

OMNIPower, K162M, K382M, & K351C

DLMS Protocol description



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1 Revision history:

| Meter Type | Meter software revision | Document revision | Description | Additional Remarks |
|-----------------------------------|-------------------------|-------------------|--|--|
| OMNIPOWER | Rev. F1 | 10.2013/Rev.A1 | First release | Updated version of DLMS/COSEM implemented in all three meter types. |
| K162M & K382M | Rev. Y1 | | | |
| K351C | Rev. H1 | | | |
| OMNIPOWER single- and three Phase | Rev. Q1 | 05.2014/Rev.B1 | OMNIPOWER CT meter included | Updated version of DLMS/COSEM implemented in all four meter types. |
| OMNIPOWER CT | Rev. Q1 | | | |
| K162M & K382M | Rev. AC1 | | | |
| K351C | Rev. L1 | | | |
| OMNIPOWER single- and three Phase | Rev. S1 | 10.2014/Rev.C1 | Alarm Server and Overvoltage Disconnect functionality added. Description of some objects improved. | Documentation updated for OMNIPOWER Rev. S1, but also prepared for OMNIPOWER CT Rev. T1 regarding the added functionality. |
| OMNIPOWER CT | Rev. T1 | | | |
| OMNIPOWER single- and three Phase | Rev. T1 | 04.2015/Rev.D1 | Image transfer (Class_id: 18) and SouthernHemisphere object (1.1.134.0.21.255) added. Description of some objects improved. | |
| OMNIPOWER CT | Rev. T1 | | | |

1.1 Referenced documents

| Ref. | Title |
|------------------------------|---|
| DLMS UA 1000-1 Ed. 9.0:2009 | <i>COSEM Interface Classes and the OBIS Identification System, "Blue Book"</i> |
| DLMS UA 1000-2 Ed. 7.0:2009 | <i>DLMS/COSEM Architecture and Protocols, the "Green Book"</i> |
| DLMS UA 1001-1, Ed. 3.0:2007 | <i>DLMS/COSEM Conformance test and certification process, the "Yellow Book"</i> <i>NOTE The Yellow Bok is under revision to be aligned with Green Book Edition 7.0 and Blue Book Edition 10.0.</i> |
| DLMS UA 1002, Ed. 1.0:2003 | <i>COSEM Glossary of terms, the "White Book"</i> |
| IEC 62056-21 | <i>Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange</i> |
| IEC 62056-42 | <i>Electricity metering – Data exchange for meter reading, tariff and load control – Part 42: Physical layer services and procedures for connection-oriented asynchronous data exchange</i> |
| IEC 62056-46 | <i>Electricity metering – Data exchange for meter reading, tariff and load control – Part 46: Data link layer using HDLC protocol</i> |
| IEC 62056-53 | <i>Electricity metering – Data exchange for meter reading, tariff and load control – Part 53: COSEM Application layer</i> |
| IEC 62056-61 | <i>Electricity metering – Data exchange for meter reading, tariff and load control – Part 61: OBIS Object identification system</i> |
| IEC 62056-62 | <i>Electricity metering – Data exchange for meter reading, tariff and load control – Part 62: Interface classes</i> |
| IEC 62056-72 | <i>Electricity metering – Data exchange for meter reading, tariff and load control – Part 72: DLMS/COSEM Data link layer</i> |
| 5512-609 | <i>Inteface specification Kamstrup IP Modules</i> |
| 5512-1040 | <i>K382M Technical Description</i> |
| 5512-1129 | <i>GSM8i Integrator guide GSM8x xG</i> |
| 5512-1235 | <i>OMNIPOWER Technical Description</i> |
| 5512-1265 | <i>K351C Technical Description</i> |
| 5512-1533 | <i>Integrator Guide OMNICON xG Modem and variants</i> |

