification is given in Table 4.

Table 4 — Eb interface specification

1	2	3
Protocol	Specification	Security
Application layer	IEC 61968-9 IEC 61968-6 IEC 61968-8	by agreement
Transport layer	TCP/UDP	by agreement
Network layer	IPv4/IPv6	by agreement
Lower layers	by agreement	by agreement

4.4.4 Interface Ec between HES and VS

The interface specification is given in Table 5.

Table 5 — Ec interface specification

1	2	3
Protocol	Specification	Security
Application layer	IEC 61968-9 IEC 61968-6 IEC 61968-8	by agreement
Transport layer	TCP/UDP	by agreement
Network layer	IPv4/IPv6	by agreement
Lower layers	by agreement	by agreement

4.4.5 Interface Ed between HES and 3rd party

The interface specification is given in Table 6.

Table 6 — Ed interface specification

1	2	3
Protocol	Specification	Security
Application layer	IEC 61968-9 IEC 61968-6 IEC 61968-8	by agreement
Transport layer	TCP/UDP	by agreement
Network layer	IPv4/IPv6	by agreement
Lower layers	by agreement	by agreement

4.4.6 Interface Ee between ERPS and HHU

The interface specification is given in Table 7.

Table 7 — Ee interface specification

1	2	3
Protocol	Specification	Security
Application layer	HTTPS	by agreement
Transport layer	TCP/UDP	by agreement
Network layer	IPv4/IPv6	by agreement
Lower layers	by agreement	by agreement

4.4.7 Interface Va between HES and VS

The interface specification is given in Table 8.

Table 8 — Va interface specification

1	2	3
Protocol	Specification	Security
Application layer	IEC 62055-41	EA7=64b key EA11=128b key
Adaptation layer	STS 101-2 STS/DLMS VTC	no security
Lower layers	by agreement	by agreement
NOTE security algorithm EA11 is to be considered when it is published in IEC 62055-41		

4.4.8 Interface Vb between POS and VS

The interface specification is given in Table 9.

Table 9 — Vb interface specification

1	2	3
Protocol	Specification	Security
Application layer	SANS 1524-6-10 XMLvend	by agreement
Transport layer	TCP/UDP	by agreement
Network layer	IPv4/IPv6	by agreement
Lower layers	by agreement	by agreement

4.4.9 Interface Vc between POS and NTC

The interface specification is given in Table 10.

Table 10 — Vc interface specification

1	2	3
Protocol	Specification	Security
Application layer	IEC 62055-41	EA7=64b key EA11=128b key
Physical layer	IEC 62055-51	no security
NOTE security algorithm EA11 is to be considered when it is published in IEC 62055-41		

4.4.10 Interface Vd between POS and internet

For future consideration (see Annex A for guidance of preferred developing standards).

4.4.11 Interface Ve between POS and GSM

For future consideration (see Annex A for guidance of preferred developing standards).

4.4.12 Interface G1 between HES and meter

The interface specification is given in Table 11.

The HES or the 3rd Party System is the DLMS/COSEM Client and the Meter is the DLMS/COSEM server.

Table 11 — G1 interface specification

1	2	3
Protocol	Specification	Security
Application layer	NRS 049 clause 6.3 IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3 DHCPv6	DLMS Suite 1
Transport layer	IEC 62056-9-7 TCP/UDP	no security
Network layer	IEC 62056-9-7 IPv6 RFC 2460	no security
Lower layers	LTE/3G/GPRS (fall-back)	as specified by service provider

4.4.13 Interface G2 between HES and NG

The interface specification is given in Table 12.

The network gateway is the proxy DLMS/COSEM client for the head-end system or the 3rd party system.

Table 12 — G2 interface specification

1	2	3
Protocol	Specification	Security
Application layer	NRS 049 clause 6.3 IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3 DHCPv6	DLMS Suite 1
Adaptation layer	IEC 62056-9-1 CAS	no additional security
Transport layer	IEC 62056-9-7 TCP/UDP	no additional security
Network layer	IEC 62056-9-7 IPv6 RFC 2460	by agreement
Lower layers	LTE/3G/GPRS/CSD (fall-back)	as specified by service provider
NOTE CSD is not to be considered for new products, but shall be constrained to support legacy products only.		

4.4.13 Interface Ca between NG and ACD

The interface specification is given in Table 13.

The NG is the DLMS/COSEM client proxy and the ACD is the DLMS/COSEM server.

The NG router provides DHCPv6 services to ACD.

Table 13 — Ca interface specification

1	2		3	
Protocol	Specification		Security	
Application layer	NRS 049 clause 6.4 IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3 DHCPv6		DLMS Suite 1	
Transport layer	IEC 62056-4-7 UDP RFC 768		IEC 62056-8-20	no security
Network layer	IPv6 RFC 2460 RPL RFC 6550			no security
Adaptation layer	6LowPAN RFC 4944, RFC 6282			no security
Data Link layer	IEEE 802.15.4e (2012)	IEEE 1901.2		no security
Physical layer	IEEE 802.15.4g RF	IEEE 1901.2 PLC		no security

4.4.15 Interface Cb between NG and meter

The interface specification is given in Table 14.

The NG is the DLMS/COSEM client proxy and the meter is the DLMS/COSEM server.

The NG router provides DHCPv6 services to meter.

Table 14 — Cb interface specification

1	2		3	
Protocol	Specification		Security	
Application layer	NRS 049 clause 6.3 IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3 DHCPv6		DLMS Suite 1	
Transport layer	IEC 62056-4-7 UDP RFC 768		IEC 62056-8-20	no security
Network layer	IPv6 RFC 2460 RPL RFC 6550			no security
Adaptation layer	6LowPAN RFC 4944, RFC 6282			no security
Data Link layer	IEEE 802.15.4e (2012)	IEEE 1901.2		no security
Physical layer	IEEE 802.15.4g RF	IEEE 1901.2 PLC		no security
NOTE It is intended that a wired option for the Data Link layer and Physical layer (for example wired MBus) be considered in a future edition of this specification.				

4.4.16 Interface K1 between NG and kiosk controller

The NG is the DLMS/COSEM client and the kiosk controller is the DLMS/COSEM server.

The NG router provides DHCPv6 services.

The interface specification is given in Table 15.

Table 15 — K1 interface specification

1	2		3	
Protocol	Specification		Security	
Application layer	NRS 049 clause 6.5 IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3 DHCPv6		DLMS Suite 1	
Transport layer	IEC 62056-4-7 UDP RFC 768		IEC 62056-8-20	no security
Network layer	IPv6 RFC 2460 RPL RFC 6550			no security
Adaptation layer	6LowPAN RFC 4944, RFC 6282			no security
Data Link layer	IEEE 802.15.4e (2012)	IEEE 1901.2		no security
Physical layer	IEEE 802.15.4g RF	IEEE 1901.2 PLC		no security
NOTE It is intended that a wired option for the Data Link layer and Physical layer (for example wired MBus) be considered in a future edition of this specification.				

4.4.17 Interface K2 between HES and kiosk controller

The HES is the DLMS/COSEM client and the kiosk controller is the DLMS/COSEM server.

The HES provides DHCPv6 services.

The interface specification is given in Table 16.

Table 16 — K2 interface specification

1	2	3
Protocol	Specification	Security
Application layer	NRS 049 clause 6.3 IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3 DHCPv6	DLMS Suite 1
Transport layer	IEC 62056-9-7 TCP/UDP	no security
Network layer	IEC 62056-9-7 IPv6 RFC 2460	no security
Lower layers	LTE/3G/GPRS (fall-back)	as specified by service provider

4.4.18 Interface Ma between meter and CIU

The interface specification is given in Table 17.

In the default case where CIU is separate from meter, then Ma is applicable and meter router provides DHCPv6 services to CIU.

In the special case where CIU is integrated in meter, then Ma is not applicable.

The meter is the DLMS/COSEM server and the CIU is the DLMS/COSEM client.

Table 17 — Ma interface specification

1	2		3	
Protocol	Specification		Security	
Application layer	NRS 049 clause 6.3 IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3 DHCPv6		DLMS Suite 1	
Transport layer	IEC 62056-4-7 UDP RFC 768		IEC 62056-8-20	no security
Network layer	IPv6 RFC 2460 RPL RFC 6550			no security
Adaptation layer	6LowPAN RFC 4944, RFC 6282			no security
Data Link layer	IEEE 802.15.4e (2012)	IEEE 1901.2		no security
Physical layer	IEEE 802.15.4g RF	IEEE 1901.2 PLC		no security
NOTE It is intended that a wired option for the Data Link layer and Physical layer (for example wired MBus) be considered in a future edition of this specification.				

4.4.19 Interface P1a between CIU keypad and NTC

The interface specification is given in Table 18.

Table 18 — P1a interface specification

1	2	3
Protocol	Specification	Security
Application layer	IEC 62055-41	EA7=64b key EA11=128b key
Physical layer	IEC 62055-51	no security
NOTE security algorithm EA11 is to be considered when it is published in IEC 62055-41		

4.4.20 Interface P1b between CIU display and customer

The interface specification is given in Table 19.

Table 19 — P1b interface specification

1	2	3
Protocol	Specification	Security
Application layer	IEC 62055-41 NRS 049 clause 0	no security
Physical layer	a) 14 segment b) dot matrix	no security

4.4.21 Interface P1c between CIU NFCR and roaming device

The interface specification is given in Table 20.

The CIU NFCR will act as PICC (reader) and the roaming device will act as PCD (tag).

The roaming device may be any suitable device such as a smartcard or a mobile phone with a compliant NFC interface for example.

In all cases the roaming device purely acts as carrier device for the standard STS 20 digit token carrier.

Table 20 — P1c interface specification

1	2	3
Protocol	Specification	Security
Application layer	IEC 62055-41	EA7=64b key EA11=128b key
Adaptation layer	IEC 62055-51 (for NFC PDU transfer)	no security
Data Link layer	ISO/IEC 14443-3A level 4	no security
Physical layer	ISO/IEC 14443-2A ISO/IEC 14443-1	no security
NOTE 1 Industry agreement is required to determine the exact syntax of the PDU in the adaptation layer on the Roaming Device which will be considered in a future edition of this specification. NOTE 2 The security algorithm EA11 is to be considered when it is published in IEC 62055-41.		

4.4.22 Interface P1d between CIU and HHU

The interface specification is given in Table 21.

Table 21 — P1d interface specification

1	2	3
Protocol	Specification	Security
Application layer	HTTPS	by agreement
Transport layer	TCP/UDP	by agreement
Network layer	IPv4/IPv6	by agreement
Lower layers	by agreement	by agreement

4.4.23 Interface A1, B1, K3 and Cc

These interface specifications are still to be agreed by the WG

4.4.24 Interface Mc between meter and HHU

The interface specification is given in Table 22.

The HHU is the DLMS/COSEM client and the meter is the DLMS/COSEM server.

The optical port shall be presented by the server and the optical probe shall be presented by the client.

Table 22 — Mc interface specification

1	2	3
Protocol	Specification	Security
Application layer	NRS 049 clause 6.3 IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3	DLMS Suite 1
Data Link layer	IEC 62056-46 HDLC	IEC 62056-7-6 (profile)
Physical layer	IEC 62056-21 clause 4.3 optical	
		no security
		no security

4.4.25 Interface Mb between meter and auxiliary meter

For future consideration (see Annex A for guidance of preferred developing standards).

4.4.26 Interface H2 between meter and HAS

For future consideration (see Annex A for guidance of preferred developing standards).

4.4.27 Interface H2a between meter and ACD

The interface specification is given in Table 23.

The ACD is a DLMS/COSEM server.

The meter router provides DHCPv6 services.

Table 23 — H2a interface specification

1	2		3
Protocol	Specification		Security
Application layer	NRS 049 clause 6.3 IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3 DHCPv6		DLMS Suite 1
Transport layer	IEC 62056-4-7 UDP RFC 768		no security
Network layer	IPv6 RFC 2460 RPL RFC 6550		no security
Adaptation layer	6LowPAN RFC 4944, RFC 6282		no security
Data Link layer	IEEE 802.15.4e (2012)	IEEE 1901.2	no security
Physical layer	IEEE 802.15.4g RF	IEEE 1901.2 PLC	no security

4.4.28 Interface H2b between CIU and mobile phone

The interface specification is given in Table 24.

The PNAP provides DHCPv6 services.

Table 24 — H2b interface specification

1	2	3
Protocol	Specification	Security
Application layer	HTTPS	no additional security
Transport layer	UDP RFC 768	no additional security
Network layer	IPv6 RFC 2460	no additional security
Data Link layer	IEEE 802.11	WPA2
Physical layer	IEEE 802.11	no additional security

The implementation detail of this interface shall be defined in a national companion specification.

4.4.29 Interface H2c between HAS and Internet

This interface is for future definition.

4.4.30 Interface H3 between NG and HAS

For future consideration (see Annex A for guidance on preferred developing standards).

4.4.31 Interface H4 between HES and ACD

The interface specification is given in Table 25.

The HES is the DLMS/COSEM client and the ACD is the DLMS/COSEM server

Table 25 — H4 interface specification

1	2	3
Protocol	Specification	Security
Application layer	NRS 049 clause 6.4 IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3 DHCPv6	DLMS Suite 1
Transport layer	IEC 62056-9-7 TCP/UDP	no additional security
Network layer	IEC 62056-9-7 IPv6 RFC 2460	no additional security
Lower layers	LTE/3G/GPRS (fall-back)	as specified by service provider

4.4.32 Interface H5a between HES, internet and mobile phone

It provides connectivity between the HES and the customer's mobile phone for the transfer of messages in service of various use cases.

The detail of this interface is for industry agreement and future consideration.

4.4.33 Interface H5b between HES and GSM

It provides connectivity between the HES and the customer's mobile phone for the transfer of messages in service of various use cases.

The detail of this interface is for industry agreement and future consideration.

4.4.34 Interface H5c between mobile phone and internet

It provides connectivity between the HES and the customer's mobile phone for the transfer of messages in service of various use cases.

The detail of this interface is for industry agreement and future consideration.

4.4.35 Interface H5d between mobile phone and GSM

It provides connectivity between the HES and the customer's mobile phone for the transfer of messages in service of various use cases.

The detail of this interface is for industry agreement and future consideration.

4.5 Interface certification

Interfaces shall be certified by an appropriate certification body. At the time of writing of NRS 049 the examples given in Table 26 were available.

Where applicable, ICASA (or equivalent) approval for use in South Africa shall also be obtained.

Table 26 — Interface certification bodies

1	2
Interface	Certification body
Ea	self certification
Eb	self certification
Ec	self certification
Ed	self certification
Va	STS Association
Vb	self certification
Vc	STS Association
Vd	for industry agreement and future consideration
Ve	for industry agreement and future consideration
G1	DLMS UA Kema
G2	DLMS UA
Ca	DLMS UA Kema
Cb	DLMS UA Kema
Ma/P1d	DLMS UA Kema
P1a	STS Association
P1b	STS Association
P1c	for industry agreement and future consideration NFC Forum
A1, B1, K3, N1	DLMS UA Kema
Mc	DLMS UA Kema
Mb	for industry agreement and future consideration
H2	for industry agreement and future consideration
H2a	DLMS UA Kema
H2b	self certification
H2c	for industry agreement and future consideration
H3	for industry agreement and future consideration
H4	DLMS UA Kema
H5a	for industry agreement and future consideration
H5b	for industry agreement and future consideration
H5c	for industry agreement and future consideration
H5d	for industry agreement and future consideration
K1	DLMS UA Kema
K2	DLMS UA Kema

5. Security requirements

5.1 General requirements

5.1.1 Devices such as meter, CIU, ACD, kiosk controller, NG and HES are generally manufactured by different manufacturers and deployed by other operators.

The key management system shall thus provide for the following use cases:

- secure initialization of devices during the manufacturing or registration stage;
- secure pairing of client and server devices during the installation stage;
- secure cryptographic protection of application data in the application layer of the interface protocol stack during the operational stage;
- secure re-configuration of cryptographic parameters during the operational stage; and

- e) message authenticity, non-repudiation and secrecy shall be assured at all stages of the life cycle of devices deployed in the metering system.

5.1.2 DLMS/COSEM application layer security shall comply with the requirements given in IEC 62056-6-1, IEC 62056-6-2 and IEC 62056-5-3 and shall use the following cryptographic elements:

- a) security suite 1;
- b) HLS ECDSA authentication;
- c) ECC CDH key agreement with the Static Unified Model C (Oe, 2s, ECC CDH) using the NIST P-256 curve;
- d) the single-step key derivation function (KDF) as defined in NIST SP800-56Ar2;
- e) random number generator (RNG) employing hash_DRBG or HMAC_DRBG as specified in NIST SP800-90Ar1 using SHA-256;
- f) bilateral key-confirmation with HMAC as specified in FIPS 198 based on SHA-256 as the MAC algorithm; and
- g) additional cryptographic elements as defined in a national companion specification:
 - i) security policy as specified in IEC 62056-5-3,
 - ii) security material such as keys, initialization vectors, certificates, etc,
 - iii) access rights to COSEM attributes and methods,
 - iv) cryptographic protection to DLMS APDUs, and
 - v) ciphered application context.

5.1.3 STS application layer security shall comply with the requirements given in IEC 62055-41.

5.1.4 Communications lower layer security shall comply with the requirements given in clause 4.

5.1.5 Role-based access control (RBAC) is a systems-wide policy implementation for access control to business functions and system infrastructure. It goes beyond the scope of of NRS 049, but it is recommended to revise this specification at the time when RBAC is considered for implementation at the enterprise level (see IEC 62351-8 in the Bibliography).

5.1.6 Key management and security setup are shown for the life cycle of a single Meter, CIU, ACD and HHU for the sake of clarity, but in practice the data exchange may be batched for convenience to suit the application environment.

5.1.7 The key management entities are given in Table 27.

Table 27— Key management entities

1	2
Entity	Role
ManagementClient	a Client operated by the utility
ManufacturerClient	a Client operated by the manufacturer of Server devices
EngineeringClient	a Client operated by the utility for managing HHU devices
Server	Any device operating as a Server (Meter, ACD, KioskController)
CIU	CIU device operating as a Client
HHU	HHU device operating as a Client
RootCA	Certification Authority: a primary trusted anchor that is able to certify a public key. May be deployed in the domain of the utility or in a remote location of a service provider
ServerManufacturerCA	Certification Authority: a secondary trusted anchor certified by a RootCA and that is able to certify a public key chained to a RootCA. Deployed in the domain of Server manufacturer
CIUManufacturerCA	Certification Authority: a secondary trusted anchor certified by a RootCA and that is able to certify a public key chained to a RootCA. Deployed in the domain of CIU manufacturer
EngineeringCA	Certification Authority: a secondary trusted anchor certified by a RootCA and that is able to certify a public key chained to a RootCA. Deployed in the domain of the utility
Rk	RootCA public key of an asymmetrical key pair
Rk'	RootCA private key of an asymmetrical key pair
MSk	ServerManufacturerCA public key of an asymmetrical key pair
MSk'	ServerManufacturerCA private key of an asymmetrical key pair
MCK	CIUManufacturerCA public key of an asymmetrical key pair
MCK'	CIUManufacturerCA private key of an asymmetrical key pair
CaUk	Generalized public key of a CA who has signed the public key of Client
CaVk	Generalized public key of a CA who has signed the public key of Server
Sk	Server public key of an asymmetrical key pair
Sk'	Server private key of an asymmetrical key pair
Ek	EngineeringCA public key of an asymmetrical key pair
Ek'	EngineeringCA private key of an asymmetrical key pair
Hk	HHU public key of an asymmetrical key pair
Hk'	HHU private key of an asymmetrical key pair
Ck	CIU public key of an asymmetrical key pair
Ck'	CIU private key of an asymmetrical key pair
RNG	Random number generator
HSM	Hardware secure module

5.2 Device security requirements

All client and server devices shall comply with the following cryptographic requirements:

- a device shall generate its own secret key, using a suitable random number generator (RNG) as specified in 5.1;
- the device shall have a high quality entropy source capable of supplying sufficient security to generate the key in accordance with NIST SP800-90, or the device shall be injected with a full-entropy key during the initial key management process, which is either used directly as the RNG key or preferably combined by using HMAC with low-quality device entropy to create the RNG key;
- the device shall store its secret keys (RNG key and asymmetric keys) in a secure element, and shall not reveal any secret key under any circumstance;
- a certificate authority (CA) shall use a hardware security module (HSM) that complies with the requirements of FIPS 140-2 or PCI-HSM or ISO 13491 to protect and store its secret keys; and
- the HSM shall store its secret keys and critical security parameters within its tamper-resistant security boundary.

5.3 Initial key management for server

The key management entities are given in Table 27.

The initial key management for server is shown in Figure 4.

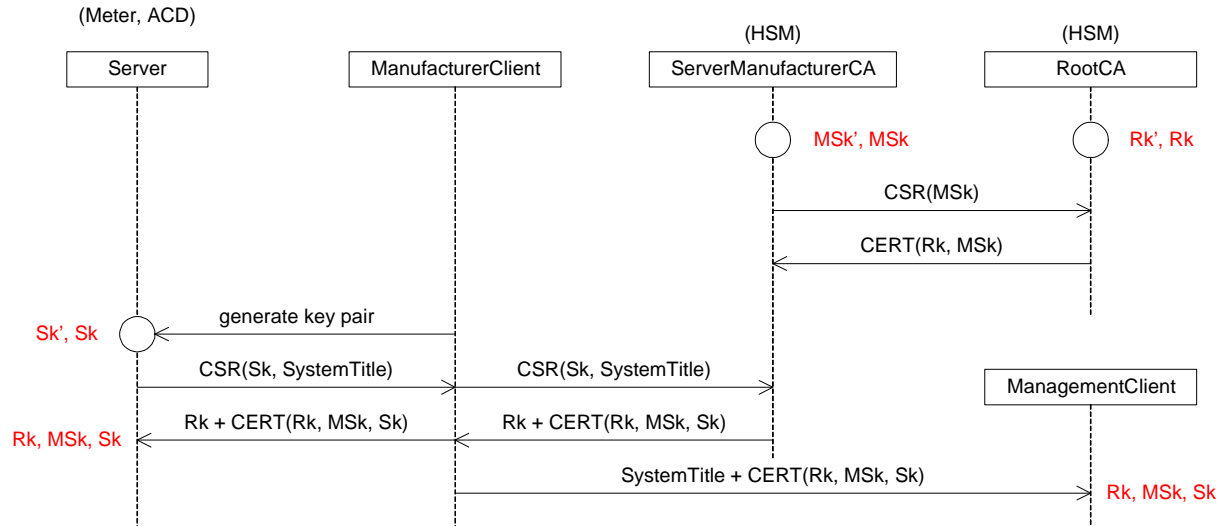


Figure 4 — Initial key management for Server

5.3.1 RootCA is assumed to have an ECDH key pair (Rk', Rk). The secret key Rk' shall be protected by an HSM.

5.3.2 ServerManufacturerCA generates an ECDH key pair (MSk', MSk). The secret key MSk' shall be protected by an HSM.

5.3.3 The public key MSk is sent to RootCA to be certified.

5.3.4 RootCA responds with CERT(Rk, MSk): an X.509 certificate of ManufacturerCA public key MSk under the root key Rk.

5.3.5 ManufacturerClient instructs Server to generate ECDH key pair Sk' and Sk in compliance with IEC 62056-5-3.

5.3.6 The public key Sk is wrapped in a certificate signing request (CSR) along with the server SystemTitle. The CSR is forwarded to ServerManufacturerCA.

5.3.7 The CSR shall contain server's unique identity (SystemTitle).

5.3.8 ServerManufacturerCA responds with CERT (Rk, MSk, Sk) + Rk:

- an X.509 certificate of the meter's public key Sk under the ServerManufacturerCA key MSk' chained with ServerManufacturerCA's certificate CERT(Rk, MSk) and RootCA's public key Rk; and
- the CERT contains server's unique identity (SystemTitle).

5.3.9 ManufacturerClient forwards the ServerManufacturerCA response to server, which stores the certificate.

5.3.10 ManufacturerClient sends a copy of the CERT (Rk, MSk, Sk), associated with server's SystemTitle, to ManagementClient.

5.3.11 Server shall have at least three storage slots for keys & certificates:

- each storage slot holds server's secret and public keys, RootCA's root public key, and Server's certificate (chained all the way to the root);
- 1 slot holds RootCA's root key for clients that cannot change keys (such as CIU); and
- 2 slots hold the current and previous RootCA's root keys for clients that can change keys (such as HHU and ManagementClient).

5.4 Initial key management for HHU

Initial key management for HHU is shown in Figure 5.

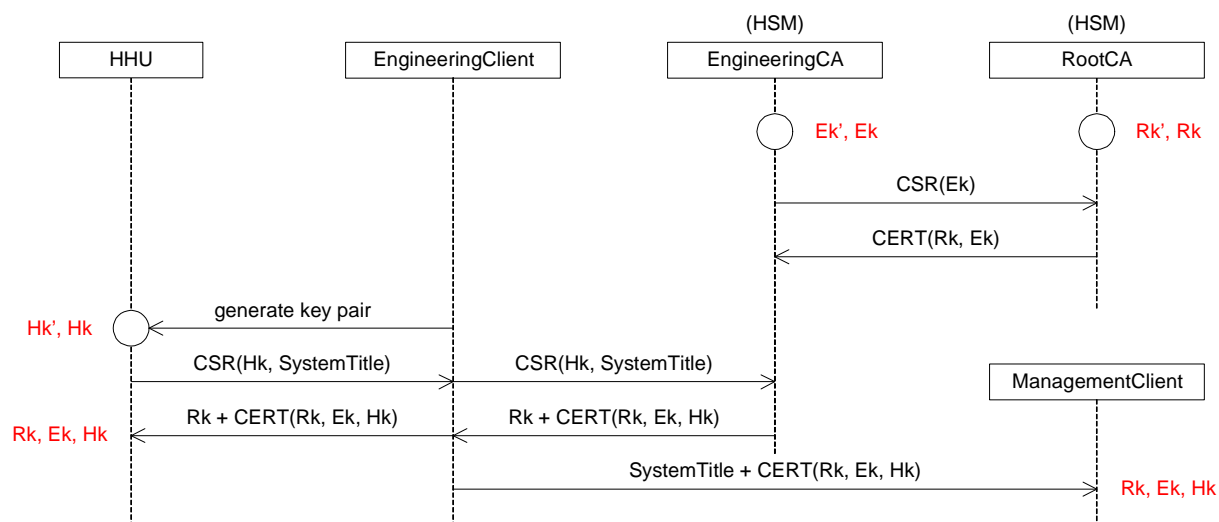


Figure 5 — Initial key management for HHU

Initial key management for HHU is similar to that of Server:

- the utility's engineering function has an intermediate EngineeringCA for HHU that is certified by RootCA;
- EngineeringClient instructs HHU to generate a key pair Hk' and Hk , the public key Hk is certified by EngineeringCA, and the certificate + RootCA root public key Rk are stored in HHU;
- a copy of HHU certificate may be sent to ManagementClient, allowing ManagementClient to communicate directly with HHU;
- HHU shall have multiple key storage slots and the ability to generate a new key pair under control of EngineeringClient.

NOTE In some instances ManagementClient may assume the role of EngineeringClient and likewise RootCA may assume the role of EngineeringCA.

5.5 Initial key management for CIU

The key management entities are given in Table 27.

Initial key management for CIU is shown in Figure 6.

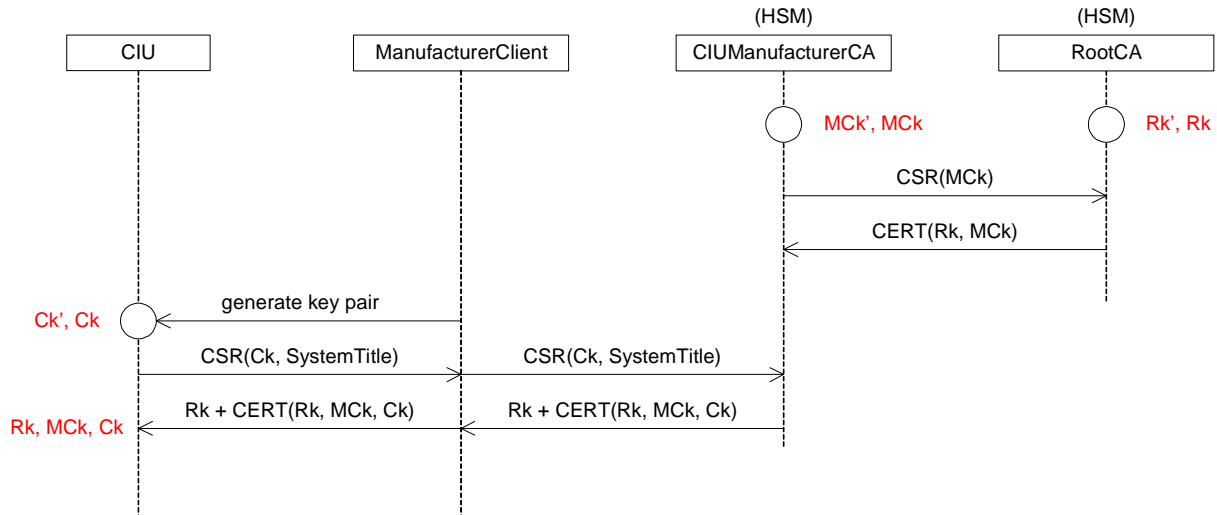


Figure 6 — Initial key management for CIU

Initial key management for CIU is similar to that of server:

- the CIU manufacturer has an intermediate CIUManufacturerCA that is certified by RootCA;
- the CIU manufacturer instructs CIU to generate a key pair Ck' and Ck , the public key Ck is certified by ManufacturerCA, and the certificate + RootCA root public key Rk are stored in CIU;
- unlike Server initial key management the CIU manufacturer does not send the CIU certificate to the ManagementClient, and the ManagementClient never communicates directly with CIU;
- CIU requires a single key storage slot, and the key can only be changed during the CIU initial key management process. CIU cannot communicate with ManagementClient.

NOTE CIU and ManagementClient do not have a DLMS contextual application association.

5.6 Client/server key agreement

5.6.1 General

5.6.1.1 All client and server devices such as CIU, HHU, ManagementClient, EngineeringClient, Meter, ACD and KioskController shall follow the key agreement process as described here and as shown in **Figure 7**. It is functionally equivalent to that as described in IEC 62056-5-3.

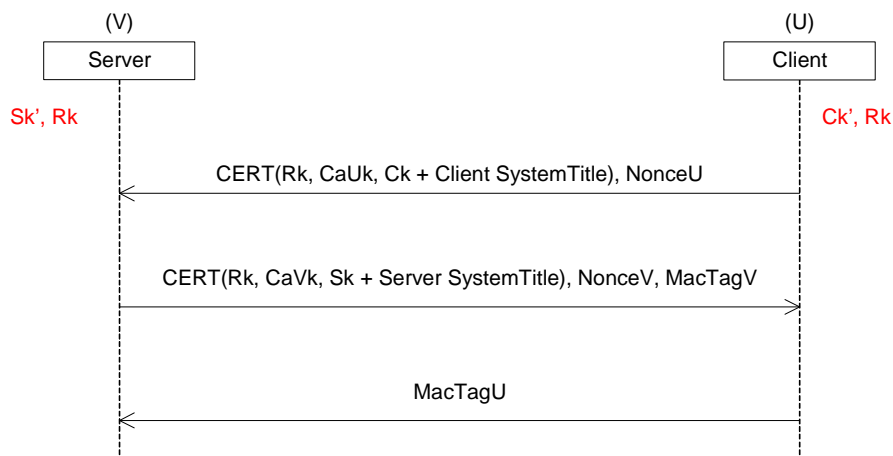


Figure 7 — Client/Server key agreement

5.6.1.2 The Client/Server key agreement proceeds according to the static unified key agreement scheme with bilateral key-confirmation as per NIST SP800-56Ar2 Figure 18 and clause 6.3.3.3.

(See also cryptographic mechanisms (clause 2) for required primitives). Client is party U and server is party V.

5.6.1.3 Client initiates the session. Client generates a value `NonceU`, opens an application association with server, and sends `CERT (Rk, CaUk, Ck)` and `NonceU`. The following shall apply:

- a) in this case `CaUk` is the certified public key of the certification authority who signed client's public key `Ck`;
- b) the `CERT` includes the identity (`SystemTitle`) of client, and client's public key `Ck`; and
- c) `NonceU` shall be a random 256-bit string.

NOTE See NIST SP800-56Ar2 clause 5.4 for full requirements.

5.6.2 Server receives client's request

5.6.2.1 Verifies that the `CERT()` is rooted in `RootCA` public key `Rk`. The `CERT` can be rooted in any of `RootCA` public keys known to server. Server requires a certificate of its own public key `Sk` with the same `RootCA` to complete the key agreement.

5.6.2.2 Verifies each signature in `CERT()`, starting at the root, to ensure that the signature chain is correct.

5.6.2.3 Extracts client's public key `Ck` and client's identity (`SystemTitle`) from the `CERT`.

5.6.2.4 Uses the ECC CDH primitive with `Ck` and Server's secret key `Sk'` to compute the shared secret `Z`.

5.6.2.5 Generates a value `NonceV`, which shall be a random 256-bit string. See NIST SP800-56Ar2 clause 5.4 for full details.

5.6.2.6 Constructs a data string `OtherInfo` per NIST SP800-56A clause 5.8.1.2. At minimum `OtherInfo` shall contain the following fields:

- a) `AlgorithmID`;
- b) client `SystemTitle`;
- c) `NonceU`;
- d) server `SystemTitle`;
- e) `NonceV`.

5.6.2.7 Applies the single-step key derivation function to the shared secret `Z` and the data string `OtherInfo` to produce `DerivedKeyingMaterial` of a sufficient length.

5.6.2.8 Takes the first 128 bits of `DerivedKeyingMaterial` as a `MacKey`, and keeps the remainder as `KeyData`.

5.6.2.9 Constructs a data string `MacDataV` per NIST SP800-56Ar2 clauses 5.2 and 6.3.3.3.

5.6.2.10 Computes `MacTagV` as HMAC-SHA256 (`MacKey`, `MacDataV`) truncated to the leftmost 64 bits.

5.6.2.11 Sends server's certificate `CERT (Rk, CaVk, Sk)`, `NonceV`, and `MacTagV` to client.

5.6.3 Client receives server's response

5.6.3.1 Performs a similar process to server, verifying the `CERT`, computing the shared secret (but using `Ck'` and `Sk`), constructs `OtherInfo`, derives the same `MacKey` and `KeyData` as server, constructs `MacDataS` and `MacDataC`, computes `MacTagS` and `MacTagC`.

5.6.3.2 Verifies that the received MacTagS and the computed MacTagS have the same value.

5.6.3.3 Sends MacTagC to server.

5.6.4 Both client and server then destroy MacKey, and split KeyData into working keys as required.

5.6.5 These working keys are unique to the session, and shared between client and server.

5.6.6 The following shall be detailed in a national companion specification:

- a) the lengths & format of NonceU & NonceV;
- b) the format of server SystemTitle & client SystemTitle;
- c) the precise construction of OtherInfo;
- d) the precise construction of MacDataV and MacDataU;
- e) the lengths of MacKey, MacTagV, and MagTagU;
- f) the splitting of KeyData into working keys;
- g) test vectors.

5.6.7 The national companion specification detail and all implementations shall comply with the requirements of NIST SP800-56Ar2 clause 5 with respect to the following:

- a) MacTag computation and verification;
- b) random number generation;
- c) nonces;
- d) domain parameters;
- e) key-pair generation;
- f) public key validation;
- g) key pair management for static key pairs;
- h) the single-step KDF and the construction of OtherInfo;
- i) key-confirmation and the construction of MacData.

6. Functional requirements

6.1 Performance and availability requirements

Performance requirements for groups of devices are given in Table 28 and for individual devices are given in Table 29.

Table 28 — Performance for groups of devices

1	2	3	4
Description	Performance level		
	90 %	99 %	99,9 %
Collection of daily meter readings and event logs	Not specified	< 8 h	< 24 h
On-demand appliance control	< 10 min	< 30 min	< 60 min
On-demand load limiting	< 10 min	< 30 min	< 60 min
Remote configuration change	< 30 min	< 2 h	< 8 h
Broadcast messages	< 1 h	< 4 h	< 8 h

Table 29 — Performance for individual devices

1	2	3	4
Description	Performance level		
	90 %	99 %	99,9 %
Collection of 31 days' daily meter readings and event logs		< 20 min	
On-demand appliance control		< 1 min	
On-demand load limiting		< 1 min	
Remote configuration change		< 10 min	
Broadcast messages		< 1 min	
Virtual prepayment tokens (if applicable)		< 5 min	
Registration of device		<3 min	

Availability characteristics of the communications network shall be measureable. The overall availability of the network shall typically be 98 %

6.2 Use cases

6.2.1 General

The following functional use-cases, seen as business capabilities, are intended to describe the functions performed by the summation of a number of technical capabilities. This level of description intends to demonstrate how a number of business benefits can be realized by means of utilizing a collection of technical capabilities. All capabilities are stated in reference to the hardware devices that the system is made up of and the interfaces they present.

For the purpose of interpretation of 6.2, the 3rd party system is synonymous with ERPS, but using its own set of interfaces Ed, G2 and G1, while always being subject to the necessary authorization and authentication requirements.

All use case parameters are configurable at production stage or at run time, but subject to which options are specified from Annex B and subject to the utility policy on access control, authorization and authentication.

Remotely issued HES commands shall always take priority over locally issued HHU commands.

The metering system shall support the following use cases, in turn supported by the COSEM interface objects defined in 6.3.

The specific sub-set of use cases to be supported for a given installation shall be in accordance with the options selected in Annex B.

6.2.2 Meter events

6.2.2.1 RecordMeterEvent

The meter shall maintain an event logging register with a capacity of at least 1000 events.

Each event shall be recorded in the meter together with a date and time stamp and the cause of the event.

6.2.2.2 ReportMeterEvent

The following interfaces are used in this use case:

- a) G1/Ea; and
- b) Cb/G2/Ea.

The Meter shall issue a push notification to the HES for each event if it has been enabled to do so. Each notification shall include a date and time stamp and the cause of the event.

It shall be possible for the HES to selectively enable or disable push notifications to the HES per event type. The specific event types are as given in the various use cases defined in 6.2.

6.2.3 Account

6.2.3.1 OperateInPrepaymentMode

The following interfaces are used in this use case:

- a) Va/G1;
- b) Va/G2/Cb;
- c) Va/H5a/H5c/P1a/Ma;
- d) Va/H5b/H5d/P1a/Ma;
- e) Va/H5a/H5c/P1c/Ma;
- f) Va/H5b/H5d/P1c/Ma;
- g) Vb/Vd/H5c/P1a/Ma;
- h) Vb/Ve/H5d/P1a/Ma;
- i) Vb/Vd/H5c/P1c/Ma;
- j) Vb/Ve/H5d/P1c/Ma; and
- k) Vb/Vc/P1a/Ma.

The customer first makes a payment into his account, which then causes the supply to his premises to be connected for the duration that his account remains in credit.

Once the customer has consumed his available credit, this causes the supply to his premises to be disconnected.

See 0 for the programmable credit limit rules.

6.2.3.2 OperateInPostPaymentMode

The following interfaces are used in this use case:

- a) Ea/G1; and
- b) Ea/G2/Cb.

The meter account is set to post-payment mode and plays no further part in the meter accounting process. The active customer account is then generally located in the ERPS.

The supply to the customer's premises is connected first, then he consumes the service, meter readings are sent to the ERPS and a bill is sent to the customer. If the customer pays his bill, the supply remains connected, else the supply is disconnected.

6.2.3.3 ConfigureAccountRemote

The following interfaces are used in this use case:

- a) Ea/G1; and
- b) Ea/G2/Cb.

The account parameters are programmed into the Meter from the ERPS.

6.2.3.4 ConfigureAccountLocal

The following interfaces are used in this use case:

- a) Ee/Mc.

The account parameters are programmed into the Meter from the ERPS via the HHU.

6.2.3.5 ChangeAccountingModeRemote

The following interfaces are used in this use case:

- a) Ea/G1; and
- b) Ea/G2/Cb.

The relevant parameter that controls the accounting mode is programmed into the Meter from the ERPS.

6.2.3.6 ChangeAccountingModeLocal

The following interfaces are used in this use case:

- a) Ee/Mc.

The relevant parameter that controls the accounting mode is programmed into the meter from the ERPS via the HHU.

6.2.4 Charges

6.2.4.1 General

TOU and block tariffs shall provide at least 4 time intervals and 4 consumption blocks per day.

All tariffs shall provide for two seasonal programs, for example, summer and winter.

Different profiles shall be programmable for week days, week-end days and seasonal periods.

6.2.4.2 ConfigTariffRemote

The following interfaces are used in this use case:

- a) Ea/G1; and
- b) Ea/G2/Cb.

The tariff rates are programmed remotely from the ERPS.

6.2.4.3 ConfigTariffLocal

The following interfaces are used in this use case:

- a) Ee/Mc.

The tariff rates are programmed locally into the meter from the ERPS via the HHU.

6.2.4.4 ChargeFlatTariffRateLocal

Customer active energy consumption is charged against the meter account in accordance with a programmable single rate tariff applied in the meter.

The cumulative active energy consumed during the billing period is recorded in the meter register for later upload to the HES.

6.2.4.5 ChargeBlockTariffRateLocal

Customer active energy consumption is charged against the meter account in accordance with a programmable block tariff rate applied in the meter.

The cumulative active energy consumed during the billing period is recorded in the meter for later upload to the HES. The register segments the recorded consumption into sub-values according to each consumption block.

6.2.4.6 ChargeTimeOfUseTariffRateLocal

Customer active energy consumption is charged against the meter account in accordance with a programmable time of use tariff rate applied in the meter.

The cumulative active energy consumed during the billing interval is recorded in the meter for later upload to the HES. The register segments the recorded consumption into sub-values according to each time interval.

6.2.4.7 ChargeMaximumDemandRateLocal

Customer active energy demand is charged against the meter account in accordance with a programmable demand tariff rate applied in the meter.

The detail of this use case will be considered in a future edition of this specification.

6.2.5 Credit

6.2.5.1 EnterTokenCreditLocal

The following interfaces are used in this use case:

- a) P1a/P1b/Ma; and
- b) P1c/P1b/Ma.

A customer payment received at the POS is converted into a currency credit token and delivered to the customer for entry into the meter. Interactive customer feedback is via the CIU display.

6.2.5.2 EnterTokenCreditRemote

The following interfaces are used in this use case:

- a) Va/G1;
- b) Va/G2/Cb;
- c) Va/H5a/H5c/P1a/Ma;
- d) Va/H5b/H5d/P1a/Ma;
- e) Va/H5a/H5c/P1c/Ma;
- f) Va/H5b/H5d/P1c/Ma;
- g) Vb/Vd/H5c/P1a/Ma;
- h) Vb/Ve/H5d/P1a/Ma;
- i) Vb/Vd/H5c/P1c/Ma;
- j) Vb/Ve/H5d/P1c/Ma; and
- k) Vb/Vc/P1a/Ma.

A customer payment received at the POS is converted into a currency credit token and entered into the meter via an online connection. Interactive customer feedback is via the CIU display or via his mobile phone.

6.2.5.3 CreditExportEnergyLocal

Customer active energy exported to the network is credited to the meter account in accordance with a programmable single rate tariff applied in the meter.

The cumulative active energy generated during the billing period is recorded in the meter register for later upload to the HES.

The detail of this use case will be considered in a future edition of this specification.

6.2.6 Metering

6.2.6.1 RecordMeteringParametersLocal

The meter continuously measures and records various metering parameters and stores their values in a suitable set of local registers for a predetermined period of time.

Load profile records shall be maintained in the meter providing for a minimum of 4800 record entries. Integration periods shall be programmable and the default values shall be 15, 20, 30 and 60 min.

6.2.6.2 ReadMeterOnScheduleRemote

The following interfaces are used in this use case:

- a) Ea/G1; and
- b) Ea/G2/Cb.

The meter shall support the following use case variants:

- c) The HES periodically reads the measured and stored metering parameter values according to a predefined schedule located in the HES;
- d) The meter periodically pushes the measured and stored metering parameter values to the HES according to a predefined schedule located in the meter. The data to be pushed is a pre-selected set determined by the HES;
- e) The meter periodically pushes the measured and stored metering parameter values to the HES according to a random schedule located in the meter. The data to be pushed is a pre-selected set determined by the HES.

The particular use case variant to use shall be determined by the HES.

As a minimum, 3 meter readings per day shall be supported.

The ERPS may also receive the meter readings from the HES on request or on subscription.

6.2.6.3 ReadMeterOnDemandRemote

The following interfaces are used in this use case:

- a) Ea/G1; and
- b) Ea/G2/Cb.

The HES reads the measured and stored metering parameter values on demand.

The HES and meter shall support two use case variants:

- c) a complete set of the meter reading data is read from the Meter by the HES; and
- d) a sub-set of the meter reading data is read from the Meter by the HES.

The ERPS may also initiate the read request to the HES.

6.2.6.4 ReadMeterOnDemandLocal

The following interfaces are used in this use case:

- a) P1a/P1b/Ma; and
- b) Ee/Mc.

The HHU or the CIU reads the measured and stored metering parameter values on demand.

6.2.7 Auxiliary metering

6.2.7.1 RecordAuxiliaryMeteringParametersLocal

The following interfaces are used in this use case:

- a) Mb.

The auxiliary meter periodically pushes its measured metering parameter values to the meter acting as proxy, where the readings are temporarily stored in buffer registers for later upload to the HES.

The auxiliary meter is usually battery powered and thus it may constrain the communications cycle in order to conserve battery life.

The detailed operation of this use case will be considered in a future edition of NRS 049.

6.2.7.2 ReadAuxiliaryMeterOnScheduleRemote

This use case is identical to 6.2.6.2 except that the buffer registers relating to the auxiliary meter are read.

6.2.7.3 ReadAuxiliaryMeterOnDemandRemote

This use case is identical to 6.2.6.3 except that the buffer registers relating to the auxiliary meter are read.

6.2.7.4 ReadAuxiliaryMeterOnDemandLocal

This use case is identical to 6.2.6.4 except that the buffer registers relating to the auxiliary meter are read.

6.2.8 Bulk-metering

6.2.8.1 General

A bulk meter is simply another instance of meter having exactly the same functional properties, except that it does not have accounting and disconnect functions.

6.2.8.2 RecordBulkMeteringParametersLocal

This use case is identical to 6.2.6.1.

6.2.8.3 ReadBulkMeterOnScheduleRemote

This use case is identical to 6.2.6.2.

6.2.8.4 ReadBulkMeterOnDemandRemote

This use case is identical to 6.2.6.3.

6.2.8.5 ReadBulkMeterOnDemandLocal

This use case is identical to 6.2.6.4 except that the CIU is not able to read from the BulkMeter.

6.2.9 Load control

6.2.9.1 General

In order to spread the transition surge during group disconnect and reconnect actions a programmable random delay from 0 to 120 seconds in steps of 1 second shall be programmed into the load control algorithm.

It shall be possible for the ERPS or HES to remotely program and operate the load control functions per single Meter or per group of meters. Remote interrogation of the load control functions shall be performed per single meter.

The STS SetPowerLimit token as defined in IEC 62055-41 shall be implemented as the default power limit control function, onto which the meter will fall back when those given in 6.2.9.11 and 6.2.9.12 are not activated.

Each disconnect and reconnect operation shall be treated as an event as given in 6.2.2.

Use cases for demand reduction given in 6.2.9.11 and 6.2.9.12 shall apply to import and export energy. Import and export demand reduction control shall be separately programmable and shall function independently from each other.

Each phase of the supply shall be separately programmable from the other phases, but all phases shall disconnect or reconnect together.

An appropriate message is sent to the CIU and the mobile phone for each disconnect and reconnect event, indicating the cause of the event. A power bar shall also be displayed, indicating the active power limit setting and the actual power as measured by the meter.

6.2.9.2 ConfigLoadControlRemote

The following interfaces are used in this use case:

- a) Ea/G1; and
- b) Ea/G2/Cb.

The load control parameters are programmed into the Meter from the ERPS or HES.

6.2.9.3 ConfigLoadControlLocal

The following interfaces are used in this use case:

- a) Ee/Mc.