1.2 List of abbreviations

| | |
|--------------|--|
| AA | Application Association |
| AARE | Application Association Response |
| AARQ | Application Association ReQuest |
| AL | Application layer |
| AP | Application process |
| APDU | Application Protocol Data Unit |
| ASE | Application Service Element |
| A-XDR | Adapted Extended Data Representation |
| base_name | The short_name corresponding to the first attribute ("logical_name") of a COSEM object |
| class_id | Interface class identification code |
| COSEM | Companion Specification for Energy Metering |
| COSEM object | An instance of a COSEM interface class |
| DHCP | Dynamic Host Control Protocol |
| DLMS | Device Language Message Specification |
| DNS | Domain Name Server |
| GMT | Greenwich Mean Time. Replaced by Coordinated Universal Time (UTC). |
| GPS | Global Positioning System |
| GPRS | General Packet Radio Service |
| GSM | Global System for Mobile Communications |
| HDLC | High-level Data Link Control |
| HLS | High Level Security |
| IC | Interface Class |
| IEC | International Electrotechnical Commission |
| IEEE | Institute of Electrical and Electronics Engineers |
| IP | Internet Protocol |
| ISO | International Organization for Standardization |
| LLC | Logical Link Control (Sublayer) |
| LLS | Low Level Security |
| LN | Logical Name |
| LSB | Least Significant Bit |
| MSB | Most Significant Bit |
| OBIS | OBject Identification System |
| PDU | Protocol Data Unit |
| PPP | Point-to-Point Protocol |
| PSTN | Public Switched Telephone Network |
| SAP | Service Access Point |

2 General description

This document describes the implementation details for the DLMS/COSEM communication in Kamstrup electricity meters OMNIPOWER single-phase (incl. OMNIPOWER single-phase ST), OMNIPOWER three-phase, OMNIPOWER CT, K382M (incl. K162M) and K351C. The implementation complies with the following standards:

- Blue Book, 10th edition, (DLMS UA 1000-1:2007, 10th Edition)
- Green Book, 7th edition, (DLMS UA 1000-2:2007, 7th Edition)

The meters are tested according to the specification defined in the Yellow Book for the DLMS certification.

The purpose of this document is to describe the choices taken to define the logical functionality of Kamstrup electricity meters.

Some manufacturer specific objects have been defined. Manufacture specific objects are used for supporting e.g. Breaker, Pre-payment, Demand registers, Tariff and Load control features as well as manufacture specific configurations.

For information on manufacture specific objects not found within this document in paragraph 3, refer to Technical Description for actual electricity meter or contact Kamstrup EL-Kamstrup@produkt.com.

2.1 Client/server type operation, communication profile

Data exchange between data collection systems and Kamstrup electricity meters using the COSEM interface object model is based on the client/server paradigm. Kamstrup electricity meter play the role of the server.

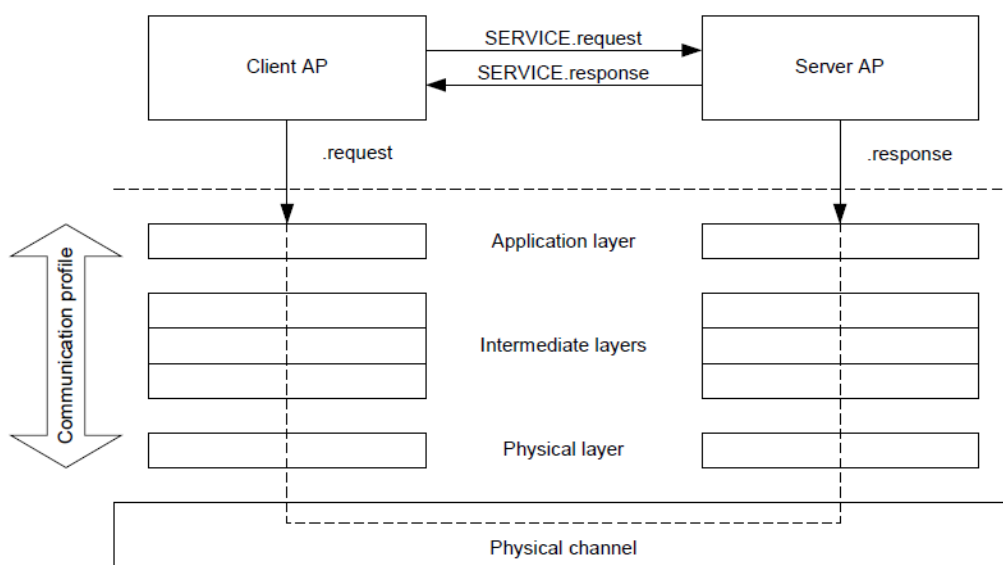


Figure 1 Client/server relationship and protocols

2.2 Connection (association) oriented operation

To be able to exchange data between the client and a server they have to be associated.

This is done as shown in the Figure 2. Kamstrup electricity meters automatically disconnects when no activity as defined by the `inactivity_time_out` value within the HDLC Setup class (Default value is 20 s). For examples of communication see paragraph 4.

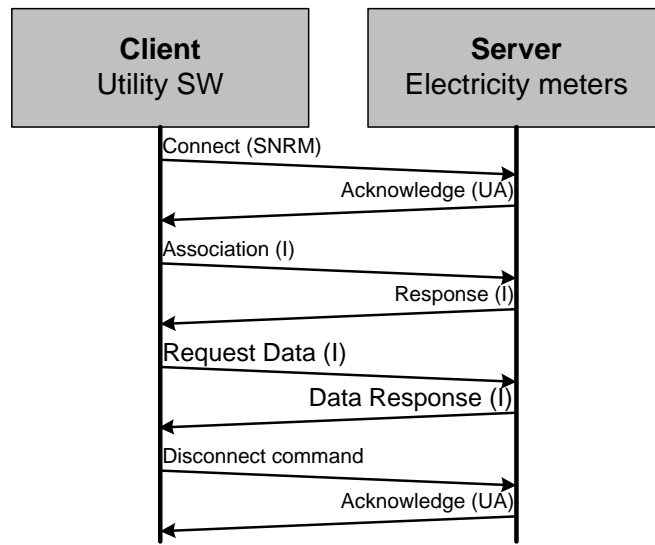


Figure 2 Complete communication session

Depending on the Application Association (AA) established between the client and the server, different access rights are granted by the server. Access rights concern a set of COSEM objects – the visible objects – that can be accessed ('seen') within the given AA. In addition, access to attributes and methods of these COSEM objects may also be restricted within the AA (for example a certain type of client can only read a particular attribute of a COSEM object, but cannot write it).

The list of the visible COSEM objects – the "association view" – can be obtained by the client by reading the "*object_list*" attribute of the appropriate association object.

2.3 Referencing methods

Attributes and methods of COSEM objects can be referenced in two different ways:

Kamstrup electricity meters use logical names (LN referencing): In this case, the attributes and methods of a COSEM interface object are referenced via the identifier of the COSEM object instance to which they belong.

The reference for an attribute is: class_id, value of the 'logical_name' attribute, attribute_index.

The reference for a method is: class_id, value of the 'logical_name' attribute, method_index.

Where:

- attribute_index is used as the identifier of the attribute required. Attribute indexes are specified in the definition of each IC. They are positive numbers starting with one. Proprietary attributes may be added: these shall be identified with negative numbers;
- method_index is used as the identifier of the method required. Method indexes are specified in the definition of each IC. They are positive numbers starting with one. Proprietary methods may be added: these shall be identified with negative numbers.

2.4 Specification Application layer

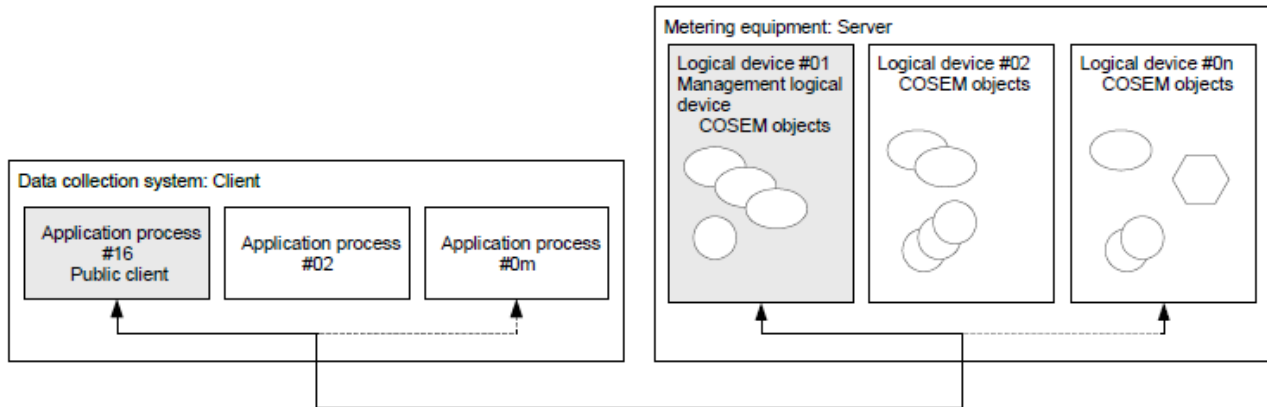


Figure 3 COSEM application model of a data collection system and metering equipment

Objects that share common characteristics are generalized as an IC, identified with a class_id. Within a specific IC, the common characteristics (attributes and methods) are described once for all objects. Instantiations of ICs are called COSEM interface objects.