The load control parameters are programmed into the Meter from the ERPS via the HHU.

6.2.9.4 ReadLoadControlStatusRemote

The following interfaces are used in this use case:

- a) Ea/G1;
- b) Ea/G2/Cb.

The load control parameters and the status of the load switch are read from the meter by the ERPS or HES.

6.2.9.5 ReadLoadControlStatusLocal

The following interfaces are used in this use case:

- a) P1a/P1b/Ma;
- b) H2b/Ma; and
- c) Ee/Mc.

The load control parameters and the status of the load switch are read from the meter by the HHU, CIU or the mobile phone.

6.2.9.6 DisconnectSupplyRemote

The following interfaces are used in this use case:

- a) Ea/G1;
- b) Ea/G2/Cb;
- c) Ea/H5a/H5c;
- d) Ea/H5b/H5d;
- e) Ma/P1b; and
- f) H2b/Ma.

The supply to the customer's premises is disconnected by the ERPS or HES.

The event is displayed on the CIU or the mobile phone.

6.2.9.7 ReconnectSupplyRemote

The following interfaces are used in this use case:

- a) Ea/G1;
- b) Ea/G2/Cb;
- c) Ea/H5a/H5c;
- d) Ea/H5b/H5d;
- e) Ma/P1b; and
- f) H2b/Ma.

The supply to the customer's premises is reconnected remotely by the ERPS or HES.

The event is displayed on the CIU or the mobile phone.

6.2.9.8 DisconnectSupplyLocal

The following interfaces are used in this use case:

- a) Ee/Mc;
- b) P1a/P1b/Ma;
- c) H2b/Ma;
- d) Ma/P1b; and
- e) Ma/H2b.

The supply to the customer's premises is disconnected by the HHU, CIU or mobile phone.

The event is displayed on the CIU or the mobile phone if there is sufficient power reserve available.

6.2.9.9 ReconnectSupplyLocal

The following interfaces are used in this use case:

- a) Ee/Mc;

- b) P1a/P1b/Ma;
- c) H2b/Ma;
- d) Ma/P1b; and
- e) Ma/H2b.

The supply to the customer's premises is reconnected by the HHU, CIU or from the mobile phone.

The event is displayed on the CIU or the mobile phone.

6.2.9.10 ReduceDemandByCriticalPeakPriceControl

The metering system is able to credit the customer in an appropriate fashion when the customer successfully adheres to a demand reduction instruction given by the utility.

The details of this use case will be defined in a future edition of this specification.

6.2.9.11 ReduceDemandByPowerLimitRemoteControl

6.2.9.11.1 The following interfaces are used in this use case:

- a) Ea/G1;
- b) Ea/G2/Cb;
- c) Ea/H5a/H5c;
- d) Ea/H5b/H5d;
- e) Ma/P1b; and
- f) Ma/H2b.

6.2.9.11.2 There shall be a programmable restricted demand limit and a programmable emergency demand limit, which will normally be set below the restricted limit.

6.2.9.11.3 The restricted and emergency demand limit control functions shall be activated and deactivated by the ERPS or HES.

6.2.9.11.4 The control algorithm shall operate in the following steps:

6.2.9.11.4.1 The CIU or the mobile phone shall warn the customer 5 minutes ahead of time that the demand limit is about to be activated;

6.2.9.11.4.2 It shall sound an audible alarm and display the current demand value, the new limit value that will be activated and the duration for which the new limit will be applied;

6.2.9.11.4.3 An audible alarm on the CIU and the mobile phone shall also warn the customer if the demand limit is about to be exceeded and shall automatically cancel when the demand falls below the warning threshold. The warning threshold shall be programmable from 5 % to 20 % in increments of 5 % below the active demand limit;

6.2.9.11.4.4 The customer is able to pro-actively reduce his current demand to below the required new limit by switching off some of his appliances by means of the following actions:

- a) manually switching off running appliances;
- b) controlling any of the ACD devices by means of a command from the CIU or the mobile phone (see 0);

6.2.9.11.4.5 During the time that the demand limit is active, the load switch shall open if the average kW demand during the last A minutes is greater than the active demand limit B kW, where:

- a) A is programmable from 1 to 60 minutes in steps of 1 minute;
- b) B is programmable from 1 to 75 kW in steps of 0,5 kW for a three-phase meter and from 1 to 25 kW in steps of 0,5 kW for a single phase meter.

6.2.9.11.4.6 The load switch shall remain open for a period of C minutes, where C is programmable from 1 to 60 minutes in increments of 1 minute, after which it shall automatically reclose;

6.2.9.11.4.7 If the demand still exceeds the active demand limit, the value of C shall increment by a programmable amount and then recursively repeat from step 4) above until the demand reduces to below the active demand limit, or until the demand limit function is deactivated by the ERPS or the HES.

The emergency demand limit control function shall operate the same as for restricted demand limit control, except that it shall take priority over any other active load control function.

The emergency demand limit shall remain active for a duration of D hours, programmable from 1 to 24 h in steps of 1 h, after which the Meter shall resume its previous operational state.

6.2.9.12 ReduceDemandByPowerLimitSchedule

6.2.9.12.1 The following interfaces are used in this use case:

- a) G1/Ea;
- b) Cb/G2/Ea;
- c) Ma/P1b;
- d) Ma/H2b;
- e) H2b/Ma/H2a; and
- e) P1a/P1b/Ma/H2a.

6.2.9.12.2 The meter restricts the demand limit in accordance with a programmable schedule.

6.2.9.12.3 The demand limit schedule shall be activated and deactivated by the ERPS or the HES.

6.2.9.12.4 Provision shall be made for 5 time intervals per day from Monday to Friday and 5 time intervals per day from Saturday to Sunday. During these time intervals the load control shall operate automatically in accordance with the programmed schedule.

6.2.9.12.5 The control algorithm shall operate in the following steps:

- a) the CIU or the mobile phone shall warn the customer 5 minutes ahead of time that the demand limit is about to be activated;
- b) it shall sound an audible alarm and display the current demand value, the new limit value that will be activated and the duration for which the new limit will be applied;
- c) an audible alarm on the CIU and the mobile phone shall also warn the customer if the demand limit is about to be exceeded and shall automatically cancel when the demand falls below the warning threshold;

NOTE The warning threshold shall be programmable from 5 % to 20 % in increments of 5 % below the active demand limit;

- d) the customer is able to pro-actively reduce his current demand to below the warning threshold by switching off some of his appliances by means of the following actions:
 - i) manually switching off running appliances, and
 - ii) controlling any of the ACD devices by means of a command from the CIU or the mobile phone (see 0).
- e) during the time that the demand limit is active, the load switch shall open if the average kW demand during the last A minutes is greater than the active demand limit B kW, where:
 - i) A is programmable from 1 to 60 minutes in steps of 1 minute, and

- ii) B is programmable from 1 to 75 kW in steps of 0,5 kW for a three-phase meter and from 1 to 25 kW in steps of 0,5 kW for a single phase meter.
- f) the load switch shall remain open for a period of C minutes, where C is programmable from 1 to 60 minutes in increments of 1 minute, after which it shall automatically reclose;
- g) if the demand still exceeds the active demand limit, the value of C shall increment by a programmable amount and then recursively repeat from step 4) above until the demand reduces to below the active demand limit, or until the demand limit schedule automatically terminates, or until the demand limit function is deactivated by the ERPS or HES.

6.2.9.13 DisconnectSupplyOnUnderFrequency

The following interfaces are used in this use case:

- a) Ma/P1b; and
- b) Ma/H2b.

The supply to the customer's premises is disconnected when the supply frequency drops below a programmable limit and is automatically reconnected when the frequency returns to the normal level within the limits.

The control parameters are pre-programmed by the ERPS, HES or the HHU.

Frequency limits shall be programmable from 48 to 50 Hz in steps of 0.1 Hz.

A programmable delay in disconnection time shall be from 100 to 5000 ms in steps of 100ms. This delay shall override the random variable delay specified in 6.2.9.1.

A programmable delay in reconnection time shall be from 100 to 5000 ms in steps of 100ms. This delay shall override the random variable delay specified in 6.2.9.1.

A subsequent low frequency detection event that occurs during the reconnection delay period shall retrigger the disconnect process immediately.

The event is displayed on the CIU or the mobile phone

6.2.10 Appliance control

6.2.10.1 General

The metering system is able to interact with appropriate appliance control devices installed into the metering system. By this, the metering system would be able to inform the appliance control device of varying tariffs or impending load limits, or is able to operate the appliance control device in the best interest of the customer.

In order to spread the transition surge during group disconnect and reconnect actions a programmable random delay of 0 to 120 seconds in steps of 1 second shall be programmed into the appliance control algorithm for both disconnect and reconnect instructions.

Additionally, a programmable delay of from 0 to 60 min in steps of 1 min shall be provided for reconnect instructions.

OnDemand instructions (see 0, 0, 0, 0) shall override any scheduled program (see 0). The ACD shall automatically resume its scheduled program after a programmable period of time from 1 to 24 h in 1 h steps from the time the OnDemand instruction was received.

An appropriate message is sent to the CIU, HAS or the mobile phone for each disconnect and reconnect event indicating the cause of the event.

An ACD shall be controllable individually or as part of a group of devices associated with a meter group.

The CIU or the mobile phone shall indicate the status of each ACD (for example, appliance 1, appliance 2, etc. and status On/OFF/Override).

6.2.10.2 ConfigApplianceControlRemote

The following interfaces are used in this use case:

- a) Ea/H4;
- b) Ea/G2/Ca;
- c) Ea/G1/H2a; and
- d) Ea/G2/Cb/H2a.

The appliance control parameters are programmed into the ACD from the ERPS or HES.

6.2.10.3 ConfigApplianceControlLocal

The following interfaces are used in this use case:

- a) Ea/A1;
- b) P1a/P1b/Ma/H2a; and
- c) H2/H2a.

The appliance control parameters are programmed into the ACD from the CIU, HHU or HAS.

6.2.10.4 RecordACDEvent

The ACD shall maintain an event logging register with a capacity of at least 1000 events.

Each event shall be recorded in the ACD together with a date and time stamp and the cause of the event.

6.2.10.5 ReportACDEvent

The following interfaces are used in this use case:

- a) H2a/G1/Ea;
- b) H2a/Cb/G2/Ea;
- c) Ca/G2/Ea;
- d) H4/Ea;
- e) H2a/Ma/H2b;and
- f) H2a/Ma/P1b.

The ACD shall issue a push notification to the HES for each event if it has been enabled to do so. Each notification shall include a date and time stamp and the cause of the event.

It shall be possible for the HES to selectively enable or disable push notifications to the HES per event type. The specific event types are as given in the various use cases defined in 6.2.

6.2.10.6 ReadApplianceControlStatusRemote

The following interfaces are used in this use case:

- a) Ea/H4;
- b) Ea/G2/Ca.
- c) Ea/G1/H2a;
- d) Ea/G2/Cb/H2a; and
- e) H5c/H2c/H2/H2a.

The appliance control parameters and the status of the appliance control switch are read from the ACD by the ERPS, HES or mobile phone.

6.2.10.7 ReadApplianceControlStatusLocal

The following interfaces are used in this use case:

- a) P1a/P1b/Ma/H2a;
- b) H2b/Ma/H2a;
- c) H2/H2a; and
- d) A1/Ee.

The appliance control parameters and the status of the appliance control switch are read from the ACD by the CIU, Mobile Phone, HAS or the HHU.

6.2.10.8 DisconnectApplianceOnDemandRemote

The following interfaces are used in this use case:

- a) Ea/H4;
- b) Ea/G2/Ca;
- c) Ea/G2/H3/H2/H2a;
- d) Ea/G1/H2a;
- e) Ea/G2/Cb/H2a;
- f) Ea/H5a/H2c/H2/H2a;
- g) H5c/H2c/H2/H2a;
- h) H2a/Ma/H2b;and
- i) H2a/Ma/P1b.

The appliance in the customer's premises is immediately disconnected by the ERPS, HES or mobile phone and overrides the current state of the ACD.

6.2.10.9 ReconnectApplianceOnDemandRemote

The following interfaces are used in this use case:

- a) Ea/H4;
- b) Ea/G2/Ca;
- c) Ea/G2/H3/H2/H2a;
- d) Ea/G1/H2a;
- e) Ea/G2/Cb/H2a;
- f) Ea/H5a/H2c/H2/H2a;
- g) H5c/H2c/H2/H2a;
- h) H2a/Ma/H2b; and
- i) H2a/Ma/P1b.

The appliance in the customer's premises is immediately reconnected remotely by the ERPS, HES or mobile phone and overrides the current state of the ACD.

6.2.10.10 DisconnectApplianceOnDemandLocal

The following interfaces are used in this use case:

- a) Ee/A1;
- b) H2/H2a;
- c) H2b/Ma/H2a; and
- d) P1a/P1b/Ma/H2a.

The appliance in the customer's premises is immediately disconnected from the CIU, HHU, HAS or the mobile phone and overrides the current state of the ACD.

6.2.10.11 ReconnectApplianceOnDemandLocal

The following interfaces are used in this use case:

- a) Ee/A1;
- b) H2/H2a;
- c) H2b/Ma/H2a; and
- d) P1a/P1b/Ma/H2a.

The appliance in the customer's premises is immediately reconnected from the CIU, HHU, HAS or the mobile phone and overrides the current state of the ACD.

6.2.10.12 ControlApplianceOnScheduleLocal

The following interfaces are used in this use case:

- a) H2a/Cb/G2/Ea;
- b) H2a/G1/Ea;
- c) H2a/H2;
- d) H2a/Ma/H2b; and
- e) H2a/Ma/P1b.

The ACD disconnects and reconnects the appliance in accordance with a programmable schedule. The schedule is programmed from the ERPS, HES or HHU (see 0 and 0).

Provision shall be made for 5 time intervals per day from Monday to Friday and 5 time intervals per day from Saturday to Sunday. During these time intervals the appliance control function shall operate automatically in accordance with the programmed schedule.

ACD informs ERPS, HAS, mobile phone and CIU of the event.

6.2.11 Power quality

6.2.11.1 MonitorPowerQualityLocal

The meter monitors and records supply parameter values of the following events in a relevant set of logging registers.

NOTE These measurements are not equivalent to the quality of supply measurements as specified in NRS 048 and are not intended for contractual use.

Each log entry shall record the start time and the end time of the event, the phase effected, the maximum reached above the positive limit setting and the minimum reached below the negative limit setting.

- 1) voltage harmonics;
- 4) voltage swells;
- 5) voltage sags;
- 6) voltage flicker;
- 7) frequency variations;
- 8) power outages.

Voltage limits shall be programmable from $\pm 5\%$ to $\pm 15\%$ of nominal voltage in steps of 1 % and discriminator duration times shall be programmable from 1 to 3600 s.

Add values for the other parameters.

6.2.11.2 ReportPowerOutage

The following interfaces are used in this use case:

- a) G1/Ea;
- b) Cb/G2/Ea; and
- c) G2/Ea.

When a power outage event occurs as defined in 0, the NG pushes a notification to the ERPS or HES, which shall take highest priority over any other process taking place in the NG at that time.

By default the NG shall report power outages instead of the meter.

In the special case where the NG is not present, the meter shall report power outages as described above.

6.2.11.3 ReadPowerQualityRecordsRemote

The following interfaces are used in this use case:

- a) Ea/G1; and
- b) Ea/G2/Cb.

The stored supply parameter values defined in 6.2.11.1 are read from the meter on demand by the ERPS or HES.

6.2.11.4 ReadPowerQualityRecordsLocal

The following interfaces are used in this use case:

- a) Mc/Ee.

The stored supply parameter values defined in 6.2.11.1 are read from the meter on demand by the HHU.

6.2.12 Meter health monitoring

6.2.12.1 General

By default no tamper events shall be displayed to the customer on the CIU.

6.2.12.2 MonitorBatteryCondition

The following interfaces are used in this use case:

- a) Ea/G1;
- b) Ea/G2/Cb; and
- c) Mc/Ee.

The Meter monitors the condition of the internal battery and records the event in an alarm register when the battery voltage falls below a critically low value, thus indicating an imminent failure of the battery.

The alarm threshold shall be programmable by the ERPS, HES or HHU and by default it shall be pre-set by the Meter manufacturer to the recommended value according to the particular battery type and loading characteristics that will allow at least 1 month of battery life remaining.

6.2.12.3 MonitorTamperLocal

The following interfaces are used in this use case:

- a) Ea/G1;
- b) Ea/G2/Cb; and
- c) Mc/Ee.

The Meter monitors and records events related to meter tampering in an alarm register.

The supply to the relevant customer premises is optionally disconnected as soon as the tamper event has been recorded in the meter. This option shall be programmable and selectable from the ERPS, HES or HHU. By default it shall be disabled.

At least the following tamper events shall be monitored:

- d) breach of the sealed meter enclosure;
- e) phase reversal of the incoming supply;
- f) bypass connection between the input and output terminals.

Some methods for detecting a bypass condition may conflict with the normal operation of the meter that is metering both import and export energy. In such a case the ERPS, HES or HHU shall be able to enable or disable this feature by programmable control.

6.2.12.4 ReportAlarmRemote

The following interfaces are used in this use case:

- a) G1/Ea;
- b) Cb/G2/Ea.

The meter automatically notifies the ERPS or HES when an event is recorded in the alarm register and pushes a notification together with the alarm register content to the HES.

6.2.12.5 ClearAlarmRemote

The following interfaces are used in this use case:

- a) Ea/G1; and
- b) Ea/G2/Cb.

The ERPS or HES clears the alarm register in the Meter.

In the case where the alarm condition had caused the disconnection of the supply to the customer's premises, the reconnection shall occur automatically as soon as the alarm register has been cleared.

6.2.12.6 ReportAlarmLocal

The following interfaces are used in this use case:

- a) Mc/Ee.

The HHU reads the alarm register content.

If the HHU detects an alarm condition according to the interpretation of the alarm register content, an appropriate message is displayed to the HHU operator who is then able to take appropriate action.

6.2.12.7 ClearAlarmLocal

The following interfaces are used in this use case:

- a) Ee/Mc;
- b) P1a/Ma; and
- c) P1c/Ma.

In the case where the alarm condition had caused the disconnection of the supply to the customer's premises, the reconnection shall occur automatically as soon as the alarm register has been cleared.

The HHU clears the alarm register.

An STS ClearTamper token may also be entered into the meter via P1a or P1c to clear the alarm register.

6.2.13 Customer information

6.2.13.1 DisplayLocalInformationOnCIU

6.2.13.1.1 The following interfaces are used in this use case:

- a) P1a/Ma/P1b; and
- b) P1a/Ma/H2a/P1b.

6.2.13.1.2 If the particular function is implemented, the customer is able to selectively view the following local information on demand:

- a) available credit;
- b) low credit warning;
- c) last credit token received and accepted;
- d) token id (TID) of last credit token accepted;
- e) STS decoder reference number (DRN);
- f) STS tariff index (TI);
- g) STS key revision number (KRN);
- h) STS key type (KT);
- i) STS supply group code (SGC);
- j) consumption rate import;
- k) consumption rate export;
- l) import cumulative total kWh;
- m) export cumulative kWh;
- n) kvarh in quadrant 1;
- o) kvarh in quadrant 2;
- p) kvarh in quadrant 3;
- q) kvarh in quadrant 4;
- r) instantaneous demand active kWh;
- s) active tariff rate;
- t) historical active energy per tariff interval;
- u) historical peak power per tariff interval;
- v) interval energy consumption;
- w) energy cost for current billing period;
- x) energy cost for previous billing period;
- y) billing registers for manual meter reading;
- z) maximum demand for current billing period;
- aa) maximum demand for previous billing period;
- bb) status of the incoming supply L1;
- cc) status of the incoming supply L2;
- dd) status of the incoming supply L3;
- ee) state of the load switch (open/closed);

- ff) power limit settings;
- gg) active power limit;
- hh) meter event disconnect and reconnect;
- ii) meter event over and under voltage detection;
- jj) meter event alarm detection;
- kk) meter event configuration change;
- ll) meter serial number;
- mm) meter software version;
- nn) date and time;
- oo) auxiliary meter reading;
- pp) appliance control switch status;
- qq) appliance control switching settings;
- rr) appliance control event disconnect and reconnect;
- ss) appliance control event configuration change;
- tt) appliance control serial number; and
- uu) appliance control software version.

No negative values shall be displayed to the customer.

The utility shall be able to select a sub-set for display in a particular order as a user-defined display profile.

The energy values to be displayed shall consist of at least six significant digits. The normal display need not indicate any fractions of kWh.

For testing and calibration purposes, the display resolution is given in clauses 7 and 8.

The rate indicator on the CIU need not be used for calibration purposes.

6.2.13.2 DisplayRemoteInformationOnCIU

6.2.13.2.1 The following interfaces are used in this use case:

- a) Ea/G1/Ma/P1b; and
- b) Ea/G2/Cb/Ma/P1b.

6.2.13.2.2 The ERPS or HES sends a free-format text message to the CIU of a single designated customer or to a group of designated customers and presents this to the customer on the CIU.

6.2.13.2.2 The length of the text string shall be constrained by the capability of the type of interface on the CIU. In general, provision shall be made for text string lengths of 160 characters (see clause 9 for particular requirements).

6.2.13.2.3 The following types of information may be sent for example:

- a) notification of impending supply disconnection when in post-payment mode;
- b) notification of impending supply interruption;
- c) notification of impending power limit reduction;
- d) notification of appliance disconnection; and
- e) notification of appliance reconnection.

6.2.13.3 DisplayLocalInformationOnMobilePhone

The following interfaces are used in this use case:

- a) H2b/Ma;
- b) H2b/Ma/H2a; and
- c) H5c/H2c/H2/H2a.

The customer is able to selectively view the same information as in 6.2.13.1 on his mobile phone.

6.2.13.4 DisplayRemoteInformationOnMobilePhone

The following interfaces are used in this use case:

- a) Ea/G1/Ma/H2b;
- b) Ea/G2/Cb/Ma/H2b;
- c) Ea/H5a/H5c; and
- d) Ea/H5b/H5d.

ERPS or HES sends a free-format text message to mobile phone of a single designated customer or to a group of designated customers and presents this to the customer on the mobile phone.

The length of the text string shall be constrained by the capability of the type of interface on the Mobile Phone. In general, provision shall be made for text string lengths of 160 characters (see clause 9 for particular requirements).

The same information as in 6.2.13.2 may be sent.

6.2.14 Configuration control

6.2.14.1 General

The metering system is able to automatically configure new devices introduced into a particular area, provided that they have been correctly setup by the field technician or pre-configured in the factory.

Pre-configuration requirements shall be stated in the purchase agreement.

Firmware updates of a Meter shall not allow changes to the metrological properties of the Meter.

The device shall push a notification of the event together with the cause of the event to the ERPS or HES on each occasion when a configuration change operation is performed on the device.

Clock synchronization of the real time clock in any device shall ensure that the maximum deviation from actual time shall be less than 5 minutes.

6.2.14.2 RegisterNetworkGateway

The following interfaces are used in this use case:

- a) G2/Ea.

The NG is initialized to a pre-defined state by the manufacturer or by the utility prior to installation, such that it is ready for installation and commissioning.

The NG automatically discovers and connects to the HES, which then registers and configures the NG to make it fully operational.

The HES provides the DHCPv6 service to the NG.

6.2.14.3 RegisterKioskController

The following interfaces are used in this use case:

- a) K1/G2/Ea; and
- b) K2/Ea.

The KioskController is initialized to a pre-defined state by the manufacturer or by the utility prior to installation, such that it is ready for installation and commissioning.

The KioskController automatically discovers and connects to the NG, which routes the connection to the HES. The NG provides the DHCPv6 services.

The HES configures the KioskController to make it fully operational.

6.2.14.4 RegisterMeter

The following interfaces are used in this use case:

- a) G1/Ea; and
- b) Cb/G2/Ea.

The meter is initialized to a pre-defined state by the manufacturer or by the utility prior to installation, such that it is ready for installation and commissioning.

The meter automatically discovers and connects to the NG, which routes the connection to the HES. The NG provides the DHCPv6 services.

In the case where the NG is not present, the meter automatically detects and connects to the HES. The HES provides the DHCPv6 services.

The HES configures the meter to make it fully operational.

6.2.14.5 RegisterCIU

The following interfaces are used in this use case:

- a) P1d/Ma.

The CIU is initialized to a pre-defined state by the manufacturer or by the utility prior to installation, such that it is ready for installation and commissioning.

The CIU automatically discovers and connects to the meter. The meter provides the DHCPv6 services.

The meter configures the CIU to make it fully operational.

6.2.14.6 RegisterACD

The following interfaces are used in this use case:

- a) H2a/Ma/G1/Ea;
- b) H2a/Ma/Cb/G2/Ea;
- c) Ca/G2/Ea; and
- d) H4/Ea.

The ACD is initialized to a pre-defined state by the manufacturer or by the utility prior to installation, such that it is ready for installation and commissioning.

The ACD automatically discovers and connects to the meter, NG or HES in default order of preference. The device that it connects to provides DHCPv6 services.

When the ACD has found a connection route and has connected with the HES, then it configures the ACD to make it fully operational.

The selection and configuration requirements of the H4, Ca and H2a interfaces shall be specified in the purchase agreement.

6.2.14.7 RegisterAuxiliaryMeter

The following interfaces are used in this use case:

- a) Mb/Ma/G1/Ea; and
- b) Mb/Ma/Cb/G2/Ea.

The auxiliary meter is initialized to a pre-defined state by the manufacturer or by the utility prior to installation, such that it is ready for installation and commissioning.

The auxiliary meter automatically discovers and connects to the meter. The meter provides the DHCPv6 services.

The meter acts as proxy to the HES and registers the auxiliary meter with the HES.

The HES configures the auxiliary meter via the meter to make it fully operational.

The detail of this use case will be defined in a future edition of NRS 049.

6.2.14.8 ConfigureKioskControllerLocal

The following interfaces are used in this use case:

- a) Ee/K3.

The HHU is able to configure programmable parameters in the KioskController and performs general maintenance procedures when required.

6.2.14.9 ConfigureMeterLocal

The following interfaces are used in this use case:

- a) Ee/Mc.

The HHU is able to configure programmable parameters in the meter and performs general maintenance procedures when required.

6.2.14.10 ConfigureACDLocal

The following interfaces are used in this use case:

- a) Ee/A1.

The HHU is able to configure programmable parameters in the ACD and performs general maintenance procedures when required.

6.2.14.11 ConfigureNGLocal

The following interfaces are used in this use case:

- a) Ee/Cc.

The HHU is able to configure programmable parameters in the NG and performs general maintenance procedures when required.

6.2.14.12 UpdateNGFirmwareRemote

The following interfaces are used in this use case:

- a) Ea/G2.

The HES downloads a new firmware image to the NG.

Restart of the new firmware shall be scheduled to automatically occur on a future date and time.

6.2.14.13 UpdateNGFirmwareLocal

The following interfaces are used in this use case:

- a) Ea/Cc.

The HHU downloads a new firmware image to the NG.

Restart of the new firmware shall be either under manual control or scheduled to automatically occur on a future date and time.

6.2.14.14 UpdateMeterFirmwareRemote

The following interfaces are used in this use case:

- a) Ea/G2/Cb; and
- b) Ea/G1.

The HES downloads a new firmware image to the Meter.

Restart of the new firmware shall be scheduled to automatically occur on a future date and time.

6.2.14.15 UpdateMeterFirmwareLocal

The following interfaces are used in this use case:

- a) Ee/Mc.

The HHU downloads a new firmware image to the Meter.

Restart of the new firmware shall be either under manual control or scheduled to automatically occur on a future date and time.

6.2.14.16 UpdateCIUFirmwareRemote

This use case will be considered in a future edition of NRS 049.

6.2.14.17 UpdateCIUFirmwareLocal

The following interfaces are used in this use case:

Ee/P1d.

The HHU downloads a new firmware image to the CIU.

Restart of the new firmware shall be either under manual control or scheduled to automatically occur on a future date and time.

6.2.14.18 UpdateACDFirmwareRemote

The following interfaces are used in this use case:

- a) G2/Cb/Ma/H2a;
- b) G1/Ma/H2a;
- c) G2/Ca; and

d) H4.

The HES downloads a new firmware image to the ACD.

Restart of the new firmware shall be scheduled to automatically occur on a future date and time.

6.2.14.19 UpdateACDFirmwareLocal

The following interfaces are used in this use case:

a) Ee/A1.

The HHU downloads a new firmware image to the ACD.

Restart of the new firmware shall be either under manual control or scheduled to automatically occur on a future date and time.

6.2.14.20 UpdateKioskControllerFirmwareRemote

The following interfaces are used in this use case:

a) Ea/G2/K1.

The HES downloads a new firmware image to the kiosk controller.

Restart of the new firmware shall be scheduled to automatically occur on a future date and time.

6.2.14.21 UpdateKioskControllerFirmwareLocal

The following interfaces are used in this use case:

a) Ee/K3.

The HHU downloads a new firmware image to the kiosk controller.

Restart of the new firmware shall be either under manual control or scheduled to automatically occur on a future date and time.

6.2.14.22 SetNGClockRemote

The following interfaces are used in this use case:

Ea/G2.

The HES synchronizes the NG clock with that of the HES.

6.2.14.23 SetNGClockLocal

The following interfaces are used in this use case:

Ee/Cc.

The HHU synchronizes the NG clock with that of the HHU.

6.2.14.24 SetMeterClockRemote

The following interfaces are used in this use case:

- a) Ea/G2/Cb; and
- b) Ea/G1.

The HES synchronizes the Meter clock with that of the HES.

6.2.14.25 SetMeterClockLocal

The following interfaces are used in this use case:

- a) Ee/Mc.

The HHU synchronizes the Meter clock with that of the HHU.

6.2.14.26 SetACDClockRemote

The following interfaces are used in this use case:

- a) Ea/G2/Cb/H2a;
- b) Ea/G1/H2a;
- c) Ea/G2/Ca; and
- d) Ea/H4.

The HES synchronizes the ACD clock with that of the HES.

6.2.14.27 SetACDClockLocal

The following interfaces are used in this use case:

- a) Ee/A1.

The HHU synchronizes the ACD clock with that of the HHU.

6.2.15 Kiosk management

6.2.15.1 General

The ERPS or HES is able to monitor and control secure access to the meter Kiosk.

The KioskController shall maintain an event log as required in 6.2.15.3.

6.2.15.2 ManageKioskAccessRemote

The following interfaces are used in this use case:

- a) Ea/G2/K1; and
- b) Ea/K2.

The kiosk operator presents an identification tag to the kiosk controller tag reader, which pushes the relevant information to the HES or the ERPS where it is authenticated.

If access to the kiosk is granted, then the HES or ERPS sends an "access authorized" message to the kiosk controller, which then enables the kiosk door to be unlocked.

If access to the kiosk is not granted, the HES or ERPS send an access declined message to the kiosk controller, which then maintains the kiosk door in the locked state.

In either case, the kiosk controller displays the result on a local indicator panel to inform the kiosk operator of the outcome of his request.

NOTE The detail of the Kiosk Controller interface with the kiosk door locking/unlocking mechanism is out of scope of NRS049.

In the case where the kiosk operator is unable to present a tag to the kiosk controller, the kiosk operator may phone in to the HES or ERPS for verbal authentication.

The ERPS or HES remotely authorizes or declines access to the kiosk.

6.2.15.3 RecordKioskEvent

The kiosk controller shall maintain an event logging register with a capacity of at least 1000 events and shall wrap around once the log is full.

Each event shall be recorded in the kiosk controller together with a date and time stamp and the cause of the event.

The following events shall be recorded.

- a) kiosk access request authorized;
- b) kiosk access request declined;
- c) kiosk interior high temperature alarm gets set (above a programmable threshold);
- d) kiosk interior high temperature alarm gets reset (below a programmable threshold);
- e) kiosk interior ambient light changes from off to on;
- f) kiosk interior ambient light changes from on to off;
- g) kiosk battery low voltage alarm gets set (below a programmable threshold);
- h) kiosk battery low voltage alarm gets reset (above a programmable threshold);
- i) power to the kiosk controller has failed;
- j) power to the kiosk controller is restored;
- k) auxiliary1 logical signal activates;
- l) auxiliary1 logical signal deactivates;
- m) auxiliary2 logical signal activates; and
- n) auxiliary2 logical signal deactivates.

An event is recorded at the time of transition from one state to another.

All states are binary, so activation of one state automatically deactivates the previous state.

Auxiliary1 and auxiliary2 are provided for future use.

Threshold values for temperature shall be programmable from the ERPS or HES.

Threshold values for battery voltage shall be programmed by the manufacturer.

6.2.15.4 ReportKioskEvent

The following interfaces are used in this use case:

- a) K1/G2/Ea;
- b) K2/Ea.

The kiosk controller shall issue a push notification to the HES for each event when it occurs and if it has been enabled to do so. Each notification shall include a date and time stamp and the cause of the event.

It shall be possible for the HES to selectively enable or disable push notifications to the HES per event type. The specific event types are as given in the various use cases defined in 0.

6.2.15.5 ReadKioskStatus

6.2.15.5.1 The following interfaces are used in this use case:

- a) Ea/G2/K1; and
- b) Ea/K2.

6.2.15.5.2 The ERPS or HES remotely reads the status registers of the kiosk.

6.2.15.5.3 The following status information of the Kiosk shall be maintained by the kiosk controller.

- a) door is open/closed;
- b) interior ambient high temperature alarm is set/reset;
- c) interior ambient light is on/off;
- d) kiosk battery low voltage alarm is set/reset;
- e) kiosk Controller power failed alarm is set/reset;
- f) auxiliary1 logical signal is activated/deactivated; and
- g) auxiliary2 logical signal is activated/deactivated.

6.2.16 Home automation integration

6.2.16.1 Energy storage system

The following interfaces are used in this use case:

- a) Ea/G1/H2;
- b) Ea/G2/Cb/H2;
- c) Ea/G2/H3; and
- d) Ea/H5a/H2c.

The metering system is able to interact with an appropriate energy storage system installed into the metering system. By this, the metering system would be able to inform the energy storage system of varying tariffs or impending load limits.

6.2.16.2 Electric vehicle system

The following interfaces are used in this use case:

- a) Ea/G1/H2;
- b) Ea/G2/Cb/H2;
- c) Ea/G2/H3; and
- d) Ea/H5a/H2c.

The metering system is able to interact with an appropriate electric vehicle charging system. By this, the metering system is able to inform the charging system of varying tariffs or impending load limits.

6.2.16.3 Embedded generation system

The following interfaces are used in this use case:

- a) Ea/G1/H2;
- b) Ea/G2/Cb/H2;
- c) Ea/G2/H3; and
- d) Ea/H5a/H2c.

The metering system is able to interact with an appropriate energy generation system installed into the metering system. By this, the metering system would be able to inform the energy generation system of varying tariffs or impending load limits. This would include interaction with a feed-in tariff (FIT) meter such as contemplated in NRS 097-2-1.

6.2.17 ERPS/HES functions

6.2.17.1 General

These functions are generally performed either by the HES or the ERPS depending on the specific configuration of the installation.

6.2.17.2 ReportEnergyBalance

The metering system is able to measure the cumulative energy consumption of a group of customers and compare that to the sum of the energy consumption measured for each individual customer, in order to determine the amount of technical and non-technical losses.

6.2.17.3 SecureDataTransfer

Data exchange between all entities installed in the metering system is secured at the communications interface level (see clauses 4 and 5).

6.2.17.4 ManageInboundData

The ERPS/HES is able to collect, organize and distribute to the various relevant software modules and the data received from the metering system effectively. This includes the logging of event notifications coming from downstream devices in the metering system.

6.2.17.5 ManageOutboundData

The ERPS/HES is able to collect, organize and transmit data and instructions generated from the various ERPS/HES software modules to the devices installed in the metering system.

6.2.17.6 ProfileCustomerLoad

The ERPS/HES is able to make use of data collected from the metering system to perform load profiling on customer segments or sub-groups of the various customer segments.

6.2.17.7 ForecastCustomerDemand

The ERPS/HES is able to make use of the data collected from the metering system to determine future customer demand by means of their historical energy usage and expected conditions.

6.2.17.8 ForecastNetworkPlanning

The ERPS/HES is able to make use of the data collected from the metering system to aid the business to plan and prioritize future grid alterations by means of the per-customer demand data.

6.2.17.9 TrackAssetMovement

The ERPS/HES is able to detect and track the installation and movement of the metering system assets installed.

6.2.17.10 ManageDeviceOperations

The ERPS/HES is able to manage the continuous operation of the various metering system devices installed. This would include overseeing data generation and collection, carrying out billing and vending, disconnection and reconnection of supply based on instruction from the billing procedures, etc.

6.2.17.11 ManageNetworkPerformance

The ERPS/HES is able to manage the operations of the assets installed, to aid in increasing the operational performance of the network.

6.2.17.12 ManageNetworkOutage

The ERPS/HES is able to manage the handling of intended and unintended network outages by means of the installed assets.

6.2.17.13 ManageCustomerInteraction

The ERPS/HES is able to manage the utility's interaction with their customers, dependant on information received from assets installed.

6.2.17.14 ManageConfigurationChanges

The ERPS/HES is able to manage and record all configuration changes and events performed on devices and entities within the metering system.

6.2.17.15 DetectSystemFraud

The ERPS/HES is able to detect and track the financial and other transactions between entities participating in the metering system. This would include the capability to detect the tampering or bypassing of metering system devices.

6.3 Meter COSEM interface objects

6.3.1 General

The meter shall implement the following functions utilizing the COSEM objects given in Annex D.

In the DLMS/COSEM context CIU is a client and meter is a server.

An AA (Application Association) shall be established between CIU client and server as a pre-condition in order to allow the DataNotification service to operate correctly.

6.3.2 Meter association and security

Association and security management objects are given in D.2 and the model is shown in Figure 8.

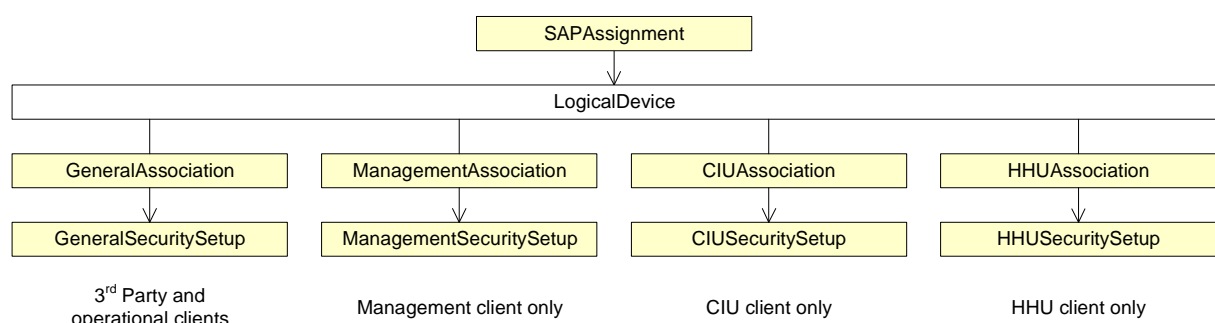


Figure 8 — Meter association and security model

6.3.3 Meter identifiers

The COSEM objects for identifiers are given in D.3.

The following shall be defined in a national companion specification:

- a) structure of the system title; and
- b) attribute values of the identifier objects.

6.3.4 Meter events

6.3.4.1 General

The COSEM objects for event management are given in D.4.

Event codes are given in Table D.4.

The generic functional model to manage events is given in Figure 9.

An application association (AA) shall be established between client and server as a pre-condition in order to enable the DataNotification service to operate correctly.

Specific instances of the generic structure are implemented for each of the following event categories:

- a) standard events;
- b) security events;
- c) comms events;
- d) disconnect events;
- e) power quality events;
- f) token events;
- g) account events; and
- h) proprietary events.

There is only one instance of EventPushScriptTable and EventPushSetup objects, which are commonly shared between the event categories. There are 8 sets of the remaining objects, one set for each of the above categories.

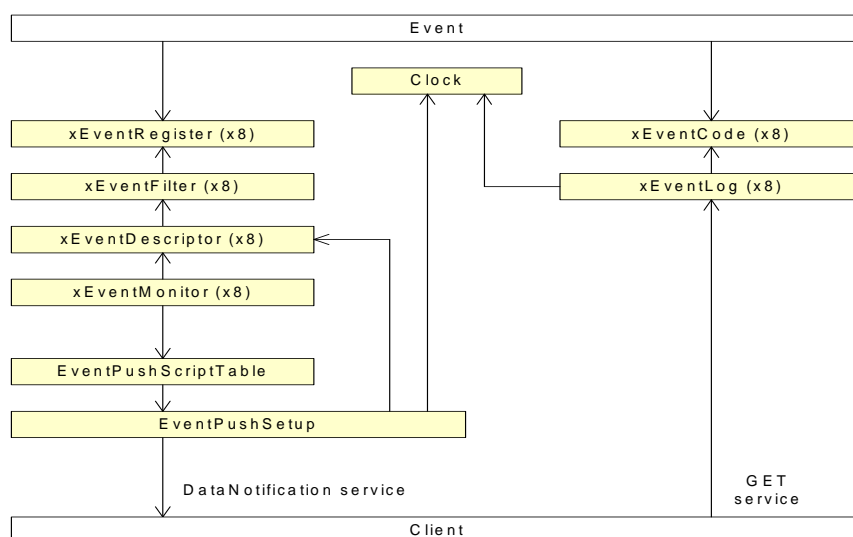


Figure 9 — Generic Meter event management model

xEventRegister is a 32-bit bit-string where each defined event is represented by a single bit that gets set when the corresponding event occurs in the application process.

xEventFilter is a 32-bit programmable mask, mapping to each corresponding bit in xEventRegister. When the mask bit is set, the corresponding event bit is allowed to be recorded in xEventDescriptor, which is also a 32-bit bit-string.

xEventManager detects any state changes (from 0 to 1) in xEventDescriptor bit-string and then activates the corresponding script in xEventPushScriptTable, which in turn causes the content of xEventDescriptor (all 8 instances), date and time to be pushed to client using the DLMS DataNotification service.

The contents of the 8 instances of EventDescriptor are concatenated in the following order:

- 8) StandardEventDescriptor;
- 9) SecurityEventDescriptor;
- 10) CommsEventDescriptor;
- 11) DisconnectEventDescriptor;
- 12) PowerQualityEventDescriptor;
- 13) TokenEventDescriptor;
- 14) AccountEventDescriptor;
- 15) ProprietaryEventDescriptor.

EventScriptTable contains a single script that invokes the push method of EventPushSetup.

As soon as the DataNotification service has been completed, the application process shall reset xEventRegister and xEventDescriptor (all 8 instances of each).

When any event occurs, the corresponding event code is also recorded in xEventCode.

EventLog monitors and detects any changes in xEventCode. The event code, date and time are then recorded in xEventLog for later retrieval by client by means of the DLMS GET service.

6.3.4.2 Meter alarm events

Alarm events are defined as those events that may cause the disconnect control function to operate in the interest of the customer or the utility for managing risk.

In addition to the specified instances for each event category in 6.3.4.1, a special model for managing alarm events is given in Figure 10, which is used for driving the Disconnect control function given in 6.3.15.

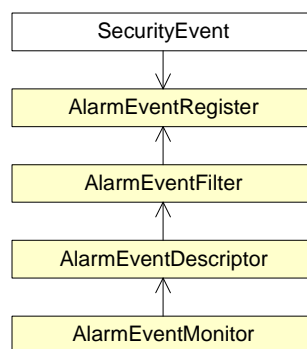


Figure 10 — Meter alarm event model

SecurityEvent is any event belonging to the category of Security events as defined in 6.3.4.1.

AlarmEventRegister, AlarmEventFilter and AlarmEventDescriptor are configured the same way as described in 6.3.4.1 for xEventRegister, xEventFilter and xEventDescriptor.

In this case AlarmEventFilter is programmed to select those specific Security events that are required to disconnect the load switch (see 6.3.15).

As soon as the event has been actioned by AlarmEventMonitor, then AlarmEventRegister and AlarmEventDescriptor shall be reset by the application process.

6.3.4.3 Meter registration events

The model for managing Meter registration events is given in Figure 11.

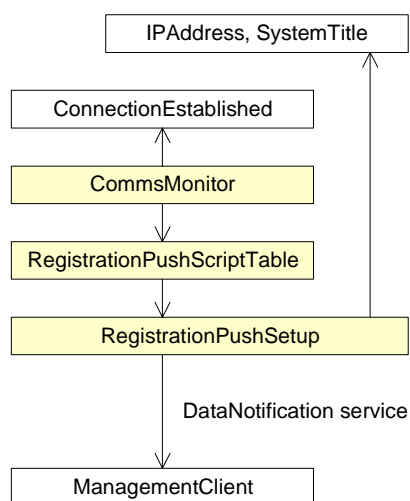


Figure 11 — Meter registration event model

CommsMonitor detects when a network connection is established between ManagementClient and Server, which then activates the appropriate script in RegistrationPushScriptTable.

The activated script causes RegistrationPushSetup to push the server IP address and system title to ManagementClient using the DLMS DataNotification service.

ManagementClient is then able to proceed with specific further configuration of server to make it fully operational.

6.3.5 Meter firmware upgrade

The COSEM objects for firmware management are given in D.5 and the model is given in Figure 12.

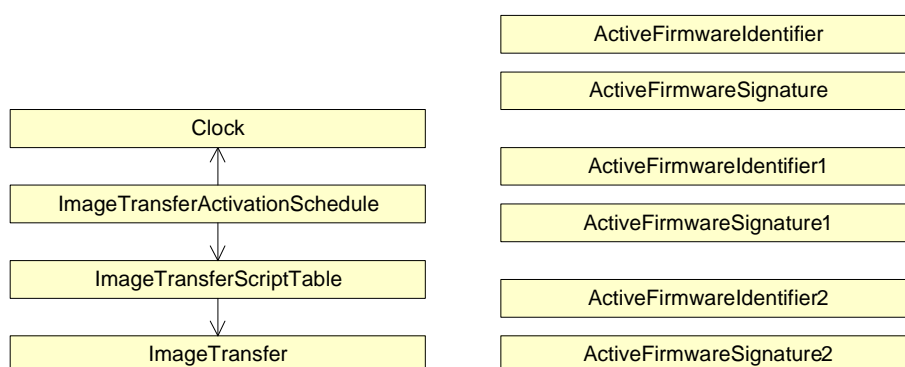


Figure 12 — Meter firmware upgrade model

The raw image for the firmware download must be provided to ManagementClient as a binary file. ManagementClient then uses the services provided by the objects listed below to transfer the binary file into Server and to activate the new firmware.

If the metrological part of the firmware is not separated from the rest, then the B field in the logical_name of the Active firmware version and the Active firmware version signature is set to B=0.

If the metrological part of the firmware is separated, then the B field in the logical_name of the Active firmware version and the Active firmware version signature is set as follows:

- a) B=0 metrologically relevant part of firmware; and
- b) B=1...9 to identify other parts of firmware.

In the case where each part has a different firmware version, the logical device firmware version as recorded in the object firmware version shall be a concatenation of the version numbers of each part.

STS relevant firmware may be included in any of the above parts by choice.

6.3.6 Meter communications

6.3.6.1 Optical port

The objects required to manage the optical port configuration are given in D.6.

6.3.6.2 TCP_UDP

The objects required to manage the TCP_UDP configuration are given in D.6.

6.3.6.3 IPv6

The objects required to manage the IPv6 configuration are given in D.6.

6.3.6.4 GPRS

The objects required to manage the GPRS configuration are given in D.6.

6.3.7 Meter time

The time keeping objects are given in D.7.

6.3.8 Metering

The metering objects are given in D.8.

6.3.9 Meter tariffication

6.3.9.1 General

The tariffication model is comprised of 3 parts:

- a) tariff control model;
- b) energy rate register model;
- c) demand rate register model.

The following programmable features are provided:

- d) 1 separate tariffication for import/export;
- e) separate tariffication for energy/demand;
- f) separate tariffication for energy/demand types;
- g) TOU and BLOCK tariff structures may be operated separately or in combination; and
- h) Single dimensional, two dimensional and three dimensional tariff structures may be realized;

6.3.9.2 Meter tariff control model

The energy tariffication control objects are given in D.9.

The common tariff control model is shown in Figure 13.

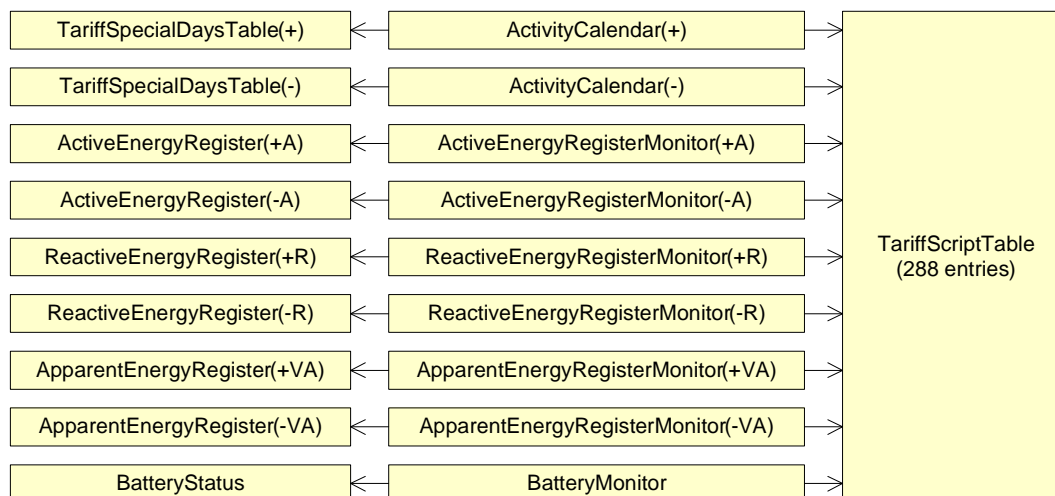


Figure 13 — Meter tariff control model

ActivityCalendar(+)/(-) and TariffSpecialDaysTable(+)/(-) set the time parameters for TOU tariff structures, providing for seasonal, weekly and daily profiles.

Monitor objects set the thresholds for block tariff structures, separate for each energy type and separate for import and export.

Battery monitor detects when the clock battery has failed, in which case it selects the fallback rates (see 6.3.9.3 and 6.3.9.4).

TariffScriptTable contains all the programmable scripts to select the appropriate rate registers in accordance with the programmed tariff structure. Storage space for at least 288 entries shall be provided.

6.3.9.3 Meter energy tariffication

The energy tariffication objects are given in Table D.10.

The energy rate register model is shown in Figure 14.

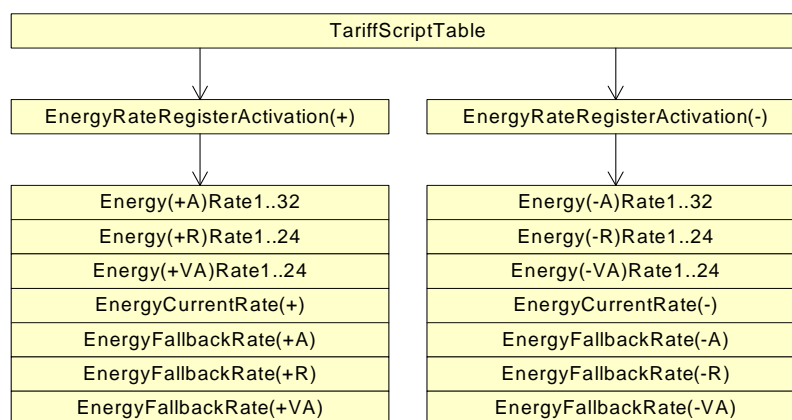


Figure 14 — Meter energy rate register model

EnergyRateRegisterActivation(+)/(-) contain the lists of rate registers available to be switched in accordance with the programmed tariff structure and control parameters. The specific rate register to be made currently active is selected by the appropriate script from TariffScriptTable.

EnergyCurrentRate(+)/(-) contain a current copy of the attributes active_mask from EnergyRateRegisterActivation(+)/(-).

EnergyFallbackRate(+A)/(-A)/(+R)/(-R)/(+VA)/(-VA) are rate registers which are activated in the case when the clock battery has failed.

6.3.9.4 Meter demand tariffication

The demand tariffication objects are given in D.11.

The demand rate register model is shown in Figure 15.

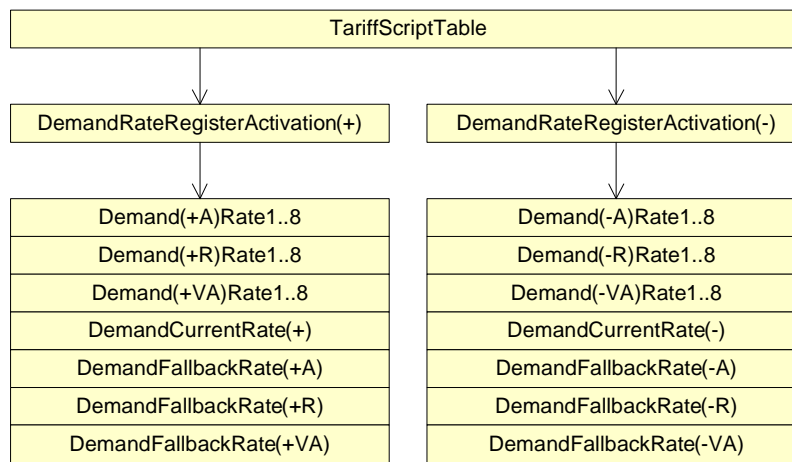


Figure 15 — Meter demand rate register model

DemandRateRegisterActivation(+)/(-) contain the lists of rate registers available to be switched in accordance with the programmed tariff structure and control parameters. The specific rate register to be made currently active is selected by the appropriate script from TariffScriptTable.

DemandCurrentRate(+)/(-) contain a current copy of the attributes active_mask from DemandRateRegisterActivation(+)/(-).

DemandFallbackRate(+A)/(-A)/(+R)/(-R)/(+VA)/(-VA) are rate registers which are activated in the case when the clock battery has failed.

6.3.9.5 Meter credit export energy tariff

To be defined in a future edition of this specification.

6.3.9.6 Meter credit critical peak pricing tariff

To be defined in a future edition of this specification.

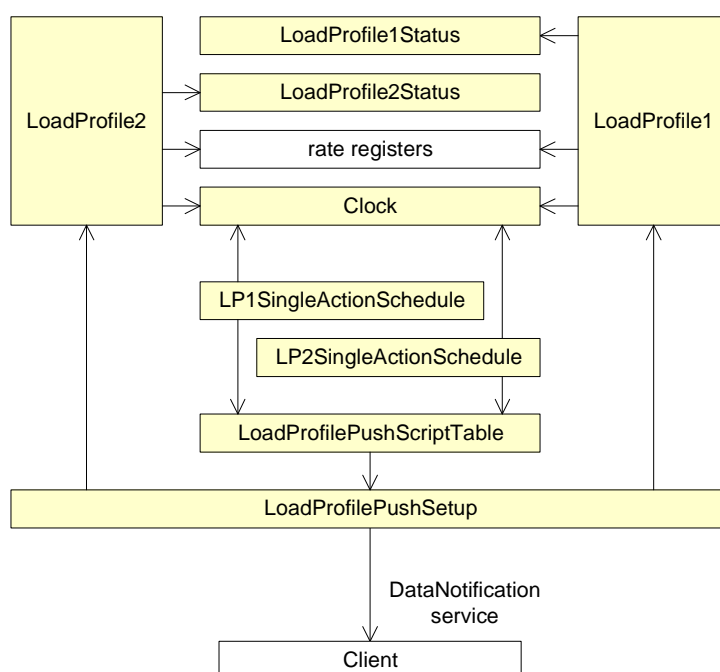
6.3.10 Meter load profile

The load profile objects are given in D.12 and the model is shown in Figure 16.

The status byte encoding for LoadProfile1Status and LoadProfile2Status is given in Table 30.

Table 30 — LoadProfile1Status and LoadProfile2Status encoding

1	2	3
Bit	Name	Description
– 0	– ERR	– critical error has occurred; also sets DNV
– 1	– CIV	– clock invalid because the power reserve is exhausted (battery fail); also sets DNV
– 2	– DNV	– data not valid without special validation (a special event has occurred)
– 3	– DST	– daylight savings time is active
– 4	– reserved	– always set to 0
– 5	– CAD	– clock adjusted by more than the synchronization limit
– 6	– reserved	– always set to 0
– 7	– PDN	– a total power outage has been detected during the affected capture period

**Figure 16 — Meter load profile push model**

LoadProfile1 and LoadProfile2 independently capture the values of the rate registers in accordance with a programmable list and integration period per capture cycle.

LoadProfile1 and LoadProfile2 minimum requirements are given in Table 31 and Table 32 respectively.

Table 31 — LoadProfile1 minimum requirements

1	2
Feature	Description
– minimum capacity	– 4800 records x 4 values each – 50 days at 15 min intervals
– integration period	– choice: 5, 10, 15, 30, 60 minutes (default = 15)
– sort method	– optional: unsorted or sorted by clock

Table 32 — LoadProfile2 minimum requirements

1	2
Feature	Description
– minimum capacity	– 1200 records x 4 values each – 50 days at 60 min intervals
– integration period	– choice: 5, 10, 15, 30, 60 minutes, 24 hours
– sort method	– optional: unsorted or sorted by clock

LP1SingleActionSchedule and LP2SingleActionSchedule are programmed to periodically push the load profiles to the Client using DataNotification service.

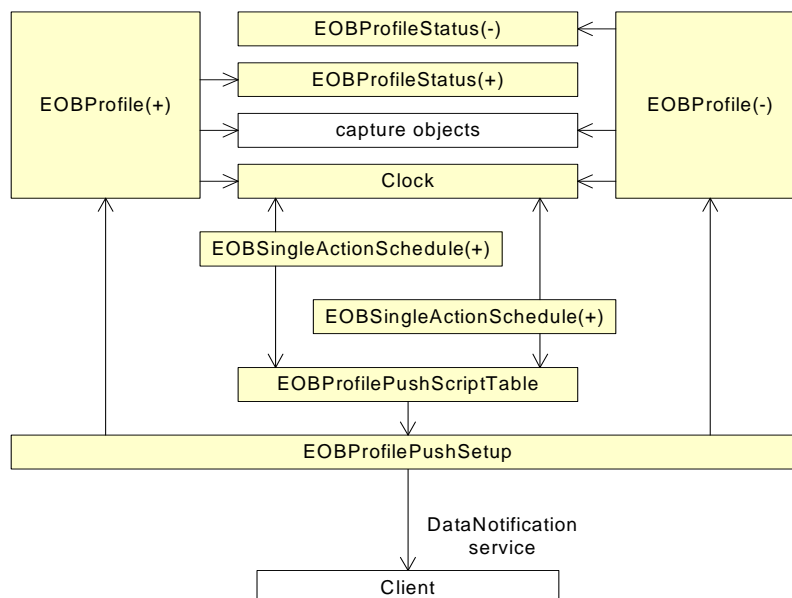
6.3.11 Meter end of billing (EOB) profile

The end of billing objects are given in D.13.and the model is shown in Figure 17.

The status byte encoding for EOBProfileStatus(+) and EOBProfileStatus(-) is given in Table 33.

Table 33 — EOBProfileStatus(+) and EOBProfileStatus(-) encoding

1	2	3
Bit	Name	Description
– 0	– ERR	– critical error has occurred; also sets DNV
– 1	– CIV	– clock invalid because the power reserve is exhausted (battery fail); also sets DNV
– 2	– DNV	– data not valid without special validation (a special event has occurred)
– 3	– DST	– daylight savings time is active
– 4	– reserved	– always set to 0
– 5	– CAD	– clock adjusted by more than the synchronization limit
– 6	– reserved	– always set to 0
– 7	– PDN	– a total power outage has been detected during the affected capture period
– Bit 0 = least significant bit in octet		

**Figure 17 — Meter end of billing push model**

EOBProfile(+) and EOBProfile(-) independently capture the content of the capture objects in accordance with a programmable list and integration period per capture cycle.

EOBActionSchedule(+) and EOBActionSchedule(-) are programmed to periodically push the billing profiles to the Client using DataNotification service.

EOBProfile(+) and EOBProfile(-) minimum requirements are given in Table 34.

Table 34 — EOBProfile(+) and EOBProfile(-) minimum requirements

1	2
Feature	Description
– minimum capacity	– 13 records x 5 values each – 13 months at 1 month intervals
– integration period	– first day of every month
– sort method	– unsorted

6.3.12 Meter reading

The meter reading objects are given in D.14 and the model is shown in Figure 18.

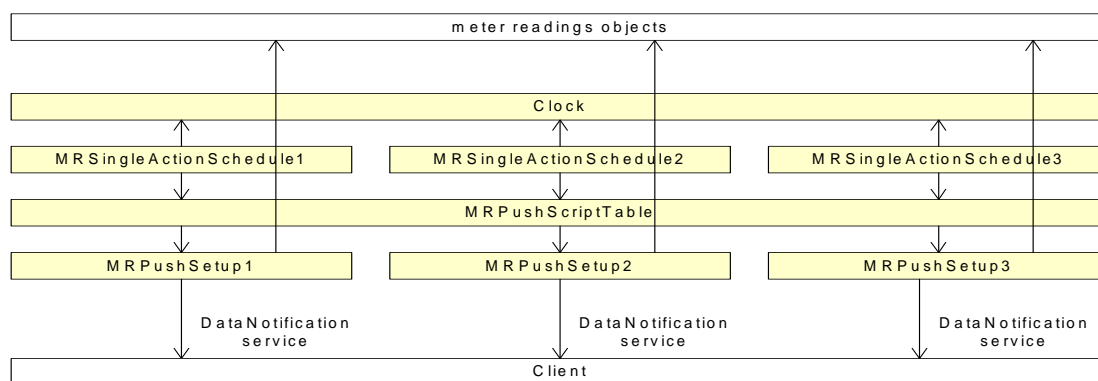


Figure 18 — Meter reading push model

Three sets of meter readings may be selected and pushed to the client, with each set being independent from the other and each having an independent schedule.

The holding capacity for the number of readings values shall be defined in a national companion specification.

6.3.13 Meter power quality

The power quality objects are given in D.14.

6.3.14 Meter accounting

The accounting objects are given in D.16 and the model is shown in Figure 19.

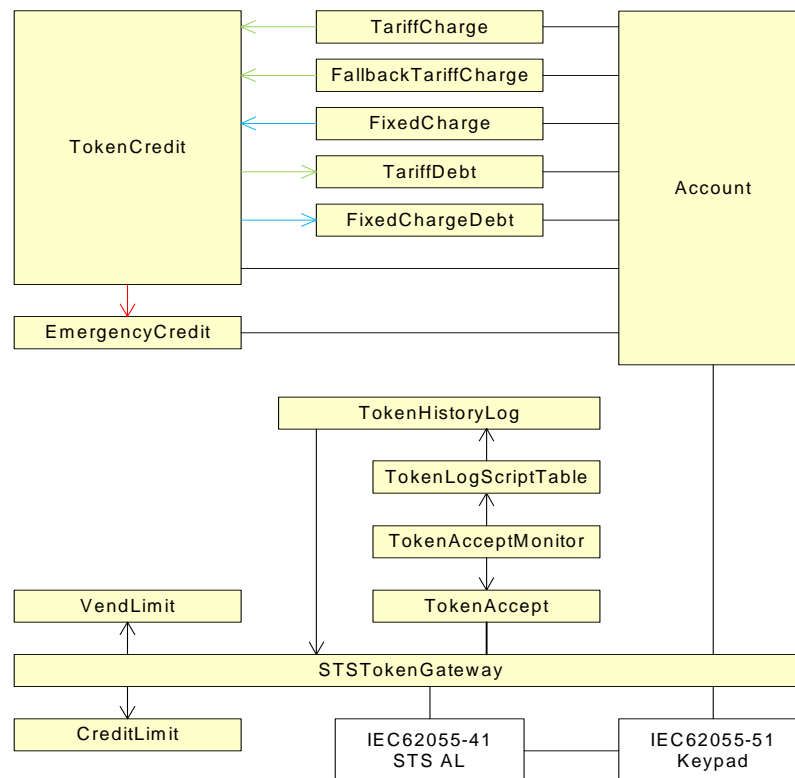


Figure 19 — Meter accounting model

VendLimit sets the maximum credit that may be entered per token.

CreditLimit sets the maximum amount of credit that may be available in the meter at any one time.

STSTokenGateway receives STS tokens via interfaces Pa1, G1 and Cb. STSTokenGateway attribute token_status shall comply with STS101-2.

TokenAccept contains the status of the token that was received after processing by the application process. When a token is received by STSTokenGateway, then the application process shall reset TokenAccept to a value = 0. If the token is accepted as defined in IEC 62055-41, then the application process shall set the TokenAccept value = 15.

TokenAcceptMonitor detects when TokenAccept changes from 0 to 16 by setting the threshold to 10. It then activates the script in TokenLogScriptTable, which invokes the *capture* method of TokenHistoryLog.

TokenHistoryLog shall provide for at least 10 entries and shall only capture tokens that have been accepted by the meter.

If a token is entered via interface P1a (keypad) the application process shall emulate the token entry via STSTokenGateway such that TokenAcceptMonitor will detect the token entry.

In the case where an STS numeric token carrier is entered via the keypad interface P1a, the token is first processed in accordance with IEC 62055-51 and IEC 62055-41 for decryption, authentication and validation. If the token value does not exceed VendLimit and Account.available_credit does not exceed CreditLimit after adding the token value to TokenCredit, then the token is further processed, else it is rejected. The result of the token entry is reflected in STSTokenGateway and also reflected on the CIU display interface P1b in accordance with requirements given in IEC 62055-41.

In the case where an STS token is entered via STSTokenGateway via interface G1 or Cb, the token is first processed in accordance with IEC 62055-51 and IEC 62055-41 for decryption, authentication

and validation. If the token value does not exceed VendLimit and Account attribute available_credit does not exceed CreditLimit after adding the token value to TokenCredit, then the token is further processed, else it is rejected. The result of the token entry is reflected in STSTokenGateway.

The Client is able to remotely read the contents of STSTokenGateway and TokenHistoryLog at any time.

TokenCredit normally receives all credit amounts entered by means of tokens via interfaces P1a, G1 or Cb. If there is debt to be settled from EmergencyCredit, TariffDebt or FixedChargeDebt, then these are settled first and the remainder is added to TokenCredit.

EmergencyCredit allows the granting of credit under emergency conditions, which is manually activated by the user by pushing a button or by entering a special code. The amount of emergency credit is programmable by the Client.

FallbackTariffCharge contains a single price per kWh, which is used when the clock battery has failed.

TariffCharge contains the prices per kWh for each rate as programmed in 0.

FixedCharge contains the fixed charge element of the service, which is normally levied on a regular basis.

TariffDebt is used as a temporary credit source to settle tariff charges in the event that TokenCredit or EmergencyCredit is not available and the load switch fails to disconnect the service. This feature is programmably enabled or disabled by Client.

FixedChargeDebt is used as a temporary credit source to settle fixed charges levied at a time when TokenCredit does not have sufficient funds available. This feature is programmably enabled or disabled by Client.

Account maintains control of the credits and charges deployed in TokenCredit, EmergencyCredit, TariffDebt, FixedChargeDebt, TariffCharge, and FallbackTariff.

The sequence of credit consumption for tariff charges is first from TokenCredit, then from EmergencyCredit and then from TariffDebt.

The sequence of credit consumption for fixed charges is first from TokenCredit and then from FixedChargeDebt.

The sequence of credit replenishment from received credit via tokens is first TariffDebt, then FixedChargeDebt, then EmergencyCredit and then TokenCredit.

6.3.15 Meter disconnect control

The cosem objects are defined in D.17 and the models are shown in Figure 20, Figure 21, Figure 22 Figure 23.

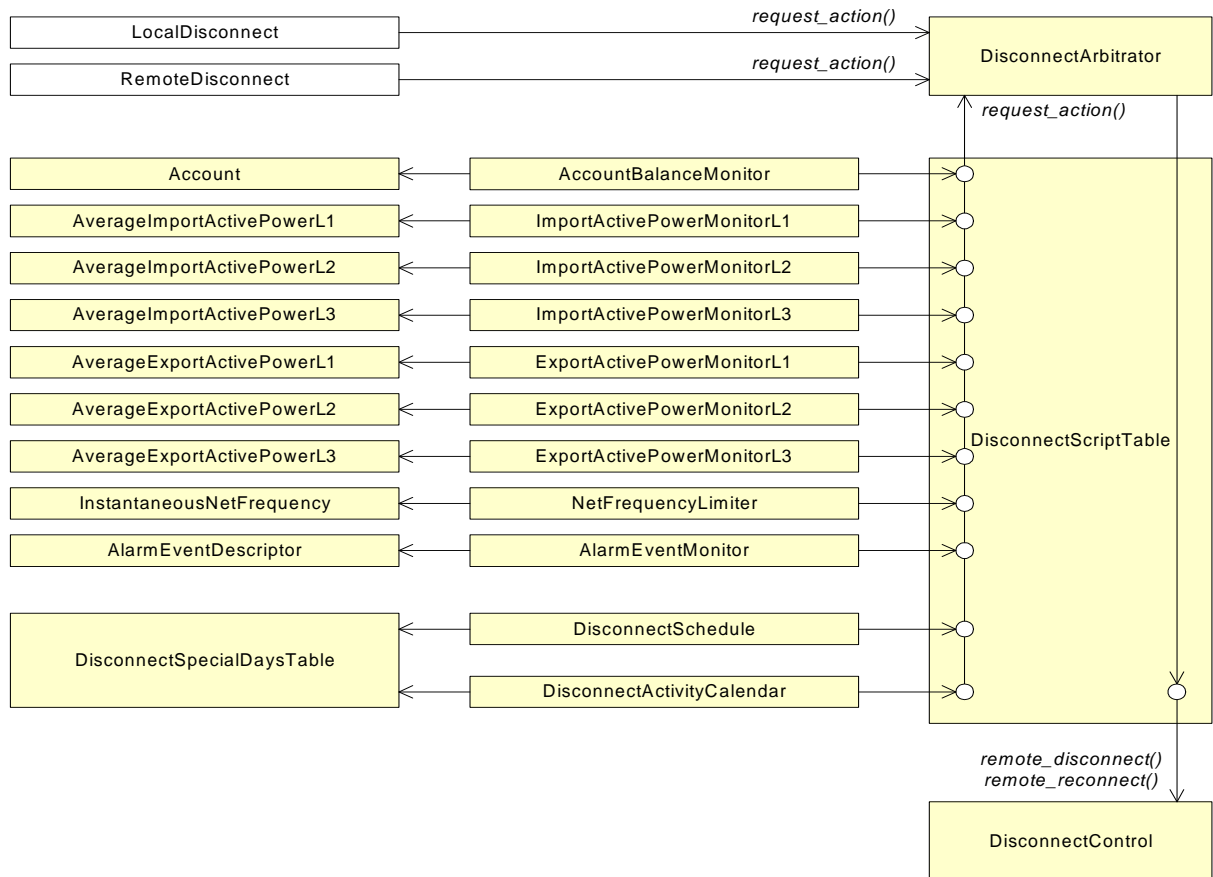


Figure 20 — Meter disconnect control model

LocalDisconnect and RemoteDisconnect are signals originating outside of ACD and received by the application process to connect or disconnect the load switch. These signals invoke the method *request_action()* of DisconnectArbitrator.

DisconnectArbitrator activates an appropriate script in DisconnectScriptTable, which invokes the method *remote_connect()* or *remote_disconnect()* of DisconnectControl. This causes the load switch to open or close.

Account attribute available_credit is monitored by AccountBalanceMonitor, which activates an appropriate script in DisconnectScriptTable to connect or disconnect the load switch, as described above, when available_credit crosses the programmable threshold in AccountBalanceMonitor. In order to realize a zero credit switch-off, the threshold needs to be programmed to 0.01 of the base currency.

Similarly the average active power, network frequency and alarm events are monitored by Monitor and Limiter objects. When any of these values cross the programmable thresholds, then an appropriate script in DisconnectScriptTable is activated, which causes the load switch to connect or disconnect as described above.

The import and export average active power Monitor objects are programmed with a demand limit and a warning limit threshold, which activate scripts in DisconnectScriptTable.

DisconnectSchedule and DisconnectActivityCalendar may be programmed in conjunction with DisconnectSpecialDaysTable to realize scheduled disconnect/connect actions or non-disconnect periods with repeating cycles and with seasonal, weekly or daily profiles.

DisconnectArbitrator is programmed with a weighted priority scheme, according to which it will arbitrate the connect or disconnect invocations requested from the various entities invoking it's

method *request_action()*. In effect all scripts wanting to invoke the methods of DisconnectControl do so via DisconnectAbitrator acting as a proxy, which in turn will allow/disallow the method invocation by activating its own set of scripts stored in DisconnectScriptTable, which in turn invoke the appropriate methods of DisconnectControl.

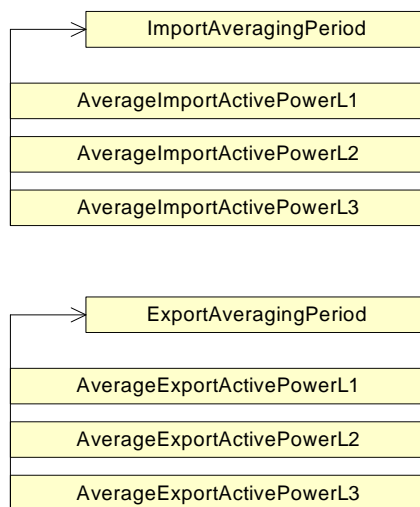


Figure 21 — Meter average power parameterization

Import and export power is measured by averaging registers. The averaging time is programmable via ImportAveragingPeriod and ExportAveragingPeriod from 1 to 60 minutes in steps of 1 minute.

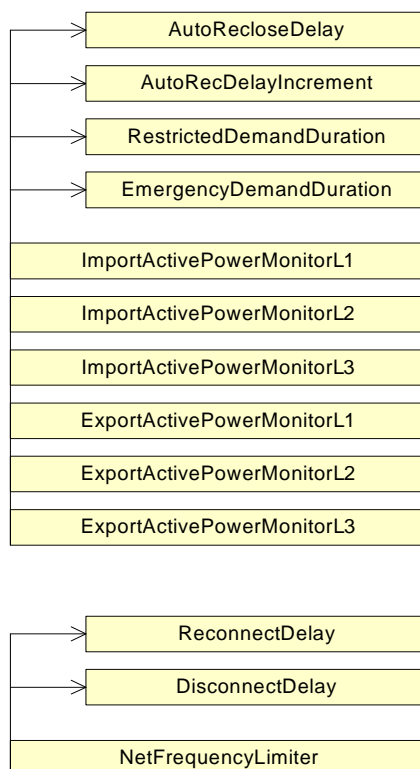


Figure 22 — Meter connect/disconnect timing parameterization

AutoRecloseDelay is programmable from 0 to 255 minutes in steps of 1 minute. See 6.2.9.11 and 6.2.9.12 for the operation of automatic reclosing of the load switch.

AutoRecDelayIncrement is programmable from 0 to 255 minutes in steps of 1 minute. See 6.2.9.11 and 6.2.9.12 for the operation of incremental delays for automatic reclosing of the load switch.

RestrictedDemandDuration is programmable from 0 to 65535 minutes in steps of 1 minute. See 6.2.9.11 for the operation of emergency demand control.

EmergencyDemandDuration is programmable from 0 to 255 hours in steps of 1 hour. See 6.2.9.11 for the operation of emergency demand control.

DisconnectDelay and ReconnectDelay are programmable from 0 to 65535 ms in steps of 1 ms. See 6.2.9.13 for operation of delays during switching caused by under-frequency detection.

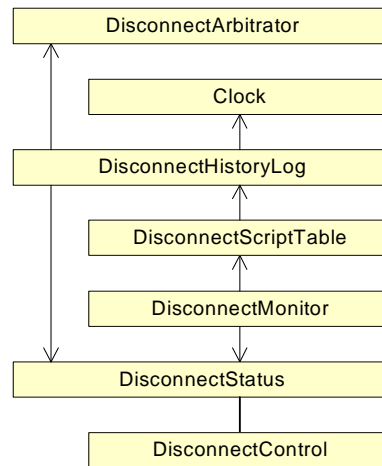


Figure 23 — Meter connect/disconnect history log

The application process maintains the logical status of the load switch in DisconnectStatus (0=open; 255=closed).

When DisconnectMonitor detects a change in DisconnectStatus, it activates a script in DisconnectScriptTable that invokes DisconnectHistoryLog method *capture()*.

DisconnectHistoryLog captures date and time from Clock, DisconnectArbitrator attribute last_outcome and DisconnectStatus attribute value.

6.3.16 Meter battery management

The Cosem objects are defined in D.18.

The application process maintains status values of the battery condition in battery status.

Enumerated values for battery status are:

- a) 0 = good;
- b) 16 = voltage is low; and
- c) 32 = battery failed.

6.3.17 Meter CIU message push from Server

The Cosem objects are defined in D.19 and the CIU message push model is given in Figure 24.

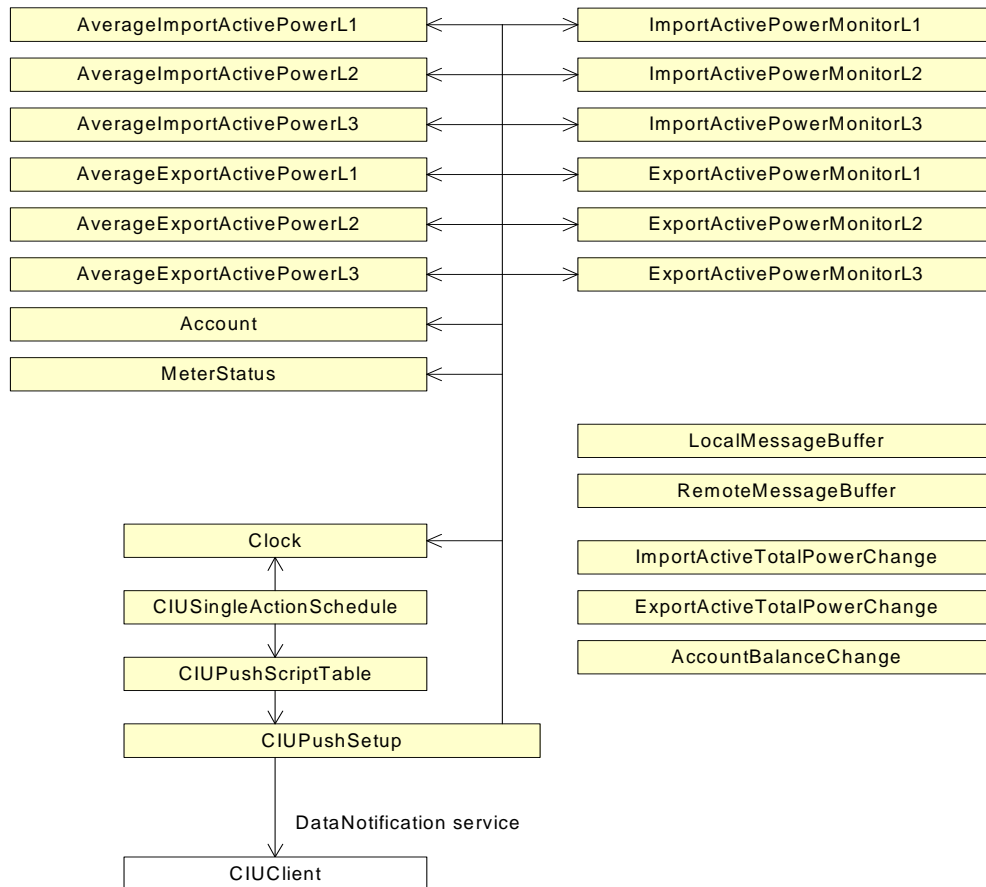


Figure 24 — Meter CIU message push model

CIUSingleActionSchedule is programmable to activate every 30 minutes, which then runs a script from CIUScriptTable that causes CIUPushSetup to send a selective set of data to the CIU using DataNotification service. The cycle time is programmable in daily, hourly and minute intervals. The application process shall add a random time delay from 0 to 255 seconds in order to reduce traffic congestion on the communications line to the CIU. The random time delay shall be recalculated with each occurrence of a scheduled push operation.

The data set to be sent to the CIU is comprised of the following elements:

- a) clock attribute time;
- b) averageImportPowerL1/L2/L3 attributes 2 (value) and 3 (scaler_unit);
- c) averageExportPowerL1/L2/L3 attributes 2 (value) and 3 (scaler_unit);
- d) importActivePowerMonitorL1/L2/L3 attribute 2 (thresholds);
- e) exportActivePowerMonitorL1/L2/L3 attribute 2 (thresholds);
- f) account attribute 5 (available_credit); and
- g) meterStatus attribute 1 (value).

If any element of the data set changes by an amount equal to or greater than the programmable values set in ImportActiveTotalPowerChange, ExportActiveTotalPowerChange and AccountBalanceChange, then the application process shall invoke the script in CIUPushScriptTable.

If any of the threshold values set in the Monitor objects change in value, then the application process shall immediately invoke the script in CIUPushScriptTable.

If any of the bit values in MeterStatus changes in value, then the application process shall immediately invoke the script in CIUPushScriptTable.

LocalMessageBuffer and RemoteMessageBuffer each has storage space for 160 ASCII characters.

If Server wants to send a message to CIUClient, then it places the message into LocalMessageBuffer and sets MeterStatus bit "local_message_received".

If remote Client wants to send a message to CIUClient, then it places the message into RemoteMessageBuffer and sets MeterStatus bit "remote_message_received".

CIUClient monitors MeterStatus bit-string and detects when a message is present in Server. It retrieves the message by using the GET service and then clears the relevant bit in MeterStatus by using the SET service.

The remote messages are free format text and are defined by the utility in ManagementClient.

The local messages are free format text defined by the manufacturer of server.

The CIU display presentation is not specified, but shall comply with the requirements of 6.2.13.

6.4 Appliance control device COSEM interface objects

6.4.1 General

The ACD shall implement the following functions utilizing the COSEM objects given in Annex E.

In the DLMS/COSEM context CIU is a client and ACD is a server.

An application association shall be established between CIUClient and server as a pre-condition in order to allow the DataNotification service to operate correctly.

6.4.2 ACD association and security

Association and security management objects are given in E.2 and the model is shown in Figure 25.

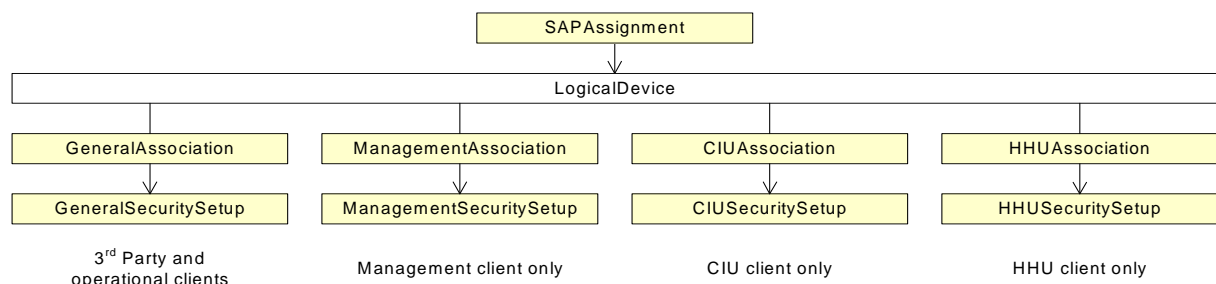


Figure 25 — ACD association and security model

6.4.3 ACD identifiers

The COSEM objects for identifiers are given in E.3.

The following shall be defined in a national companion specification:

- structure of the system title; and
- qattribute values of the identifier objects.

6.4.4 ACD events

6.4.4.1 General

The COSEM objects for event management are given in E.4.

Event codes are given in Table E.4.

The generic functional model to manage events is given in Figure 26.

An application association shall be established between client and server as a pre-condition in order to enable the DataNotification service to operate correctly.

Specific instances of the generic structure are implemented for each of the following event categories:

- a) standard events;
- b) security events;
- c) comms events; and
- d) disconnect events;

There is only one instance of EventPushScriptTable and EventPushSetup objects, which are commonly shared between the event categories. There are 4 sets of the remaining objects - one set for each of the above categories.

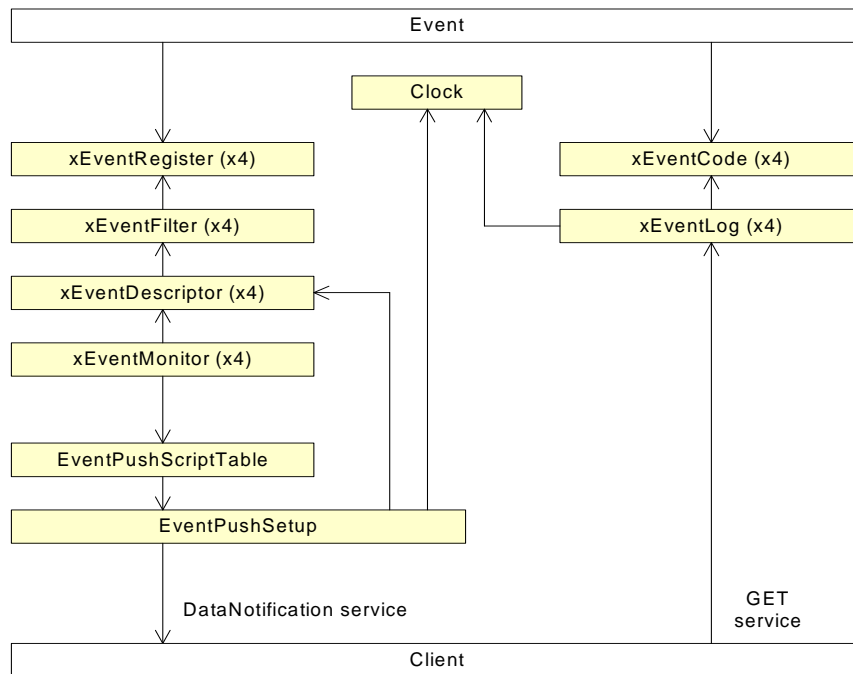


Figure 26 — Generic ACD event management model

xEventRegister is a 32-bit bit-string where each defined event is represented by a single bit that gets set when the corresponding event occurs in the application process.

xEventFilter is a 32-bit programmable mask, mapping to each corresponding bit in xEventRegister. When the mask bit is set, the corresponding event bit is allowed to be recorded in xEventDescriptor, which is also a 32-bit bit-string.

xEventMonitor detects any state changes (from 0 to 1) in xEventDescriptor bit-string and then activates the corresponding script in xEventPushScriptTable, which in turn causes the content of xEventDescriptor (all 8 instances), date and time to be pushed to client using the DLMS DataNotification service.

The contents of the 4 instances of EventDescriptor are concatenated in the following order:

- a) StandardEventDescriptor;
- b) SecurityEventDescriptor;

- c) CommsEventDescriptor; and
- d) DisconnectEventDescriptor.

EventScriptTable contains a single script that invokes the *push* method of EventPushSetup.

As soon as the DataNotification service has been completed, the application process shall reset xEventRegister and xEventDescriptor (all 4 instances of each).

When any event occurs, the corresponding event code is also recorded in xEventCode.

EventLog monitors and detects any changes in xEventCode. The event code, date and time are then recorded in xEventLog for later retrieval by Client by means of the DLMS GET service.

5.4.4.2 ACD registration events

The model for managing Meter registration events is given in **Figure 27**.

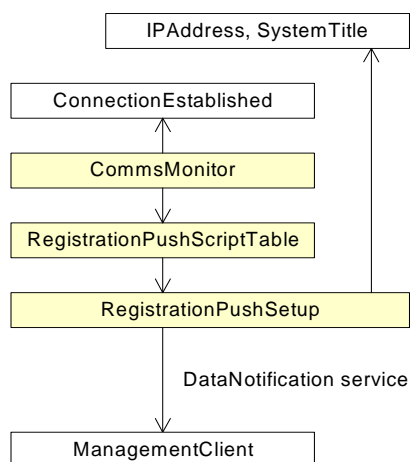


Figure 27 — ACD registration event model

CommsMonitor detects when a network connection is established between ManagementClient and Server, which then activates the appropriate script in RegistrationPushScriptTable.

The activated script causes RegistrationPushSetup to push the server IP address and System Title to ManagementClient using the DLMS DataNotification service.

ManagementClient is then able to proceed with specific further configuration of Server to make it fully operational.

6.4.5 ACD firmware upgrade

The COSEM objects for firmware management are given in E.5 and the model is given in Figure 28.

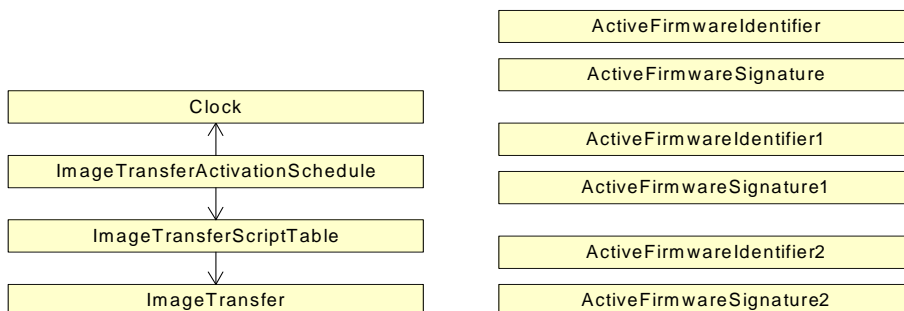


Figure 28 — ACD firmware upgrade model

The raw image for the firmware download must be provided to ManagementClient as a binary file. ManagementClient then uses the services provided by the objects listed below to transfer the binary file into Server and to activate the new firmware.

If the metrological part of the firmware is not separated from the rest, then the B field in the logical_name of the Active firmware version and the Active firmware version signature is set to B=0.

If the metrological part of the firmware is separated, then the B field in the logical_name of the Active firmware version and the Active firmware version signature is set as follows:

- a) B=0 metrologically relevant part of firmware; and
- b) B=1...9 to identify other parts of firmware.

In the case where each part has a different firmware version, the logical device firmware version as recorded in the object FirmwareVersion shall be a concatenation of the version numbers of each part.

6.4.6 ACD communications

6.4.6.1 Optical port

The objects required to manage the optical port configuration are given in E.6.

6.4.6.2 TCP_UDP

The objects required to manage the TCP_UDP configuration are given in E.6.

6.4.6.3 IPv6

The objects required to manage the IPv6 configuration are given in E.6.

6.4.6.4 GPRS

The objects required to manage the GPRS configuration are given in E.6.

6.4.7 ACD time

The time keeping objects are given in E.7.

6.4.8 ACD disconnect control

The COSEM objects are defined in E.8 and the models are shown in Figure 29 and Figure 30.

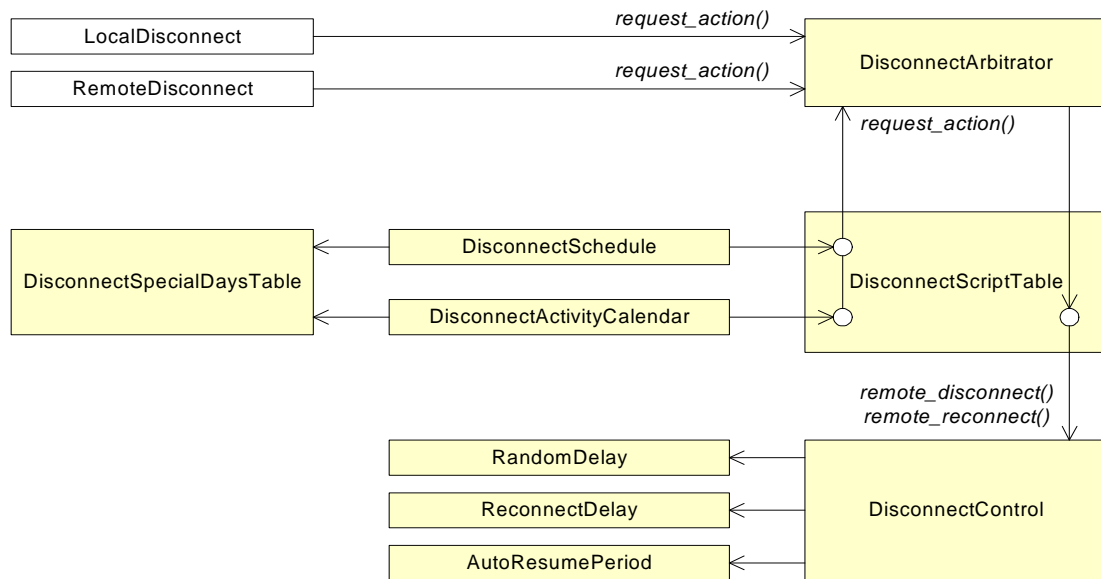


Figure 29 — ACD disconnect control model

LocalDisconnect and RemoteDisconnect are signals originating outside of ACD and received by the application process to connect or disconnect the load switch. These signals invoke the method *request_action()* of DisconnectArbitrator.

DisconnectArbitrator activates an appropriate script in DisconnectScriptTable, which invokes the method *remote_connect()* or *remote_disconnect()* of DisconnectControl. This causes the load switch to open or close.

DisconnectSchedule and DisconnectActivityCalendar may be programmed in conjunction with DisconnectSpecialDaysTable to realize scheduled disconnect/connect actions or non-disconnect periods with repeating cycles and with seasonal, weekly or daily profiles.

DisconnectArbitrator is programmed with a weighted priority scheme, according to which it will arbitrate the connect or disconnect invocations requested from the various entities invoking its method *request_action()*. In effect all scripts wanting to invoke the methods of DisconnectControl do so via DisconnectArbitrator acting as a proxy, which in turn will allow/disallow the method invocation by activating its own set of scripts stored in DisconnectScriptTable, which in turn invoke the appropriate methods of DisconnectControl.

RandomDelay is programmable from 0 to 255 seconds in steps of 1 second. See 6.2.10.1 for the operation of random delay before opening and reclosing of the load switch.

ReconnectDelay is programmable from 0 to 255 minutes in steps of 1 minute. See 6.2.10.1 for the operation of reconnection delay for reclosing of the load switch.

AutoResumePeriod is programmable from 0 to 65535 minutes in steps of 1 minute. See 6.2.10.1 for the operation of automatic resumption of the normal schedule.

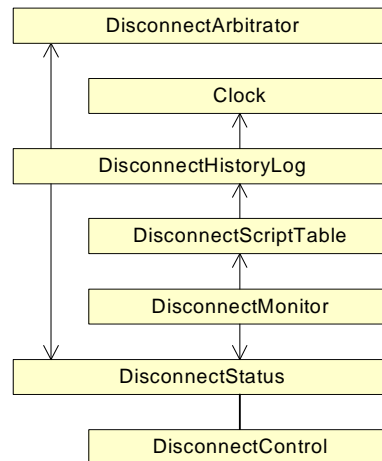


Figure 30 — ACD connect/disconnect history log

The application process maintains the logical status of the load switch in DisconnectStatus (0=open; 255=closed).

When DisconnectMonitor detects a change in DisconnectStatus, it activates a script in DisconnectScriptTable that invokes DisconnectHistoryLog method *capture()*.

DisconnectHistoryLog captures date and time from Clock, DisconnectArbitrator attribute *last_outcome* and DisconnectStatus attribute value.

6.4.9 ACD battery management

The COSEM objects are defined in E.9.

The application process maintains status values of the battery condition in battery status.

Enumerated values for battery status are:

- a) 0 = good;
- b) 16 = voltage is low; and
- c) 32 = battery failed.

6.4.10 ACD CIU message push from server

The COSEM objects are defined in E.10 and the CIU message push model is given in Figure 31.