Figure 4 illustrates these terms by means of an example:

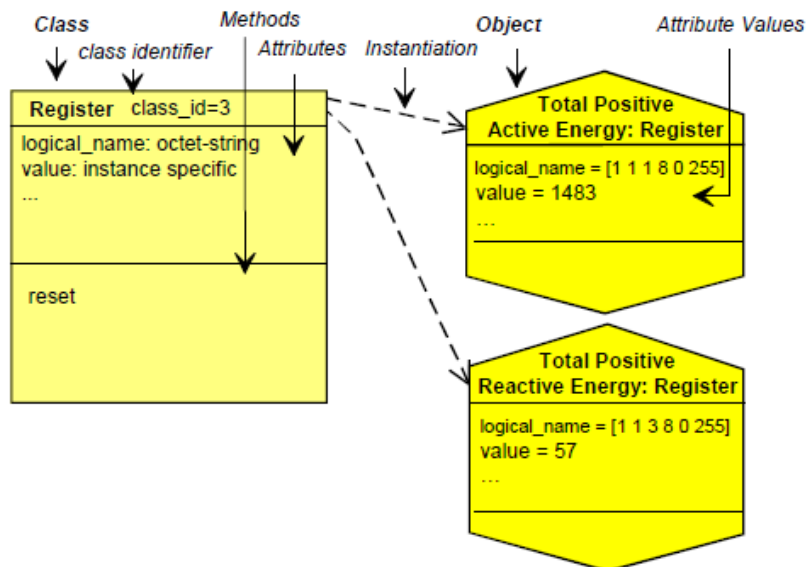


Figure 4 Example of interface class and its instances

The IC “Register” is formed by combining the features necessary to model the behavior of a generic register (containing measured or static information) as seen from the client (data collection system, hand held terminal). The contents of the register are identified by the attribute “logical_name”. The logical_name contains an OBIS identifier. The actual (dynamic) content of the register is carried by its “value” attribute.

2.4.1 Implemented classes

The following classes are implemented:

- Data (Class 1)
- Register (Class 3)
- Extended register (Class 4)
- Profile generic (Class 7)
- Clock (Class 8)
- Association LN (Class 15)
- SAP (Class 17)
- Image transfer (Class 18)
- HDLC Setup (Class 23)

All defined objects with their access rights, depending on the current association, are listed paragraph 3.

2.4.2 Management Logic device

The objects of the Management Logic device can be accessed using the public association without security as required by the standard.

Public Association without security (No security):

- Client SAP: 16
- Server SAP: 1
- Context name: Logical name addressing
- Mechanism name: No security
- Conformance: GET, Block transfer with GET

The following objects are available for all meter types using the public association on all interfaces.

Access rights for all objects are read (R).

| Class_id | Ver. | Name | Logical Name | Access | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|-----------------------------|-----------------|--------|-------|-------|-----------------------------|--------------|
| 23 | 1 | HDLC Setup class | 0.0.22.0.0.255 | R | ● | ● | ● | ● |
| 15 | 0 | Association LN class | 0.0.40.0.0.255 | R | ● | ● | ● | ● |
| 17 | 0 | SAP Class | 0.0.41.0.0.255 | R | ● | ● | ● | ● |
| 8 | 0 | RTC | 0.1.1.0.0.255 | R | ● | ● | ● | ● |
| 1 | 0 | MeterNoLow | 1.1.0.0.0.255 | R | ● | ● | ● | ● |
| 1 | 0 | MeterNo1 | 1.1.0.0.1.255 | R | ● | ● | ● | ● |
| 1 | 0 | MeterNo2 | 1.1.0.0.2.255 | R | ● | ● | ● | ● |
| 1 | 0 | MeterNo3 | 1.1.0.0.3.255 | R | ● | ● | ● | ● |
| 1 | 0 | IdentificationNumber | 1.1.0.0.4.255 | R | - | - | ● | ● |
| 1 | 0 | SoftwareNumberRevisionAscii | 1.1.0.2.0.255 | R | ● | ● | ● | ● |
| 1 | 0 | SoftwareRevision | 1.1.0.2.2.128 | R | ● | ● | ● | ● |
| 1 | 0 | SpecialData | 1.1.0.130.1.255 | R | ● | ● | ● | ● |
| 1 | 0 | SpecialData2 | 1.1.0.130.2.255 | R | ● | ● | ● | ● |
| 1 | 0 | SerialNo | 1.1.96.1.0.255 | R | ● | ● | ● | ● |
| 1 | 0 | CompleteMeterTypeNo | 1.1.96.1.1.255 | R | ● | ● | ● | ● |