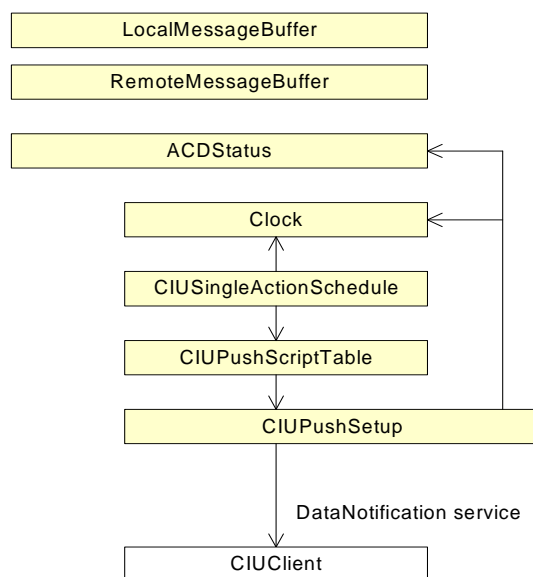


Figure 31 — ACD CIU message push model

CIUSingleActionSchedule is programmable to activate every 30 minutes, which then runs a script from CIUPushScriptTable that causes CIUPushSetup to send a selective set of data to the CIU using DataNotification service. The cycle time is programmable in daily, hourly and minute intervals. The application process shall add a random time delay from 0 to 255 seconds in order to reduce traffic congestion on the communications line to the CIU. The random time delay shall be recalculated with each occurrence of a scheduled push operation.

The data set to be sent to the CIU is comprised of the following elements:

- a) Clock attribute time; and
- b) ACDStatus attribute 1 (value).

If any of the bit values in ACDStatus changes in value, then the application process shall immediately invoke the script in CIUPushScriptTable.

LocalMessageBuffer and RemoteMessageBuffer each has storage space for 160 ASCII characters.

If Server wants to send a message to CIUClient, then it places the message into LocalMessageBuffer and sets ACDStatus bit "local_message_received".

If remote Client wants to send a message to CIUClient, then it places the message into RemoteMessageBuffer and sets ACDStatus bit "remote_message_received".

CIUClient monitors ACDStatus bit-string and detects when a message is present in server. It retrieves the message by using the GET service and then clears the relevant bit in ACDStatus by using the SET service.

The remote messages are free format text and are defined by the utility in ManagementClient.

The local messages are free format text defined by the manufacturer of server.

The CIU display presentation is not specified, but shall comply with the requirements of 6.2.13.

6.5 Kiosk controller COSEM interface objects

These COSEM objects will be defined in a future revision of NRS 049.

6.6 Mobile phone/CIU application layer functions

TCIU act as proxy for ACD connection to mobile phone.

Mobile phone primarily connects to CIU via LNAP router over the network layer and lower layers of the communication interface.

The application layer protocol between CIU and mobile phone is not defined in detail, but it shall at least support the following functions:

- a) CIU shall replicate all local and remote messages received from HES/Meter to MobilePhone;
- b) CIU shall replicate all local and remote messages received from HES/ACD to MobilePhone;
and
- c) CIU shall relay all messages received from MobilePhone to either Meter or ACD depending on the context.

Mobile phone shall not have a DLMS/COSEM contextual relationship with any device in the metering systems.

6.7 Network gateway application layer functions

NG shall provide the COSEM access service interface G2 as defined in 4.4.13.

In the case where the the G2 interface network connection is down and a downstream Server needs to send a push notification message to the HES, NG shall temporarily store the message and forward it to the HES as soon as the G2 connection is re-established.

In the case where the network connection between NG and a downstream server is down and the HES needs to send a message to that Server, NG shall temporarily store the message and forward it to the relevant Server as soon as the connection is re-established.

NG shall maintain a real-time clock in compliance with the requirements given in clause 7 and 10. NG shall monitor and report power outages to the HES in support of the use cases defined in 6.2.11.1 and 6.2.11.2.

6.8 Functional certification

All products shall be tested against the requirements given in clause 6.

A suitable certification test specification and certification body has not been identified at this stage. For the time being, utilities need to perform their own tests.

7. General requirement for meter, CIU, NG and ACD devices

7.1 General

For meter and CIU devices the requirements given in SANS 1524-1 shall apply, except for the particular deviations and additions as given in clauses 7, 8 and 9.

For devices, other than meter and CIU devices, the requirements given in IEC 62052-21 shall apply, except for the particular deviations and additions as given in clauses 7, 10 and 11.

Requirements for accelerated life tests shall be specified in the purchase agreement.

All devices shall have a design life of 15 years and the annualised failure rate shall not exceed 2 % per annum.

Requirements for interoperability shall be tested as given in 4.5.

Functional requirements shall be tested as given in 6.6.

Where a device keeps time by design it shall maintain an accuracy to within 20 parts per million under reference conditions.

Where a replaceable battery is used to maintain the time keeping function in the device, it shall be fitted under a separate sealable cover. By design it shall have a minimum shelf life of ten years and a minimum standby service life of three years in the absence of supply to the device.

All communicating devices shall be designed to reliably communicate over the physical location distances as given in 4.2.

If any statutory specification applies to a device, then this shall be stated in the purchase agreement.

7.2 Mechanical requirements

Devices shall comply with the requirements of insulating encased equipment of protective class II.

External wiring terminations on devices shall be made by means of clamp terminals using one screw.

Terminal blocks on devices shall be mounted in such a way that they do not cause undue stress forces on internal circuitry.

When a device offers a three-pin mains plug mounting option, the 16A plug and the 16A socket on the device shall comply with SANS 164-1.

Provision shall be made for sealing devices in accordance with NRS 096-1. It shall be possible to seal the terminal cover and front cover separately (if the cover is removable).

Where a device employs a battery, the instructions concerning the replacement of the battery shall preferably be displayed on the device body. No special tools shall be required to replace the battery.

7.3 Climatic requirements

Meter and CIU devices that are intended for installation in enclosures located inside buildings shall meet the requirements given in SANS 1524-1 clause 6 as for indoor meters, except that the temperature ranges given in Table 35 shall apply and an upper temperature of 55 °C shall be used for the damp heat cyclic test.

Meter and CIU devices that are intended for installation in enclosures located outside buildings shall meet the requirements given in SANS 1524-1 clause 6 as for indoor meters, except that the temperature ranges given in Table 36 shall apply and an upper temperature of 55 °C shall be used for the damp heat cyclic test.

Devices, other than meters and CIU devices, that are intended for installation in enclosures located inside buildings shall meet the requirements given in IEC 62052-21 clause 6, except that the temperature ranges given in Table 35 shall apply and an upper temperature of 55 °C shall be used for the damp heat cyclic test.

Devices, other than meters and CIU devices, that are intended for installation in enclosures not located inside buildings shall meet the requirements given in IEC 62052-21 clause 6, except that the temperature ranges given in Table 36 shall apply and an upper temperature of 55 °C shall be used for the damp heat cyclic test.

Table 35 — Temperature ranges for devices installed inside buildings

1	2
	Temperature
Specified operating range	from -10 °C to +55 °C
Limit range of operation	from -25 °C to +55 °C
Limit range for storage and transport	from -25 °C to +70 °C

Table 36 — Temperature ranges for devices installed outside buildings

1	2
	Temperature
Specified operating range	from -10 °C to +55 °C
Limit range of operation	from -25 °C to +65 °C
Limit range for storage and transport	from -25 °C to +70 °C

7.4 Electrical requirements

7.4.1 General

The phase to neutral voltage and the phase to phase voltage of the network supply and the maximum load currents for devices shall be specified in the purchase agreement.

Where a device employs a load switch, the utilization category as defined in SANS 1524-1 7.9 shall be specified in the purchase agreement.

The load switch shall be a mechanically latching device and shall make and break all live circuits of the supply to the load. It shall not be required to be permanently energized in order to remain in the open or in the closed position.

The voltage ranges for devices are given in Table 37.

Table 37 — Voltage ranges for devices

1	2
	Voltage range
Specified operating range	from 0,9 U_n to 1,1 U_n
Extended operating range	from 0,8 U_n to 1,15 U_n
Limit range of operation	from 0,0 U_n to 1,8 U_n
Withstand range of operation	from 0,0 U_n to 1,9 U_n

The rated supply frequency shall be 50 Hz in accordance with IEC 62052-21 7.1.2.

If applicable, the device shall be approved for use in the wiring of premises as specified in SANS 10142-1.

7.4.2 Particular tests for NG and ACD devices

7.4.2.1 Test for limit range of operation

Connect the device as for normal use with no load and apply a supply voltage of 1,8 U_n for 48 h. The status of all registers, values, and parameters associated with the device functions shall continue to be valid and free of corruption.

Any internal timekeeping facility shall continue to maintain timekeeping until the support period applicable to any operational reserve has elapsed.

The communications interface need not operate, but no invalid commands shall negatively influence the normal behaviour of the device. It shall not accept invalid commands and it shall not issue invalid commands.

The display need not operate, or is permitted to operate erratically.

The state of the load switch shall not alter.

NOTE Where requirements for a device function that specifically opens the load switch during low or high supply voltage conditions are agreed between purchaser and supplier of the device, it shall be possible for this function to be inhibited when assessing compliance with this clause, without changing any relevant firmware.

Correct operation of all aspects of the device shall resume when the supply voltage has returned to within the extended operating range.

7.4.2.2 Test for withstand range of operation

Connect the device as for normal use and apply a supply voltage of $1.9 U_n$ for 48 h.

It is acceptable if the device sustains permanent damage or degradation to its functional characteristics, but this shall not give rise to a safety hazard, for example exposure of live conductors, fire, explosion.

7.4.2.3 Test for voltage dips and interruptions

The requirements given in IEC 62052-11 7.1.2 shall apply.

Voltage dips and short interruptions shall not produce any loss or corruption of data in the device.

The communications interface need not operate, but no invalid commands shall negatively influence the normal behaviour of the device. It shall not accept invalid commands and it shall not issue invalid commands.

After the tests the communications interface and all internal functions shall operate correctly, including the operation of the load switch if fitted (off and on).

If a load switch is fitted, the test shall be carried out first with the load switch closed and it shall be in, or resume, the closed position at the end of the test. The test shall be repeated with the switch open and it shall remain open throughout the test.

8. Particular requirements for meters

8.1 General

Meters shall meet the general requirements given in clause 7, except where these are modified in the following clauses.

For the purposes of meeting the requirements of SANS 1524-1, the Meter shall always be regarded as a payment Meter, regardless of whether it is in prepayment mode or in post-payment mode, and both modes shall be tested.

Meters that are designed for use as multi-device installations shall be tested as a whole. The connection method recommended by the manufacturer shall be used and the length of connection between the devices shall conform to the minimum length specified by the manufacturer.

An optical test output shall be provided for calibration purposes as specified in IEC 62052-11. Where provision is made for a kWh and kvarh test output then they shall be at least 20mm apart.

The meter shall have the capacity to connect to at least 2 ACDs.

8.2 Mechanical requirements

Meters, or devices in a multi-device installation, that are intended for installation in enclosures located outside buildings shall meet the requirements given in SANS 1524-1 clause 5 as for outdoor rating and shall be rated as IP54 for protection against penetration of dust and water.

Meters, or devices in a multi-device installation, that are intended for installation in enclosures located inside buildings shall meet the requirements given in SANS 1524-1 clause 5 as for indoor rating and shall be rated as IP52 for protection against penetration of dust and water.

In addition to the requirements given in SANS 1524-1 5.1, the meter serial number, as specified in SANS 474/NRS 057 Annex A, shall also be displayed on the meter case and also be stored in the Meter's non-volatile memory.

Where a meter measures import and export energy, an additional symbol shall be displayed on the nameplate in accordance with IEC 62053-52 9.11, the register display always positive.

Where a single phase meter is intended to replace an existing common base footprint meter, the maximum dimensions shall be 290 mm high by 130 mm wide by 110 mm deep.

Where a single phase meter is intended to replace an existing BS footprint meter, the maximum dimensions shall be 210 mm high by 145 mm wide by 110 mm deep.

Where a three phase meter is intended to replace an existing BS footprint meter, the maximum dimensions shall be 300 mm high by 200 mm wide by 110 mm deep.

The requirements for terminal arrangements shall be specified in the purchase agreement and shall comply with one of the following types:

- a) the BS footprint as specified in BS 7856:2013; and
- b) DIN rail as specified in Annex C;

NOTE The majority of meters are expected to be installed in the place of existing electromechanical credit meters and common base prepayment meters.

DIN rail single phase meters shall provide two neutral terminals.

Each electrical supply or load wiring terminal shall present an opening of at least 8mm wide by 8mm high or 8mm in diameter.

Printed circuit boards shall not be used to conduct current from instrumentation current transformers.

8.3 Climatic requirements

In the case of a multi-device installation, each device shall be tested separately for compliance against its own particular requirements, while maintaining connection between the devices.

8.4 Electrical requirements

When a CIU is powered from the load-side of the metering element, then the CIU burden shall not be taken into account for the purpose of testing for compliance against power consumption requirements as given in SANS 1524-1 7.3.

NOTE It is admissible to disconnect the CIU during the performance of this test.

8.5 Metering accuracy requirements

The accuracy class shall be specified in the purchase agreement.

8.6 Time keeping requirements

The meter shall keep real time by means of a real time clock maintaining an accuracy as given in 7.1.

The meter shall detect when the battery fails, in which case it shall revert to the following basic default functionality.

- a) fall-back to a default single rate tariff (see also 6.3.9); and
- b) record the consumed kWh in a separate register until the battery is replaced.

The meter shall detect when the battery is restored, in which case it shall resume with its programmed tariff as it was prior to when the battery failed.

9. Particular requirements for customer interface units

9.1 General

CIUs shall meet the general requirements given in clause 7, except where these are modified in the following clauses.

The CIU is intended to be used in a multi-device installation and shall be tested together with the other devices as a whole (see also 8.1).

9.2 Mechanical requirements

The CIU is intended for installation in enclosures located inside buildings. It shall meet the requirements given in SANS 1524-1 clause 5 as for indoor rating and shall be rated as IP52 for protection against penetration of dust and water.

The CIU shall offer at least one of the following mounting options:

- a) surface mountable;
- b) able to be plugged directly into a standard mains socket-outlet;
- c) free standing upright on its own; and
- d) able to be plugged directly into a common base as specified in SANS 1524-1-1.

The requirements for mounting of the CIU shall be stated in the purchase agreement.

The display shall be able to display scrolling messages of at least 160 characters long. Characters may comprise alphanumeric characters, symbols and icons. If symbols or icons are used, their meaning shall be explained in a user manual provided with each CIU. The characters of the display shall be at least 4 mm in height.

Buttons or other means shall be provided to allow for navigation of all information as specified in the purchase agreement.

The CIU display shall be capable of being read in the dark. This capability shall be activated by pressing any button on the keypad.

The CIU display shall have anti-glare and non-blinking properties. Filters shall have a non-reflective finish and be suitable for use in direct sunlight.

9.3 Electrical requirements

The CIU shall remain functional after the Meter has disconnected the electricity supply to the premises.

10. Particular requirements for network gateways

10.1 General

NGs shall meet the general requirements given in clause 7, except where these are modified in the following clauses.

The NG shall have the capacity to connect to at least 50 Meters and 2 ACDs per Meter.

10.2 Mechanical requirements

The NG is intended for installation in enclosures located outside buildings. It shall meet the requirements given in IEC 62052-21 clause 5 and shall be rated as IP54 for protection against penetration of dust and water.

The NG shall be available in housings that are suitable for one of the following mounting methods:

- a) surface mounting; and
- b) DIN-rail mounting as specified in C.3.

The requirements for mounting of the NG shall be stated in the purchase agreement.

10.3 Electrical requirements

The requirements given in IEC 62052-21 clause 7.4 shall apply, except that the voltage range shall be as given in Table 37.

The power consumption shall comply with IEC 62052-21 7.1.3 for time switches.

The requirements and tests given in 7.4.2 shall apply.

11. Particular requirements for application control devices

11.1 General

ACDs shall meet the general requirements given in clause 7, except where these are modified in the following clauses.

11.2 Mechanical requirements

The ACD is intended for installation in enclosures located inside buildings. It shall meet the requirements given in IEC 62052-21 clause 5 and shall be rated as IP52 for protection against penetration of dust and water.

The ACD shall be available in housings that are suitable for one of the following mounting methods:

- a) surface mounting;
- b) DIN-rail mounting as specified in Annex C; and
- c) three-pin mains plug mounting.

The requirements for mounting of the ACD shall be stated in the purchase agreement.

11.3 Electrical requirements

The requirements given in IEC 62052-21 clause 7 shall apply, except that the voltage range shall be as given in Table 37.

The power consumption shall comply with IEC 62052-21 7.1.3 for ripple control receivers.
The requirements and tests given in 7.4.2 shall apply.

The rated breaking voltage shall be specified in the purchase agreement in accordance with IEC 62052-21 7.4.1.

The rated breaking current shall be specified in the purchase agreement in accordance with IEC 62052-21 7.4.2.

The ACD load switch shall be normally closed and shall only open upon receiving an appropriate command via its communications interface.

Annex A – Preferred interface standards under development (informative)

A.1 General

The following standards are still under development and may be considered as preferred standards for future incorporation into this specification.

A.2 Schedules

In this context the Meter is the DLMS/COSEM Client and the Auxiliary Meter is the DLMS/COSEM Server.

NOTE There are still unsolved security issues with respect to this solution, which may result in a different architecture to the one considered here.

An alternative architecture would be for the Auxiliary Meter to be a DLMS/COSEM Server and route its network connection to the HES via the G1 or Cb/G2 interfaces.

The Meter provides DHCPv6 services.

Table A.1 — Mb interface specification

1	2	3
Protocol	Specification	Security
Application layer	NRS 049 clause 6.3 IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3	DLMS Suite 1
Transport layer	IEC 62056-4-7 UDP RFC 768	no security
Network layer	IPv6 RFC 2460 RPL RFC 6550	no security
Data Link layer	to be defined	no security
Physical layer	to be defined	no security

NOTE The IEC62056-7-3 is not considered suitable for this interface due to the following reasons:

- a) It uses EN standards that are European standards and as such are not "open" for ZA influence or participation in determining its future development;
- b) It does not have a network layer, which makes it difficult to fit into the IPv6-based network architecture;
- 3) The long-term viability of MBUS is questionable in terms of modern IoT trends for low energy devices requiring light-weight protocols;
- 4) There is no existing certification body for product conformance testing.

A.3 Interface H2 between meter and HAS

The interface shown in Table A.2 is recommended for consideration for a future edition of this specification.

There may be further requirements for the definition of COSEM objects specific to the HAS and for use in the application layer protocol.

Annex A

(concluded)

Table A.2 — H2 interface specification

1	2		3	
Protocol	Specification		Security	
Application layer	IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3 DHCPv6		DLMS Suite 1	
Transport layer	IEC 62056-4-7 UDP RFC 768		IEC 62056-8-20	no security
Network layer	IPv6 RFC 2460 RPL RFC 6550			no security
Adaptation layer	6LowPAN RFC 4944, RFC 6282			no security
Data Link layer	IEEE 802.15.4e (2012)	IEEE 1901.2		no security
Physical layer	IEEE 802.15.4g RF	IEEE 1901.2 PLC		no security

A.4 Interface H3 between NG and HAS

The interface shown in Table A.3 is recommended for consideration for a future edition of this specification.

The NG is the HES proxy DLMS/COSEM Client and the HAS is the DLMS/COSEM Server. The NG provides DHCPv6 services.

There may be further requirements for the definition of COSEM objects specific to the HAS and for use in the Application layer protocol.

Table A.3 — H3 interface specification

1	2		3	
Protocol	Specification		Security	
Application layer	IEC 62056-6-1 IEC 62056-6-2 IEC 62056-5-3 DHCPv6		DLMS Suite 1	
Transport layer	IEC 62056-4-7 UDP RFC 768		IEC 62056-8-20	no security
Network layer	IPv6 RFC 2460 RPL RFC 6550			no security
Adaptation layer	6LowPAN RFC 4944, RFC 6282			no security
Data Link layer	IEEE 802.15.4e (2012)	IEEE 1901.2		no security
Physical layer	IEEE 802.15.4g RF	IEEE 1901.2 PLC		no security

A.5 Interface Vd between POS and internet

There are no specific recommendations at this moment in time, other than to note the rapid development in the domain of social media applications. Future editions of this specification should consider these platforms for appropriate application at that time.

A.6 Interface Ve between POS and GSM

There are no specific recommendations at this moment in time, other than to note the rapid development in the domain of social media applications. Future editions of this specification should consider these platforms for appropriate application at that time.

Annex B – Guide to purchasers

(informative)

B.1 Selection of device features

Two selection profiles A and B for each device are shown in Table B.1, B.2, B.3, B.4, B.5, B.6 and B.7.

Table B.8 and Table B.9.

Profile A represents a basic minimum set of features for each device, while profile B represents an advanced set of features. Profile B selections are in addition to those selected in profile A.

Purchasers of metering devices are recommended to specify which profile is required for each device in the tender documents and/or in the purchase agreement.

Table B.1 — Head-end System selection profiles

1	2	3	4
Function	Profile A	Profile B	Comment
HES interfaces			
ERPS interface Ea	X		
3rd Party interface Ed		X	
VS interface Ec		X	
VS interface Va	X		
NG interface G2	X		when there is a Network Gateway
Meter interface G1	X		when there is no Network Gateway
ACD interface H4		X	
Internet interface H5a		X	
GSM interface H5b		X	

Table B.2 — Vending System selection profiles

1	2	3	4
Function	Profile A	Profile B	Comment
VS interfaces			
ERPS interface Eb	X		
HES interface Ec		X	when Eb is not available
HES interface Va	X		
POS interface Vb	X		
NTC interface Vc	X		

Table B.3 — Point Of Sale selection profiles

1	2	3	4
Function	Profile A	Profile B	Comment
POS interfaces			
VS interface Vb	X		
NTC vending interface Vc	X		
Internet Services interface Vd		X	
GSM Services interface Vd		X	

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(continued)

Table B.4 — Meter selection profiles

1	2	3	4
Function	Profile A	Profile B	Comment
Metering import energy			
accuracy class 0.5		X	
accuracy class 1	X		optional for 3 phase
accuracy class 2	X		default for single and 3 phase
active energy	X		
reactive energy (Q1/Q4)		X	
active energy 4 rate billing	X		
reactive energy 4 rate billing		X	
active energy demand	X		
reactive energy demand		X	
active energy maximum demand 4 rate		X	
reactive energy maximum demand 4 rate		X	
active energy load profile with status	X		
instantaneous voltage per phase	X		
instantaneous current per phase	X		
instantaneous active power per phase	X		
instantaneous reactive power per phase		X	
instantaneous active power sum	X		
instantaneous reactive power sum		X	
power outages	X		
power outage event log	X		
voltage sags		X	
voltage swells		X	
voltage harmonics		X	
voltage flicker		X	
frequency deviation		X	
active energy 1 rate tariff	X		
active energy 4 rate block tariff	X		
active energy 4 rate TOU tariff	X		
active energy 4 rate maximum demand tariff		X	
critical peak pricing 1 rate tariff		X	
Metering export energy			
accuracy class 0.5		X	
accuracy class 1	X		optional for 3 phase
accuracy class 2	X		default for single and 3 phase
active energy	X		
reactive energy (Q2/Q3)		X	
active energy 4 rate billing	X		
reactive energy 4 rate billing		X	
active energy demand	X		
reactive energy demand		X	
active energy maximum demand 4 rate		X	
reactive energy maximum demand 4 rate		X	
active energy load profile with status	X		
instantaneous voltage per phase	X		
instantaneous current per phase	X		
instantaneous active power per phase	X		
instantaneous reactive power per phase		X	
instantaneous active power sum	X		
instantaneous reactive power sum		X	
power outages	X		
power outage event log	X		
voltage sags		X	

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(continued)

voltage swells		X	
voltage harmonics		X	
voltage flicker		X	
frequency deviation		X	
active energy 1 rate tariff	X		
active energy 4 rate block tariff	X		
active energy 4 rate TOU tariff	X		
active energy 4 rate maximum demand tariff		X	
critical peak pricing 1 rate tariff		X	
Meter accounting			
prepayment mode	X		
post payment mode	X		
active energy 1 rate tariff charge	X		
active energy 4 rate block tariff charge	X		
active energy 4 rate TOU tariff charge	X		
active energy 4 rate max demand tariff charge		X	future edition of NRS049
critical peak pricing 1 rate tariff charge		X	future edition of NRS049
token credit	X		
active energy export 1 rate tariff credit	X		future edition of NRS049
critical peak pricing 1 rate tariff credit		X	future edition of NRS049
Load control			
remote/local programmable power limit (import)	X		
remote/local programmable power limit (export)	X		
remote/local supply disconnect/reconnect	X		
remote/local appliance disconnect/reconnect	X		
Tamper detection			
monitor removal of meter cover	X		
monitor supply phase reversal	X		
monitor bypass	X		
Meter mounting			
BS footprint mounting	X		
DIN rail mounting	X		
Meter general			
accelerated life cycle tests required	Y/N	Y/N	purchaser to select
maximum load current for single phase meter	80 A		
maximum load current for 3-phase meter	100 A		per phase
utilisation category for load switch	UC2		propose UC3 for profile B
statutory requirements	Y/N	Y/N	purchaser to select
Guarantee period (in years)	5		purchaser to select
Meter interfaces			
CIU interface Ma	X		
HHU interface Mc	X		
AuxiliaryMeter interface Mb			future edition of NRS049
HAS interface H2			future edition of NRS049
ACD interface H2a	X		
NG interface Cb	X		default
HES interface G1	X		optional

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(continued)

Table B.5 — Customer Interface Unit selection profiles

1	2	3	4
Option	Profile A	Profile B	Comment
CIU mounting			
surface mounting	X		
free standing		X	
three-pin mains plug mounting		X	
common base mounting	X		
CIU general			
accelerated life cycle tests required	Y/N	Y/N	purchaser to select
statutory requirements	Y/N	Y/N	purchaser to select
CIU interfaces			
14 segment alpha/numeric display	X		
dot matrix display		X	
keypad interface P1a	X		
NFCR interface P1c		X	future edition of NRS049
Meter interface Ma	X		
MobilePhone interface H2b		X	
HHU interface P1d	X		

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(concluded)

Table B.6 — Network Gateway selection profiles

1	2	3	4
Option	Profile A	Profile B	Comment
NG mounting			
surface mounting	X		
DIN rail mounting		X	
NG general			
accelerated life cycle tests required	Y/N	Y/N	purchaser to select
statutory requirements	Y/N	Y/N	purchaser to select
NG interfaces			
HES interface G2	X		
HAS interface H3		X	future edition of NRS049
ACD interface Ca		X	
Meter interface Cb	X		
Kiosk interface K1	?	?	future edition of NRS049
HHU interface Cc	X		

Table B.7 — Auxiliary Meter selection profiles

1	2	3	4
Option	Profile A	Profile B	Comment
Metering parameters			
metering parameters for water		X	to be determined for a future edition
metering parameters for gas		X	to be determined for a future edition

Table B.8 — Appliance Control Device selection profiles

1	2	3	4
Option	Profile A	Profile B	Comment
ACD mounting			
surface mounting		X	
DIN rail mounting	X		
three-pin mains plug mounting		X	
ACD electrical parameters			
nominal voltage $U_n = 230$ VAC	X		
rated breaking voltage = 230 VAC	X		
rated breaking current = 16 A	X		
ACD general			
accelerated life cycle tests required	Y/N	Y/N	purchaser to select
statutory requirements	Y/N	Y/N	purchaser to select
ACD interfaces			
HES interface H4		X	
NG interface Ca	X		
Meter interface H2a		X	
HHU interface A1	X		

Table B.9 — Selection of network conditions

1	2	3	4
Option	Profile A	Profile B	Comment
Network voltage			
network phase to neutral nominal voltage	230 V		

Annex C – Dimension for DN rail mounted meters (normative)

C.1 Single phase DIN rail mounted meters

Dimensions and terminal arrangements for single phase DIN rail mounted meters are given in 7.2, 8.2 and Figure C.1.

The two neutral terminals may be positioned in any convenient, but practical location at the bottom of the meter.

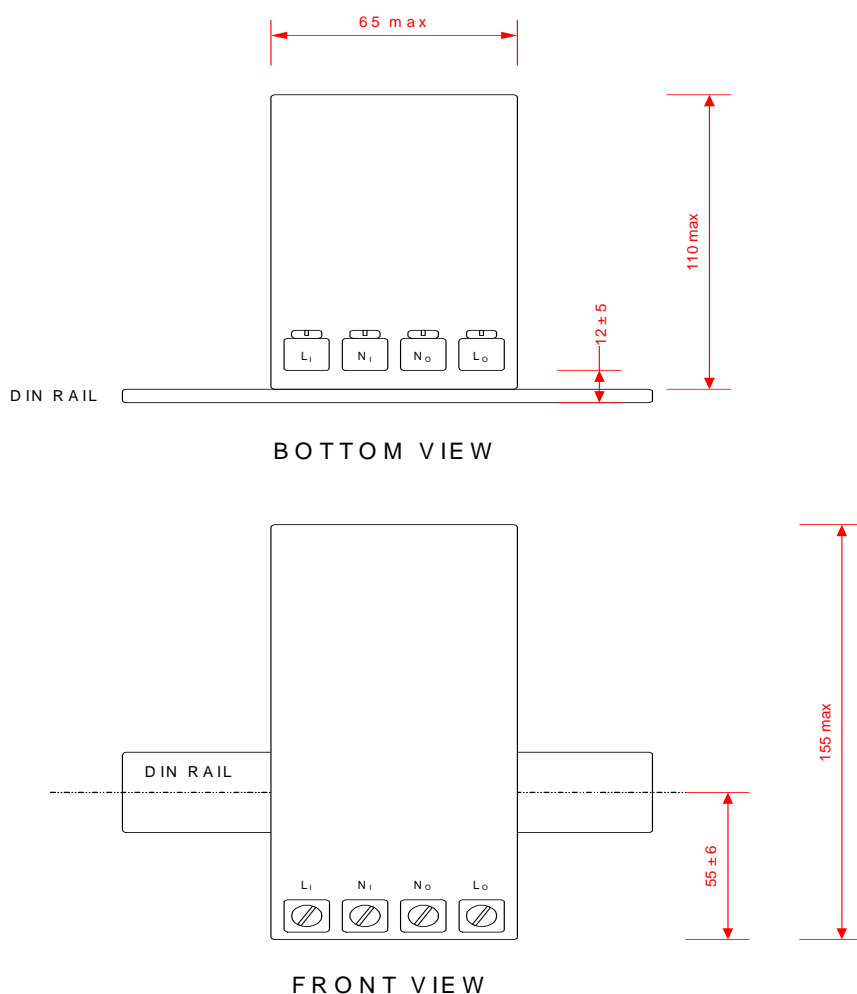


Figure C.1 — Dimensions for single phase DIN rail mounted meters

C.2 Three phase DIN rail mounted meters

Dimensions and terminal arrangements for three phase DIN rail mounted meters will be considered in a future edition of this specification.

C.3 DIN rail mounted network meters

Dimensions and terminal arrangements for DIN rail mounted Network Gateways will be considered in a future edition of this specification.

Annex D – Meter COSEM objects

(normative)

D.1 General

These COSEM objects shall be implemented in accordance with the requirements given in IEC 62056-6-1 and IEC 62056-6-2.

The attribute definitions and access rights are not specified in this specification, but shall be specified in a country-specific national companion specification.

It is proposed that such a national companion specification should be compiled by a joint working group comprising participants from the utilities and participants from manufacturers.

D.2 Meter association and security objects

The objects for association and security are given in Table D.1.

Table D.1 — Meter COSEM objects for association and security

1	2	3		4	5		6	7	8					9
					IC				Access rights Get, Set, Action					
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Association & Security													
B	SAPAssignment	M	M	SAP Assignment	1	0	0xFC00	0-0:41.0.0.255						
1	logical_name			octet_string[6]				"0000290000FF"	G	--	G			
2	SAP_assignment_list			asslist_type			0x08	{{1, *}}	G	--	G			One logical device, Server SAP 1

Annex D

(continued)

1	connect_logical_device						0x20		--	--	--			
B	GeneralAssociation	M	M	Association LN	15	3		0-0:40.0.1.255						dynamic AA for all clients
1	logical_name			octet_string[6]				"0000280001FF"	G	--	G			
2	object_list			object_list_type			0x08		G	--	G			
3	associated_partners_id			associated_partners_type			0x10		G	--	G			
4	application_context_name			application_context_name			0x18		G	--	G			
5	xDLMS_context_info			xDLMS_context_type			0x20		G	--	G			
6	authentication_mechanism_name			mechanism_name_structure			0x28		G	--	G, (S)			Optionally Set can be used to restrict the next association to a specific mechanism_name e.g. to mechanism_name(5) after commissioning.
7	secret			octet_string			0x30		--	--	(S)			In case of using LLS one can use attr 7 of Current Assoc. to change the LLS PW For HLS using GMAC secret is handled via Security setup
8	association_status			enum			0x38		G	--	G			
9	security_setup_reference			octet_string[6]			0x40		G	--	G			
10	user_list			array[1..*]			0x48							
1	reply_to_HLS_authentication						0x60		--	--	A			
2	change_HLS_secret						0x68		--	--	(A)			For changing the HLS secret in case of using MD5 or SHA-1
3	add_object						0x70		--	--	--			
4	remove_object						0x78		--	--	--			
5	add_user						0x80				A			
6	remove_user						0x88				A			

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(continued)

B	ManagementAssociation	M	M	Association LN	15	3		0-0:40.0.0.255						static AA for management client
1	logical_name			octet_string[6]				"0000280000FF"	G	--	G			
2	object_list			object_list_type			0x08		G	--	G			
3	associated_partners_id			associated_partners_type			0x10		G	--	G			
4	application_context_name			application_context_name			0x18		G	--	G			
5	xDLMS_context_info			xDLMS_context_type			0x20		G	--	G			
6	authentication_mechanism_name			mechanism_name_structure			0x28		G	--	G, (S)			Optionally Set can be used to restrict the next association to a specific mechanism_name e.g. to mechanism_name(5) after commissioning.
7	secret			octet_string			0x30		--	--	(S)			In case of using LLS one can use attr 7 of Current Assoc. to change the LLS PW For HLS using GMAC secret is handled via Security setup
8	association_status			enum			0x38		G	--	G			
9	security_setup_reference			octet_string[6]			0x40		G	--	G			
10	user_list			array[1..*]			0x48							
1	reply_to_HLS_authentication						0x60		--	--	A			
2	change_HLS_secret						0x68		--	--	(A)			For changing the HLS secret in case of using MD5 or SHA-1
3	add_object						0x70		--	--	--			
4	remove_object						0x78		--	--	--			
5	add_user						0x80				A			
6	remove_user						0x88				A			

Annex D

(continued)

B	CIUAssociation	M	M	Association LN	15	3	0-0:40.0.2.255						static AA for CIU client
1	logical_name			octet_string[6]			"0000280002FF"	G	--	G			
2	object_list			object_list_type			0x08	G	--	G			
3	associated_partners_id			associated_partner_s_type			0x10	G	--	G			
4	application_context_name			application_context_name			0x18	G	--	G			
5	xDLMS_context_info			xDLMS_context_type			0x20	G	--	G			
6	authentication_mechanism_name			mechanism_name_structure			0x28	G	--	G, (S)			Optionally Set can be used to restrict the next association to a specific mechanism_name e.g. to mechanism_name(5) after commissioning.
7	secret			octet_string			0x30	--	--	(S)			In case of using LLS one can use attr 7 of Current Assoc. to change the LLS PW For HLS using GMAC secret is handled via Security setup
8	association_status			enum			0x38	G	--	G			
9	security_setup_reference			octet_string[6]			0x40	G	--	G			
10	user_list			array[1..*]			0x48						
1	reply_to_HLS_authentication						0x60	--	--	A			
2	change_HLS_secret						0x68	--	--	(A)			For changing the HLS secret in case of using MD5 or SHA-1
3	add_object						0x70	--	--	--			
4	remove_object						0x78	--	--	--			
5	add_user						0x80			A			
6	remove_user						0x88			A			

(continued)

[illegible]

Annex D

(continued)

B	GeneralSecuritySetup	M	M	Security setup	6 4	1		0-0:43.0.1.255						for all clients except CIU and MC
1	logical_name			octet_string[6]				"00002B0001FF"	--	--	G	G		
2	security_policy			enum			0x08		--	--	G, S	G		
3	security_suite			enum			0x10	1	--	--	G, S	G		
4	client_system_title			octet_string[8]			0x18		--	--	G	G		
5	server_system_title			octet_string[8]			0x20		--	--	G	G		
6	certificates			array[1..*]			0x28				G, S	G		
1	security_activate			enum			0x30		--	--	A			
2	key_transfer						0x38		--	--	A			
3	key_agreement						0x48				A			
4	generate_key_pair						0x50				A			
5	generate_certificate_request						0x58				A			
6	import_certificate						0x60				A			
7	export_certificate						0x68				A			
8	remove_certificate						0x70				A			
B	ManagementSecuritySetup	M	M	Security setup	6 4	1		0-0:43.0.0.255						for management client
1	logical_name			octet_string[6]				"00002B0000FF"	--	--	G	G		
2	security_policy			enum			0x08		--	--	G, S	G		
3	security_suite			enum			0x10	1	--	--	G, S	G		
4	client_system_title			octet_string[8]			0x18		--	--	G	G		
5	server_system_title			octet_string[8]			0x20		--	--	G	G		
6	certificates			array[1..*]			0x28				G, S	G		

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(continued)

1	security_activate			enum			0x30		--	--	A			
2	key_transfer						0x38		--	--	A			
3	key_agreement						0x48				A			
4	generate_key_pair						0x50				A			
5	generate_certificate_request						0x58				A			
6	import_certificate						0x60				A			
7	export_certificate						0x68				A			
8	remove_certificate						0x70				A			
B	CIUSecuritySetup	M	M	Security setup	6 4	1		0-0:43.0.2.255						for CIU client
1	logical_name			octet_string[6]				"00002B0002FF"	--	--	G	G		
2	security_policy			enum			0x08		--	--	G, S	G		
3	security_suite			enum			0x10	1	--	--	G, S	G		
4	client_system_title			octet_string[8]			0x18		--	--	G	G		
5	server_system_title			octet_string[8]			0x20		--	--	G	G		
6	certificates			array[1..*]			0x28				G, S	G		
1	security_activate			enum			0x30		--	--	A			
2	key_transfer						0x38		--	--	A			
3	key_agreement						0x48				A			
4	generate_key_pair						0x50				A			
5	generate_certificate_request						0x58				A			
6	import_certificate						0x60				A			
7	export_certificate						0x68				A			
8	remove_certificate						0x70				A			

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(continued)

B	HHUSecuritySetup	M	M	Security setup	6 4	1		0-0:43.0.3.255						for HHU client
1	logical_name			octet_string[6]				"00002B0003FF"	--	--	G	G		
2	security_policy			enum			0x08		--	--	G, S	G		
3	security_suite			enum			0x10	1	--	--	G, S	G		
4	client_system_title			octet_string[8]			0x18		--	--	G	G		
5	server_system_title			octet_string[8]			0x20		--	--	G	G		
6	certificates			array[1..*]			0x28				G, S	G		
1	security_activate			enum			0x30		--	--	A			
2	key_transfer						0x38		--	--	A			
3	key_agreement						0x48				A			
4	generate_key_pair						0x50				A			
5	generate_certificate_request						0x58				A			
6	import_certificate						0x60				A			
7	export_certificate						0x68				A			
8	remove_certificate						0x70				A			
B	BroadcastKeyFrameCounter	M	M	Data	1	0		0-0:43.1.1.255						
1	logical_name			octet_string[6]				"00002B0101FF"	G	--	G			
2	value			double_long_unsigned			0x08		G	--	G			
B	UnicastKeyFrameCounter	M	M	Data	1	0		0-0:43.1.0.255						
1	logical_name			octet_string[6]				"00002B0100FF"	G	--	G			
2	value			double_long_unsigned			0x08		G	--	G			

Annex D

(continued)

D.3 Meter identifier objects

The objects for identifiers are given in Table D.2.

Table D.2 — Meter COSEM objects for identifiers

1	2	3		4	5 IC		6	7	8 Access rights Get, Set, Action					9
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Identifiers													
B	LogicalDeviceName	M	M	Data	1	0	0xFD00	0-0:42.0.0.255						logical device identifier
1	logical_name			octet_string[6]				"00002A0000FF"	G	--	G	G		
2	value			octet_string[16]			0x08		G	--	G	G		unique identification of the logical device
B	DeviceID1	M	M	Data	1	0		0-0:96.1.0.255						manufacturing number
1	logical_name			octet_string[6]				"0000600100FF"	--	--	G	G		
2	value			octet_string[0..16]			0x08		--	--	G	G		E-meter serial number (Serial number of the device, handled by the manufacturer); ASCII coded
B	DeviceID2	M	M	Data	1	0		0-0:96.1.1.255						E-meter equipment identifier
1	logical_name			octet_string[6]				"0000600101FF"	--	--	G	G		
2	value			octet_string[0..48]			0x08		--	--	G,S	G		see companion specification

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(continued)

B	DeviceID3	M	M	Data	1	0		0-0:96.1.2.255					function location (optional)
1	logical_name			octet_string[6]				"0000600102FF"	--	--	G	G	
2	value			octet_string[0..48]			0x08		--	--	G, S	G	(ASCII)
B	DeviceID4	M	M	Data	1	0		0-0:96.1.3.255					location information
1	logical_name			octet_string[6]				"0000600103FF"	--	--	G	G	
2	value			octet_string[0..48]			0x08		--	--	G, S	G	geographical information (ASCII)
B	DeviceID5	M	M	Data	1	0		0-0:96.1.4.255					not assigned
1	logical_name			octet_string[6]				"0000600104FF"	--	--	G	G	
2	value			octet_string[0..48]			0x08		--	--	G, S	G	
B	DeviceID6	M	M	Data	1	0		0-0:96.1.5.255					certification number
1	logical_name			octet_string[6]				"0000600105FF"	--	--	G	G	
2	value			octet_string[0..16]			0x08		--	--	G	G	certification number (ASCII)
B	STSTConfig	M	M	Data	1	0		0-5:96.1.0.255					STS configuration data
1	logical_name			octet_string[6]				"0005600100FF"	--	--	G	G	
2	value			octet_string[0..55]			0x08		--	--	G	G	see companion specification
B	CIUConfig	M	M	Data	1	0		0-5:96.1.1.255					CIU configuration data
1	logical_name			octet_string[6]				"0005600101FF"	--	--	G	G	
2	value			octet_string[0..55]			0x08		--	--	G	G	see companion specification
B	FirmwareVersion	M	M	Data	1	0		0-5:96.1.2.255					firmware version
1	logical_name			octet_string[6]				"0005600102FF"	--	--	G	G	
2	value			octet_string[0..16]			0x08		--	--	G	G	concat (STSV1+Vn) (ASCII)
B	UtilityDeviceNumber	M	M	Data	1	0		0-5:96.1.3.255					utility device reference number
1	logical_name			octet_string[6]				"0005600103FF"	--	--	G	G	
2	value			octet_string[0..24]			0x08		--	--	G	G	managed by utility (ASCII)

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(continued)

B	UsagePoint	M	M	Data	1	0		0-5:96.1.4.255						service point reference number
1	logical_name			octet_string[6]				"0005600104FF"	--	--	G	G		
2	value			octet_string[0..24]			0x08		--	--	G	G		managed by utility (ASCII)

D.4 Meter events objects

The objects for events are given in Table D.3.

Event codes are given in Table D.4.

Table D.3 — Meter COSEM objects for events

1	2	3		4	5		6	7	8					9
					IC				Access rights Get, Set, Action					
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Events													
B	StandardEventRegister	M	M	Data	1	0		0-1:97.98.0.255						standard events
1	logical_name			octet_string[6]				"0001616200FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			
B	StandardEventFilter	M	M	Data	1	0		0-1:97.98.10.255						standard events
1	logical_name			octet_string[6]				"000161620AFF"	--	--	G			

Annex D

(continued)

2	value			double_long_unsigned			0x08		--	--	G, S		This filter defines, whether an event is pushed to the HES
B	StandardEventDescriptor	M	M	Data	1	0		0-1:97.98.20.255					standard events
1	logical_name			octet_string[6]				"0001616214FF"	--	--	G		
2	value			double_long_unsigned			0x08		--	--	G, S		Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the event descriptor is set
B	StandardEventMonitor	M	M	Register monitor	2 1	0		0-1:16.1.0.255					standard events
1	logical_name			octet_string[6]				"0001100100FF"	--	--	G		
2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G		Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G		
4	actions			array[1](action_set)			0x18		--	--	G, S		triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared
B	StandardEventCode	M	M	Data	1	0		0-5:96.11.0.255					standard events
1	logical_name			octet_string[6]				"0005600B00FF"	--	--	G		
2	value			enum			0x08		--	--	G		event number (0 to 255); at first power up or if no events were yet generated the value should return 255

Annex D

(continued)

B	StandardEventLog	M	M	Profile generic	7	1		0-1:99.98.3.255						standard events
1	logical_name			octet_string[6]				"0001636203FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2] (capture_object_definition)			0x10		--	--	G, (S)			clock; event code
4	capture_period			double_long_unsigned			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*.*.*.*,*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G			100 entries minimum
1	reset			integer			0x58		--	--	A			
B	SecurityEventRegister	M	M	Data	1	0		0-1:97.98.1.255						Security events
1	logical_name			octet_string[6]				"0001616201FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			
B	SecurityEventFilter	M	M	Data	1	0		0-1:97.98.11.255						Security events
1	logical_name			octet_string[6]				"000161620BFF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			This filter defines, whether an event is pushed to the HES
B	SecurityEventDescriptor	M	M	Data	1	0		0-1:97.98.21.255						Security events
1	logical_name			octet_string[6]				"0001616215FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the

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(continued)

B	SecurityEventMonitor	M	M	Register monitor	2	0		0-1:16.1.1.255						Security events
1	logical_name			octet_string[6]				"0001100101FF"	--	--	G			
2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G			Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G			
4	actions			array[1](action_set)			0x18		--	--	G, S			triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared
B	SecurityEventCode	M	M	Data	1	0		0-5:96.11.1.255						Security events
1	logical_name			octet_string[6]				"0005600B01FF"	--	--	G			
2	value			enum			0x08		--	--	G			event number (0 to 255); at first power up or if no events were yet generated the value should return 255
B	SecurityEventLog	M	M	Profile generic	7	1		0-1:99.98.4.255						Security events
1	logical_name			octet_string[6]				"0001636204FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2] (capture_object_definition)			0x10		--	--	G, (S)			clock; event code
4	capture_period			double_long_unsigned			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*.*.*.*.*,*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G			100 entries minimum

Annex D

(continued)

1	reset			integer			0x58		--	--	A			
B	CommsEventRegister	M	M	Data	1	0		0-1:97.98.2.255						Comms events
1	logical_name			octet_string[6]				"0001616202FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			
B	CommsEventFilter	M	M	Data	1	0		0-1:97.98.12.255						Comms events
1	logical_name			octet_string[6]				"000161620CFF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			This filter defines, whether an event is pushed to the HES
B	CommsEventDescriptor	M	M	Data	1	0		0-1:97.98.22.255						Comms events
1	logical_name			octet_string[6]				"0001616216FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the event descriptor is set
B	CommsEventMonitor	M	M	Register monitor	2 1	0		0-1:16.1.2.255						Comms events
1	logical_name			octet_string[6]				"0001100102FF"	--	--	G			
2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G			Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G			
4	actions			array[1](action_set)			0x18		--	--	G, S			triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared

Annex D

(continued)

B	CommsEventCode	M	M	Data	1	0		0-5:96.11.2.255					Comms events
1	logical_name			octet_string[6]				"0005600B02FF"	--	--	G		
2	value			enum			0x08		--	--	G		event number (0 to 255); at first power up or if no events were yet generated the value should return 255
B	CommsEventLog	M	M	Profile generic	7	1		0-1:99.98.5.255					Comms events
1	logical_name			octet_string[6]				"0001636205FF"	--	--	G		
2	buffer			array			0x08		--	--	G		selective access per range
3	capture_objects			array[2] (capture_object_definition)			0x10		--	--	G, (S)		clock; event code
4	capture_period			double_long_unsigned			0x18	0	--	--	G		asynchronously
5	sort_method			enum			0x20	1	--	--	G		unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*-*.*.*.*,*,*}	--	--	G		unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G		
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G		100 entries minimum
1	reset			integer			0x58		--	--	A		
B	DisconnectControlEventRegister	M	M	Data	1	0		0-1:97.98.3.255					DisconnectControl events
1	logical_name			octet_string[6]				"0001616203FF"	--	--	G		
2	value			double_long_unsigned			0x08		--	--	G, S		
B	DisconnectControlEventFilter	M	M	Data	1	0		0-1:97.98.13.255					DisconnectControl events
1	logical_name			octet_string[6]				"000161620DFF"	--	--	G		
2	value			double_long_unsigned			0x08		--	--	G, S		This filter defines, whether an event is pushed to the HES

Annex D

(continued)

B	DisconnectControlEventDescriptor	M	M	Data	1	0		0-1:97.98.23.255						DisconnectControl events
1	logical_name			octet_string[6]				"0001616217FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the event descriptor is set
B	DisconnectControlEventMonitor	M	M	Register monitor	2	0		0-1:16.1.3.255						DisconnectControl events
1	logical_name			octet_string[6]				"0001100103FF"	--	--	G			
2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G			Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G			
4	actions			array[1](action_set)			0x18		--	--	G, S			triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared
B	DisconnectControlEventCode	M	M	Data	1	0		0-5:96.11.3.255						DisconnectControl events
1	logical_name			octet_string[6]				"0005600B03FF"	--	--	G			
2	value			enum			0x08		--	--	G			event number (0 to 255); at first power up or if no events were yet generated the value should return 255

Annex D

(continued)

B	DisconnectControlEventLog	M	M	Profile generic	7	1		0-1:99.98.6.255						DisconnectControl events
1	logical_name			octet_string[6]				"0001636206FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2] (capture_object_definition)			0x10		--	--	G, (S)			clock; event code
4	capture_period			double_long_unsigned			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*.*.*.*.*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G			100 entries minimum
1	reset			integer			0x58		--	--	A			
B	PowerQualityEventRegister	M	M	Data	1	0		0-1:97.98.4.255						PowerQuality events
1	logical_name			octet_string[6]				"0001616204FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			
B	PowerQualityEventFilter	M	M	Data	1	0		0-1:97.98.14.255						PowerQuality events
1	logical_name			octet_string[6]				"000161620EFF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			This filter defines, whether an event is pushed to the HES

Annex D

(continued)

B	PowerQualityEventDescriptor	M	M	Data	1	0		0-1:97.98.24.255						PowerQuality events
1	logical_name			octet_string[6]				"0001616218FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the event descriptor is set
B	PowerQualityEventManager	M	M	Register monitor	2	0		0-1:16.1.4.255						PowerQuality events
1	logical_name			octet_string[6]				"0001100104FF"	--	--	G			
2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G			Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G			
4	actions			array[1](action_set)			0x18		--	--	G, S			triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared
B	PowerQualityEventCode	M	M	Data	1	0		0-5:96.11.4.255						PowerQuality events
1	logical_name			octet_string[6]				"0005600B04FF"	--	--	G			
2	value			enum			0x08		--	--	G			event number (0 to 255); at first power up or if no events were yet generated the value should return 255

Annex D

(continued)

B	PowerQualityEventLog	M	M	Profile generic	7	1		0-1:99.98.7.255						PowerQuality events
1	logical_name			octet_string[6]				"0001636207FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2] (capture_object_definition)			0x10		--	--	G, (S)			clock; event code
4	capture_period			double_long_unsigned			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*.*.*.*.*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G			100 entries minimum
1	reset			integer			0x58		--	--	A			
B	AccountEventRegister	M	M	Data	1	0		0-1:97.98.5.255						Account events
1	logical_name			octet_string[6]				"0001616205FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			
B	AccountEventFilter	M	M	Data	1	0		0-1:97.98.15.255						Account events
1	logical_name			octet_string[6]				"000161620FFF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			This filter defines, whether an event is pushed to the HES
B	AccountEventDescriptor	M	M	Data	1	0		0-1:97.98.25.255						Account events
1	logical_name			octet_string[6]				"0001616219FF"	--	--	G			

2	value			double_long_unsign ed			0x08		--	--	G, S			Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the event descriptor is set
---	-------	--	--	--------------------------	--	--	------	--	----	----	---------	--	--	---

Annex D

(continued)

B	AccountEventMonitor	M	M	Register monitor	2	0		0-1:16.1.5.255					Account events
1	logical_name			octet_string[6]				"0001100105FF"	--	--	G		
2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G		Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G		
4	actions			array[1](action_set)			0x18		--	--	G, S		triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared
B	AccountEventCode	M	M	Data	1	0		0-5:96.11.5.255					Account events
1	logical_name			octet_string[6]				"0005600B05FF"	--	--	G		
2	value			enum			0x08		--	--	G		event number (0 to 255); at first power up or if no events were yet generated the value should return 255
B	AccountEventLog	M	M	Profile generic	7	1		0-1:99.98.8.255					Account events
1	logical_name			octet_string[6]				"0001636208FF"	--	--	G		
2	buffer			array			0x08		--	--	G		selective access per range
3	capture_objects			array[2] (capture_object_definition)			0x10		--	--	G, (S)		clock; event code
4	capture_period			double_long_unsigned			0x18	0	--	--	G		asynchronously
5	sort_method			enum			0x20	1	--	--	G		unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*.*.*.*.*,*,*}	--	--	G		unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G		
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G		100 entries minimum

(continued)

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Annex D

(continued)

B	TokenEventCode	M	M	Data	1	0		0-5:96.11.6.255						Token events
1	logical_name			octet_string[6]				"0005600B06FF"	--	--	G			
2	value			enum			0x08		--	--	G			event number (0 to 255); at first power up or if no events were yet generated the value should return 255
B	TokenEventLog	M	M	Profile generic	7	1		0-1:99.98.9.255						Token events
1	logical_name			octet_string[6]				"0001636209FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2] (capture_object_definition)			0x10		--	--	G, (S)			clock; event code
4	capture_period			double_long_unsigned			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*-*.*.*.*,*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G			100 entries minimum
1	reset			integer			0x58		--	--	A			
B	ProprietaryEventRegister	M	M	Data	1	0		0-1:97.98.7.255						proprietary events
1	logical_name			octet_string[6]				"0001616207FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			
B	ProprietaryEventFilter	M	M	Data	1	0		0-1:97.98.17.255						proprietary events
1	logical_name			octet_string[6]				"0001616211FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			This filter defines, whether an event is pushed to the HES

Annex D

(continued)

B	ProprietaryEventDescriptor	M	M	Data	1	0		0-1:97.98.27.255						proprietary events
1	logical_name			octet_string[6]				"000161621BFF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the event descriptor is set
B	ProprietaryEventMonitor	M	M	Register monitor	2	0		0-1:16.1.7.255						proprietary events
1	logical_name			octet_string[6]				"0001100107FF"	--	--	G			
2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G			Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G			
4	actions			array[1](action_set)			0x18		--	--	G, S			triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared
B	ProprietaryEventCode	M	M	Data	1	0		0-5:96.11.7.255						proprietary events
1	logical_name			octet_string[6]				"0005600B07FF"	--	--	G			
2	value			enum			0x08		--	--	G			event number (0 to 255); at first power up or if no events were yet generated the value should return 255

(continued)

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Annex D

(continued)

B	EventPushSetup	M	M	Push setup	4 0	0		0-103:25.9.0.255						all events
1	logical_name			octet_string[6]				"0067190900FF"	--	--	G			
2	push_object_list			array[0..*] (capture_object_definition)			0x08		--	--	G, S			
3	send_destination_and_method			send_destination_and_method_type			0x10		--	--	G, S			
4	communication_window			array[0..*](window_element)			0x18		--	--	G, S			
5	randomisation_start_interval			long_unsigned			0x20	0	--	--	G, S			Randomization time in seconds, 0 = no randomization at start of the first window defined in calling_window
6	number_of_retries			unsigned			0x28		--	--	G, S			Max number of repetitions of unsuccessful push
7	repetition_delay			long_unsigned			0x30		--	--	G, S			Delay in seconds between repetitions
1	push			integer			0x38		--	A	A			
B	AlarmEventRegister	M	M	Data	1	0		0-1:97.98.8.255						Alarm events
1	logical_name			octet_string[6]				"0001616208FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			
B	AlarmEventFilter	M	M	Data	1	0		0-1:97.98.18.255						Alarm events
1	logical_name			octet_string[6]				"0001616212FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			This filter defines, whether an event is pushed to the HES

Annex D

(continued)

B	AlarmEventDescriptor	M	M	Data	1	0		0-1:97.98.28.255						Alarm events
1	logical_name			octet_string[6]				"000161621CFF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the event descriptor is set
B	AlarmEventMonitor	M	M	Register monitor	2	0		0-1:16.1.8.255						Alarm events
1	logical_name			octet_string[6]				"0001100108FF"	--	--	G			
2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G			Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G			
4	actions			array[1](action_set)			0x18		--	--	G, S			triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared
B	EventStatus	M	M	Data	1	0		0-5:96.10.3.255						summary of events (256)
1	logical_name			octet_string[6]				"0005600A03FF"	--	--	G	G		
2	status			bit-string[256]			0x08		--	--	G	G		1 bit per event type

Annex D

(continued)

Table D.1 — Meter event codes

1	2	3
EventCode	Bit No	Event name
		Standard events
0	0	device_powered_down
1	1	device_powered_up
2	2	daylight_savings_disabled
3	3	daylight_savings_enabled
4	4	clock_adjusted
5	5	clock_invalid
6	6	battery_voltage_low
7	7	battery_failed
8	8	program_memory_error
9	9	RAM_error
10	10	NV_memory_error
11	11	watchdog_error
12	12	firmware_ready_for_activation
13	13	firmware_activated
14	14	server_client_connection_established
15	15	CIU_client_registered
16	16	CIU_client_deregistered
17	17	measurement_system_error
18	18	reserved
19	19	reserved
20	20	reserved
21	21	reserved
22	22	reserved
23	23	reserved
24	24	reserved
25	25	reserved
26	26	reserved
27	27	reserved
28	28	reserved
29	29	reserved
30	30	server_configuration_changed
31	31	standard_event_log_cleared
		Security events
32	0	client_association_established
33	1	client_association_terminated
34	2	client_association_authentication_failed
35	3	APDU_authentication_failed
36	4	message_replayed
37	5	DLMS_key_changed
38	6	FW_verification_failed
39	7	STS_key_changed
40	8	meter_cover_opened
41	9	meter_cover_closed
42	10	meter_cover_off_during_power_down
43	11	terminal_cover_opened
44	12	terminal_cover_closed
45	13	terminal_cover_off_during_power_down
46	14	magnetic_field_present
47	15	magnetic_field_normal
48	16	illegal_consumption
49	17	phase_sequence_reversed
50	18	phase_load_unbalanced

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(continued)

51	19	neutral_missing
52	20	power_reversal
53	21	reserved
54	22	reserved
55	23	reserved
56	24	reserved
57	25	reserved
58	26	reserved
59	27	reserved
60	28	reserved
61	29	reserved
62	30	reserved
63	31	security_event_log_cleared
		Comms events
64	0	connection_timed_out
65	1	modem_initialization_failed
66	2	SIM_card_failed
67	3	SIM_card_normal
68	4	modem_SW_eset
69	5	modem_HW_reset
70	6	GSM_registration_failed
71	7	GPRS_registration_failed
72	8	GSM_outgoing_connected
73	9	GSM_incoming_connected
74	10	GSM_hang_up
75	11	modem_diagnostic_failed
76	12	signal_quality_is_low
77	13	auto_answer_number_of_calls_exceeded
78	14	local_communication_established
79	15	reserved
80	16	reserved
81	17	reserved
82	18	reserved
83	19	reserved
84	20	reserved
85	21	reserved
86	22	reserved
87	23	reserved
88	24	reserved
89	25	reserved
90	26	reserved
91	27	reserved
92	28	reserved
93	29	reserved
94	30	comms_configuration_changed
95	31	comms_event_log_cleared
		Disconnect control events
96	0	remote_disconnect
97	1	remote_reconnect
98	2	local_disconnect
99	3	local_reconnect
100	4	special_days_disconnect
101	5	special_days_reconnect
102	6	scheduled_disconnect
103	7	scheduled_reconnect
104	8	single_action_schedule_disconnect
105	9	single_action_schedule_reconnect

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(continued)

106	10	non_disconnect_period_reconnect
107	11	import_power_limit_L1_disconnect
108	12	import_power_limit_L2_disconnect
109	13	import_power_limit_L3_disconnect
110	14	export_power_limit_L1_disconnect
111	15	export_power_limit_L2_disconnect
112	16	export_power_limit_L3_disconnect
113	17	automatic_reclose_reconnect
114	18	net_frequency_disconnect
115	19	net_frequency_reconnect
116	20	alarm_disconnect
117	21	alarm_reconnect
118	22	account_disconnect
119	23	account_reconnect
120	24	reserved
121	25	reserved
122	26	reserved
123	27	reserved
124	28	reserved
125	29	reserved
126	30	disconnect_control_reconfigured
127	31	disconnect_control_event_log_cleared
		Power quality events
128	0	voltage_harmonics_out_of_limit L1
129	1	voltage_harmonics_out_of_limit L2
130	2	voltage_harmonics_out_of_limit L3
131	3	voltage_harmonics_normal L1
132	4	voltage_harmonics_normal L2
133	5	voltage_harmonics_normal L3
134	6	voltage_swell_above_limit L1
135	7	voltage_swell_above_limit L2
136	8	voltage_swell_above_limit L3
137	9	voltage_swell_normal L1
138	10	voltage_swell_normal L2
139	11	voltage_swell_normal L3
140	12	voltage_sag_below_limit L1
141	13	voltage_sag_below_limit L2
142	14	voltage_sag_below_limit L3
143	15	voltage_sag_normal L1
144	16	voltage_sag_normal L2
145	17	voltage_sag_normal L3
146	18	voltage_missing_L1
147	19	voltage_missing_L2
148	20	voltage_missing_L3
149	21	voltage_normal_L1
150	22	voltage_normal_L2
151	23	voltage_normal_L3
152	24	frequency_above_limit
153	25	frequency_normal
154	26	frequency_below_limit
155	27	voltage_high_any_phase
156	28	voltage_normal_all_phases
157	29	voltage_low_any_phase
158	30	reserved
159	31	power_quality_event_log_cleared

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(continued)

		Account events
160	0	accountmode_changed_to_prepay_mode
161	1	account_mode_changed_to_postpay_mode
162	2	account_activated
163	3	account_closed
164	4	account_reset
165	5	token_credit_received
166	6	credit_is_low
167	7	available_credit_exhausted
168	8	emergency_credit_updated
169	9	emergency_credit_activated
170	10	tariff_debt_activated
171	11	fixed_charge_debt_activated
172	12	tariff_charge_unit_charge_updated
173	13	tariff_charge_passive_charge_activated
174	14	fallback_tariff_charge_unit_charge_updated
175	15	fallback_tariff_charge_passive_charge_activated
176	16	fixed_charge_unit_charge_updated
177	17	fixed_charge_passive_charge_activated
178	18	load_profiles_have_been_reset
179	19	reserved
180	20	reserved
181	21	reserved
182	22	reserved
183	23	reserved
184	24	reserved
185	25	reserved
186	26	reserved
187	27	reserved
188	28	reserved
189	29	reserved
190	30	reserved
191	31	account_event_log_cleared
		Token events
192	0	token_received
193	1	token_accepted
194	2	crc_error
195	3	mfr_code_error
196	4	old_error
197	5	used_error
198	6	key_expired_error
199	7	ddtk_error
200	8	1stKCT_received
201	9	2ndKCT_received
202	10	3rdKCT_received
203	11	4thKCT_received
204	12	overflow_error
205	13	key_type_error
206	14	format_error
207	15	range_error
208	16	function_error
209	17	token_data_typeError
210	18	vend_limit_exceeded
211	19	credit_limit_exceeded
212	20	reserved
213	21	reserved
214	22	reserved

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(continued)

215	23	reserved
216	24	reserved
217	25	reserved
218	26	reserved
219	27	reserved
220	28	reserved
221	29	reserved
222	30	reserved
223	31	token_event_log_cleared
		Proprietary events
224	0	manufacturer-specific
225	1	manufacturer-specific
226	2	manufacturer-specific
227	3	manufacturer-specific
228	4	manufacturer-specific
229	5	manufacturer-specific
230	6	manufacturer-specific
231	7	manufacturer-specific
232	8	manufacturer-specific
233	9	manufacturer-specific
234	10	manufacturer-specific
235	11	manufacturer-specific
236	12	manufacturer-specific
237	13	manufacturer-specific
238	14	manufacturer-specific
239	15	manufacturer-specific
240	16	manufacturer-specific
241	17	manufacturer-specific
242	18	manufacturer-specific
243	19	manufacturer-specific
244	20	manufacturer-specific
245	21	manufacturer-specific
246	22	manufacturer-specific
247	23	manufacturer-specific
248	24	manufacturer-specific
249	25	manufacturer-specific
250	26	manufacturer-specific
251	27	manufacturer-specific
252	28	manufacturer-specific
253	29	manufacturer-specific
254	30	manufacturer-specific
255	31	manufacturer-specific

Annex D

(continued)

D.5 Meter firmware upgrade objects

The objects for firmware upgrades are given in Table D.5

Table D.5 — Meter COSEM objects for firmware upgrades

1	2	3		4	5		6	7	8					9
					IC				Access rights Get, Set, Action					
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Firmware upgrade													
B	ImageTransfer	M	M	Image transfer	18	0		0-0:44.0.0.255						firmware image
1	logical_name			octet_string[6]				"00002C0000FF"	--	--	G			
2	image_block_size			double_long_unsigned			0x08		--	--	G			block size in bytes
3	image_transferred_block_status			bit_string			0x10		--	--	G			each bit provides info about one individual image block 0 = not transferred 1 = transferred
4	image_first_not_transferred_block_number			double_long_unsigned			0x18		--	--	G			provides block number of the first missing block
5	image_transfer_enabled			boolean			0x20		--	--	G, S			enabled or not; detail information in image_transfer_status FALSE = disabled TRUE = enabled

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(continued)

6	image_transfer status		enum		0x28		--	--	G			detailed status of image transfer process 0 = transfer not initiated (not active; default state) 1 = transfer initiated 2 = verification initiated 3 = verification successful 4 = verification failed 5 = activation initiated 6 = activation successful 7 = activation failed
7	image_to_activate_info		array		0x30		--	--	G			
1	image_transfer_initiate		structure		0x40		--	--	A			initiates the transfer process; includes data in format { image_identifier image_size }
2	image_block_transfer		structure		0x48		--	A	A			transfers one single block; includes data in format { image_block_number image_block_value }
3	image_verify		integer		0x50		--	--	A			verifies the integrity before activation; result can be (0) success, if the verification could be completed; (2) temporary-failure if the verification has not been completed; (250) other-reason if the verification failed.

Annex D

(continued)

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Annex D

(continued)

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Annex D

(continued)

B	ActiveFirmwareIdentifier0	M	M	Data	1	0		1-0:0.2.0.255						If several FW instances are present inside the device, the B field is used for differentiation:
1	logical_name			octet_string[6]				"0100000200FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			
B	ActiveFirmwareSignature0	M	M	Data	1	0		1-0:0.2.8.255						
1	logical_name			octet_string[6]				"0100000208FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			
B	ActiveFirmwareIdentifier1	O	O	Data	1	0		1-1:0.2.0.255						
1	logical_name			octet_string[6]				"0101000200FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			
B	ActiveFirmwareSignature1	O	O	Data	1	0		1-1:0.2.8.255						
1	logical_name			octet_string[6]				"0101000208FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			
B	ActiveFirmwareIdentifier2	O	O	Data	1	0		1-2:0.2.0.255						
1	logical_name			octet_string[6]				"0102000200FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			
B	ActiveFirmwareSignature2	O	O	Data	1	0		1-2:0.2.8.255						
1	logical_name			octet_string[6]				"0102000208FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			

Annex D

(continued)

D.6 Meter communications objects

The objects for communication are given in Table D.6

Table D.6 — Meter COSEM objects for communications

Reference	attribute/ method	mandatory/ optional		IC name/ Data type	IC		SN	OBIS/ value	Access rights <u>Get</u> , <u>Set</u> , <u>Action</u>					Comment
		1PH	3PH		Class	Version			Public	Pre-estab	Management	CIU	HHU	
A	Communications													
B	OpticalPortMACSetup	M	M	IEC HDLC setup	2 3	1		0-0:22.0.0.255						62056-46 HDLC MAC on Optical port.
1	logical_name			octet_string[6]				"0000160000FF"	--	--	G			
2	comm_speed			enum			0x08		--	S	G, S			
3	window_size_transmit			unsigned			0x10		--	S	G, S			
4	window_size_receive			unsigned			0x18		--	S	G, S			
5	max_info_field_lenght _transmit			long_unsigned			0x20		--	S	G, S			
6	max_info_field_lenght _receive			long_unsigned			0x28		--	S	G, S			
7	inter_octet_time_out			long_unsigned			0x30		--	S	G, S			
8	inactivity_time_out			long_unsigned			0x38		--	S	G,			

S

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(continued)

9	device_address			long_unsigned			0x40		--	--	G, S			
B	TCP_UDPSetup	M	M	TCP-UDP setup	4 1	0		0-0:25.0.0.255						
1	logical_name			octet_string[6]				"0000190000FF"	--	--	G			
2	TCP_UDP_port			long_unsigned			0x08	4059	--	--	G, S			
3	IP_reference			octet_string[6]			0x10		--	--	G			
4	MSS			long_unsigned			0x18	1280	--	--	G, S			
5	nb_of_sim_conn			unsigned			0x20	1	--	--	G, S			
6	inactivity_time_out			long_unsigned			0x28	180	--	--	G, S			
B	IPv6Setup	M	M	IPv6 setup	4 8	0		0-0:25.7.0.255						
1	logical_name			octet_string[6]				"0000190700FF"	--	--	G			
2	DL_reference			octet_string[6]			0x08		--	--	G, S			
3	address_config_mode			enum			0x10	0	--	--	G, S			
4	unicast_IPv6_addresses			array[0..*](IPv6_address)			0x18		--	--	G, S			
5	multicast_IPv6_addresses			array[0..*](IPv6_address)			0x20		--	--	G, S			
6	gateway_IPv6_address			array[0..*](IPv6_address)			0x28		--	--	G, S			
7	primary_DNS_addresses			IPv6_address			0x30		--	--	G, S			
8	secondary_DNS_address			IPv6_address			0x38		--	--	G, S			
9	traffic_class			unsigned			0x40		--	--	G, S			

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(continued)

10	neighbor_discovery_setup			array[0..*](neighbor_discovery_setup_element)			0x48		--	--	G, S			
1	add_IPv6_address			IPv6_address_entry			0x60		--	--	--			
2	remove_IPv6_addresses			IPv6_address_entry			0x68		--	--	--			
B	Auto connect	M	M	Auto connect	29	2		0-0:2.1.0.255						
1	logical_name			octet_string[6]				"0000020100FF"	--	--	G			
2	mode			enum			0x08	101	--	--	G, S			
3	repetitions			unsigned			0x10	0	--	--	G, S			
4	repetition_delay			long_unsigned			0x18	0	--	--	G, S			
5	calling_window			array[0..*](window_element)			0x20		--	--	G, S			
6	destination_list			array[0..*]			0x28		--	--	G, (S)			
1	connect			integer			0x30		--	--	A			
B	GPRS modem setup	M - G	M - G	GPRS modem setup	45	0		0-0:25.4.0.255						
1	logical_name			octet_string[6]				"0000190400FF"	--	--	G			
2	APN			octet_string[0..64]			0x08		--	--	G, S			An APN with a size of 64 bytes at least is supported, i.e. [0.64] is mandatory but can be longer
3	PIN_code			long_unsigned			0x10		--	--	G, S			
4	quality_of_service			quality_of_service_type			0x18		--	--	G, S			

Annex D

(continued)

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Annex D

(continued)

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Annex D

(continued)

D.7 Meter keeping objects

The objects for time keeping are given in Table D.7

Table D.7 — Meter COSEM objects for time keeping

1	2	3	4	5		6	7	8					9
				IC				Access rights Get, Set, Action					
Reference	attribute/ method	mandatory/ optional	IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH 3PH											
A	Time												
B	Clock	M	M	Clock	8	0	0-0:1.0.0.255						
1	logical_name			octet_string[6]			"0000010000FF"			G			
2	time			octet_string[12]		0x08		--	S	G, S			Current date and time as local time, deviation can be handled or set to 0x8000, status must be handled. With Set deviation=0x8000 and status=0xFF
3	time_zone			long		0x10	-120	--	S	G, S			
4	status			unsigned		0x18		--		G			
5	daylights_savings_begin			octet_string[12]		0x20	"FFFFFFFFFFFFFFFF8000FF"	--	S	G, S			last sunday in March at 02:00

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(continued)

6	daylights_savings_end			octet_string[12]			0x28	"FFFFFFFFFFFFFFFF8000FF"	--	S	G, S		last sunday in October at 03:00
7	daylights_savings_deviation			integer			0x30	0	--	S	G, S		
8	daylights_savings_enabled			boolean			0x38	0	--	S	G, S		
9	clock_base			enum			0x40	0	--		G		internal crystal (by default)
1	adjust_to_quarter(data)						0x60		--	--			optional
2	adjust_to_measuring_period(data)						0x68						optional
3	adjust_to_minute(data)						0x70						optional
4	adjust_to_preset_time(data)						0x78						optional
5	preset_adjusting_time(data)						0x80						optional
6	shift_time(data)						0x88						optional
B	LocalTime	M	M	Data	1	0		1-0:0.9.1.255					For display and readout purposes, not used for remote communication
1	logical_name			octet_string[6]				"0100000901FF"	--	--	G		
2	value			octet_string[4]			0x08		--	--	G		
B	LocalDate	M	M	Data	1	0		1-0:0.9.2.255					For display and readout purposes, not used for remote communication
1	logical_name			octet_string[6]				"0100000902FF"	--	--	G		
2	value			octet_string[5]			0x08		--	--	G		
B	ClockTimeShiftLimit	M	M	Register	3	0		1-0:0.9.11.255					
1	logical_name			octet_string[6]				"010000090BFF"	--	--	G		
2	value			unsigned			0x08	60	--	S	G, S		Maximum allowed time shift without registration of a time

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3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			shift event seconds
---	-------------	--	--	----------------	--	--	------	-------	----	----	---	--	--	------------------------

Annex D

(continued)

1	reset					0x28		--	--				
B	ActivityCalendar(+)	M	M	Activity calendar	2 0	0		0-1:13.0.0.255					for all import energy tariffs
1	logical_name			octet_string[6]			"00010D0000FF"	--	--	G			
2	calendar_name_active			octet_string[0..8]			0x08	--	--	G			The calendar_name_active has a size of 8 characters at least, i.e. [0..8] is mandatory but can be longer
3	season_profile_active			array[0..*]			0x10	--	--	G			
4	week_profile_table_active			array[0..*]			0x18	--	--	G			
5	day_profile_table_active			array[0..*]			0x20	--	--	G			
6	calendar_name_passive			octet_string[0..8]			0x28	--	S	G, S			see calendar_name_active
7	season_profile_passive			array[0..*]			0x30	--	S	G, S			
8	week_profile_table_passive			array[0..*]			0x38	--	S	G, S			
9	day_profile_table_passive			array[0..*]			0x40	--	S	G, S			
10	activate_passive_calendar_time			octet_string[12]			0x48	--	S	G, S			
1	activate_passive_calendar			integer			0x50	--	(A)	(A)			
B	ActivityCalendar(-)	M	M	Activity calendar	2 0	0		0-1:13.0.1.255					for all export energy tariffs
1	logical_name			octet_string[6]			"00010D0001FF"	--	--	G			
2	calendar_name_active			octet_string[0..8]			0x08	--	--	G			The calendar_name_active has a size of 8 characters at least, i.e. [0..8] is mandatory but can be longer

Annex D

(continued)

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Annex D

(continued)

D.8 Meter metering objects

The objects for metering are given in Table D.8

Table D.8 — Meter COSEM objects for metering

1	2	3		4	5		6	7	8					9
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	IC		SN	OBIS/ value	Access rights <u>Get</u> , <u>Set</u> , <u>Action</u>					Comment
					Class	Version			Public	Pre-estab	Management	CIU	HHU	
		1PH	3PH											
A	Metering													
B	ActiveEnergyRegister (+A)	M	M	Register	3	0		1-0:1.8.0.255						(+A) import
1	logical_name			octet_string[6]				"0100010800FF"	--	--	G	G		
2	value			double_long_unsign ed			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	ActiveEnergyRegister (-A)	M	M	Register	3	0		1-0:2.8.0.255						(-A) export
1	logical_name			octet_string[6]				"0100020800FF"	--	--	G	G		
2	value			double_long_unsign ed			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			

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(continued)

B	ActiveEnergyTotalRegister(+)	M	M	Register	3	0		1-0:15.8.0.255						(+A + -A)
1	logical_name			octet_string[6]				"01000F0800FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	ActiveEnergyTotalRegister(-)	M	M	Register	3	0		1-0:16.8.0.255						(+A - -A)
1	logical_name			octet_string[6]				"0100100800FF"	--	--	G	G		
2	value			double_long			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	ReactiveEnergyQ1Register(+Ri)	M	M	Register	3	0		1-0:5.8.0.255						(+Ri) inductive
1	logical_name			octet_string[6]				"0100050800FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	ReactiveEnergyQ2Register(+Rc)	M	M	Register	3	0		1-0:6.8.0.255						(+Rc) capacitive
1	logical_name			octet_string[6]				"0100060800FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	ReactiveEnergyQ3 Register(-Ri)	M	M	Register	3	0		1-0:7.8.0.255						(-Ri) inductive
1	logical_name			octet_string[6]				"0100070800FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	ReactiveEnergyQ4 Register(-Rc)	M	M	Register	3	0		1-0:8.8.0.255						(-Rc) capacitive
1	logical_name			octet_string[6]				"0100080800FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	ReactiveEnergyRegister(+R)	M	M	Register	3	0		1-0:3.8.0.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030800FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	ReactiveEnergyRegister(-R)	M	M	Register	3	0		1-0:4.8.0.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040800FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	ApparentEnergyRegister(+VA)	M	M	Register	3	0		1-0:9.8.0.255						(+VA) (Q1+Q4) import
1	logical_name			octet_string[6]				"0100090800FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	ApparentEnergyRegister(-VA)	M	M	Register	3	0		1-0:10.8.0.255						(-VA) (Q2+Q3) export
1	logical_name			octet_string[6]				"01000A0800FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	DemandRegister1(+A)	M	M	Demand register	5	0		1-0:1.4.0.255						(+A) import
1	logical_name			octet_string[6]				"0100010400FF"	--	--	G	G		
2	current_average_value			double_long_unsigned			0x08		--	--	G	G		

Annex D

(continued)

3	last_average_value			double_long_unsigned			0x10		--	--	G	G		
4	scaler_unit			scal_unit_type			0x18	{0,27}	--	--	G	G		
5	status			unsigned			0x20	0	--	--	G	G		
6	capture_time			octet_string			0x28		--	--	G	G		
7	start_time_current			octet_string			0x30		--	--	G	G		
8	period			double_long_unsigned			0x38	900	--	--	G	G		Changing period of one instance will change the period of all instances automatically!
9	number_of_periods			long_unsigned			0x40	1	--	--	G	G		Siliding demand optional. Changing number_of_periods of one instance will change number_of_periods of all instances automatically!
1	reset						0x48		--	--	--			
2	next_period						0x50		--	--	--			
B	DemandRegister2(-A)	M	M	Demand register	5	0		1-0:2.4.0.255						(-A) export
1	logical_name			octet_string[6]				"0100020400FF"	--	--	G	G		
2	current_average_value			double_long_unsigned			0x08		--	--	G	G		
3	last_average_value			double_long_unsigned			0x10		--	--	G	G		
4	scaler_unit			scal_unit_type			0x18	{0,27}	--	--	G	G		
5	status			unsigned			0x20	0	--	--	G	G		
6	capture_time			octet_string			0x28		--	--	G	G		
7	start_time_current			octet_string			0x30		--	--	G	G		
8	period			double_long_unsigned			0x38	900	--	--	G	G		Changing period of one instance will change the period of all instances

															automatically!
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----------------

Annex D

(continued)

9	number_of_periods			long_unsigned			0x40	1	--	--	G , S	G		Siliding demand optional. Changing number_of_periods of one instance will change number_of_periods of all instances automatically!
1	reset						0x48		--	--	--			
2	next_period						0x50		--	--	--			
B	DemandRegister3(+R)	M	M	Demand register	5	0		1-0:3.4.0.255						(+R) import
1	logical_name			octet_string[6]				"0100030400FF"	--	--	G	G		
2	current_average_value			double_long_unsigned			0x08		--	--	G	G		
3	last_average_value			double_long_unsigned			0x10		--	--	G	G		
4	scaler_unit			scal_unit_type			0x18	{0,29}	--	--	G	G		
5	status			unsigned			0x20	0	--	--	G	G		
6	capture_time			octet_string			0x28		--	--	G	G		
7	start_time_current			octet_string			0x30		--	--	G	G		
8	period			double_long_unsigned			0x38	900	--	--	G , S	G		Changing period of one instance will change the period of all instances automatically!
9	number_of_periods			long_unsigned			0x40	1	--	--	G , S	G		Siliding demand optional. Changing number_of_periods of one instance will change number_of_periods of all instances automatically!
1	reset						0x48		--	--	--			
2	next_period						0x50		--	--	--			

B	DemandRegister4(-R)	M	M	Demand register	5	0		1-0:4.4.0.255							(-R) export
---	---------------------	---	---	-----------------	---	---	--	---------------	--	--	--	--	--	--	-------------

Annex D

(continued)

1	logical_name			octet_string[6]				"0100040400FF"	--	--	G	G		
2	current_average_value			double_long_unsigned			0x08		--	--	G	G		
3	last_average_value			double_long_unsigned			0x10		--	--	G	G		
4	scaler_unit			scal_unit_type			0x18	{0,29}	--	--	G	G		
5	status			unsigned			0x20	0	--	--	G	G		
6	capture_time			octet_string			0x28		--	--	G	G		
7	start_time_current			octet_string			0x30		--	--	G	G		
8	period			double_long_unsigned			0x38	900	--	--	G	G		Changing period of one instance will change the period of all instances automatically!
9	number_of_periods			long_unsigned			0x40	1	--	--	G	G		Siliding demand optional. Changing number_of_periods of one instance will change number_of_periods of all instances automatically!
1	reset						0x48		--	--	--			
2	next_period						0x50		--	--	--			
B	DemandRegister5(+VA)	M	M	Demand register	5	0		1-0:9.4.0.255						(+VA) import
1	logical_name			octet_string[6]				"0100090400FF"	--	--	G	G		
2	current_average_value			double_long_unsigned			0x08		--	--	G	G		
3	last_average_value			double_long_unsigned			0x10		--	--	G	G		

4	scaler_unit			scal_unit_type			0x18	{0,28}	--	--	G	G		
5	status			unsigned			0x20	0	--	--	G	G		
6	capture_time			octet_string			0x28		--	--	G	G		

Annex D

(continued)

7	start_time_current			octet_string			0x30		--	--	G	G		
8	period			double_long_unsigned			0x38	900	--	--	G	G		Changing period of one instance will change the period of all instances automatically!
9	number_of_periods			long_unsigned			0x40	1	--	--	G	G		Siliding demand optional. Changing number_of_periods of one instance will change number_of_periods of all instances automatically!
1	reset						0x48		--	--	--			
2	next_period						0x50		--	--	--			
B	DemandRegister6(-VA)	M	M	Demand register	5	0		1-0:10.4.0.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0400FF"	--	--	G	G		
2	current_average_value			double_long_unsigned			0x08		--	--	G	G		
3	last_average_value			double_long_unsigned			0x10		--	--	G	G		
4	scaler_unit			scal_unit_type			0x18	{0,28}	--	--	G	G		
5	status			unsigned			0x20	0	--	--	G	G		
6	capture_time			octet_string			0x28		--	--	G	G		
7	start_time_current			octet_string			0x30		--	--	G	G		
8	period			double_long_unsigned			0x38	900	--	--	G	G		Changing period of one instance will change the period of all instances automatically!

9	number_of_periods			long_unsigned			0x40	1	--	--	G , S	G		Siliding demand optional. Changing number_of_periods of one instance will change number_of_periods of all instances automatically!
---	-------------------	--	--	---------------	--	--	------	---	----	----	-------------	---	--	--

Annex D

(continued)

1	reset						0x48		--	--	--			
2	next_period						0x50		--	--	--			
B	LastAverageDemand(+A)	M	M	Extended register	4	0		1-0:1.5.0.255						(+A) import (display only)
1	logical_name			octet_string[6]				"0100010500FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	LastAverageDemand(-A)	M	M	Extended register	4	0		1-0:2.5.0.255						(-A) export (display only)
1	logical_name			octet_string[6]				"0100020500FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	LastAverageDemand(+R)	M	M	Extended register	4	0		1-0:3.5.0.255						(+R) import (display only)
1	logical_name			octet_string[6]				"0100030500FF"	--	--	G	G		

							F"						
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,29}	--	--	G	G		
4	status			unsigned		0x18		--	--	G	G		

Annex D

(continued)

5	capture_time			octet_string		0x20		--	--	G	G		
1	reset			integer		0x38		--	--	--			
B	LastAverageDemand(-R)	M	M	Extended register	4	0		1-0:4.5.0.255					(-R) export (display only)
1	logical_name			octet_string[6]			"0100040500F"	--	--	G	G		
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,29}	--	--	G	G		
4	status			unsigned		0x18		--	--	G	G		
5	capture_time			octet_string		0x20		--	--	G	G		
1	reset			integer		0x38		--	--	--			
B	LastAverageDemand(+VA)	M	M	Extended register	4	0		1-0:9.5.0.255					(+VA) import (display only)
1	logical_name			octet_string[6]			"0100090500F"	--	--	G	G		
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,28}	--	--	G	G		
4	status			unsigned		0x18		--	--	G	G		
5	capture_time			octet_string		0x20		--	--	G	G		
1	reset			integer		0x38		--	--	--			
B	LastAverageDemand(-VA)	M	M	Extended register	4	0		1-0:10.5.0.255					(-VA) export (display only)
1	logical_name			octet_string[6]			"01000A0500F"	--	--	G	G		

							F"						
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,28}	--	--	G	G		
4	status			unsigned		0x18		--	--	G	G		

Annex D

(continued)

5	capture_time			octet_string		0x20		--	--	G	G		
1	reset			integer		0x38		--	--	--			
B	Demand(+A)	M	M	Extended register	4	0		1-0:1.6.0.255					(+A) import
1	logical_name			octet_string[6]			"0100010600F"	--	--	G	G		
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,27}	--	--	G	G		
4	status			unsigned		0x18		--	--	G	G		
5	capture_time			octet_string		0x20		--	--	G	G		
1	reset			integer		0x38		--	--	--			
B	Demand(-A)	M	M	Extended register	4	0		1-0:2.6.0.255					(-A) export
1	logical_name			octet_string[6]			"0100020600F"	--	--	G	G		
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,27}	--	--	G	G		
4	status			unsigned		0x18		--	--	G	G		
5	capture_time			octet_string		0x20		--	--	G	G		
1	reset			integer		0x38		--	--	--			
B	Demand(+R)	M	M	Extended register	4	0		1-0:3.6.0.255					(+R) import
1	logical_name			octet_string[6]			"0100030600F"	--	--	G	G		
2	value			double_long_unsigned		0x08		--	--	G	G		

3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			

Annex D
(continued)

B	Demand(-R)	M	M	Extended register	4	0		1-0:4.6.0.255						(-R) export
1	logical_name			octet_string[6]				"0100040600F F"	--	--	G	G		
2	value			double_long_unsi gned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+VA)	M	M	Extended register	4	0		1-0:9.6.0.255						(+VA) import
1	logical_name			octet_string[6]				"0100090600F F"	--	--	G	G		
2	value			double_long_unsi gned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-VA)	M	M	Extended register	4	0		1-0:10.6.0.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0600F F"	--	--	G	G		
2	value			double_long_unsi gned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		

[illegible]

Annex D

(continued)

D.9 Meter tariffication control objects

The objects for tariffication control are given in Table D.9

The detailed requirements for these objects shall be defined and agreed by industry.

Table D.9 — Meter COSEM objects for tariffication control

1	2	3		4	5 IC		6	7	8 Access rights Get, Set, Action					9	
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment	
		1PH	3PH												
A	Tariffication control													monitors and script table	
B	TariffSpecialDaysTable(+)	M	M	Special days table	1 1	0		0-1:11.0.0.255						for al import energy tariffs	
1	logical_name			octet_string[6]				"00010B0000FF"	--	--	Get				
2	entries			array[0..30]			0x08		--	Set	Get , Set				
B	TariffSpecialDaysTable(-)	M	M	Special days table	1 1	0		0-1:11.0.1.255						for all export energy tariffs	
1	logical_name			octet_string[6]				"00010B0001FF"	--	--	Get				
2	entries			array[0..30]			0x08		--	Set	Get , Set				

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(continued)

B	ActiveEnergyRegister Monitor(+A)	M	M	Register monitor	2 1	0		1-1:1.8.0.255						tariff import
1	logical_name			octet_string[6]				"0101010800FF"	--	--	Get			
2	thresholds			array[1]			0x08		--	--	Get , Set			The threshold is of the same type as the monitored attribute of the referenced object
3	monitored_value			value_definition			0x10		--	--	Get , Set			
4	actions			array[1](action_set)			0x18		--	--	Get , Set			
B	ActiveEnergyRegister Monitor(-A)	M	M	Register monitor	2 1	0		1-1:2.8.0.255						tariff export
1	logical_name			octet_string[6]				"0101020800FF"	--	--	Get			
2	thresholds			array[1]			0x08		--	--	Get , Set			The threshold is of the same type as the monitored attribute of the referenced object
3	monitored_value			value_definition			0x10		--	--	Get , Set			
4	actions			array[1](action_set)			0x18		--	--	Get , Set			
B	ReactiveEnergyRegisterMonitor(+R)	M	M	Register monitor	2 1	0		1-1:3.8.0.255						reactive energy tariff import
1	logical_name			octet_string[6]				"0101030800FF"	--	--	Get			
2	thresholds			array[1]			0x08		--	--	Get , Set			The threshold is of the same type as the monitored attribute of the referenced object
3	monitored_value			value_definition			0x10		--	--	Get , Set			

Annex D

(continued)

4	actions			array[1](action_set)			0x18		--	--	Get , Set			
B	ReactiveEnergyRegisterMonitor(-R)	M	M	Register monitor	2 1	0		1-1:4.8.0.255						reactive energy tariff export
1	logical_name			octet_string[6]				"0101040800FF"	--	--	Get			
2	thresholds			array[1]			0x08		--	--	Get , Set			The threshold is of the same type as the monitored attribute of the referenced object
3	monitored_value			value_definition			0x10		--	--	Get , Set			
4	actions			array[1](action_set)			0x18		--	--	Get , Set			
B	ApparentEnergyRegisterMonitor(+VA)	M	M	Register monitor	2 1	0		1-1:9.8.0.255						apparent energy tariff import
1	logical_name			octet_string[6]				"0101090800FF"	--	--	Get			
2	thresholds			array[1]			0x08		--	--	Get , Set			The threshold is of the same type as the monitored attribute of the referenced object
3	monitored_value			value_definition			0x10		--	--	Get , Set			
4	actions			array[1](action_set)			0x18		--	--	Get , Set			
B	ApparentEnergyRegisterMonitor(-VA)	M	M	Register monitor	2 1	0		1-1:10.8.0.255						apparent energy tariff export
1	logical_name			octet_string[6]				"01010A0800FF"	--	--	Get			
2	thresholds			array[1]			0x08		--	--	Get , Set			The threshold is of the same type as the monitored attribute of the referenced object

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(continued)

3	monitored_value			value_definition			0x10		--	--	Get , Set			
4	actions			array[1](action_set)			0x18		--	--	Get , Set			
B	TariffScriptTable	M	M	Script table	9	0		0- 1:10.0.100.255						for import and export tariff
1	logical_name			octet_string[6]				"00010A0064FF"	--	--	Get			
2	scripts			scripts			0x08		--	--	Get , Set			
1	execute			long_unsigned			0x20		--	--	(Ac tion)			

D.10 Meter energy tarrification objects

The objects for energy tariffication are given in Table D.10

Table D.10 — Meter COSEM objects for metering

1	2	3	4	5	6	7	8	9
				IC			Access rights Get, Set, Action	
Reference	attribute/ method	mandatory/ optional	IC name/ Data type	Class	Version	SN	OBIS/ value	Public Pre-estab Management CIU HHU Comment
		1PH 3PH						
A	Energy tariffication							Tariff registers

Annex D

(continued)

B	Energy(+A)Rate1	M	M	Register	3	0		1-0:1.8.1.255					(+A) active energy import
1	logical_name			octet_string[6]				"0100010801FF"	--	--	G	G	
2	value			double_long_unsign ed		0x08			--	--	G	G	
3	scaler_unit			scal_unit_type		0x10	{0,30}		--	--	G	G	
1	reset					0x28			--	--	--		
B	Energy(+A)Rate2	M	M	Register	3	0		1-0:1.8.2.255					(+A) active energy import
1	logical_name			octet_string[6]				"0100010802FF"	--	--	G	G	
2	value			double_long_unsign ed		0x08			--	--	G	G	
3	scaler_unit			scal_unit_type		0x10	{0,30}		--	--	G	G	
1	reset					0x28			--	--	--		
B	Energy(+A)Rate3	M	M	Register	3	0		1-0:1.8.3.255					(+A) active energy import
1	logical_name			octet_string[6]				"0100010803FF"	--	--	G	G	
2	value			double_long_unsign ed		0x08			--	--	G	G	
3	scaler_unit			scal_unit_type		0x10	{0,30}		--	--	G	G	
1	reset					0x28			--	--	--		
B	Energy(+A)Rate4	M	M	Register	3	0		1-0:1.8.4.255					(+A) active energy import

1	logical_name			octet_string[6]			"0100010804FF"	--	--	G	G		
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,30}	--	--	G	G		
1	reset					0x28		--	--	--			
B	Energy(+A)Rate5	M	M	Register	3	0	1-0:1.8.5.255						(+A) active energy import
1	logical_name			octet_string[6]			"0100010805FF"	--	--	G	G		
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,30}	--	--	G	G		
1	reset					0x28		--	--	--			

Annex D

(continued)

B	Energy(+A)Rate6	M	M	Register	3	0		1-0:1.8.6.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010806FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate7	M	M	Register	3	0		1-0:1.8.7.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010807FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate8	M	M	Register	3	0		1-0:1.8.8.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010808FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate9	M	M	Register	3	0		1-0:1.8.9.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010809FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate10	M	M	Register	3	0		1-0:1.8.10.255						(+A) active energy import
1	logical_name			octet_string[6]				"010001080AFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate11	M	M	Register	3	0		1-0:1.8.11.255						(+A) active energy import

Annex D

(continued)