Table 2-1 Object list - Public Association

Table 2-2 is an example of register values and data types. SerialNo (1.1.96.1.0.255) and the CompleteMeterTypNo (1.1.96.1.1.255) are both unique identifiers for the actual meter. MeterNo1 (1.1.0.0.1.255) is a reprogrammable meter number and SoftwareNumberRevisionAscii (1.1.0.2.0.255) is the identifier for the software incl. revision.

| Class_id | Ver. | Name | Logical Name | Value (example) | Data Type |
|----------|------|-----------------------------|-----------------|--------------------|----------------|
| 23 | 1 | HDLC Setup class | 0.0.22.0.0.255 | | |
| 15 | 0 | Association LN class | 0.0.40.0.0.255 | | |
| 17 | 0 | SAP Class | 0.0.41.0.0.255 | | |
| 8 | 0 | RTC | 0.1.1.0.0.255 | | |
| 1 | 0 | MeterNoLow | 1.1.0.0.0.255 | 74543 | Octet-String |
| 1 | 0 | MeterNo1 | 1.1.0.0.1.255 | 19083074 | Unsigned32 |
| 1 | 0 | MeterNo2 | 1.1.0.0.2.255 | 0 | Unsigned32 |
| 1 | 0 | MeterNo3 | 1.1.0.0.3.255 | 0 | Unsigned32 |
| 1 | 0 | IdentificationNumber | 1.1.0.0.4.255 | 1KAS0019083074 | Visible-String |
| 1 | 0 | SoftwareNumberRevisionAscii | 1.1.0.2.0.255 | 50981040-Q1 | Visible-String |
| 1 | 0 | SoftwareRevision | 1.1.0.2.2.128 | Q1 | Visible-String |
| 1 | 0 | SpecialData | 1.1.0.130.1.255 | 0 | Unsigned32 |
| 1 | 0 | SpecialData2 | 1.1.0.130.2.255 | 0 | Unsigned32 |
| 1 | 0 | SerialNo | 1.1.96.1.0.255 | 19083074 | Unsigned32 |
| 1 | 0 | CompleteMeterTypeNo | 1.1.96.1.1.255 | 6851125CD140111040 | Visible-String |

Table 2-2 Example of register values and data type (OMNIPOWER CT)

2.4.3 Electric meter logic devices

The Electric meter logic device models the data of the Kamstrup electrical meter.

Primary Module interface Association with Low Level security (Password protected)

- Client SAP: 18
- Server SAP: 16
- Context name: Logical name addressing
- Mechanism name: Low Level security. Password default is '12345'
- Conformance: GET, Block transfer with GET, SET, ACTION, SELECTIVE ACCESS

Optical interface Association with Low Level security (Password protected)

- Client SAP: 19¹
- Server SAP: 16
- Context name: Logical name addressing
- Mechanism name: Low Level security. Password default is '12345'
- Conformance: GET, Block transfer with GET, SET, ACTION, SELECTIVE ACCESS

Association used from Module_Port_2 interface:

CCC Module interface Association with Low Level security (Password protected):

- Client SAP: 20²
- Server SAP: 16
- Context name: Logical name addressing
- Mechanism name: Low Level security. Password default is '12345'
- Conformance: GET, Block transfer with GET, SET, ACTION, SELECTIVE ACCESS

For a list of objects available for Module Interface and Optical Interface associations, refer to paragraph 3.

¹ For OMNIPOWER software revision F1 (Only) the Client SAP is 20.

² For OMNIPOWER software revision F1 (Only) the Client SAP is 19.

2.5 Specification Data Link Layer

The 3-layer, connection-oriented, HDLC-based profile is used for all communication with Kamstrup electricity meters.