1	logical_name			octet_string[6]				"010001080BFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate12	M	M	Register	3	0		1-0:1.8.12.255						(+A) active energy import
1	logical_name			octet_string[6]				"010001080CFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate13	M	M	Register	3	0		1-0:1.8.13.255						(+A) active energy import
1	logical_name			octet_string[6]				"010001080DFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate14	M	M	Register	3	0		1-0:1.8.14.255						(+A) active energy import
1	logical_name			octet_string[6]				"010001080EFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate15	M	M	Register	3	0		1-0:1.8.15.255						(+A) active energy import
1	logical_name			octet_string[6]				"010001080FFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+A)Rate16	M	M	Register	3	0		1-0:1.8.16.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010810FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate17	M	M	Register	3	0		1-0:1.8.17.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010811FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate18	M	M	Register	3	0		1-0:1.8.18.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010812FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate19	M	M	Register	3	0		1-0:1.8.19.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010813FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate20	M	M	Register	3	0		1-0:1.8.20.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010814FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+A)Rate21	M	M	Register	3	0		1-0:1.8.21.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010815FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate22	M	M	Register	3	0		1-0:1.8.22.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010816FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate23	M	M	Register	3	0		1-0:1.8.23.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010817FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate24	M	M	Register	3	0		1-0:1.8.24.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010818FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+A)Rate25	M	M	Register	3	0		1-0:1.8.25.255						(+A) active energy import
1	logical_name			octet_string[6]				"0100010819FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+A)Rate26	M	M	Register	3	0		1-0:1.8.26.255					(+A) active energy import
1	logical_name			octet_string[6]				"010001081AFF"	--	--	G	G	
2	value			double_long_unsigned			0x08		--	--	G	G	
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G	
1	reset						0x28		--	--	--		
B	Energy(+A)Rate27	M	M	Register	3	0		1-0:1.8.27.255					(+A) active energy import
1	logical_name			octet_string[6]				"010001081BFF"	--	--	G	G	
2	value			double_long_unsigned			0x08		--	--	G	G	
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G	
1	reset						0x28		--	--	--		
B	Energy(+A)Rate28	M	M	Register	3	0		1-0:1.8.28.255					(+A) active energy import
1	logical_name			octet_string[6]				"010001081CFF"	--	--	G	G	
2	value			double_long_unsigned			0x08		--	--	G	G	
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G	
1	reset						0x28		--	--	--		
B	Energy(+A)Rate29	M	M	Register	3	0		1-0:1.8.29.255					(+A) active energy import
1	logical_name			octet_string[6]				"010001081DFF"	--	--	G	G	
2	value			double_long_unsigned			0x08		--	--	G	G	
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G	
1	reset						0x28		--	--	--		
B	Energy(+A)Rate30	M	M	Register	3	0		1-0:1.8.30.255					(+A) active energy import
1	logical_name			octet_string[6]				"010001081EFF"	--	--	G	G	
2	value			double_long_unsigned			0x08		--	--	G	G	
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G	

Annex D

(continued)

1	reset					0x28		--	--	--			
B	Energy(+A)Rate31	M	M	Register	3	0		1-0:1.8.31.255					(+A) active energy import
1	logical_name			octet_string[6]			"010001081FFF"	--	--	G	G		
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,30}	--	--	G	G		
1	reset					0x28		--	--	--			
B	Energy(+A)Rate32	M	M	Register	3	0		1-0:1.8.32.255					(+A) active energy import
1	logical_name			octet_string[6]			"0100010820FF"	--	--	G	G		
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,30}	--	--	G	G		
1	reset					0x28		--	--	--			
B	EnergyFallbackRate(+A)	M	M	Register	3	0		1-0:1.8.33.255					(+A) active energy import
1	logical_name			octet_string[6]			"0100010821FF"	--	--	G	G		
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,30}	--	--	G	G		
1	reset					0x28		--	--	--			
B	Energy(-A)Rate1	M	M	Register	3	0		1-0:2.8.1.255					(-A) active energy export
1	logical_name			octet_string[6]			"0100020801FF"	--	--	G	G		
2	value			double_long_unsigned		0x08		--	--	G	G		
3	scaler_unit			scal_unit_type		0x10	{0,30}	--	--	G	G		
1	reset					0x28		--	--	--			

Annex D

(continued)

B	Energy(-A)Rate2	M	M	Register	3	0		1-0:2.8.2.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020802FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate3	M	M	Register	3	0		1-0:2.8.3.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020803FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate4	M	M	Register	3	0		1-0:2.8.4.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020804FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate5	M	M	Register	3	0		1-0:2.8.5.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020805FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate6	M	M	Register	3	0		1-0:2.8.6.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020806FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		

Annex D

(continued)

3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate7	M	M	Register	3	0		1-0:2.8.7.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020807FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate8	M	M	Register	3	0		1-0:2.8.8.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020808FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate9	M	M	Register	3	0		1-0:2.8.9.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020809FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate10	M	M	Register	3	0		1-0:2.8.10.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002080AFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-A)Rate11	M	M	Register	3	0		1-0:2.8.11.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002080BFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate12	M	M	Register	3	0		1-0:2.8.12.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002080CFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate13	M	M	Register	3	0		1-0:2.8.13.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002080DFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate14	M	M	Register	3	0		1-0:2.8.14.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002080EFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate15	M	M	Register	3	0		1-0:2.8.15.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002080FFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		

Annex D

(continued)

3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate16	M	M	Register	3	0		1-0:2.8.16.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020810FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate17	M	M	Register	3	0		1-0:2.8.17.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020811FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate18	M	M	Register	3	0		1-0:2.8.18.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020812FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate19	M	M	Register	3	0		1-0:2.8.19.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020813FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-A)Rate20	M	M	Register	3	0		1-0:2.8.20.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020814FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate21	M	M	Register	3	0		1-0:2.8.21.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020815FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate22	M	M	Register	3	0		1-0:2.8.22.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020816FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate23	M	M	Register	3	0		1-0:2.8.23.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020817FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate24	M	M	Register	3	0		1-0:2.8.24.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020818FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-A)Rate25	M	M	Register	3	0		1-0:2.8.25.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020819FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate26	M	M	Register	3	0		1-0:2.8.26.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002081AFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate27	M	M	Register	3	0		1-0:2.8.27.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002081BFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate28	M	M	Register	3	0		1-0:2.8.28.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002081CFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate29	M	M	Register	3	0		1-0:2.8.29.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002081DFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-A)Rate30	M	M	Register	3	0		1-0:2.8.30.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002081EFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate31	M	M	Register	3	0		1-0:2.8.31.255						(-A) active energy export
1	logical_name			octet_string[6]				"010002081FFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-A)Rate32	M	M	Register	3	0		1-0:2.8.32.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020820FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	EnergyFallbackRate(-A)	M	M	Register	3	0		1-0:2.8.33.255						(-A) active energy export
1	logical_name			octet_string[6]				"0100020821FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,30}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate1	M	M	Register	3	0		1-0:3.8.1.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030801FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+R)Rate2	M	M	Register	3	0		1-0:3.8.2.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030802FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate3	M	M	Register	3	0		1-0:3.8.3.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030803FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate4	M	M	Register	3	0		1-0:3.8.4.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030804FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate5	M	M	Register	3	0		1-0:3.8.5.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030805FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate6	M	M	Register	3	0		1-0:3.8.6.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030806FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+R)Rate7	M	M	Register	3	0		1-0:3.8.7.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030807FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate8	M	M	Register	3	0		1-0:3.8.8.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030808FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate9	M	M	Register	3	0		1-0:3.8.9.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030809FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate10	M	M	Register	3	0		1-0:3.8.10.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"010003080AFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate11	M	M	Register	3	0		1-0:3.8.11.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"010003080BFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+R)Rate12	M	M	Register	3	0		1-0:3.8.12.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"010003080CFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate13	M	M	Register	3	0		1-0:3.8.13.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"010003080DFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate14	M	M	Register	3	0		1-0:3.8.14.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"010003080EFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate15	M	M	Register	3	0		1-0:3.8.15.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"010003080FFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate16	M	M	Register	3	0		1-0:3.8.16.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030810FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+R)Rate17	M	M	Register	3	0		1-0:3.8.17.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030811FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate18	M	M	Register	3	0		1-0:3.8.18.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030812FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate19	M	M	Register	3	0		1-0:3.8.19.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030813FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate20	M	M	Register	3	0		1-0:3.8.20.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030814FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate21	M	M	Register	3	0		1-0:3.8.21.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030815FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+R)Rate22	M	M	Register	3	0		1-0:3.8.22.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030816FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate23	M	M	Register	3	0		1-0:3.8.23.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030817FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+R)Rate24	M	M	Register	3	0		1-0:3.8.24.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030818FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	EnergyFallbackRate(+R)	M	M	Register	3	0		1-0:3.8.25.255						(+R) (Q1+Q2) import
1	logical_name			octet_string[6]				"0100030819FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-R)Rate1	M	M	Register	3	0		1-0:4.8.1.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040801FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-R)Rate2	M	M	Register	3	0		1-0:4.8.2.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040802FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-R)Rate3	M	M	Register	3	0		1-0:4.8.3.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040803FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-R)Rate4	M	M	Register	3	0		1-0:4.8.4.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040804FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-R)Rate5	M	M	Register	3	0		1-0:4.8.5.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040805FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G			
1	reset						0x28		--	--	--			
B	Energy(-R)Rate6	M	M	Register	3	0		1-0:4.8.6.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040806FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G			
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-R)Rate7	M	M	Register	3	0		1-0:4.8.7.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040807FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G			
1	reset						0x28		--	--	--			
B	Energy(-R)Rate8	M	M	Register	3	0		1-0:4.8.8.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040808FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G			
1	reset						0x28		--	--	--			
B	Energy(-R)Rate9	M	M	Register	3	0		1-0:4.8.9.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040809FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G			
1	reset						0x28		--	--	--			
B	Energy(-R)Rate10	M	M	Register	3	0		1-0:4.8.10.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"010004080AFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G			
1	reset						0x28		--	--	--			
B	Energy(-R)Rate11	M	M	Register	3	0		1-0:4.8.11.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"010004080BFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G			
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-R)Rate12	M	M	Register	3	0		1-0:4.8.12.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"010004080CFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G			
1	reset						0x28		--	--	--			
B	Energy(-R)Rate13	M	M	Register	3	0		1-0:4.8.13.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"010004080DFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-R)Rate14	M	M	Register	3	0		1-0:4.8.14.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"010004080EFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-R)Rate15	M	M	Register	3	0		1-0:4.8.15.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"010004080FFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-R)Rate16	M	M	Register	3	0		1-0:4.8.16.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040810FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-R)Rate17	M	M	Register	3	0		1-0:4.8.17.255							(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040811FF"	--	--	G	G			
2	value			double_long_unsigned			0x08		--	--	G	G			
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G				
1	reset						0x28		--	--	--				
B	Energy(-R)Rate18	M	M	Register	3	0		1-0:4.8.18.255							(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040812FF"	--	--	G	G			
2	value			double_long_unsigned			0x08		--	--	G	G			
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G				
1	reset						0x28		--	--	--				
B	Energy(-R)Rate19	M	M	Register	3	0		1-0:4.8.19.255							(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040813FF"	--	--	G	G			
2	value			double_long_unsigned			0x08		--	--	G	G			
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G				
1	reset						0x28		--	--	--				
B	Energy(-R)Rate20	M	M	Register	3	0		1-0:4.8.20.255							(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040814FF"	--	--	G	G			
2	value			double_long_unsigned			0x08		--	--	G	G			
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G				
1	reset						0x28		--	--	--				
B	Energy(-R)Rate21	M	M	Register	3	0		1-0:4.8.21.255							(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040815FF"	--	--	G	G			
2	value			double_long_unsigned			0x08		--	--	G	G			
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G				
1	reset						0x28		--	--	--				

Annex D

(continued)

B	Energy(-R)Rate22	M	M	Register	3	0		1-0:4.8.22.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040816FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G			
1	reset						0x28		--	--	--			
B	Energy(-R)Rate23	M	M	Register	3	0		1-0:4.8.23.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040817FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,32}	--	--	G			
1	reset						0x28		--	--	--			
B	Energy(-R)Rate24	M	M	Register	3	0		1-0:4.8.24.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040818FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G			
1	reset						0x28		--	--	--			
B	EnergyFallbackRate(-R)	M	M	Register	3	0		1-0:4.8.25.255						(-R) (Q3+Q4) export
1	logical_name			octet_string[6]				"0100040819FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G			
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate1	M	M	Register	3	0		1-0:9.8.1.255						(+VA) import
1	logical_name			octet_string[6]				"0100090801FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+VA)Rate2	M	M	Register	3	0		1-0:9.8.2.255						(+VA) import
1	logical_name			octet_string[6]				"0100090802FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate3	M	M	Register	3	0		1-0:9.8.3.255						(+VA) import
1	logical_name			octet_string[6]				"0100090803FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate4	M	M	Register	3	0		1-0:9.8.4.255						(+VA) import
1	logical_name			octet_string[6]				"0100090804FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate5	M	M	Register	3	0		1-0:9.8.5.255						(+VA) import
1	logical_name			octet_string[6]				"0100090805FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate6	M	M	Register	3	0		1-0:9.8.6.255						(+VA) import
1	logical_name			octet_string[6]				"0100090806FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+VA)Rate7	M	M	Register	3	0		1-0:9.8.7.255						(+VA) import
1	logical_name			octet_string[6]				"0100090807FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate8	M	M	Register	3	0		1-0:9.8.8.255						(+VA) import
1	logical_name			octet_string[6]				"0100090808FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate9	M	M	Register	3	0		1-0:9.8.9.255						(+VA) import
1	logical_name			octet_string[6]				"0100090809FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate10	M	M	Register	3	0		1-0:9.8.10.255						(+VA) import
1	logical_name			octet_string[6]				"010009080AFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate11	M	M	Register	3	0		1-0:9.8.11.255						(+VA) import
1	logical_name			octet_string[6]				"010009080BFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+VA)Rate12	M	M	Register	3	0		1-0:9.8.12.255						(+VA) import
1	logical_name			octet_string[6]				"010009080CFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate13	M	M	Register	3	0		1-0:9.8.13.255						(+VA) import
1	logical_name			octet_string[6]				"010009080DFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate14	M	M	Register	3	0		1-0:9.8.14.255						(+VA) import
1	logical_name			octet_string[6]				"010009080EFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate15	M	M	Register	3	0		1-0:9.8.15.255						(+VA) import
1	logical_name			octet_string[6]				"010009080FFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate16	M	M	Register	3	0		1-0:9.8.16.255						(+VA) import
1	logical_name			octet_string[6]				"0100090810FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+VA)Rate17	M	M	Register	3	0		1-0:9.8.17.255						(+VA) import
1	logical_name			octet_string[6]				"0100090811FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate18	M	M	Register	3	0		1-0:9.8.18.255						(+VA) import
1	logical_name			octet_string[6]				"0100090812FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate19	M	M	Register	3	0		1-0:9.8.19.255						(+VA) import
1	logical_name			octet_string[6]				"0100090813FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate20	M	M	Register	3	0		1-0:9.8.20.255						(+VA) import
1	logical_name			octet_string[6]				"0100090814FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate21	M	M	Register	3	0		1-0:9.8.21.255						(+VA) import
1	logical_name			octet_string[6]				"0100090815FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(+VA)Rate22	M	M	Register	3	0		1-0:9.8.22.255						(+VA) import
1	logical_name			octet_string[6]				"0100090816FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate23	M	M	Register	3	0		1-0:9.8.23.255						(+VA) import
1	logical_name			octet_string[6]				"0100090817FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(+VA)Rate24	M	M	Register	3	0		1-0:9.8.24.255						(+VA) import
1	logical_name			octet_string[6]				"0100090818FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	EnergyFallbackRate(+VA)	M	M	Register	3	0		1-0:9.8.25.255						(+VA) import
1	logical_name			octet_string[6]				"0100090819FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate1	M	M	Register	3	0		1-0:10.8.1.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0801FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-VA)Rate2	M	M	Register	3	0		1-0:10.8.2.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0802FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate3	M	M	Register	3	0		1-0:10.8.3.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0803FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate4	M	M	Register	3	0		1-0:10.8.4.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0804FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate5	M	M	Register	3	0		1-0:10.8.5.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0805FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate6	M	M	Register	3	0		1-0:10.8.6.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0806FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-VA)Rate7	M	M	Register	3	0		1-0:10.8.7.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0807FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate8	M	M	Register	3	0		1-0:10.8.8.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0808FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate9	M	M	Register	3	0		1-0:10.8.9.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0809FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate10	M	M	Register	3	0		1-0:10.8.10.255						(-VA) export
1	logical_name			octet_string[6]				"01000A080AFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate11	M	M	Register	3	0		1-0:10.8.11.255						(-VA) export
1	logical_name			octet_string[6]				"01000A080BFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-VA)Rate12	M	M	Register	3	0		1-0:10.8.12.255						(-VA) export
1	logical_name			octet_string[6]				"01000A080CFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate13	M	M	Register	3	0		1-0:10.8.13.255						(-VA) export
1	logical_name			octet_string[6]				"01000A080DFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate14	M	M	Register	3	0		1-0:10.8.14.255						(-VA) export
1	logical_name			octet_string[6]				"01000A080EFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate15	M	M	Register	3	0		1-0:10.8.15.255						(-VA) export
1	logical_name			octet_string[6]				"01000A080FFF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-VA)Rate16	M	M	Register	3	0		1-0:10.8.16.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0810FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate17	M	M	Register	3	0		1-0:10.8.17.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0811FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate18	M	M	Register	3	0		1-0:10.8.18.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0812FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate19	M	M	Register	3	0		1-0:10.8.19.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0813FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate20	M	M	Register	3	0		1-0:10.8.20.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0814FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	Energy(-VA)Rate21	M	M	Register	3	0		1-0:10.8.21.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0815FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate22	M	M	Register	3	0		1-0:10.8.22.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0816FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate23	M	M	Register	3	0		1-0:10.8.23.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0817FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	Energy(-VA)Rate24	M	M	Register	3	0		1-0:10.8.24.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0818FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			
B	EnergyFallbackRate(-VA)	M	M	Register	3	0		1-0:10.8.25.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0819FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,31}	--	--	G	G		
1	reset						0x28		--	--	--			

Annex D

(continued)

B	EnergyCurrentRate(+)	M	M	Data	1	0		0-1:96.14.0.255						current active tariff rate
1	logical_name			octet_string[6]				"0001600E00FF"	--	--	G	G		
2	value			octet_string[0..8]			0x08		--	--	G	G		currently active tariff = active_mask of register activation object Empty octet string represents no tariff is active.
B	EnergyCurrentRate(-)	M	M	Data	1	0		0-1:96.14.1.255						current active tariff rate
1	logical_name			octet_string[6]				"0001600E01FF"	--	--	G	G		
2	value			octet_string[0..8]			0x08		--	--	G	G		currently active tariff = active_mask of register activation object Empty octet string represents no tariff is active.
B	EnergyRateRegisterActivation(+)	M	M	Register activation	6	0		0-0:14.0.5.255						time of use import
1	logical_name			octet_string[6]				"00000E0005FF"	--	--	G			
2	register_assignment			array[24..*] (register_assignment_item)			0x08		--	(S)	G, (S)			Array size depends on the number of rated registers supported; 24 mandatory, others optional
3	mask_list			array[0..*]			0x10		--	S	G, S			
4	active_mask			octet_string[0..8]			0x18		--	--	G			
B	EnergyRateRegisterActivation(-)	M	M	Register activation	6	0		0-0:14.0.6.255						time of use export
1	logical_name			octet_string[6]				"00000E0006FF"	--	--	G			
2	register_assignment			array[24..*] (register_assignment_item)			0x08		--	(S)	G, (S)			Array size depends on the number of rated registers supported; 24 mandatory, others optional
3	mask_list			array[0..*]			0x10		--	S	G, S			

Annex D

(continued)

4	active_mask			octet_string[0..8]			0x18		--	--	G			

D.11 Meter demand tariffication objects

The objects for demand tariffication are given in Table D.11.

Table D.11 — Meter COSEM objects for demand tariffication

1	2	3		4	5		6	7	8					9
					IC				Access rights Get, Set, Action					
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Demand tariffication													Tariff registers
B	Demand(+A)Rate1	M	M	Extended register	4	0		1-0:1.6.1.255						(+A) import
1	logical_name			octet_string[6]				"0100010601FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+A)Rate2	M	M	Extended register	4	0		1-0:1.6.2.255						(+A) import
1	logical_name			octet_string[6]				"0100010602FF"	--	--	G	G		

Annex D

(continued)

2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+A)Rate3	M	M	Extended register	4	0		1-0:1.6.3.255						(+A) import
1	logical_name			octet_string[6]				"0100010603FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+A)Rate4	M	M	Extended register	4	0		1-0:1.6.4.255						(+A) import
1	logical_name			octet_string[6]				"0100010604FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+A)Rate5	M	M	Extended register	4	0		1-0:1.6.5.255						(+A) import
1	logical_name			octet_string[6]				"0100010605FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+A)Rate6	M	M	Extended register	4	0		1-0:1.6.6.255						(+A) import
1	logical_name			octet_string[6]				"0100010606FF"	--	--	G	G		

Annex D

(continued)

2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+A)Rate7	M	M	Extended register	4	0		1-0:1.6.7.255						(+A) import
1	logical_name			octet_string[6]				"0100010607FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+A)Rate8	M	M	Extended register	4	0		1-0:1.6.8.255						(+A) import
1	logical_name			octet_string[6]				"0100010608FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	DemandFallbackRate (+A)	M	M	Extended register	4	0		1-0:1.6.9.255						(+A) import
1	logical_name			octet_string[6]				"0100010609FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			

Annex D

(continued)

B	Demand(-A)Rate1	M	M	Extended register	4	0		1-0:2.6.1.255						(-A) export
1	logical_name			octet_string[6]				"0100020601FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-A)Rate2	M	M	Extended register	4	0		1-0:2.6.2.255						(-A) export
1	logical_name			octet_string[6]				"0100020602FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-A)Rate3	M	M	Extended register	4	0		1-0:2.6.3.255						(-A) export
1	logical_name			octet_string[6]				"0100020603FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-A)Rate4	M	M	Extended register	4	0		1-0:2.6.4.255						(-A) export
1	logical_name			octet_string[6]				"0100020604FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			

Annex D

(continued)

B	Demand(-A)Rate5	M	M	Extended register	4	0		1-0:2.6.5.255						(-A) export
1	logical_name			octet_string[6]				"0100020605FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-A)Rate6	M	M	Extended register	4	0		1-0:2.6.6.255						(-A) export
1	logical_name			octet_string[6]				"0100020606FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-A)Rate7	M	M	Extended register	4	0		1-0:2.6.7.255						(-A) export
1	logical_name			octet_string[6]				"0100020607FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-A)Rate8	M	M	Extended register	4	0		1-0:2.6.8.255						(-A) export
1	logical_name			octet_string[6]				"0100020608FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			

Annex D

(continued)

B	DemandFallbackRate (-A)	M	M	Extended register	4	0		1-0:2.6.9.255						(-A) export
1	logical_name			octet_string[6]				"0100020609FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+R)Rate1	M	M	Extended register	4	0		1-0:3.6.1.255						(+R) import
1	logical_name			octet_string[6]				"0100030601FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+R)Rate2	M	M	Extended register	4	0		1-0:3.6.2.255						(+R) import
1	logical_name			octet_string[6]				"0100030602FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+R)Rate3	M	M	Extended register	4	0		1-0:3.6.3.255						(+R) import
1	logical_name			octet_string[6]				"0100030603FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			

Annex D

(continued)

B	Demand(+R)Rate4	M	M	Extended register	4	0		1-0:3.6.4.255						(+R) import
1	logical_name			octet_string[6]				"0100030604FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+R)Rate5	M	M	Extended register	4	0		1-0:3.6.5.255						(+R) import
1	logical_name			octet_string[6]				"0100030605FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+R)Rate6	M	M	Extended register	4	0		1-0:3.6.6.255						(+R) import
1	logical_name			octet_string[6]				"0100030606FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+R)Rate7	M	M	Extended register	4	0		1-0:3.6.7.255						(+R) import
1	logical_name			octet_string[6]				"0100030607FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			

Annex D

(continued)

B	Demand(+R)Rate8	M	M	Extended register	4	0		1-0:3.6.8.255						(+R) import
1	logical_name			octet_string[6]				"0100030608FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	DemandFallbackRate(+R)	M	M	Extended register	4	0		1-0:3.6.9.255						(+R) import
1	logical_name			octet_string[6]				"0100030609FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-R)Rate1	M	M	Extended register	4	0		1-0:4.6.1.255						(-R) export
1	logical_name			octet_string[6]				"0100040601FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-R)Rate2	M	M	Extended register	4	0		1-0:4.6.2.255						(-R) export
1	logical_name			octet_string[6]				"0100040602FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		

Annex D

(continued)

1	reset			integer			0x38		--	--	--			
B	Demand(-R)Rate3	M	M	Extended register	4	0		1-0:4.6.3.255						(-R) export
1	logical_name			octet_string[6]				"0100040603FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-R)Rate4	M	M	Extended register	4	0		1-0:4.6.4.255						(-R) export
1	logical_name			octet_string[6]				"0100040604FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-R)Rate5	M	M	Extended register	4	0		1-0:4.6.5.255						(-R) export
1	logical_name			octet_string[6]				"0100040605FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-R)Rate6	M	M	Extended register	4	0		1-0:4.6.6.255						(-R) export
1	logical_name			octet_string[6]				"0100040606FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		

Annex D

(continued)

1	reset			integer			0x38		--	--	--			
B	Demand(-R)Rate7	M	M	Extended register	4	0		1-0:4.6.7.255						(-R) export
1	logical_name			octet_string[6]				"0100040607FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-R)Rate8	M	M	Extended register	4	0		1-0:4.6.8.255						(-R) export
1	logical_name			octet_string[6]				"0100040608FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	DemandFallbackRate (-R)	M	M	Extended register	4	0		1-0:4.6.9.255						(-R) export
1	logical_name			octet_string[6]				"0100040609FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		not use; return 0
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+VA)Rate1	M	M	Extended register	4	0		1-0:9.6.1.255						(+VA) import
1	logical_name			octet_string[6]				"0100090601FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		

Annex D

(continued)

5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+VA)Rate2	M	M	Extended register	4	0		1-0:9.6.2.255						(+VA) import
1	logical_name			octet_string[6]				"0100090602FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+VA)Rate3	M	M	Extended register	4	0		1-0:9.6.3.255						(+VA) import
1	logical_name			octet_string[6]				"0100090603FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+VA)Rate4	M	M	Extended register	4	0		1-0:9.6.4.255						(+VA) import
1	logical_name			octet_string[6]				"0100090604FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+VA)Rate5	M	M	Extended register	4	0		1-0:9.6.5.255						(+VA) import
1	logical_name			octet_string[6]				"0100090605FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		

Annex D

(continued)

5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+VA)Rate6	M	M	Extended register	4	0		1-0:9.6.6.255						(+VA) import
1	logical_name			octet_string[6]				"0100090606FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+VA)Rate7	M	M	Extended register	4	0		1-0:9.6.7.255						(+VA) import
1	logical_name			octet_string[6]				"0100090607FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(+VA)Rate8	M	M	Extended register	4	0		1-0:9.6.8.255						(+VA) import
1	logical_name			octet_string[6]				"0100090608FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	DemandFallbackRate(+VA)	M	M	Extended register	4	0		1-0:9.6.9.255						(+VA) import
1	logical_name			octet_string[6]				"0100090609FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		

Annex D

(continued)

4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-VA)Rate1	M	M	Extended register	4	0		1-0:10.6.1.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0601FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-VA)Rate2	M	M	Extended register	4	0		1-0:10.6.2.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0602FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-VA)Rate3	M	M	Extended register	4	0		1-0:10.6.3.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0603FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-VA)Rate4	M	M	Extended register	4	0		1-0:10.6.4.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0604FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		

Annex D

(continued)

4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-VA)Rate5	M	M	Extended register	4	0		1-0:10.6.5.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0605FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-VA)Rate6	M	M	Extended register	4	0		1-0:10.6.6.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0606FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-VA)Rate7	M	M	Extended register	4	0		1-0:10.6.7.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0607FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	Demand(-VA)Rate8	M	M	Extended register	4	0		1-0:10.6.8.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0608FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		

Annex D

(continued)

4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	DemandFallbackRate (-VA)	M	M	Extended register	4	0		1-0:10.6.9.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0609FF"	--	--	G	G		
2	value			double_long_unsigned			0x08		--	--	G	G		
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G	G		
4	status			unsigned			0x18		--	--	G	G		
5	capture_time			octet_string			0x20		--	--	G	G		
1	reset			integer			0x38		--	--	--			
B	DemandCurrentRate(+)	M	M	Data	1	0		0-1:96.14.8.255						current active tariff
1	logical_name			octet_string[6]				"0001600E08FF"	--	--	G	G		
2	value			octet_string[0..8]			0x08		--	--	G	G		currently active tariff = active_mask of register activation object Empty octet string represents no tariff is active.
B	DemandCurrentRate(-)	M	M	Data	1	0		0-1:96.14.9.255						current active tariff
1	logical_name			octet_string[6]				"0001600E09FF"	--	--	G	G		
2	value			octet_string[0..8]			0x08		--	--	G	G		currently active tariff = active_mask of register activation object Empty octet string represents no tariff is active.
B	DemandRateRegister Activation(+)	M	M	Register activation	6	0		0-0:14.0.3.255						demand import
1	logical_name			octet_string[6]				"00000E0003FF"	--	--	G			

Annex D

(continued)

2	register_assignment			array[12..*] (register_assignme nt_item)			0x08		--	(S)	G, (S)			Array size depends on the number of rated registers supported; 12 mandatory, others optional
3	mask_list			array[0..*]			0x10		--	S	G, S			
4	active_mask			octet_string[0..8]			0x18		--	--	G			
B	DemandRateRegister Activation(-)	M	M	Register activation	6	0		0-0:14.0.4.255						demand export
1	logical_name			octet_string[6]				"00000E0004FF"	--	--	G			
2	register_assignment			array[12..*] (register_assignme nt_item)			0x08		--	(S)	G, (S)			Array size depends on the number of rated registers supported; 12 mandatory, others optional
3	mask_list			array[0..*]			0x10		--	S	G, S			
4	active_mask			octet_string[0..8]			0x18		--	--	G			

D.12 Meter load profile objects

The objects for load profiles are given in Table D.12

Annex D

(continued)

Table D.12 — Meter COSEM objects for load profiles

1	2	3		4	5		6	7	8					9
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	IC		SN	OBIS/ value	Access rights Get, Set, Action					Comment
		1PH	3PH		Class	Version			Public	Pre-estab	Management	CIU	HHU	
A	Load profiles													
B	LoadProfile1Status	M	M	Data	1	0		0-0:96.10.1.255						for period 1
1	logical_name			octet_string[6]				"0000600A01FF"	--	--	G	G		
2	status			unsigned			0x08		--	--	G	G		bitmask :: {PDN,reserved,CAD,reserved,D ST,DNV,CIV,ERR}
B	LoadProfile2Status	M	M	Data	1	0		0-0:96.10.2.255						for period 2
1	logical_name			octet_string[6]				"0000600A02FF"	--	--	G	G		
2	status			unsigned			0x08		--	--	G	G		bitmask :: {PDN,reserved,CAD,reserved,D ST,DNV,CIV,ERR}
B	LoadProfile1	M	M	Profile generic	7	1		1-0:99.1.0.255						general load profile
1	logical_name			octet_string[6]				"0100630100FF"	--	--	G	G		
2	buffer			array			0x08		--	--	G	G		selective access per range and entry
3	capture_objects			array[2..*] (capture_object_definition)			0x10		--	--	G, S	G		clock;AMR profile status; +A;–A

Annex D

(continued)

4	capture_period			double_long_unsign ed			0x18	choice(300, 600, 900, 1800, 3600)	--	--	G, S	G		15 minutes
5	sort_method			enum			0x20	choice(1,4)	--	--	G	G		unsorted (FIFO) or sorted (smallest)
6	sort_object			capture_object_defi nition			0x28	choice({*, *- *.*.*.*.*,*}, {8,0- 0:1.0.0.255,2,0})	--	--	G	G		unsorted or sorted by clock depending on choice in attr. sort_method i.e. if sort_method=sorted then sort_object=0-0:1.0.0.255
7	entries_in_use			double_long_unsign ed			0x30		--	--	G	G		
8	profile_entries			double_long_unsign ed			0x38	[4800..*]	--	--	G, (S)	G		≥50 days, optional set to restrict maximum capacity according to national laws
1	reset						0x58		--	--	A			
B	LoadProfile2	M	M	Profile generic	7	1		1-0:99.2.0.255						daily values load profile
1	logical_name			octet_string[6]				"0100630200FF"	--	--	G	G		
2	buffer			array			0x08		--	--	G	G		selective access per range and entry
3	capture_objects			array[2..*] (capture_object_def inition)			0x10		--	--	G, S	G		clock;AMR profile status; choice amongst rated registers, etc.
4	capture_period			double_long_unsign ed			0x18	choice(86400, 300, 600, 900, 1800, 3600)	--	--	G, S	G		daily
5	sort_method			enum			0x20	choice(1,4)	--	--	G	G		unsorted (FIFO) or sorted (smallest)
6	sort_object			capture_object_defi nition			0x28	choice({*, *- *.*.*.*.*,*}, {8,0- 0:1.0.0.255,2,0})	--	--	G	G		unsorted or sorted by clock depending on choice in attr. sort_method i.e. if sort_method=sorted then sort_object=0-0:1.0.0.255
7	entries_in_use			double_long_unsign ed			0x30		--	--	G	G		

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(continued)

8	profile_entries			double_long_unsigned			0x38	[1200..*]	--	--	G, (S)	G		≥50 days, optional set to restrict maximum capacity according to national laws
1	reset						0x58		--	--	A			
B	LP1SingleActionSchedule	M	M	Single action schedule	2	0		0-100:15.0.4.255						for load profile 1
1	logical_name			octet_string[6]				"00640F0004FF"	--	--	G			
2	executed_script			script			0x08		--	--	G, (S)			
3	type			enum			0x10	5	--	--	G, (S)			
4	execution_time			array[0..*](execution_time_date)			0x18		--	--	G, S			
B	LP2SingleActionSchedule	M	M	Single action schedule	2	0		0-101:15.0.4.255						for load profile 2
1	logical_name			octet_string[6]				"00650F0004FF"	--	--	G			
2	executed_script			script			0x08		--	--	G, (S)			
3	type			enum			0x10	5	--	--	G, (S)			
4	execution_time			array[0..*](execution_time_date)			0x18		--	--	G, S			
B	LoadProfilePushScriptTable	M	M	Script table	9	0		0-105:10.0.108.255						for load profiles
1	logical_name			octet_string[6]				"00690A006CFF"	--	--	G			
2	scripts			scripts			0x08		--	--	G, (S)			

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(continued)

1	execute			long_unsigned			0x20		--	--	A			
B	LoadProfilePushSetup	M	M	Push setup	4 0	0		0-104:25.9.0.255						all events
1	logical_name			octet_string[6]				"0068190900FF"	--	--	G			
2	push_object_list			array[0..*] (capture_object_definition)			0x08		--	--	G, S			
3	send_destination_and_method			send_destination_and_method_type			0x10		--	--	G, S			
4	communication_window			array[0..*](window_element)			0x18		--	--	G, S			
5	randomisation_start_interval			long_unsigned			0x20	0	--	--	G, S			Randomization time in seconds, 0 = no randomization at start of the first window defined in calling_window
6	number_of_retries			unsigned			0x28		--	--	G, S			Max number of repetitions of unsuccessful push
7	repetition_delay			long_unsigned			0x30		--	--	G, S			Delay in seconds between repetitions
1	push			integer			0x38		--	A	A			

Annex D

(continued)

D.13 Meter end of billing profile objects

The objects for end of billing schedule are given in Table D.13.

Table D.13 — Meter COSEM objects for load profiles

1	2	3		4	5 IC		6	7	8 Access rights Get, Set, Action					9
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	End of billing profile													
B	EOBProfileStatus(+)	M	M	Data	1	0		0-5:96.10.1.255						for EOB
1	logical_name			octet_string[6]				"0005600A01FF"	--	--	G	G		
2	status			unsigned			0x08		--	--	G	G		bitmask :: {PDN,reserved,CAD,reserved,D ST,DNV,CIV,ERR}
B	EOBProfileStatus(-)	M	M	Data	1	0		0-5:96.10.2.255						for EOB
1	logical_name			octet_string[6]				"0005600A02FF"	--	--	G	G		
2	status			unsigned			0x08		--	--	G	G		bitmask :: {PDN,reserved,CAD,reserved,D ST,DNV,CIV,ERR}

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(continued)

B	EOBProfile(+)	M	M	Profile generic	7	1		0-0:98.1.1.255						Stored Billing Values Profile import
1	logical_name			octet_string[6]				"0000620101FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range and entry
3	capture_objects			array[1..*] (capture_object_definition)			0x10		--	--	G, S			clock;+A rate 1;+A rate 2;–A rate 1;–A rate 2; etc.
4	capture_period			double_long_unsigned			0x18	0	--	--	G			
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*.*.*.*,*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[13..*]	--	--	G			≥ 13 months
1	reset			integer			0x58		--	--	A			
B	EOBProfile(-)	M	M	Profile generic	7	1		0-0:98.1.2.255						Stored Billing Values Profile export
1	logical_name			octet_string[6]				"0000620102FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range and entry
3	capture_objects			array[1..*] (capture_object_definition)			0x10		--	--	G, S			clock;+A rate 1;+A rate 2;–A rate 1;–A rate 2; etc.
4	capture_period			double_long_unsigned			0x18	0	--	--	G			
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*.*.*.*,*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[13..*]	--	--	G			≥ 13 months

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(continued)

1	reset			integer			0x58		--	--	A			
B	EOBSingleActionSchedule(+)	M	M	Single action schedule	2 2	0		0-1:15.0.0.255						Single action scheduler for Stored Billing Values Profile for import
1	logical_name			octet_string[6]				"00010F0000FF"	--	--	G			
2	executed_script			script			0x08		--	--	G			"MDI reset / end of billing period"
3	type			enum			0x10	1	--	--	G, (S)			1 is mandatory (Other are optional). If only type 1 is supported Set is optional)
4	execution_time			array[0..1] (execution_time_date)			0x18		--	--	G, S			at midnight (or any other time) of the first day of every month; the execution can be disabled with writing empty array or {"FFFFFFFF", "FFFFFFFFFFFF"}}
B	EOBSingleActionSchedule(-)	M	M	Single action schedule	2 2	0		0-1:15.0.1.255						Single action scheduler for Stored Billing Values Profile for export
1	logical_name			octet_string[6]				"00010F0001FF"	--	--	G			
2	executed_script			script			0x08		--	--	G			"MDI reset / end of billing period"
3	type			enum			0x10	1	--	--	G, (S)			1 is mandatory (Other are optional). If only type 1 is supported Set is optional)
4	execution_time			array[0..1] (execution_time_date)			0x18		--	--	G, S			at midnight (or any other time) of the first day of every month; the execution can be disabled with writing empty array or {"FFFFFFFF", "FFFFFFFFFFFF"}}
B	EOBProfilePushScriptTable	M	M	Script table	9	0		0-100:10.0.108.255						
1	logical_name			octet_string[6]				"00640A006CFF"	--	--	G			

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2	scripts			scripts			0x08		--	--	(G)				The attribute's access rights must be declared in CTI file. Allowed possibilities - no access or Get access
1	execute			long_unsigned			0x20	1	--	--	A				The activation of this scripts is performed by calling the execute() method to the script identifier 1 of the corresponding script object
B	EOBProfilePushSetup	M	M	Push setup	4 0	0		0-105:25.9.0.255							all events
1	logical_name			octet_string[6]				"0069190900FF"	--	--	G				
2	push_object_list			array[0..*] (capture_object_definition)			0x08		--	--	G, S				
3	send_destination_and_method			send_destination_and_method_type			0x10		--	--	G, S				
4	communication_window			array[0..*](window_element)			0x18		--	--	G, S				
5	randomisation_start_interval			long_unsigned			0x20	0	--	--	G, S				Randomiztion time in seconds, 0 = no randomization at start of the first window defined in calling_window
6	number_of_retries			unsigned			0x28		--	--	G, S				Max number of repetitions of unsuccessful push
7	repetition_delay			long_unsigned			0x30		--	--	G, S				Delay in seconds between repetitions
1	push			integer			0x38		--	A	A				

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(continued)

D.14 Meter reading objects

The objects for meter reading are given in Table D.14.

Table D.14 — Meter COSEM objects for meter reading

1	2	3	4	5		6	7	8					9	
				IC				Access rights Get, Set, Action						
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Meter reading													
B	MRSingleActionSchedule1	M	M	Single action schedule	2	0		0-102:15.0.4.255						
1	logical_name			octet_string[6]				"00660F0004FF"	--	--	G			
2	executed_script			script			0x08		--	--	G, (S)			
3	type			enum			0x10	5	--	--	G, (S)			
4	execution_time			array[0..*](execution_time_date)			0x18		--	--	G, S			
B	MRSingleActionSchedule2	M	M	Single action schedule	2	0		0-103:15.0.4.255						
1	logical_name			octet_string[6]				"00670F0004FF"	--	--	G			
2	executed_script			script			0x08		--	--	G, (S)			

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3	type			enum			0x10	5	--	--	G, (S)			
4	execution_time			array[0..*](execution_time_date)			0x18		--	--	G, S			
B	MRSingleActionSchedule3	M	M	Single action schedule	2	0		0-104:15.0.4.255						
1	logical_name			octet_string[6]				"00680F0004FF"	--	--	G			
2	executed_script			script			0x08		--	--	G, (S)			
3	type			enum			0x10	5	--	--	G, (S)			
4	execution_time			array[0..*] (execution_time_date)			0x18		--	--	G, S			
B	MRPushScriptTable	M	M	Script table	9	0		0-106:10.0.108.255						
1	logical_name			octet_string[6]				"006A0A006CFF"	--	--	G			
2	scripts			scripts			0x08		--	--	G, (S)			
1	execute			long_unsigned			0x20		--	--	A			
B	MRPushSetup1	M	M	Push setup	4	0		0-100:25.9.0.255						
1	logical_name			octet_string[6]				"0064190900FF"	--	--	G			
2	push_object_list			array[0..*] (capture_object_definition)			0x08		--	--	G, S			
3	send_destination_and_method			send_destination_and_method_type			0x10		--	--	G, S			
4	communication_window			array[0..*](window_element)			0x18		--	--	G, S			

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5	randomisation_start_interval			long_unsigned			0x20	0	--	--	G, S			Randomization time in seconds, 0 = no randomization at start of the first window defined in calling_window
6	number_of_retries			unsigned			0x28		--	--	G, S			Max number of repetitions of unsuccessful push
7	repetition_delay			long_unsigned			0x30		--	--	G, S			Delay in seconds between repetitions
1	push			integer			0x38		--	A	A			
B	MRPushSetup2	M	M	Push setup	4 0	0		0-101:25.9.0.255						
1	logical_name			octet_string[6]				"0065190900FF"	--	--	G			
2	push_object_list			array[0..*] (capture_object_definition)			0x08		--	--	G, S			
3	send_destination_and_method			send_destination_and_method_type			0x10		--	--	G, S			
4	communication_window			array[0..*](window_element)			0x18		--	--	G, S			
5	randomisation_start_interval			long_unsigned			0x20	0	--	--	G, S			Randomization time in seconds, 0 = no randomization at start of the first window defined in calling_window
6	number_of_retries			unsigned			0x28		--	--	G, S			Max number of repetitions of unsuccessful push
7	repetition_delay			long_unsigned			0x30		--	--	G, S			Delay in seconds between repetitions
1	push			integer			0x38		--	A	A			
B	MRPushSetup3	M	M	Push setup	4 0	0		0-102:25.9.0.255						
1	logical_name			octet_string[6]				"0066190900FF"	--	--	G			
2	push_object_list			array[0..*] (capture_object_definition)			0x08		--	--	G, S			

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3	send_destination_and_method			send_destination_and_method_type			0x10		--	--	G, S			
4	communication_window			array[0..*](window_element)			0x18		--	--	G, S			
5	randomisation_start_interval			long_unsigned			0x20	0	--	--	G, S			Randomization time in seconds, 0 = no randomization at start of the first window defined in calling_window
6	number_of_retries			unsigned			0x28		--	--	G, S			Max number of repetitions of unsuccessful push
7	repetition_delay			long_unsigned			0x30		--	--	G, S			Delay in seconds between repetitions
1	push			integer			0x38		--	A	A			

D.15 Meter power quality objects

The objects for power quality are given in Table D.15.

Table D.15 — Meter COSEM objects for load profiles

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B	NoPowerFailures	M	M	Data	1	0		0-0:96.7.21.255						any phase
1	logical_name			octet_string[6]				"0000600715FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
B	NoLongPowerFailures	M	M	Data	1	0		0-0:96.7.9.255						any phase
1	logical_name			octet_string[6]				"0000600709FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
B	LongPowerFailureTimeThreshold	M	M	Register	3	0		0-0:96.7.20.255						
1	logical_name			octet_string[6]				"0000600714FF"	--	--	G			
2	value			long_unsigned			0x08	180	--	S	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			
1	reset						0x28		--	--	--			
B	LastLongPowerFailureDuration	M	M	Register	3	0		0-0:96.7.19.255						any phase
1	logical_name			octet_string[6]				"0000600713FF"	--	--	G			
2	value			choice(long_unsigned, double_long_unsigned)			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			
1	reset						0x28		--	--	--			
B	VoltageSagThreshold	M	M	Register	3	0		1-0:12.31.0.255						for all phases
1	logical_name			octet_string[6]				"01000C1F00FF"	--	--	G			
2	value			long_unsigned			0x08	207	--	S	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,35}	--	--	G			
1	reset						0x28		--	--	--			
B	VoltageSagTimeThre	M	M	Register	3	0		1-0:12.43.0.255						for all phases

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1	logical_name			octet_string[6]			"01000C2B00FF"	--	--	G			
2	value			long_unsigned		0x08	30	--	S	G, S			
3	scaler_unit			scal_unit_type		0x10	{0,7}	--	--	G			
1	reset					0x28		--	--	--			
B	NoVoltageSagsL1	M	M	Data	1	0	1-0:32.32.0.255						
1	logical_name			octet_string[6]			"0100202000FF"	--	--	G			
2	value			long_unsigned		0x08		--	--	G			
B	NoVoltageSagsL2	N A	M	Data	1	0	1-0:52.32.0.255						
1	logical_name			octet_string[6]			"0100342000FF"	--	--	G			
2	value			long_unsigned		0x08		--	--	G			
B	NoVoltageSagsL3	N A	M	Data	1	0	1-0:72.32.0.255						
1	logical_name			octet_string[6]			"0100482000FF"	--	--	G			
2	value			long_unsigned		0x08		--	--	G			
B	LastVoltageSagDurationL1	M	M	Register	3	0	1-0:32.33.0.255						
1	logical_name			octet_string[6]			"0100202100FF"	--	--	G			
2	value			long_unsigned		0x08		--	--	G			
3	scaler_unit			scal_unit_type		0x10	{0,7}	--	--	G			
1	reset					0x28		--	--	--			
B	LastVoltageSagDurationL2	N A	M	Register	3	0	1-0:52.33.0.255						
1	logical_name			octet_string[6]			"0100342100FF"	--	--	G			
2	value			long_unsigned		0x08		--	--	G			
3	scaler_unit			scal_unit_type		0x10	{0,7}	--	--	G			
1	reset					0x28		--	--	--			

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(continued)

B	LastVoltageSagDurationL3	N A	M	Register	3	0		1-0:72.33.0.255						
1	logical_name			octet_string[6]				"0100482100FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			
1	reset						0x28		--	--	--			
B	LastVoltageSagMagnitudeL1	M	M	Register	3	0		1-0:32.34.0.255						
1	logical_name			octet_string[6]				"0100202200FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,35}	--	--	G			
1	reset						0x28		--	--	--			
B	LastVoltageSagMagnitudeL2	N A	M	Register	3	0		1-0:52.34.0.255						
1	logical_name			octet_string[6]				"0100342200FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,35}	--	--	G			
1	reset						0x28		--	--	--			
B	LastVoltageSagMagnitudeL3	N A	M	Register	3	0		1-0:72.34.0.255						
1	logical_name			octet_string[6]				"0100482200FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,35}	--	--	G			
1	reset						0x28		--	--	--			
B	VoltageSwellThreshold	M	M	Register	3	0		1-0:12.35.0.255						for all phases
1	logical_name			octet_string[6]				"01000C2300FF"	--	--	G			
2	value			long_unsigned			0x08	253	--	S	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,35}	--	--	G			
1	reset						0x28		--	--	--			

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(continued)

B	VoltageSwellTimeThreshold	M	M	Register	3	0		1-0:12.44.0.255						for all phases
1	logical_name			octet_string[6]				"01000C2C00FF"	--	--	G			
2	value			long_unsigned			0x08	30	--	S	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			
1	reset						0x28		--	--	--			
B	NoVoltageSwellsL1	M	M	Data	1	0		1-0:32.36.0.255						
1	logical_name			octet_string[6]				"0100202400FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
B	NoVoltageSwellsL2	N A	M	Data	1	0		1-0:52.36.0.255						
1	logical_name			octet_string[6]				"0100342400FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
B	NoVoltageSwellsL3	N A	M	Data	1	0		1-0:72.36.0.255						
1	logical_name			octet_string[6]				"0100482400FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
B	LastVoltageSwellDurationL1	M	M	Register	3	0		1-0:32.37.0.255						
1	logical_name			octet_string[6]				"0100202500FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			
1	reset						0x28		--	--	--			
B	LastVoltageSwellDurationL2	N A	M	Register	3	0		1-0:52.37.0.255						
1	logical_name			octet_string[6]				"0100342500FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			
1	reset						0x28		--	--	--			

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(continued)

B	LastVoltageSwellDurationL3	N A	M	Register	3	0		1-0:72.37.0.255						
1	logical_name			octet_string[6]				"0100482500FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			
1	reset						0x28		--	--	--			
B	LastVoltageSwellMagnitudeL1	M	M	Register	3	0		1-0:32.38.0.255						
1	logical_name			octet_string[6]				"0100202600FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,35}	--	--	G			
1	reset						0x28		--	--	--			
B	LastVoltageSwellMagnitudeL2	N A	M	Register	3	0		1-0:52.38.0.255						
1	logical_name			octet_string[6]				"0100342600FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,35}	--	--	G			
1	reset						0x28		--	--	--			
B	LastVoltageSwellMagnitudeL3	N A	M	Register	3	0		1-0:72.38.0.255						
1	logical_name			octet_string[6]				"0100482600FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,35}	--	--	G			
1	reset						0x28		--	--	--			
B	VoltageCutThreshold	M	M	Register	3	0		1-0:12.39.0.255						for all phases
1	logical_name			octet_string[6]				"01000C2700FF"	--	--	G			
2	value			long_unsigned			0x08	103	--	S	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,35}	--	--	G			
1	reset						0x28		--	--	--			

Annex D

(continued)

B	VoltageCutTimeThres hold	M	M	Register	3	0		1-0:12.45.0.255						for all phases
1	logical_name			octet_string[6]				"01000C2D00FF"	--	--	G			
2	value			long_unsigned			0x08	30	--	S	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			
1	reset						0x28		--	--	--			
B	PowerFailureEventLog	M	M	Profile generic	7	1		1-0:99.97.0.255						
1	logical_name			octet_string[6]				"0100636100FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2]			0x10		--	--	G, (S)			clock;duration of long power failures in any phase
4	capture_period			double_long_unsign ed			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_defi nition			0x28	{*,*-*.*.*.*,*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsign ed			0x30		--	--	G			
8	profile_entries			double_long_unsign ed			0x38	[10..*]	--	--	G			
1	reset			integer			0x58		--	--	A			
B	PowerQualityLog	M	M	Profile generic	7	1		0-1:99.98.1.255						
1	logical_name			octet_string[6]				"0001636201FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2]			0x10		--	--	G, (S)			clock;event code
4	capture_period			double_long_unsign ed			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)

Annex D

(continued)

6	sort_object			capture_object_definition			0x28	{*,*:*:*:*:*,*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G			
1	reset						0x58		--	--	A			
B	InstantaneousVoltageL1	M	M	Register	3	0		1-0:32.7.0.255						
1	logical_name			octet_string[6]				"0100200700FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	choice({0,35},{-1,35})	--	--	G			scaler=0 or-1, unit=V resolution: 0 or 0.0 V
1	reset						0x28		--	--	--			
B	AverageVoltageL1	M	M	Register	3	0		1-0:32.24.0.255						
1	logical_name			octet_string[6]				"0100201800FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			10 minutes average voltage
3	scaler_unit			scal_unit_type			0x10	choice({0,35},{-1,35})	--	--	G			scaler=0 or-1, unit=V resolution: 0 or 0.0 V
1	reset						0x28		--	--	--			
B	InstantaneousCurrentL1	M	M	Register	3	0		1-0:31.7.0.255						
1	logical_name			octet_string[6]				"01001F0700FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	choice({0,33},{-1,33},{-2,33})	--	--	G			scaler=0,-1 or-2, unit=A resolution: 0, 0.0 or 0.00 A
1	reset						0x28		--	--	--			
B	SlidingAverageCurrentL1	M	M	Demand register	5	0		1-0:31.4.0.255						for fuse supervision
1	logical_name			octet_string[6]				"01001F0400FF"	--	--	G			
2	current_average_value			double_long_unsigned			0x08		--	--	G			

Annex D

(continued)

3	last_average_value			double_long_unsigned		0x10		--	--	G			
4	scaler_unit			scal_unit_type		0x18	choice({0,33},{-1,33},{-2,33})	--	--	G			
5	status			unsigned		0x20	0	--	--	G			
6	capture_time			octet_string		0x28		--	--	G			
7	start_time_current			octet_string		0x30		--	--	G			
8	period			double_long_unsigned		0x38	1	--	--	G			
9	number_of_periods			long_unsigned		0x40	90	--	--	G, S			
1	reset					0x48		--	--	--			
2	next_period					0x50		--	--	--			
B	InstantaneousVoltage L2	N A	M	Register	3	0		1-0:52.7.0.255					
1	logical_name			octet_string[6]			"0100340700FF"	--	--	G			
2	value			long_unsigned		0x08		--	--	G			
3	scaler_unit			scal_unit_type		0x10	choice({0,35},{-1,35})	--	--	G			scaler=0 or-1, unit=V resolution: 0 or 0.0 V
1	reset					0x28		--	--	--			
B	AverageVoltageL2	N A	M	Register	3	0		1-0:52.24.0.255					
1	logical_name			octet_string[6]			"0100341800FF"	--	--	G			
2	value			long_unsigned		0x08		--	--	G			10 minutes average voltage
3	scaler_unit			scal_unit_type		0x10	choice({0,35},{-1,35})	--	--	G			scaler=0 or-1, unit=V resolution: 0 or 0.0 V
1	reset					0x28		--	--	--			
B	InstantaneousCurrent L2	N A	M	Register	3	0		1-0:51.7.0.255					
1	logical_name			octet_string[6]			"0100330700FF"	--	--	G			
2	value			long_unsigned		0x08		--	--	G			
3	scaler_unit			scal_unit_type		0x10	choice({0,33},{-1,33},{-2,33})	--	--	G			scaler=0,-1 or-2, unit=A resolution: 0, 0.0 or 0.00 A

1	reset					0x28		--	--	--			
---	-------	--	--	--	--	------	--	----	----	----	--	--	--

Annex D
(continued)

B	SlidingAverageCurrentL2	N A	M	Demand register	5	0		1-0:51.4.0.255						for fuse supervision
1	logical_name			octet_string[6]				"0100330400FF"	--	--	G			
2	current_average_value			double_long_unsigned			0x08		--	--	G			
3	last_average_value			double_long_unsigned			0x10		--	--	G			
4	scaler_unit			scal_unit_type			0x18	choice({0,33},{-1,33},{-2,33})	--	--	G			
5	status			unsigned			0x20	0	--	--	G			
6	capture_time			octet_string			0x28		--	--	G			
7	start_time_current			octet_string			0x30		--	--	G			
8	period			double_long_unsigned			0x38	1	--	--	G			
9	number_of_periods			long_unsigned			0x40	90	--	--	G, S			
1	reset						0x48		--	--	--			
2	next_period						0x50		--	--	--			
B	InstantaneousVoltageL3	N A	M	Register	3	0		1-0:72.7.0.255						
1	logical_name			octet_string[6]				"0100480700FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	choice({0,35},{-1,35})	--	--	G			scaler=0 or-1, unit=V resolution: 0 or 0.0 V
1	reset						0x28		--	--	--			
B	AverageVoltageL3	N A	M	Register	3	0		1-0:72.24.0.255						
1	logical_name			octet_string[6]				"0100481800FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			average voltage (see object MeasurementPeriod3)
3	scaler_unit			scal_unit_type			0x10	choice({0,35},{-1,35})	--	--	G			scaler=0 or-1, unit=V resolution: 0 or 0.0 V

1	reset						0x28		--	--	--			

Annex D

(continued)

B	InstantaneousCurrentL3	N A	M	Register	3	0		1-0:71.7.0.255						
1	logical_name			octet_string[6]				"0100470700FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	choice({0,33},{-1,33},{-2,33})	--	--	G			scaler=0,-1 or-2, unit=A resolution: 0, 0.0 or 0.00 A
1	reset						0x28		--	--	--			
B	SlidingAverageCurrentL3	N A	M	Demand register	5	0		1-0:71.4.0.255						for fuse supervision
1	logical_name			octet_string[6]				"0100470400FF"	--	--	G			
2	current_average_value			double_long_unsigned			0x08		--	--	G			
3	last_average_value			double_long_unsigned			0x10		--	--	G			
4	scaler_unit			scal_unit_type			0x18	choice({0,33},{-1,33},{-2,33})	--	--	G			
5	status			unsigned			0x20	0	--	--	G			
6	capture_time			octet_string			0x28		--	--	G			
7	start_time_current			octet_string			0x30		--	--	G			
8	period			double_long_unsigned			0x38	1	--	--	G			
9	number_of_periods			long_unsigned			0x40	90	--	--	G, S			
1	reset						0x48		--	--	--			
2	next_period						0x50		--	--	--			
B	InstantaneousCurrent	M	M	Register	3	0		1-0:90.7.0.255						sum over all phases
1	logical_name			octet_string[6]				"01005A0700FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			total current (sum of all phases)
3	scaler_unit			scal_unit_type			0x10	choice({0,33},{-1,33},{-2,33})	--	--	G			scaler=0,-1 or-2, unit=A resolution: 0, 0.0 or 0.00 A
1	reset						0x28		--	--	--			

B	InstantaneousNetFrequency	M	M	Register	3	0		1-0:14.7.0.255						any phase
1	logical_name			octet_string[6]				"01000E0700FF"	--	--	G			

Annex D

(continued)

2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	choice({0,44},{-1,44},{-2,44})	--	--	G			scaler=0,-1 or-2, unit=Hz resolution: 0, 0.0 or 0.00 Hz
1	reset						0x28		--	--	--			
B	InstantaneousActivePowerL1(+A)	M	M	Register	3	0		1-0:21.7.0.255						(+A) import
1	logical_name			octet_string[6]				"0100150700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	InstantaneousActivePowerL2(+A)	M	M	Register	3	0		1-0:41.7.0.255						(+A) import
1	logical_name			octet_string[6]				"0100290700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	InstantaneousActivePowerL3(+A)	M	M	Register	3	0		1-0:61.7.0.255						(+A) import
1	logical_name			octet_string[6]				"01003D0700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	InstantaneousActivePowerL1(-A)	M	M	Register	3	0		1-0:22.7.0.255						(-A) export
1	logical_name			octet_string[6]				"0100160700FF"	--	--	G			

2	value			double_long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			

Annex D

(continued)

B	InstantaneousActivePowerL2(-A)	M	M	Register	3	0		1-0:42.7.0.255						(-A) export
1	logical_name			octet_string[6]				"01002A0700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	InstantaneousActivePowerL3(-A)	M	M	Register	3	0		1-0:62.7.0.255						(-A) export
1	logical_name			octet_string[6]				"01003E0700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	InstantaneousActivePower	M	M	Register	3	0		1-0:15.7.0.255						(+A + -A)
1	logical_name			octet_string[6]				"01000F0700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			sum of all phases: QI+QIV + QII+QIII
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	InstantaneousActivePower(+A)	M	M	Register	3	0		1-0:1.7.0.255						(+A) import
1	logical_name			octet_string[6]				"0100010700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			

Annex D

(continued)

B	InstantaneousActivePower(-A)	M	M	Register	3	0		1-0:2.7.0.255						(-A) export
1	logical_name			octet_string[6]				"0100020700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	InstantaneousReactivePower(+R)	M	M	Register	3	0		1-0:3.7.0.255						(+R) import
1	logical_name			octet_string[6]				"0100030700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G			
1	reset						0x28		--	--	--			
B	InstantaneousReactivePower(-R)	M	M	Register	3	0		1-0:4.7.0.255						(-R) export
1	logical_name			octet_string[6]				"0100040700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,29}	--	--	G			
1	reset						0x28		--	--	--			
B	InstantaneousApparentPower(+VA)	M	M	Register	3	0		1-0:9.7.0.255						(+VA) import
1	logical_name			octet_string[6]				"0100090700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G			
1	reset						0x28		--	--	--			
B	InstantaneousApparentPower(-VA)	M	M	Register	3	0		1-0:10.7.0.255						(-VA) export
1	logical_name			octet_string[6]				"01000A0700FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			

Annex D

(continued)

3	scaler_unit			scal_unit_type			0x10	{0,28}	--	--	G			
1	reset						0x28		--	--	--			
B	AverageImportPower(+A)	M	M	Demand register	5	0		1-0:1.24.0.255						(+A) import sliding demand with its own period
1	logical_name			octet_string[6]				"0100011800FF"	--	--	G			
2	current_average_value			double_long_unsigned			0x08		--	--	G			
3	last_average_value			double_long_unsigned			0x10		--	--	G			
4	scaler_unit			scal_unit_type			0x18	{0,27}	--	--	G			
5	status			unsigned			0x20	0	--	--	G			
6	capture_time			octet_string			0x28		--	--	G			
7	start_time_current			octet_string			0x30		--	--	G			
8	period			double_long_unsigned			0x38	60	--	--	G			
9	number_of_periods			long_unsigned			0x40	15	--	--	G, S			
1	reset						0x48		--	--	--			
2	next_period						0x50		--	--	--			
B	AverageNetPower	M	M	Demand register	5	0		1-0:16.24.0.255						(+A - -A) sliding demand with its own period
1	logical_name			octet_string[6]				"0100101800FF"	--	--	G			
2	current_average_value			double_long			0x08		--	--	G			
3	last_average_value			double_long			0x10		--	--	G			
4	scaler_unit			scal_unit_type			0x18	{0,27}	--	--	G			
5	status			unsigned			0x20	0	--	--	G			
6	capture_time			octet_string			0x28		--	--	G			
7	start_time_current			octet_string			0x30		--	--	G			
8	period			double_long_unsigned			0x38	60	--	--	G			
9	number_of_periods			long_unsigned			0x40	15	--	--	G, S			

Annex D

(continued)

1	reset					0x48		--	--	--			
2	next_period					0x50		--	--	--			
B	AverageTotalPower	M	M	Demand register	5	0		1-0:15.24.0.255					(+A + -A) Sliding demand with its own period
1	logical_name			octet_string[6]			"01000F1800FF"	--	--	G			
2	current_average_value			double_long_unsigned		0x08		--	--	G			
3	last_average_value			double_long_unsigned		0x10		--	--	G			
4	scaler_unit			scal_unit_type		0x18	{0,27}	--	--	G			
5	status			unsigned		0x20	0	--	--	G			
6	capture_time			octet_string		0x28		--	--	G			
7	start_time_current			octet_string		0x30		--	--	G			
8	period			double_long_unsigned		0x38	60	--	--	G			
9	number_of_periods			long_unsigned		0x40	15	--	--	G, S			
1	reset					0x48		--	--	--			
2	next_period					0x50		--	--	--			
B	InstantaneousPowerFactor	M	M	Register	3	0		1-0:13.7.0.255					(+A/+VA)
1	logical_name			octet_string[6]			"01000D0700FF"	--	--	G			
2	value			long_unsigned		0x08		--	--	G			
3	scaler_unit			scal_unit_type		0x10	{-3,255}	--	--	G			
1	reset					0x28		--	--	--			
B	LastAveragePowerFactor	M	M	Extended register	4	0		1-0:13.5.0.255					(+A/+VA) For display purposes only
1	logical_name			octet_string[6]			"01000D0500FF"	--	--	G			
2	value			long_unsigned		0x08		--	--	G			
3	scaler_unit			scal_unit_type		0x10	{-3,255}	--	--	G			
4	status			unsigned		0x18		--	--	G			

5	capture_time			octet_string			0x20		--	--	G			
---	--------------	--	--	--------------	--	--	------	--	----	----	---	--	--	--

Annex D

(continued)

1	reset			integer			0x38		--	--	--			
B	MinimumPowerFactor	M	M	Extended register	4	0		1-0:13.3.0.255						(+A/+VA) For display purposes only
1	logical_name			octet_string[6]				"01000D0300FF"	--	--	G			
2	value			long_unsigned			0x08		--	--	G			
3	scaler_unit			scal_unit_type			0x10	{-3,255}	--	--	G			
4	status			unsigned			0x18		--	--	G			
5	capture_time			octet_string			0x20		--	--	G			
1	reset			integer			0x38		--	--	--			
B	MeasurementPeriod3	M	M	Register	3	0		1-0:0.8.2.255						for instantaneous values Used with simple average scheme (see IC3, D=24). If object not used period is considered as implicit!
1	logical_name			octet_string[6]				"0100000802FF"	--	--	G			
2	value			double_long_unsigned			0x08	600	--	S	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			
1	reset						0x28		--	--	--			

D.16 Meter accounting objects

The objects for accounting are given in Table D.16.

Annex D

(continued)

Table D.16 — Meter COSEM objects for accounting

1	2	3		4	5 IC		6	7	8 Access rights Get, Set, Action					9
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Accounting													
B	STSTokenGateway	M	M	Token gateway	1 1 5	0		0-0:19.40.0.255						for STS tokens only
1	logical_name			octet_string[6]				"0000132800FF"			G	G		
2	token			octet_string[9]			0x08				G	G		
3	token_time			date-time			0x10				G	G		
4	token_description			array			0x18				G	G		
5	token_delivery_method			enum			0x20				G	G		
6	token_status			structure			0x28				G	G		
1	enter (data)						0x30				A			
B	CreditLimit	M	M	Data	1	0		0-0:19.50.0.255						value per account
1	logical_name			octet_string[6]				"0000133200FF"	--	--	G	G		
2	value			double-long			0x08		--	--	G,S	G		
B	VendLimit	M	M	Data	1	0		0-0:19.50.1.255						value per token
1	logical_name			octet_string[6]				"0000133201FF"	--	--	G	G		
2	value			double-long			0x08		--	--	G,S	G		

Annex D

(continued)

B	TokenAccept	M	M	Data	1	0		0-0:94.27.9.255						indicated if token was accepted
1	logical_name			octet_string[6]				"00005E1B09FF"	--	--	G	G		
2	value			unsigned			0x08		--	--	G, S	G		"accepted" = 16, else =0
B	TokenAcceptMonitor	M	M	Register monitor	2 1	0		0-0:16.0.0.255						detects "token accepted"
1	logical_name			octet_string[6]				"0000100000FF"	--	--	G			
2	thresholds			array[1]			0x08		--	--	G, S			
3	monitored_value			value_definition			0x10		--	--	G, S			"TokenAccepted" object
4	actions			array[1](action_set)			0x18		--	--	G, S			
B	TokenLogScriptTable	M	M	Script table	9	0		0-101:10.0.108.255						
1	logical_name			octet_string[6]				"00650A006CFF"	--	--	G			
2	scripts			array[4]			0x08		--	--	G, S			
1	execute			long_unsigned			0x20		--	--	--			
B	TokenHistoryLog	M	M	Profile generic	7	1		0-1:99.98.2.255						capture historical accepted tokens
1	logical_name			octet_string[6]				"0001636202FF"	--	--	G	G		
2	buffer			array			0x08		--	--	G	G		selective access per range
3	capture_objects			array[3]			0x10		--	--	G, (S)	G		clock;token;TID
4	capture_period			double_long_unsigned			0x18	0	--	--	G	G		asynchronously
5	sort_method			enum			0x20	1	--	--	G	G		unsorted (FIFO)

Annex D

(continued)

6	sort_object			capture_object_definition			0x28	{*,*-.*.*.*.*,*}	--	--	G	G		unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G	G		
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G	G		
1	reset						0x58		--	--	A			
2	capture						0x60		--	--	A			
B	Account	M	M	Account	1 1 1	0		0-0:19.0.0.255						Electricity - currency
1	logical_name			octet_string[6]				"0000130000FF"			G	G		
2	account_mode_and_status			structure			0x08				G, S	G		
3	current_credit_in_use			unsigned			0x10				G	G		
4	current_credit_statuses			bit-string			0x18				G	G		
5	available_credit			double-long			0x20				G	G		
6	amount_to_clear			double-long			0x28				G	G		
7	clearance_threshold			double-long			0x30				G, S	G		
8	aggregated_debt			double-long			0x38				G	G		
9	credit_reference_list			array			0x40				G, S	G		
10	charge_reference_list			array			0x48				G, S	G		
11	credit_charge_configuration			array			0x50				G, S	G		
12	token_gateway_configuration			array			0x58				G, S	G		
13	account_activation_time			octet-string			0x60				G, S	G		
14	account_closure_time			octet-string			0x68				G, S	G		

Annex D

(continued)

15	currency			structure			0x70				G, S	G		
16	low_credit_threshold			double-long			0x78				G, S	G		
17	next_credit_available_threshold			double-long			0x80				G, S	G		
18	max_provision			long-unsigned			0x88				G, S	G		
19	max_provision_period			double-long			0x90				G, S	G		
1	activate_account (data)						0x98				A			
2	close_account (data)						0xA0				A			
3	reset_account (data)						0xA8				A			
B	TokenCredit	M	M	Credit	1 1 2	0		0-0:19.10.0.255						Electricity - currency
1	logical_name			octet_string[6]				"0000130A00FF"			G	G		
2	current_credit_amount			double-long			0x08				G	G		
3	credit_type			enum			0x10	0			G, S	G		
4	priority			unsigned			0x18				G, S	G		
5	warning_threshold			double-long			0x20				G, S	G		
6	limit			double-long			0x28				G, S	G		
7	credit_configuration			bit-string			0x30				G, S	G		
8	credit_status			enum			0x38				G	G		
9	preset_credit_amount			double-long			0x40				G, S	G		

Annex D

(continued)

10	credit_available_threshold			double-long			0x48			G, S	G		
11	period			date-time			0x50			G, S	G		
1	update_amount (data)						0x58			A			
2	set_amount_to_value (data)						0x60			A			
3	invoke_credit (data)						0x68			A			
B	EmergencyCredit	M	M	Credit	1 1 2	0		0-0:19.10.1.255					Electricity - currency
1	logical_name			octet_string[6]				"0000130A01FF"		G	G		
2	current_credit_amount			double-long			0x08			G	G		
3	credit_type			enum			0x10	2		G, S	G		
4	priority			unsigned			0x18			G, S	G		
5	warning_threshold			double-long			0x20			G, S	G		
6	limit			double-long			0x28			G, S	G		
7	credit_configuration			bit-string			0x30			G, S	G		
8	credit_status			enum			0x38			G	G		
9	preset_credit_amount			double-long			0x40			G, S	G		
10	credit_available_threshold			double-long			0x48			G, S	G		
11	period			date-time			0x50			G, S	G		
1	update_amount (data)						0x58			A			
2	set_amount_to_value (data)						0x60			A			

Annex D

(continued)

3	invoke_credit (data)						0x68				A	A		
B	TariffDebt	M	M	Credit	1 1 2	0		0-0:19.10.2.255						Electricity - currency
1	logical_name			octet_string[6]				"0000130A02FF"			G	G		
2	current_credit_amount			double-long			0x08				G	G		negative credit
3	credit_type			enum			0x10	4			G	G		
4	priority			unsigned			0x18				G	G		
5	warning_threshold			double-long			0x20				G	G		
6	limit			double-long			0x28				G	G		
7	credit_configuration			bit-string			0x30				G	G		
8	credit_status			enum			0x38				G	G		
9	preset_credit_amount			double-long			0x40				G	G		
10	credit_available_threshold			double-long			0x48				G	G		
11	period			date-time			0x50				G	G		
1	update_amount (data)						0x58							
2	set_amount_to_value (data)						0x60							
3	invoke_credit (data)						0x68							
B	FixedChargeDebt	M	M	Credit	1 1 2	0		0-0:19.10.3.255						Electricity - currency
1	logical_name			octet_string[6]				"0000130A03FF"			G	G		
2	current_credit_amount			double-long			0x08				G	G		negative credit
3	credit_type			enum			0x10	3			G	G		
4	priority			unsigned			0x18				G	G		
5	warning_threshold			double-long			0x20				G	G		
6	limit			double-long			0x28				G	G		
7	credit_configuration			bit-string			0x30				G	G		

8	credit_status			enum			0x38				G	G		
---	---------------	--	--	------	--	--	------	--	--	--	---	---	--	--

Annex D

(continued)

9	preset_credit_amount			double-long			0x40				G	G		
10	credit_available_threshold			double-long			0x48				G	G		
11	period			date-time			0x50				G	G		
1	update_amount (data)						0x58							
2	set_amount_to_value (data)						0x60							
3	invoke_credit (data)						0x68							
B	TariffCharge	M	M	Charge	1 1 3	0		0-0:19.20.0.255						tariff charges - currency
1	logical_name			octet_string[6]				"0000131400FF"			G	G		
2	total_amount_paid			double-long			0x08				G, S	G		
3	charge_type			enum			0x10	0			G, S	G		
4	priority			unsigned			0x18				G, S	G		
5	unit_charge_active			structure			0x20				G	G		table of prices
6	unit_charge_passive			structure			0x28				G, S	G		table of prices
7	unit_charge_activation_time			octet-string			0x30				G, S	G		
8	period			double-long-unsigned			0x38				G, S	G		
9	charge_configuration			bit-string			0x40				G, S	G		
10	last_collection_time			date-time			0x48				G	G		
11	last_collection_amount			double-long			0x50				G	G		
12	total_amount_remaining			double-long			0x58				G	G		
13	proportion			long-unsigned			0x60				G,	G		

S

Annex D

(continued)

1	update_unit_charge (data)					0x68			A			
2	activate_passive_unit_charge (data)					0x70			A			
3	collect (data)					0x78			A			
4	update_total_amount_remaining (data)					0x80			A			
5	set_total_amount_remaining (data)					0x88			A			
B	FixedCharge	M	M	Charge	1 1 3	0		0-0:19.20.1.255				fixed charges - currency
1	logical_name			octet_string[6]			"0000131401FF"		G	G		
2	total_amount_paid			double-long		0x08			G, S	G		
3	charge_type			enum		0x10	1		G, S	G		
4	priority			unsigned		0x18			G, S	G		
5	unit_charge_active			structure		0x20			G	G		table of prices
6	unit_charge_passive			structure		0x28			G, S	G		table of prices
7	unit_charge_activation_time			octet-string		0x30			G, S	G		
8	period			double-long-unsigned		0x38			G, S	G		
9	charge_configuration			bit-string		0x40			G, S	G		
10	last_collection_time			date-time		0x48			G	G		
11	last_collection_amount			double-long		0x50			G	G		
12	total_amount_remaining			double-long		0x58			G	G		
13	proportion			long-unsigned		0x60			G, S	G		

Annex D

(continued)

1	update_unit_charge (data)						0x68				A			
2	activate_passive_unit_charge (data)						0x70				A			
3	collect (data)						0x78				A			
4	update_total_amount_remaining (data)						0x80				A			
5	set_total_amount_remaining (data)						0x88				A			
B	FallBackTariffCharge	M	M	Charge	1 1 3	0		0-0:19.20.2.255						for when battery fails
1	logical_name			octet_string[6]				"0000131402FF"			G	G		
2	total_amount_paid			double-long			0x08				G, S	G		
3	charge_type			enum			0x10	0			G, S	G		
4	priority			unsigned			0x18				G, S	G		
5	unit_charge_active			structure			0x20				G	G		table of prices
6	unit_charge_passive			structure			0x28				G, S	G		table of prices
7	unit_charge_activation_time			octet-string			0x30				G, S	G		
8	period			double-long-unsigned			0x38				G, S	G		
9	charge_configuration			bit-string			0x40				G, S	G		
10	last_collection_time			date-time			0x48				G	G		
11	last_collection_amount			double-long			0x50				G	G		
12	total_amount_remaining			double-long			0x58				G	G		
13	proportion			long-unsigned			0x60				G, S	G		

Annex D

(continued)

1	update_unit_charge (data)					0x68				A			
2	activate_passive_unit_charge (data)					0x70				A			
3	collect (data)					0x78				A			
4	update_total_amount_remaining (data)					0x80				A			
5	set_total_amount_remaining (data)					0x88				A			

D.17 Meter disconnect objects

The objects for disconnect control are given in Table D.17.

Table D.17 — Meter COSEM objects for disconnect control

1	2	3		4	5		6	7	8					9
					IC				Access rights Get, Set, Action					
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Disconnect													
B	DisconnectControl	M	M	Disconnect control	70	0		0-0:96.3.10.255						
1	logical_name			octet_string[6]				"000060030AFF"	--	--	G	G		
2	output_state			boolean			0x08		--	--	G	G		
3	control_state			enum			0x10		--	--	G	G		

Annex D

(continued)

4	control_mode			enum			0x18		--	--	G, (S)	G		if only one control mode is available set is not allowed.
1	remote_disconnect			integer			0x20		--	--	--	--		
2	remote_connect			integer			0x28		--	--	--	--		
B	DisconnectStatus	M	M	Data	1	0		0-0:94.27.10.255						load switch is open or closed
1	logical_name			octet_string[6]				"00005E1B0AFF"	--	--	G	G		
2	value			unsigned			0x08	choice(5)	--	--	G	G		0 = open 255 = closed
B	DisconnectMonitor	M	M	Parameter monitor	65	0		0-0:16.2.0.255						detect connect/disconnect events
1	logical_name			octet_string[6]				"0000100200FF"	--	--	G			
2	changed_parameter			structure			0x08		--	--	G			DisconnectStatus.value
3	capture_time			date-time			0x10		--	--	G			
4	parameter_list			array			0x18		--	--	G			
1	add_parameter(data)						0x20		--	--	A			
2	delete_parameter(data)						0x28		--	--	A			
B	DisconnectHistoryLog	M	M	Profile generic	7	1		0-1:99.98.0.255						
1	logical_name			octet_string[6]				"0001636200FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2..3] (capture_object_definition)			0x10		--	--	G, (S)			clock; DisconnectStatus.value; DisconnectArbitrator.last_outcome;
4	capture_period			double_long_unsigned			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*.*.*.*,*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			

Annex D

(continued)

8	profile_entries			double_long_unsigned			0x38	[10..*]	--	--	G			
1	reset			integer			0x58		--	--	A			
B	DisconnectScriptTable	M	M	Script table	9	0		0-102:10.0.108.255						
1	logical_name			octet_string[6]				"00660A006CFF"	--	--	G			
2	scripts			array[26]			0x08		--	--	G, S			26 entries
1	execute			long_unsigned			0x20		--	--	--			
B	DisconnectArbitrator	M	M	Arbitrator	68	0		0-0:96.3.20.255						prioritization of connect/disconnect control
1	logical_name			octet_string[6]				"0000600314FF"			G			
2	actions			array			0x08				G, S			
3	permissions_table			array			0x10				G, S			
4	weightings_table			array			0x18				G, S			
5	most_recent_requests_table			array			0x20				G			
6	last_outcome			unsigned			0x28				G			
1	request_action ()						0x30				A			for remote disconnect
2	reset ()						0x38				A			
B	AccountBalanceMonitor	M	M	Register monitor	21	0		0-0:16.0.1.255						for disconnect control
1	logical_name			octet_string[6]				"0000100001FF"	--	--	G			
2	thresholds			array[1]			0x08		--	--	G, S			The threshold is of the same type as the monitored attribute of the referenced object
3	monitored_value			value_definition			0x10		--	--	G, S			

Annex D

(continued)

4	actions			array[1](action_set)			0x18		--	--	G, S			
B	ImportActivePowerMonitorL1	M	M	Register monitor	21	0		1-1:21.7.0.255						for disconnect control
1	logical_name			octet_string[6]				"0101150700FF"	--	--	G			
2	thresholds			array[1..2]			0x08		--	--	G, S			warning threshold and active power limit threshold
3	monitored_value			value_definition			0x10		--	--	G, S			
4	actions			array[1..2](action_set)			0x18		--	--	G, S			
B	ImportActivePowerMonitorL2	M	M	Register monitor	21	0		1-1:41.7.0.255						for disconnect control
1	logical_name			octet_string[6]				"0101290700FF"	--	--	G			
2	thresholds			array[1..2]			0x08		--	--	G, S			warning threshold and active power limit threshold
3	monitored_value			value_definition			0x10		--	--	G, S			
4	actions			array[1..2](action_set)			0x18		--	--	G, S			
B	ImportActivePowerMonitorL3	M	M	Register monitor	21	0		1-1:61.7.0.255						for disconnect control
1	logical_name			octet_string[6]				"01013D0700FF"	--	--	G			
2	thresholds			array[1..2]			0x08		--	--	G, S			warning threshold and active power limit threshold
3	monitored_value			value_definition			0x10		--	--	G, S			
4	actions			array[1..2](action_set)			0x18		--	--	G, S			
B	ExportActivePowerMonitorL1	M	M	Register monitor	21	0		1-1:22.7.0.255						for disconnect control
1	logical_name			octet_string[6]				"0101160700FF"	--	--	G			
2	thresholds			array[1..2]			0x08		--	--	G, S			warning threshold and active power limit threshold
3	monitored_value			value_definition			0x10		--	--	G, S			

Annex D

(continued)

4	actions			array[1..2](action_set)			0x18		--	--	G, S			
B	ExportActivePowerMonitorL2	M	M	Register monitor	21	0		1-1:42.7.0.255						for disconnect control
1	logical_name			octet_string[6]				"01012A0700FF"	--	--	G			
2	thresholds			array[1..2]			0x08		--	--	G, S			warning threshold and active power limit threshold
3	monitored_value			value_definition			0x10		--	--	G, S			
4	actions			array[1..2](action_set)			0x18		--	--	G, S			
B	ExportActivePowerMonitorL3	M	M	Register monitor	21	0		1-1:62.7.0.255						for disconnect control
1	logical_name			octet_string[6]				"01013E0700FF"	--	--	G			
2	thresholds			array[1..2]			0x08		--	--	G, S			warning threshold and active power limit threshold
3	monitored_value			value_definition			0x10		--	--	G, S			
4	actions			array[1..2](action_set)			0x18		--	--	G, S			
B	NetFrequencyLimiter	M	M	Limiter	71	0		0-1:17.0.0.255						network frequency
1	logical_name			octet_string[6]				"0001110000FF"	--	--	G			
2	monitored_value			value_definition			0x08		--	--	G, S			instantaneous frequency
3	threshold_active			threshold			0x10		--	--	G			
4	threshold_normal			threshold			0x18		--	--	G, S			
5	threshold_emergency			threshold			0x20		--	--	G, S			
6	min_over_threshold_duration			double_long_unsigned			0x28	60	--	--	G, S			1 minute
7	min_under_threshold_duration			double_long_unsigned			0x30	60	--	--	G, S			1 minute
8	emergency_profile			emergency_profile_type			0x38		--	--	G, S			

Annex D

(continued)

9	emergency_profile_group_id_list			array			0x40		--	--	G, S			
10	emergency_profile_active			boolean			0x48		--	--	G			
11	actions			action_set			0x50		--	--	G, (S)			
B	DisconnectSchedule	M	M	Schedule	10	0		0-0:12.0.0.255						
1	logical_name			octet_string[6]				"00000C0000FF"	--	--	G			
2	entries			array[1]			0x08		--	--	G, S			
1	enable/disable(data)						0x20		--	--	A			
2	insert(data)						0x28		--	--	A			
3	delete(data)						0x30		--	--	A			
B	DisconnectActivityCalendar	M	M	Activity calendar	20	0		0-1:13.0.2.255						
1	logical_name			octet_string[6]				"00010D0002FF"	--	--	G			
2	calendar_name_active			octet_string[0..8]			0x08		--	--	G			The calendar_name_active has a size of 8 characters at least, i.e. [0..8] is mandatory but can be longer
3	season_profile_active			array[0..*]			0x10		--	--	G			
4	week_profile_table_active			array[0..*]			0x18		--	--	G			
5	day_profile_table_active			array[0..*]			0x20		--	--	G			
6	calendar_name_passive			octet_string[0..8]			0x28		--	S	G, S			
7	season_profile_passive			array[0..*]			0x30		--	S	G, S			

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(continued)

8	week_profile_table_passive			array[0..*]			0x38		--	S	G, S			
9	day_profile_table_passive			array[0..*]			0x40		--	S	G, S			
10	activate_passive_calendar_time			octet_string[12]			0x48		--	S	G, S			
1	activate_passive_calendar			integer			0x50		--	(A)	(A)			
B	DisconnectSpecialDaysTable	M	M	Special days table	1 1	0		0-1:11.0.2.255						
1	logical_name			octet_string[6]				"00010B0002FF"	--	--	G			
2	entries			array[0..30]			0x08		--	S	G, S			
B	AverageImportActivePowerL1	M	M	Register	3	0		1-0:21.4.0.255						(+A) import
1	logical_name			octet_string[6]				"0100150400FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			moving average
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	AverageImportActivePowerL2	M	M	Register	3	0		1-0:41.4.0.255						(+A) import
1	logical_name			octet_string[6]				"0100290400FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			moving average
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	AverageImportActivePowerL3	M	M	Register	3	0		1-0:61.4.0.255						(+A) import
1	logical_name			octet_string[6]				"01003D0400FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			moving average

Annex D

(continued)

3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	AverageExportActivePowerL1	M	M	Register	3	0		1-0:22.4.0.255						(-A) export
1	logical_name			octet_string[6]				"0100160400FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			moving average
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	AverageExportActivePowerL2	M	M	Register	3	0		1-0:42.4.0.255						(-A) export
1	logical_name			octet_string[6]				"01002A0400FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			moving average
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	AverageExportActivePowerL3	M	M	Register	3	0		1-0:62.4.0.255						(-A) export
1	logical_name			octet_string[6]				"01003E0400FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G			moving average
3	scaler_unit			scal_unit_type			0x10	{0,27}	--	--	G			
1	reset						0x28		--	--	--			
B	ImportAveragingPeriod	M	M	Register	3	0		0-0:94.27.1.255						for averaging import power
1	logical_name			octet_string[6]				"00005E1B01FF"	--	--	G			
2	value			long_unsigned			0x08	0..65535	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,6}	--	--	G			minutes
1	reset						0x28		--	--	--			

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(continued)

B	ExportAveragingPeriod	M	M	Register	3	0		0-0:94.27.2.255						for averaging export power
1	logical_name			octet_string[6]				"00005E1B02FF"	--	--	G			
2	value			long_unsigned			0x08	0..65535	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,6}	--	--	G			minutes
1	reset						0x28		--	--	--			
B	AutoRecloseDelay	M	M	Register	3	0		0-0:94.27.3.255						for power limit monitor
1	logical_name			octet_string[6]				"00005E1B03FF"	--	--	G			
2	value			unsigned			0x08	0..255	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,6}	--	--	G			minutes
1	reset						0x28		--	--	--			
B	AutoRecDelayIncrement	M	M	Register	3	0		0-0:94.27.4.255						for power limit monitor
1	logical_name			octet_string[6]				"00005E1B04FF"	--	--	G			
2	value			unsigned			0x08	0..255	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,6}	--	--	G			minutes
1	reset						0x28		--	--	--			
B	RestrictedDemandDuration	M	M	Register	3	0		0-0:94.27.5.255						for emergency power limit
1	logical_name			octet_string[6]				"00005E1B05FF"	--	--	G			
2	value			long_unsigned			0x08	0..65535	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,6}	--	--	G			minutes
1	reset						0x28		--	--	--			

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(continued)

B	EmergencyDemand Duration	M	M	Register	3	0		0-0:94.27.6.255						for emergency power limit
1	logical_name			octet_string[6]				"00005E1B06FF"	--	--	G			
2	value			unsigned			0x08	0..255	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,5}	--	--	G			hours
1	reset						0x28		--	--	--			
B	DisconnectDelay	M	M	Register	3	0		0-0:94.27.7.255						for frequency monitor
1	logical_name			octet_string[6]				"00005E1B07FF"	--	--	G			
2	value			long_unsigned			0x08	0..65535	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{-3,7}	--	--	G			0.001 seconds
1	reset						0x28		--	--	--			
B	ReconnectDelay	M	M	Register	3	0		0-0:94.27.8.255						for frequency monitor
1	logical_name			octet_string[6]				"00005E1B08FF"	--	--	G			
2	value			long_unsigned			0x08	0..65535	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{-3,7}	--	--	G			0.001 seconds
1	reset						0x28		--	--	--			
B	ImportActiveTotalP owerChange	M	M	Register	3	0		0- 0:94.27.12.255						for CIU push of import power
1	logical_name			octet_string[6]				"00005E1B0CFF"	--	--	G			
2	value			long_unsigned			0x08	0..65535	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{2,27}	--	--	G			100 watt units
1	reset						0x28		--	--	--			

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(continued)

B	ExportActiveTotalPowerChange	M	M	Register	3	0		0-0:94.27.13.255						for CIU push of export power
1	logical_name			octet_string[6]				"00005E1B0DFF"	--	--	G			
2	value			long_unsigned			0x08	0..65535	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{2,27}	--	--	G			100 watt units
1	reset						0x28		--	--	--			
B	AccountBalanceChange	M	M	Register	3	0		0-0:94.27.14.255						for CIU push of available credit
1	logical_name			octet_string[6]				"00005E1B0EFF"	--	--	G			
2	value			long_unsigned			0x08	0..65535	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{-2,10}	--	--	G			0.01 base currency units
1	reset						0x28		--	--	--			

D.18 Meter battery management objects

The objects for battery management are given in Table D.18.

Annex D

(continued)

Table D.18 — Meter COSEM objects for battery management

1	2	3	4	5	6	7	8	9
				IC			Access rights Get, Set, Action	
Reference	attribute/ method	mandatory/ optional	IC name/ Data type	Class	Version	SN	OBIS/ value	Public Pre-estab Management CIU HHU Comment
		1PH 3PH						
A	Battery							
B	BatteryStatus	M	M	Data	1	0	0-0:94.27.0.255	battery state
1	logical_name			octet_string[6]			"00005E1B00FF"	-- -- G G
2	value			unsigned		0x08		-- -- G G 00 = good 16 = voltage low 32 = failed
B	BatteryMonitor	M	M	Register monitor	21	0	0-0:16.0.2.255	
1	logical_name			octet_string[6]			"0000100002FF"	-- -- G
2	thresholds			array[1]		0x08		-- -- G, S
3	monitored_value			value_definition		0x10		-- -- G, S
4	actions			array[1](action_set)		0x18		-- -- G, S

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(continued)

D.19 Meter CIU message push objects

The objects for CIU message push function are given in Table D.19.

MeterStatus codes are given in Table D.20.

Table D.19 — Meter COSEM objects for CIU message push function

1	2	3		4	5		6	7	8					9
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	IC		SN	OBIS/ value	Access rights Get, Set, Action					Comment
					Class	Version			Public	Pre-estab	Management	CIU	HHU	
		1PH	3PH											
A	CIU display													
B	MeterStatus	M	M	Data	1	0		0-0:94.27.11.255					meter status	
1	logical_name			octet_string[6]				"00005E1B0BFF"	--	--	G	G		
2	value			long64-unsigned			0x08	choice(21)	--	--	G	G, S	64-bit string of status bits	
B	LocalMessageBuffer	M	M	Data	1	0		0-1:96.13.0.255					meter to CIU message buffer	
1	logical_name			octet_string[6]				"0001600D00FF"	--	--	G	G		
2	value			visible-string[1..160]			0x08	choice(10)	--	--	G	G	160 characters	
B	RemoteMessageBuffer	M	M	Data	1	0		0-1:96.13.1.255					HES to CIU message buffer	
1	logical_name			octet_string[6]				"0001600D01FF"	--	--	G	G		
2	value			visible-string[1..160]			0x08	choice(10)	--	--	G	G	160 characters	

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(continued)

B	CIUSingleActionSchedule	M	M	Single action schedule	22	0		0-105:15.0.4.255						for CIU message push
1	logical_name			octet_string[6]				"00690F0004FF"	--	--	G			
2	executed_script			script			0x08		--	--	G, (S)			
3	type			enum			0x10		--	--	G, (S)			
4	execution_time			array[0..*]			0x18		--	--	G, S			
B	CIUPushScriptTable	M	M	Script table	9	0		0-107:10.0.108.255						for load profiles
1	logical_name			octet_string[6]				"006B0A006CFF"	--	--	G			
2	scripts			scripts			0x08		--	--	G, (S)			
1	execute			long_unsigned			0x20		--	--	A			
B	CIUPushSetup	M	M	Push setup	40	0		0-106:25.9.0.255						all events
1	logical_name			octet_string[6]				"006A190900FF"	--	--	G			
2	push_object_list			array[0..*] (capture_object_definition)			0x08		--	--	G, S			
3	send_destination_and_method			send_destination_and_method_type			0x10		--	--	G, S			
4	communication_window			array[0..*](window_element)			0x18		--	--	G, S			
5	randomisation_start_interval			long_unsigned			0x20		--	--	G, S			
6	number_of_retries			unsigned			0x28		--	--	G, S			
7	repetition_delay			long_unsigned			0x30		--	--	G, S			
1	push			integer			0x38		--	A	A			

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(continued)

Table D.20 — Meter status codes

1 Bit No.	2 Status	3 Description
0	supply_to_meter_is_present	L1, L2 and L3 are all present
1	voltage_high	any phase
2	voltage_normal	all phases
3	voltage_low	any phase
4	load_switch_is_closed	logical state
5	remote_disconnect	disconnected by HES
6	local_disconnect	disconnected by HHU
7	account_disconnect	disconnected by account
8	import_power_limit_disconnect	disconnected by import power limit
9	export_power_limit_disconnect	disconnected by export power limit
10	network_frequency_disconnect	disconnected by network under-frequency limit
11	alarm_disconnect	disconnected by alarm detection
12	scheduled_disconnect	disconnected by programmed schedule
13	remote_reconnect	reconnected by HES
14	local_reconnect	reconnected by HHU
15	account_reconnect	reconnected by account
16	import_power_limit_reconnect	reconnected by import power limit
17	export_power_limit_reconnect	reconnected by export power limit
18	network_frequency_reconnect	reconnected by network under-frequency limit
19	alarm_reconnect	reconnected by alarm detection
20	scheduled_reconnect	reconnected by programmed schedule
21	non-disconnect_period_is_active	scheduled non-disconnect period is active
22	normal_power_limit	unconstrained power limit is active
23	constrained_power_limit	constrained power limit is active
24	emergency_power_limit	emergency power limit is active
25	power_limit_warning	active power limit about to be exceeded
26	account_is_activated	meter account is activated
27	account_in_prepayment_mode	prepay mode or post-pay mode
28	low_credit_warning	available credit is about to be exhausted
29	available_credit_exhausted	available credit is exhausted
30	emergency_credit_available	emergency credit is available for activation
31	emergency_credit_active	emergency credit has been activated
32	CIU_on_line	meter/CIU are on line
33	HES_on_line	meter/HES are on line
34	demand_limit_5_minute_warning	a new demand limit will be activated in 5 minutes time
35	flat_rate_tariff_is_active	fall-back tariff when battery fails
36	BLOCK_tariff_is_active	normal operational tariff
37	TOU_tariff_is_active	normal operational tariff
38	local_message_received	set by meter when it wants to send a message to CIU; cleared by CIU when buffer has been read
39	remote_message_received	set by meter when remote message received; cleared by CIU when buffer has been read
40	reserved	
41	reserved	
42	reserved	
43	reserved	
44	reserved	
45	reserved	
46	reserved	
47	reserved	
48	reserved	

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49	reserved	
50	reserved	
51	reserved	
52	reserved	
53	reserved	
54	reserved	
55	reserved	
56	reserved	
57	reserved	
58	reserved	
59	reserved	
60	reserved	
61	reserved	
62	reserved	
63	reserved	

Annex E – Appliance control device COSEM objects

(normative)

E.1 General

These COSEM objects shall be implemented in accordance with the requirements given in IEC 62056-6-1 and IEC 62056-6-2.

The attribute definitions and access rights are not specified in this specification, but shall be specified in a country-specific national companion specification.

It is proposed that such a national companion specification should be compiled by a joint working group comprising participants from the utilities and participants from manufacturers.

E.2 ACD association and safety objects

The objects for association and security are given in Table E.1.

Table E.1 — ACD COSEM objects for association and security

1	2	3		4	5		6	7	8					9
					IC				Access rights Get, Set, Action					
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Association & Security													
B	SAPAssignment	M	M	SAP Assignment	17	0	0xFC00	0-0:41.0.0.255						
1	logical_name			octet_string[6]				"0000290000FF"	G	--	G			

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(continued)

2	SAP_assignment_list			asslist_type			0x08	{{1, *}}	G	--	G			One logical device, Server SAP 1
1	connect_logical_device						0x20		--	--	--			
B	GeneralAssociation	M	M	Association LN	15	3		0-0:40.0.1.255						dynamic AA for all clients
1	logical_name			octet_string[6]				"0000280001FF"	G	--	G			
2	object_list			object_list_type			0x08		G	--	G			
3	associated_partners_id			associated_partners_type			0x10		G	--	G			
4	application_context_name			application_context_name			0x18		G	--	G			
5	xDLMS_context_info			xDLMS_context_type			0x20		G	--	G			
6	authentication_mechanism_name			mechanism_name_structure			0x28		G	--	G, (S)			Optionally Set can be used to restrict the next association to a specific mechanism_name e.g. to mechanism_name(5) after commissioning.
7	secret			octet_string			0x30		--	--	(S)			In case of using LLS one can use attr 7 of Current Assoc. to change the LLS PW For HLS using GMAC secret is handled via Security setup
8	association_status			enum			0x38		G	--	G			
9	security_setup_reference			octet_string[6]			0x40		G	--	G			
10	user_list			array[1..*]			0x48							
1	reply_to_HLS_authentication						0x60		--	--	A			
2	change_HLS_secret						0x68		--	--	(A)			For changing the HLS secret in case of using MD5 or SHA-1
3	add_object						0x70		--	--	--			
4	remove_object						0x78		--	--	--			
5	add_user						0x80				A			
6	remove_user						0x88				A			

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(continued)

B	ManagementAssociation	M	M	Association LN	15	3		0-0:40.0.0.255						static AA for management client
1	logical_name			octet_string[6]				"0000280000FF"	G	--	G			
2	object_list			object_list_type			0x08		G	--	G			
3	associated_partners_id			associated_partners_type			0x10		G	--	G			
4	application_context_name			application_context_name			0x18		G	--	G			
5	xDLMS_context_info			xDLMS_context_type			0x20		G	--	G			
6	authentication_mechanism_name			mechanism_name_structure			0x28		G	--	G, (S)			Optionally Set can be used to restrict the next association to a specific mechanism_name e.g. to mechanism_name(5) after commissioning.
7	secret			octet_string			0x30		--	--	(S)			In case of using LLS one can use attr 7 of Current Assoc. to change the LLS PW For HLS using GMAC secret is handled via Security setup
8	association_status			enum			0x38		G	--	G			
9	security_setup_reference			octet_string[6]			0x40		G	--	G			
10	user_list			array[1..*]			0x48							
1	reply_to_HLS_authentication						0x60		--	--	A			
2	change_HLS_secret						0x68		--	--	(A)			For changing the HLS secret in case of using MD5 or SHA-1
3	add_object						0x70		--	--	--			
4	remove_object						0x78		--	--	--			
5	add_user						0x80				A			
6	remove_user						0x88				A			
B	CIUAssociation	M	M	Association LN	15	3		0-0:40.0.2.255						static AA for CIU client
1	logical_name			octet_string[6]				"0000280002FF"	G	--	G			
2	object_list			object_list_type			0x08		G	--	G			

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3	associated_partner_s_id			associated_partner_s_type			0x10		G	--	G			
4	application_context_name			application_context_name			0x18		G	--	G			
5	xDLMS_context_info			xDLMS_context_type			0x20		G	--	G			
6	authentication_mechanism_name			mechanism_name_structure			0x28		G	--	G, (S)			Optionally Set can be used to restrict the next association to a specific mechanism_name e.g. to mechanism_name(5) after commissioning.
7	secret			octet_string			0x30		--	--	(S)			In case of using LLS one can use attr 7 of Current Assoc. to change the LLS PW For HLS using GMAC secret is handled via Security setup
8	association_status			enum			0x38		G	--	G			
9	security_setup_reference			octet_string[6]			0x40		G	--	G			
10	user_list			array[1..*]			0x48							
1	reply_to_HLS_authentication						0x60		--	--	A			
2	change_HLS_secret						0x68		--	--	(A)			For changing the HLS secret in case of using MD5 or SHA-1
3	add_object						0x70		--	--	--			
4	remove_object						0x78		--	--	--			
5	add_user						0x80				A			
6	remove_user						0x88				A			
B	HHUAssociation	M	M	Association LN	15	3		0-0:40.0.3.255						static AA for HHU client
1	logical_name			octet_string[6]				"0000280003FF"	G	--	G			
2	object_list			object_list_type			0x08		G	--	G			
3	associated_partner_s_id			associated_partner_s_type			0x10		G	--	G			
4	application_context_name			application_context_name			0x18		G	--	G			

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(continued)

5	xDLMS_context_info			xDLMS_context_type			0x20		G	--	G			
6	authentication_mechanism_name			mechanism_name_structure			0x28		G	--	G, (S)			Optionally Set can be used to restrict the next association to a specific mechanism_name e.g. to mechanism_name(5) after commissioning.
7	secret			octet_string			0x30		--	--	(S)			In case of using LLS one can use attr 7 of Current Assoc. to change the LLS PW For HLS using GMAC secret is handled via Security setup
8	association_status			enum			0x38		G	--	G			
9	security_setup_reference			octet_string[6]			0x40		G	--	G			
10	user_list			array[1..*]			0x48							
1	reply_to_HLS_authentication						0x60		--	--	A			
2	change_HLS_secret						0x68		--	--	(A)			For changing the HLS secret in case of using MD5 or SHA-1
3	add_object						0x70		--	--	--			
4	remove_object						0x78		--	--	--			
5	add_user						0x80				A			
6	remove_user						0x88				A			
B	GeneralSecuritySetup	M	M	Security setup	64	1		0-0:43.0.1.255						for all clients except CIU and MC
1	logical_name			octet_string[6]				"00002B0001FF"	--	--	G	G		
2	security_policy			enum			0x08		--	--	G, S	G		
3	security_suite			enum			0x10	1	--	--	G, S	G		
4	client_system_title			octet_string[8]			0x18		--	--	G	G		
5	server_system_title			octet_string[8]			0x20		--	--	G	G		
6	certificates			array[1..*]			0x28				G, S	G		

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(continued)

1	security_activate			enum			0x30		--	--	A			
2	key_transfer						0x38		--	--	A			
3	key_agreement						0x48				A			
4	generate_key_pair						0x50				A			
5	generate_certificate_request						0x58				A			
6	import_certificate						0x60				A			
7	export_certificate						0x68				A			
8	remove_certificate						0x70				A			
B	ManagementSecurity Setup	M	M	Security setup	64	1		0-0:43.0.0.255						for management client
1	logical_name			octet_string[6]				"00002B0000FF"	--	--	G	G		
2	security_policy			enum			0x08		--	--	G, S	G		
3	security_suite			enum			0x10	1	--	--	G, S	G		
4	client_system_title			octet_string[8]			0x18		--	--	G	G		
5	server_system_title			octet_string[8]			0x20		--	--	G	G		
6	certificates			array[1..*]			0x28				G, S	G		
1	security_activate			enum			0x30		--	--	A			
2	key_transfer						0x38		--	--	A			
3	key_agreement						0x48				A			
4	generate_key_pair						0x50				A			
5	generate_certificate_request						0x58				A			
6	import_certificate						0x60				A			
7	export_certificate						0x68				A			
8	remove_certificate						0x70				A			
B	CIUSecuritySetup	M	M	Security setup	64	1		0-0:43.0.2.255						for CIU client
1	logical_name			octet_string[6]				"00002B0002FF"	--	--	G	G		
2	security_policy			enum			0x08		--	--	G, S	G		

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(continued)

3	security_suite			enum		0x10	1	--	--	G, S	G		
4	client_system_title			octet_string[8]		0x18		--	--	G	G		
5	server_system_title			octet_string[8]		0x20		--	--	G	G		
6	certificates			array[1..*]		0x28				G, S	G		
1	security_activate			enum		0x30		--	--	A			
2	key_transfer					0x38		--	--	A			
3	key_agreement					0x48				A			
4	generate_key_pair					0x50				A			
5	generate_certificate_request					0x58				A			
6	import_certificate					0x60				A			
7	export_certificate					0x68				A			
8	remove_certificate					0x70				A			
B	HHUSecuritySetup	M	M	Security setup	64	1	0-0:43.0.3.255						for HHU client
1	logical_name			octet_string[6]			"00002B0003FF"	--	--	G	G		
2	security_policy			enum		0x08		--	--	G, S	G		
3	security_suite			enum		0x10	1	--	--	G, S	G		
4	client_system_title			octet_string[8]		0x18		--	--	G	G		
5	server_system_title			octet_string[8]		0x20		--	--	G	G		
6	certificates			array[1..*]		0x28				G, S	G		
1	security_activate			enum		0x30		--	--	A			
2	key_transfer					0x38		--	--	A			
3	key_agreement					0x48				A			
4	generate_key_pair					0x50				A			
5	generate_certificate_request					0x58				A			
6	import_certificate					0x60				A			
7	export_certificate					0x68				A			
8	remove_certificate					0x70				A			

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(continued)

B	BroadcastKeyFrameCounter	M	M	Data	1	0		0-0:43.1.1.255						
1	logical_name			octet_string[6]				"00002B0101FF"	G	--	G			
2	value			double_long_unsigned			0x08		G	--	G			
B	UnicastKeyFrameCounter	M	M	Data	1	0		0-0:43.1.0.255						
1	logical_name			octet_string[6]				"00002B0100FF"	G	--	G			
2	value			double_long_unsigned			0x08		G	--	G			

E.3 ACD identifier objects

The objects for identifiers are given in Table E.2.

Table E.2 — ACD COSEM objects for identifiers

1	2	3		4	5		6	7	8					9
					IC				Access rights Get, Set, Action					
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Identifiers													
B	LogicalDeviceName	M	M	Data	1	0	0xFD00	0-0:42.0.0.255						logical device identifier
1	logical_name			octet_string[6]				"00002A0000FF"	G	--	G	G		

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(continued)

2	value			octet_string[16]			0x08		G	--	G	G		unique identification of the logical device
B	DeviceID1	M	M	Data	1	0		0-0:96.1.0.255						manufacturing number
1	logical_name			octet_string[6]				"0000600100FF"	--	--	G	G		
2	value			octet_string[0..16]			0x08		--	--	G	G		E-meter serial number (Serial number of the device, handled by the manufacturer); ASCII coded
B	DeviceID2	M	M	Data	1	0		0-0:96.1.1.255						E-meter equipment identifier
1	logical_name			octet_string[6]				"0000600101FF"	--	--	G	G		
2	value			octet_string[0..48]			0x08		--	--	G, S	G		see companion specification
B	DeviceID3	M	M	Data	1	0		0-0:96.1.2.255						function location (optional)
1	logical_name			octet_string[6]				"0000600102FF"	--	--	G	G		
2	value			octet_string[0..48]			0x08		--	--	G, S	G		(ASCII)
B	DeviceID4	M	M	Data	1	0		0-0:96.1.3.255						location information
1	logical_name			octet_string[6]				"0000600103FF"	--	--	G	G		
2	value			octet_string[0..48]			0x08		--	--	G, S	G		geographical information (ASCII)
B	DeviceID5	M	M	Data	1	0		0-0:96.1.4.255						not assigned
1	logical_name			octet_string[6]				"0000600104FF"	--	--	G	G		
2	value			octet_string[0..48]			0x08		--	--	G, S	G		
B	DeviceID6	M	M	Data	1	0		0-0:96.1.5.255						certification number
1	logical_name			octet_string[6]				"0000600105FF"	--	--	G	G		
2	value			octet_string[0..16]			0x08		--	--	G	G		certification number (ASCII)
B	CIUConfig	M	M	Data	1	0		0-5:96.1.1.255						CIU configuration data
1	logical_name			octet_string[6]				"0005600101FF"	--	--	G	G		

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(continued)

2	value			octet_string[0..55]			0x08		--	--	G	G		see companion specification
B	FirmwareVersion	M	M	Data	1	0		0-5:96.1.2.255						firmware version
1	logical_name			octet_string[6]				"0005600102FF"	--	--	G	G		
2	value			octet_string[0..16]			0x08		--	--	G	G		concat (STSV1+Vn) (ASCII)
B	UtilityDeviceNumber	M	M	Data	1	0		0-5:96.1.3.255						utility device reference number
1	logical_name			octet_string[6]				"0005600103FF"	--	--	G	G		
2	value			octet_string[0..24]			0x08		--	--	G	G		managed by utility (ASCII)
B	UsagePoint	M	M	Data	1	0		0-5:96.1.4.255						service point reference number
1	logical_name			octet_string[6]				"0005600104FF"	--	--	G	G		
2	value			octet_string[0..24]			0x08		--	--	G	G		managed by utility (ASCII)

E.4 ACD events objects

The objects for events are given in Table E.2.

Events codes are given in Table E.4.

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(continued)

Table E.3 — ACD COSEM objects for events

1	2	3		4	5		6	7	8					9
					IC				Access rights Get, Set, Action					
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Events													
B	StandardEventRegister	M	M	Data	1	0		0-1:97.98.0.255						standard events
1	logical_name			octet_string[6]				"0001616200FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			
B	StandardEventFilter	M	M	Data	1	0		0-1:97.98.10.255						standard events
1	logical_name			octet_string[6]				"000161620AFF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			This filter defines, whether an event is pushed to the HES
B	StandardEventDescriptor	M	M	Data	1	0		0-1:97.98.20.255						standard events
1	logical_name			octet_string[6]				"0001616214FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the event descriptor is set

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(continued)

B	StandardEventMonitor	M	M	Register monitor	21	0		0-1:16.1.0.255						standard events
1	logical_name			octet_string[6]				"0001100100FF"	--	--	G			
2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G			Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G			
4	actions			array[1](action_set)			0x18		--	--	G, S			triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared
B	StandardEventCode	M	M	Data	1	0		0-5:96.11.0.255						standard events
1	logical_name			octet_string[6]				"0005600B00FF"	--	--	G			
2	value			enum			0x08		--	--	G			event number (0 to 255); at first power up or if no events were yet generated the value should return 255
B	StandardEventLog	M	M	Profile generic	7	1		0-1:99.98.3.255						standard events
1	logical_name			octet_string[6]				"0001636203FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2] (capture_object_definition)			0x10		--	--	G, (S)			clock; event code
4	capture_period			double_long_unsigned			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*-*.*.*.*,*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G			100 entries minimum

Annex E

(continued)

1	reset			integer			0x58		--	--	A			
B	SecurityEventRegister	M	M	Data	1	0		0-1:97.98.1.255						Security events
1	logical_name			octet_string[6]				"0001616201FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			
B	SecurityEventFilter	M	M	Data	1	0		0-1:97.98.11.255						Security events
1	logical_name			octet_string[6]				"000161620BFF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			This filter defines, whether an event is pushed to the HES
B	SecurityEventDescriptor	M	M	Data	1	0		0-1:97.98.21.255						Security events
1	logical_name			octet_string[6]				"0001616215FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the event descriptor is set
B	SecurityEventMonitor	M	M	Register monitor	21	0		0-1:16.1.1.255						Security events
1	logical_name			octet_string[6]				"0001100101FF"	--	--	G			
2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G			Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G			
4	actions			array[1](action_set)			0x18		--	--	G, S			triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared

Annex E

(continued)

B	SecurityEventCode	M	M	Data	1	0		0-5:96.11.1.255						Security events
1	logical_name			octet_string[6]				"0005600B01FF"	--	--	G			
2	value			enum			0x08		--	--	G			event number (0 to 255); at first power up or if no events were yet generated the value should return 255
B	SecurityEventLog	M	M	Profile generic	7	1		0-1:99.98.4.255						Security events
1	logical_name			octet_string[6]				"0001636204FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2] (capture_object_definition)			0x10		--	--	G, (S)			clock; event code
4	capture_period			double_long_unsigned			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*:*:*:*:*,*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G			100 entries minimum
1	reset			integer			0x58		--	--	A			
B	CommsEventRegister	M	M	Data	1	0		0-1:97.98.2.255						Comms events
1	logical_name			octet_string[6]				"0001616202FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			
B	CommsEventFilter	M	M	Data	1	0		0-1:97.98.12.255						Comms events
1	logical_name			octet_string[6]				"000161620CFF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			This filter defines, whether an event is pushed to the HES

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(continued)

B	CommsEventDescriptor	M	M	Data	1	0		0-1:97.98.22.255						Comms events
1	logical_name			octet_string[6]				"0001616216FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the event descriptor is set
B	CommsEventMonitor	M	M	Register monitor	2	0		0-1:16.1.2.255						Comms events
1	logical_name			octet_string[6]				"0001100102FF"	--	--	G			
2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G			Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G			
4	actions			array[1](action_set)			0x18		--	--	G, S			triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared
B	CommsEventCode	M	M	Data	1	0		0-5:96.11.2.255						Comms events
1	logical_name			octet_string[6]				"0005600B02FF"	--	--	G			
2	value			enum			0x08		--	--	G			event number (0 to 255); at first power up or if no events were yet generated the value should return 255
B	CommsEventLog	M	M	Profile generic	7	1		0-1:99.98.5.255						Comms events
1	logical_name			octet_string[6]				"0001636205FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2] (capture_object_definition)			0x10		--	--	G, (S)			clock; event code

Annex E

(continued)

4	capture_period			double_long_unsigned			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*.*.*.*.*,*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G			100 entries minimum
1	reset			integer			0x58		--	--	A			
B	DisconnectControlEventRegister	M	M	Data	1	0		0-1:97.98.3.255						DisconnectControl events
1	logical_name			octet_string[6]				"0001616203FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			
B	DisconnectControlEventFilter	M	M	Data	1	0		0-1:97.98.13.255						DisconnectControl events
1	logical_name			octet_string[6]				"000161620DFF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			This filter defines, whether an event is pushed to the HES
B	DisconnectControlEventDescriptor	M	M	Data	1	0		0-1:97.98.23.255						DisconnectControl events
1	logical_name			octet_string[6]				"0001616217FF"	--	--	G			
2	value			double_long_unsigned			0x08		--	--	G, S			Updated on event register change i.e. on 0->1 transition of any of the bits in event register. The corresponding bit in the event descriptor is set
B	DisconnectControlEventMonitor	M	M	Register monitor	2 1	0		0-1:16.1.3.255						DisconnectControl events
1	logical_name			octet_string[6]				"0001100103FF"	--	--	G			

Annex E

(continued)

2	thresholds			array[1] (double_long_unsigned)			0x08	{0}	--	--	G		Monitored value is event descriptor. Value 0 in threshold means if any of the bits in monitor value is newly triggered the action of the monitor will be set.
3	monitored_value			value_definition			0x10		--	--	G		
4	actions			array[1](action_set)			0x18		--	--	G, S		triggers push on event in case of occurrence, no action is triggered in case the event descriptor is cleared
B	DisconnectControlEventCode	M	M	Data	1	0		0-5:96.11.3.255					DisconnectControl events
1	logical_name			octet_string[6]				"0005600B03FF"	--	--	G		
2	value			enum			0x08		--	--	G		event number (0 to 255); at first power up or if no events were yet generated the value should return 255
B	DisconnectControlEventLog	M	M	Profile generic	7	1		0-1:99.98.6.255					DisconnectControl events
1	logical_name			octet_string[6]				"0001636206FF"	--	--	G		
2	buffer			array			0x08		--	--	G		selective access per range
3	capture_objects			array[2] (capture_object_definition)			0x10		--	--	G, (S)		clock; event code
4	capture_period			double_long_unsigned			0x18	0	--	--	G		asynchronously
5	sort_method			enum			0x20	1	--	--	G		unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*.*.*.*,*,*}	--	--	G		unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G		
8	profile_entries			double_long_unsigned			0x38	[100..*]	--	--	G		100 entries minimum

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(continued)

1	reset			integer			0x58		--	--	A			
B	EventPushScriptTable	M	M	Script table	9	0		0-104:10.0.108.255						all events
1	logical_name			octet_string[6]				"00680A006CFF"	--	--	G			
2	scripts			scripts			0x08		--	--	G, (S)			
1	execute			long_unsigned			0x20		--	--	A			
B	EventPushSetup	M	M	Push setup	4	0		0-103:25.9.0.255						all events
1	logical_name			octet_string[6]				"0067190900FF"	--	--	G			
2	push_object_list			array[0..*] (capture_object_definition)			0x08		--	--	G, S			
3	send_destination_and_method			send_destination_and_method_type			0x10		--	--	G, S			
4	communication_window			array[0..*](window_element)			0x18		--	--	G, S			
5	randomisation_start_interval			long_unsigned			0x20	0	--	--	G, S			Randomization time in seconds, 0 = no randomization at start of the first window defined in calling_window
6	number_of_retries			unsigned			0x28		--	--	G, S			Max number of repetitions of unsuccessful push
7	repetition_delay			long_unsigned			0x30		--	--	G, S			Delay in seconds between repetitions
1	push			integer			0x38		--	A	A			
B	EventStatus	M	M	Data	1	0		0-5:96.10.3.255						summary of events (256)
1	logical_name			octet_string[6]				"0005600A03FF"	--	--	G	G		
2	status			bit-string[256]			0x08		--	--	G	G		1 bit per event type

Annex E

(continued)

Table E.4 — ACD event codes

1	2	3
Event code	Bit No.	Event name
		Standard events
0	0	device_powered_down
1	1	device_powered_up
2	2	daylight_savings_disabled
3	3	daylight_savings_enabled
4	4	clock_adjusted
5	5	clock_invalid
6	6	battery_voltage_low
7	7	battery_failed
8	8	program_memory_error
9	9	RAM_error
10	10	NV_memory_error
11	11	watchdog_error
12	12	firmware_ready_for_activation
13	13	firmware_activated
14	14	server_client_connection_established
15	15	CIU_client_registered
16	16	CIU_client_deregistered
17	17	measurement_system_error
18	18	reserved
19	19	reserved
20	20	reserved
21	21	reserved
22	22	reserved
23	23	reserved
24	24	reserved
25	25	reserved
26	26	reserved
27	27	reserved
28	28	reserved
29	29	reserved
30	30	server_configuration_changed
31	31	standard event log cleared
		Security events
32	0	client_association_established
33	1	client_association_terminated
34	2	client_association_authentication_failed
35	3	APDU_authentication_failed
36	4	message_replayed
37	5	DLMS_key_changed
38	6	FW_verification_failed
39	7	reserved
40	8	NG_cover_opened
41	9	NG_cover_closed
42	10	NG_cover_off_during_power_down
43	11	reserved
44	12	reserved
45	13	reserved
46	14	reserved
47	15	reserved
48	16	reserved
49	17	reserved
50	18	reserved

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(continued)

51	19	reserved
52	20	reserved
53	21	reserved
54	22	reserved
55	23	reserved
56	24	reserved
57	25	reserved
58	26	reserved
59	27	reserved
60	28	reserved
61	29	reserved
62	30	reserved
63	31	security_event_log_cleared
		Comms events
64	0	connection_timed_out
65	1	modem_initialization_failed
66	2	SIM_card_failed
67	3	SIM_card_normal
68	4	modem_SW_eset
69	5	modem_HW_reset
70	6	GSM_registration_failed
71	7	GPRS_registration_failed
72	8	GSM_outgoing_connected
73	9	GSM_incoming_connected
74	10	GSM_hang_up
75	11	modem_diagnostic_failed
76	12	signal_quality_is_low
77	13	auto_answer_number_of_calls_exceeded
78	14	local_communication_established
79	15	reserved
80	16	reserved
81	17	reserved
82	18	reserved
83	19	reserved
84	20	reserved
85	21	reserved
86	22	reserved
87	23	reserved
88	24	reserved
89	25	reserved
90	26	reserved
91	27	reserved
92	28	reserved
93	29	reserved
94	30	comms_configuration_changed
95	31	comms_event_log_cleared
		Disconnect control events
96	0	remote_disconnect
97	1	remote_reconnect
98	2	local_disconnect
99	3	local_reconnect
100	4	special_days_disconnect
101	5	special_days_reconnect
102	6	scheduled_disconnect
103	7	scheduled_reconnect
104	8	single_action_schedule_disconnect
105	9	single_action_schedule_reconnect

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(continued)

106	10	non_disconnect_period_reconnect
107	11	reserved
108	12	reserved
109	13	reserved
110	14	reserved
111	15	reserved
112	16	reserved
113	17	reserved
114	18	reserved
115	19	reserved
116	20	reserved
117	21	reserved
118	22	reserved
119	23	reserved
120	24	reserved
121	25	reserved
122	26	reserved
123	27	reserved
124	28	reserved
125	29	reserved
126	30	disconnect_control_reconfigured
127	31	disconnect_control_event_log_cleared

E.5 ACD firmware upgrade objects

The objects for firmware upgrade are given in Table E.5.

Table E.5 — ACD COSEM objects for firmware upgrade

1	2	3		4	5		6	7	8					9
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	IC		SN	OBIS/ value	Access rights Get, Set, Action					Comment
		1PH	3PH		Class	Version			Public	Pre-estab	Management	CIU	HHU	
A	Firmware upgrade													
B	ImageTransfer	M	M	Image transfer	1	0		0-0:44.0.0.255						firmware image
					8									
1	logical_name			octet_string[6]				"00002C0000FF"	--	--	G			
2	image_block_size			double_long_unsigned			0x08		--	--	G			block size in bytes
3	image_transferred_block_status			bit_string			0x10		--	--	G			each bit provides info about one individual image block 0 = not transferred 1 = transferred
4	image_first_not_transferred_block_number			double_long_unsigned			0x18		--	--	G			provides block number of the first missing block
5	image_transfer_enabled			boolean			0x20		--	--	G, S			enabled or not; detail information in image_transfer_status FALSE = disabled TRUE = enabled

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6	image_transfer status		enum		0x28		--	--	G		detailed status of image transfer process 0 = transfer not initiated (not active; default state) 1 = transfer initiated 2 = verification initiated 3 = verification successful 4 = verification failed 5 = activation initiated 6 = activation successful 7 = activation failed
7	image_to_activate_info		array		0x30		--	--	G		
1	image_transfer_initiate		structure		0x40		--	--	A		initiates the transfer process; includes data in format { image_identifier image_size }
2	image_block_transfer		structure		0x48		--	A	A		transfers one single block; includes data in format { image_block_number image_block_value }
3	image_verify		integer		0x50		--	--	A		verifies the integrity before activation; result can be (0) success, if the verification could be completed; (2) temporary-failure if the verification has not been completed; (250) other-reason if the verification failed.

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4	image_activate			integer			0x58		--	--	A			activates the transferred and verified image; result can be (0) success, if the verification could be completed; (2) temporary-failure if the verification has not been completed; (250) other-reason if the verification failed.
B	ImageTransferActivationSchedule	M	M	Single action schedule	2	0		0-0:15.0.2.255						
1	logical_name			octet_string[6]				"00000F0002FF"	--	--	G			
2	executed_script			script			0x08		--	--	G, (S)			activate image
3	type			enum			0x10	1	--	--	G, (S)			1 is mandatory (Other are optional). If only type 1 is supported Set is optional)
4	execution_time			array[0..1] (execution_time_date)			0x18		--	--	G, S			the execution can be disabled with writing empty array or {"FFFFFFFF", "FFFFFFFFFFFF"}}
B	ImageTransferScriptTable	M	M	Script table	9	0		0-103:10.0.108.255						
1	logical_name			octet_string[6]				"00670A006CFF"	--	--	G			
2	scripts			scripts			0x08		--	--	(G)			The attribute's access rights must be declared in CTI file. Allowed possibilities - no access or Get access

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1	execute			long_unsigned			0x20	1	--	--	A			The activation of this scripts is performed by calling the execute() method to the script identifier 1 of the corresponding script object
B	ActiveFirmwareIdentifier0	M	M	Data	1	0		1-0:0.2.0.255						If several FW instances are present inside the device, the B field is used for differentiation:
1	logical_name			octet_string[6]				"0100000200FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			
B	ActiveFirmwareSignature0	M	M	Data	1	0		1-0:0.2.8.255						
1	logical_name			octet_string[6]				"0100000208FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			
B	ActiveFirmwareIdentifier1	O	O	Data	1	0		1-1:0.2.0.255						
1	logical_name			octet_string[6]				"0101000200FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			
B	ActiveFirmwareSignature1	O	O	Data	1	0		1-1:0.2.8.255						
1	logical_name			octet_string[6]				"0101000208FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			
B	ActiveFirmwareIdentifier2	O	O	Data	1	0		1-2:0.2.0.255						
1	logical_name			octet_string[6]				"0102000200FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			
B	ActiveFirmwareSignature2	O	O	Data	1	0		1-2:0.2.8.255						
1	logical_name			octet_string[6]				"0102000208FF"	--	--	G			
2	value			octet_string			0x08		--	--	G			

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(continued)

E.6 ACD communication objects

The objects for communication are given in Table E.6.

Table E.6 — ACD COSEM objects for communication

1	2	3		4	5		6	7	8					9	
					IC				Access rights Get, Set, Action						
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment	
		1PH	3PH												
A	Communications														
B	OpticalPortMACSetup	M	M	IEC HDLC setup	2 3	1		0-0:22.0.0.255						62056-46 HDLC MAC on Optical port.	
1	logical_name			octet_string[6]				"0000160000FF"	--	--	G				
2	comm_speed			enum			0x08		--	S	G, S				
3	window_size_transmit			unsigned			0x10		--	S	G, S				
4	window_size_receive			unsigned			0x18		--	S	G, S				
5	max_info_field_lenght _transmit			long_unsigned			0x20		--	S	G, S				
6	max_info_field_lenght _receive			long_unsigned			0x28		--	S	G, S				
7	inter_octet_time_out			long_unsigned			0x30		--	S	G, S				
8	inactivity_time_out			long_unsigned			0x38		--	S	G, S				

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9	device_address			long_unsigned			0x40		--	--	G, S			
B	TCP_UDPSetup	M	M	TCP-UDP setup	4 1	0		0-0:25.0.0.255						
1	logical_name			octet_string[6]				"0000190000FF"	--	--	G			
2	TCP_UDP_port			long_unsigned			0x08	4059	--	--	G, S			
3	IP_reference			octet_string[6]			0x10		--	--	G			
4	MSS			long_unsigned			0x18	1280	--	--	G, S			
5	nb_of_sim_conn			unsigned			0x20	1	--	--	G, S			
6	inactivity_time_out			long_unsigned			0x28	180	--	--	G, S			
B	IPv6Setup	M	M	IPv6 setup	4 8	0		0-0:25.7.0.255						
1	logical_name			octet_string[6]				"0000190700FF"	--	--	G			
2	DL_reference			octet_string[6]			0x08		--	--	G, S			
3	address_config_mode			enum			0x10	0	--	--	G, S			
4	unicast_IPv6_addresses			array[0..*](IPv6_address)			0x18		--	--	G, S			
5	multicast_IPv6_addresses			array[0..*](IPv6_address)			0x20		--	--	G, S			
6	gateway_IPv6_address			array[0..*](IPv6_address)			0x28		--	--	G, S			
7	primary_DNS_address			IPv6_address			0x30		--	--	G, S			
8	secondary_DNS_address			IPv6_address			0x38		--	--	G, S			
9	traffic_class			unsigned			0x40		--	--	G, S			

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B	Modem configuration	M - G	M - G	Modem configuration	27	1		0-0:2.0.0.255						
1	logical_name			octet_string[6]				"0000020000FF"	--	--	G			
2	comm_speed			enum			0x08		--	--	G, S			
3	initialization_string			array			0x10		--	--	G, S			
4	modem_profile			array			0x18		--	--	G, S			
B	Auto answer	M - G	M - G	Auto answer	28	2		0-0:2.2.0.255						
1	logical_name			octet_string[6]				"0000020200FF"	--	--	G			
2	mode			enum			0x08		--	--	G, S			
3	listening_window			array[0..*]			0x10		--	--	G, S			Array[0] equals always listening
4	status			enum			0x18		--	--	G, S			
5	number_of_calls			unsigned			0x20		--	--	G, S			
6	number_of_rings			nr_rings_type			0x28		--	--	G, S			
7	list_of_allowed_callers			array[0..*](list_of_allowed_callers_element)			0x30		--	--	G, S			phone number is an ASCII coded octet-string of phone number length
B	PPP setup	M - G	M - G	PPP setup	44	0		0-0:25.3.0.255						
1	logical_name			octet_string[6]				"0000190300FF"	--	--	G			
2	PHY_refernce			octet_string[6]			0x08	0-0:25.4.0.255	--	--	G, S			

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3	LCP_options			array[1..8](LCP_options_element)			0x10	{ {3, 4, 0xC023},... }	--	--	G, S			{ LCP-option-type := Auth-Prot, LCP-Option-Length := 2, LCP-option-data := PAP }
4	IPCP_options			array[1..5](IPCP_options_element)			0x18	{ {2, 4, 0x0000},... }	--	--	G, S			{ IPCP-option-type := IP-comp-prot, IPCP-option-Length := 2, IPCP-option-data := No-IP-Compresion-is-used }
5	PPP_authentication			PPP_authentication_type			0x20		--	--	G, S			{ choice(NULL, { user-name, PAP-password }) }

E.7 ACD time keeping objects

The objects for time keeping are given in Table E.7.

Table E.7 — ACD COSEM objects for time keeping

1	2	3		4	5		6	7	8					9
					IC				Access rights Get, Set, Action					
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Time													
B	Clock	M	M	Clock	8	0		0-0:1.0.0.255						
1	logical_name			octet_string[6]				"0000010000FF"			G			

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2	time			octet_string[12]			0x08		--	S	G, S			Current date and time as local time, deviation can be handled or set to 0x8000, status must be handled. With Set deviation=0x8000 and status=0xFF
3	time_zone			long			0x10	-120	--	S	G, S			
4	status			unsigned			0x18		--		G			
5	daylights_savings_begin			octet_string[12]			0x20	"FFFFFFFFFFFFFFFF8000FF"	--	S	G, S			last sunday in March at 02:00
6	daylights_savings_end			octet_string[12]			0x28	"FFFFFFFFFFFFFFFF8000FF"	--	S	G, S			last sunday in October at 03:00
7	daylights_savings_deviation			integer			0x30	0	--	S	G, S			
8	daylights_savings_enabled			boolean			0x38	0	--	S	G, S			
9	clock_base			enum			0x40	0	--		G			internal crystal (by default)
1	adjust_to_quarter (data)						0x60		--	--				optional
2	adjust_to_measuring (data)						0x68							optional
3	adjust_to_minute (data)						0x70							optional
4	adjust_to_preset_time (data)						0x78							optional
5	preset_adjusting_time (data)						0x80							optional
6	shift_time (data)						0x88							optional
B	LocalTime	M	M	Data	1	0		1-0:0.9.1.255						For display and readout purposes, not used for remote communication
1	logical_name			octet_string[6]				"0100000901FF"	--	--	G			
2	value			octet_string[4]			0x08		--	--	G			

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B	LocalDate	M	M	Data	1	0		1-0:0.9.2.255						For display and readout purposes, not used for remote communication
1	logical_name			octet_string[6]				"0100000902FF"	--	--	G			
2	value			octet_string[5]			0x08		--	--	G			
B	ClockTimeShiftLimit	M	M	Register	3	0		1-0:0.9.11.255						
1	logical_name			octet_string[6]				"010000090BFF"	--	--	G			
2	value			unsigned			0x08	60	--	S	G, S			Maximum allowed time shift without registration of a time shift event
3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			seconds
1	reset						0x28		--	--				
B	ActivityCalendar(+)	M	M	Activity calendar	2	0		0-1:13.0.0.255						for all import energy tariffs
1	logical_name			octet_string[6]				"00010D0000FF"	--	--	G			
2	calendar_name_active			octet_string[0..8]			0x08		--	--	G			The calendar_name_active has a size of 8 characters at least, i.e. [0..8] is mandatory but can be longer
3	season_profile_active			array[0..*]			0x10		--	--	G			
4	week_profile_table_active			array[0..*]			0x18		--	--	G			
5	day_profile_table_active			array[0..*]			0x20		--	--	G			
6	calendar_name_passive			octet_string[0..8]			0x28		--	S	G, S			see calendar_name_active
7	season_profile_passive			array[0..*]			0x30		--	S	G, S			
8	week_profile_table_passive			array[0..*]			0x38		--	S	G, S			
9	day_profile_table_passive			array[0..*]			0x40		--	S	G, S			

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(continued)

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E.8 ACD disconnect objects

The objects for disconnect control are given in Table E.8.

Table E.8 — ACD COSEM objects for disconnect

1	2	3		4	5 IC		6	7	8 Access rights Get, Set, Action					9
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Disconnect													
B	DisconnectControl	M	M	Disconnect control	7 0	0		0-0:96.3.10.255						
1	logical_name			octet_string[6]				"000060030AFF"	--	--	G	G		
2	output_state			boolean			0x08		--	--	G	G		
3	control_state			enum			0x10		--	--	G	G		
4	control_mode			enum			0x18		--	--	G, (S)	G		if only one control mode is available set is not allowed.
1	remote_disconnect			integer			0x20		--	--	--	--		
2	remote_connect			integer			0x28		--	--	--	--		
B	DisconnectStatus	M	M	Data	1	0		0- 0:94.27.10.255						load switch is open or closed
1	logical_name			octet_string[6]				"00005E1B0AFF"	--	--	G	G		

2	value			unsigned			0x08	choice(5)	--	--	G	G		0 = open 255 = closed
---	-------	--	--	----------	--	--	------	-----------	----	----	---	---	--	--------------------------

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(continued)

B	DisconnectMonitor	M	M	Parameter monitor	6	0		0-0:16.2.0.255						detect connect/disconnect events
1	logical_name			octet_string[6]				"0000100200FF"	--	--	G			
2	changed_parameter			structure			0x08		--	--	G			DisconnectStatus.value
3	capture_time			date-time			0x10		--	--	G			
4	parameter_list			array			0x18		--	--	G			
1	add_parameter(data)						0x20		--	--	A			
2	delete_parameter(data)						0x28		--	--	A			
B	DisconnectHistoryLog	M	M	Profile generic	7	1		0-1:99.98.0.255						
1	logical_name			octet_string[6]				"0001636200FF"	--	--	G			
2	buffer			array			0x08		--	--	G			selective access per range
3	capture_objects			array[2..3] (capture_object_definition)			0x10		--	--	G, (S)			clock; DisconnectStatus.value; DisconnectArbitrator.last_outcome;
4	capture_period			double_long_unsigned			0x18	0	--	--	G			asynchronously
5	sort_method			enum			0x20	1	--	--	G			unsorted (FIFO)
6	sort_object			capture_object_definition			0x28	{*,*:*:*:*:*,*}	--	--	G			unsorted
7	entries_in_use			double_long_unsigned			0x30		--	--	G			
8	profile_entries			double_long_unsigned			0x38	[10..*]	--	--	G			
1	reset			integer			0x58		--	--	A			
B	DisconnectScriptTable	M	M	Script table	9	0		0-102:10.0.108.255						
1	logical_name			octet_string[6]				"00660A006CFF"	--	--	G			
2	scripts			array[26]			0x08		--	--	G, S			26 entries

1	execute			long_unsigned			0x20		--	--	--			

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B	DisconnectArbitrator	M	M	Arbitrator	6 8	0		0-0:96.3.20.255						prioritization of connect/disconnect control
1	logical_name			octet_string[6]				"0000600314FF"			G			
2	actions			array			0x08				G, S			
3	permissions_table			array			0x10				G, S			
4	weightings_table			array			0x18				G, S			
5	most_recent_request s_table			array			0x20				G			
6	last_outcome			unsigned			0x28				G			
1	request_action ()						0x30				A			for remote disconnect
2	reset ()						0x38				A			
B	DisconnectSchedule	M	M	Schedule	1 0	0		0-0:12.0.0.255						
1	logical_name			octet_string[6]				"00000C0000FF"	--	--	G			
2	entries			array[1]			0x08		--	--	G, S			
1	enable/disable(data)						0x20		--	--	A			
2	insert(data)						0x28		--	--	A			
3	delete(data)						0x30		--	--	A			
B	DisconnectActivityCalendar	M	M	Activity calendar	2 0	0		0-1:13.0.2.255						
1	logical_name			octet_string[6]				"00010D0002FF"	--	--	G			
2	calendar_name_active			octet_string[0..8]			0x08		--	--	G			The calendar_name_active has a size of 8 characters at least, i.e. [0..8] is mandatory but can be longer
3	season_profile_active			array[0..*]			0x10		--	--	G			

4	week_profile_table_active			array[0..*]			0x18		--	--	G			
---	---------------------------	--	--	-------------	--	--	------	--	----	----	---	--	--	--

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5	day_profile_table_active			array[0..*]			0x20		--	--	G			
6	calendar_name_passive			octet_string[0..8]			0x28		--	S	G, S			
7	season_profile_passive			array[0..*]			0x30		--	S	G, S			
8	week_profile_table_passive			array[0..*]			0x38		--	S	G, S			
9	day_profile_table_passive			array[0..*]			0x40		--	S	G, S			
10	activate_passive_calendar_time			octet_string[12]			0x48		--	S	G, S			
1	activate_passive_calendar			integer			0x50		--	(A)	(A)			
B	DisconnectSpecialDaysTable	M	M	Special days table	1 1	0		0-1:11.0.2.255						
1	logical_name			octet_string[6]				"00010B0002FF"	--	--	G			
2	entries			array[0..30]			0x08		--	S	G, S			
B	RandomDelay	M	M	Register	3	0		0-0:94.27.1.255						disconnect/reconnect delay
1	logical_name			octet_string[6]				"00005E1B01FF"	--	--	G			
2	value			unsigned			0x08	0..255	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,7}	--	--	G			seconds
1	reset						0x28		--	--	--			
B	ReconnectDelay	M	M	Register	3	0		0-0:94.27.2.255						reconnect only
1	logical_name			octet_string[6]				"00005E1B02FF"	--	--	G			
2	value			unsigned			0x08	0..255	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,6}	--	--	G			minutes
1	reset						0x28		--	--	--			

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(continued)

B	AutoResumePeriod	M	M	Register	3	0		0-0:94.27.3.255						resume normal schedule
1	logical_name			octet_string[6]				"00005E1B03FF"	--	--	G			
2	value			long_unsigned			0x08	0..65535	--	--	G, S			
3	scaler_unit			scal_unit_type			0x10	{0,6}	--	--	G			minutes
1	reset						0x28		--	--	--			

E.9 ACD battery management objects

The objects for battery management are given in Table E.9.

Table E.9 — ACD COSEM objects for battery management

1	2	3		4	5		6	7	8					9
					IC				Access rights Get, Set, Action					
Reference	attribute/ method	mandatory/ optional		IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH	3PH											
A	Battery													
B	BatteryStatus	M	M	Data	1	0		0-0:94.27.0.255						battery state
1	logical_name			octet_string[6]				"00005E1B00FF"	--	--	G	G		
2	value			unsigned			0x08		--	--	G	G		00 = good 16 = voltage low 32 = failed

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B	BatteryMonitor	M	M	Register monitor	2 1	0		0-0:16.0.2.255						apparent energy tariff export
1	logical_name			octet_string[6]				"0000100002FF"	--	--	G			
2	thresholds			array[1]			0x08		--	--	G, S			The threshold is of the same type as the monitored attribute of the referenced object
3	monitored_value			value_definition			0x10		--	--	G, S			
4	actions			array[1](action_set)			0x18		--	--	G, S			

E.10 ACD CIU message push objects

The objects for CIU message push function are given in Table E.10.

ACDStatus coded are in Table E.11.

Table E.10 — ACD COSEM objects for CIU message push

1	2	3	4	5 IC		6	7	8 Access rights Get, Set, Action					9
Reference	attribute/ method	mandatory/ optional	IC name/ Data type	Class	Version	SN	OBIS/ value	Public	Pre-estab	Management	CIU	HHU	Comment
		1PH 3PH											
A	CIU display												
B	ACDStatus	M	M	Data	1	0	0-0:94.27.11.255						meter status
1	logical_name			octet_string[6]			"00005E1B0BFF"	--	--	G	G		

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2	value			long64-unsigned			0x08	choice(21)	--	--	G	G, S		64-bit string of status bits
B	LocalMessageBuffer	M	M	Data	1	0		0-1:96.13.0.255						meter to CIU message buffer
1	logical_name			octet_string[6]				"0001600D00FF"	--	--	G	G		
2	value			visible-string[1..160]			0x08	choice(10)	--	--	G	G		160 characters
B	RemoteMessageBuffer	M	M	Data	1	0		0-1:96.13.1.255						HES to CIU message buffer
1	logical_name			octet_string[6]				"0001600D01FF"	--	--	G	G		
2	value			visible-string[1..160]			0x08	choice(10)	--	--	G	G		160 characters
B	CIUSingleActionSchedule	M	M	Single action schedule	2	0		0-105:15.0.4.255						for CIU message push
1	logical_name			octet_string[6]				"00690F0004FF"	--	--	G			
2	executed_script			script			0x08		--	--	G, (S)			
3	type			enum			0x10		--	--	G, (S)			
4	execution_time			array[0..*]			0x18		--	--	G, S			
B	CIUPushScriptTable	M	M	Script table	9	0		0-107:10.0.108.255						for load profiles
1	logical_name			octet_string[6]				"006B0A006CFF"	--	--	G			
2	scripts			scripts			0x08		--	--	G, (S)			

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1	execute			long_unsigned			0x20		--	--	A			
B	CIUPushSetup	M	M	Push setup	4 0	0		0- 106:25.9.0.255						all events
1	logical_name			octet_string[6]				"006A190900FF"	--	--	G			
2	push_object_list			array[0..*] (capture_object_definition)			0x08		--	--	G, S			
3	send_destination_and_method			send_destination_and_method_type			0x10		--	--	G, S			
4	communication_window			array[0..*](window_element)			0x18		--	--	G, S			
5	randomisation_start_interval			long_unsigned			0x20		--	--	G, S			
6	number_of_retries			unsigned			0x28		--	--	G, S			
7	repetition_delay			long_unsigned			0x30		--	--	G, S			
1	push			integer			0x38		--	A	A			

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(continued)

Table E.11 — ACD status codes

1	2	3
Bit No.	Status	Description
0	load_switch_closed	logical state
1	remote_disconnect	disconnected by HES
2	local_disconnect	disconnected by HHU, CIU or Mobile phone
3	scheduled_disconnect	disconnected by programmed schedule
4	remote_reconnect	reconnected by HES
5	local_reconnect	reconnected by HHU, CIU or Mobile phone
6	scheduled_reconnect	reconnected by programmed schedule
7	reconnect_delay_active	programmable delay after reconnect instruction
8	reconnect_on_timeout	automatic resumption of scheduled operation
9	CIU_on_line	meter/CIU are on line
10	HES_on_line	meter/HES are on line
11	local_message_received	set by meter when it wants to send a message to CIU; cleared by CIU when buffer has been read
12	remote_message_received	set by meter when remote message received; cleared by CIU when buffer has been read
13	reserved	
14	reserved	
15	reserved	
16	reserved	
17	reserved	
18	reserved	
19	reserved	
20	reserved	
21	reserved	
22	reserved	
23	reserved	
24	reserved	
25	reserved	
26	reserved	
27	reserved	
28	reserved	
29	reserved	
30	reserved	
31	reserved	
32	reserved	
33	reserved	
34	reserved	
35	reserved	
36	reserved	
37	reserved	
38	reserved	
39	reserved	
40	reserved	
41	reserved	
42	reserved	
43	reserved	
44	reserved	
45	reserved	
46	reserved	
47	reserved	
48	reserved	
49	reserved	

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50	reserved	
51	reserved	
52	reserved	
53	reserved	
54	reserved	
55	reserved	
56	reserved	
57	reserved	
58	reserved	
59	reserved	
60	reserved	
61	reserved	
62	reserved	
63	reserved	

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