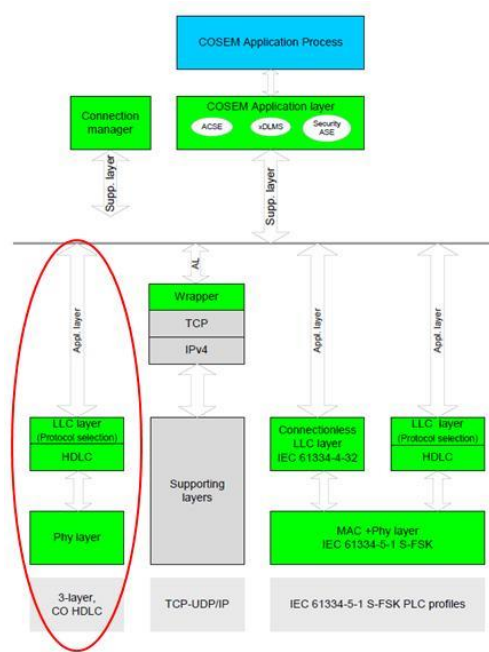


Figure 5 DLMS/COSEM communication profile

- Communication profiles: HDLC
- Inactivity timeout³: Configurable with object 0.0.22.0.0.255 Attr. 8. Default value is 20 s.
- Interframe timeout: Configurable with object 0.0.22.0.0.255 Attr. 7. Default value is 500 ms.
- Response timeout: 2 s
- Disc to NDM timeout: 100 ms
- Addressing schemes: 1 byte, 2 byte and 4 byte
- Physical address: Configurable with object 0.0.22.0.0.255 Attr. 9. Default address is 32.
- Info size RX: 1010⁴ (0x3F2)
- Info size Tx: 1010⁵ (0x3F2)
- Window size receive: 1
- Window size transmit: 1

2.6 Specification Physical Layer

³ If this value is set to 0 inactivity timeout is disabled.

⁴ In OMNIPOWER M1 the Info size RX (from meter) was increased to 1010, for K382M and K351C the Info size RX is 512. All meters are supporting segmentation.

⁵ In OMNIPOWER T1 the Info size TX (to meter) was increased to 1010, for K382M and K351C the Info size TX is 128.

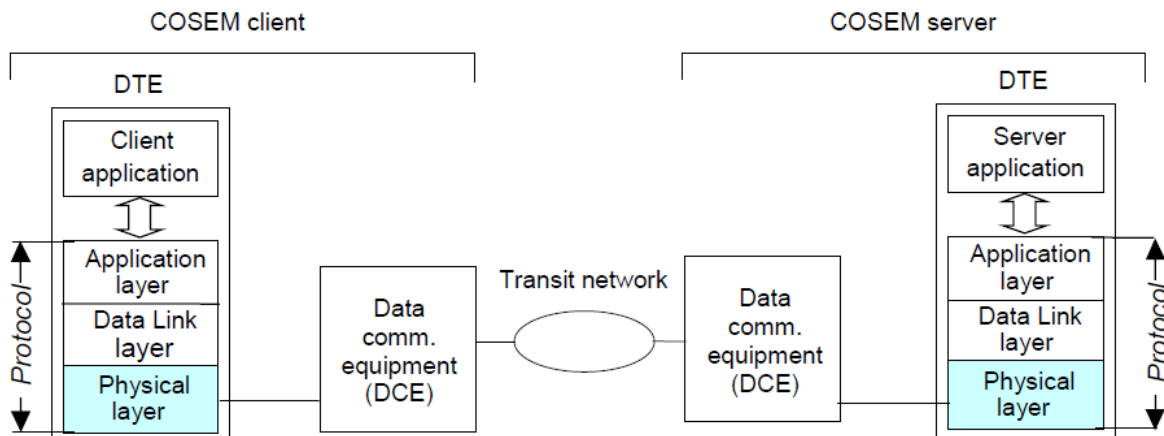


Figure 6 Location of the physical layer

- Opening mode: Direct HDLC
- Echo: None
- Baud rate : 9600 bps N81
- TCP/IP port: 1025 (Using IP101i module)
- TCP/IP port: 4059 (Using GSM8i 2G module⁶, 6819XXXXXXX)
- UDP/IP port: 4059 (Using GSMD 2G module, 681CXXXXXXX)

For interfacing Kamstrup electricity meters via TCP/IP module (IP101) or GSM modems refer to applicable interface guide (5512-609, 5512-1129 or 5512-1533).

The frame format of the HDLC frame is show in Figure 1. The length of the flag field is one byte and its value is 0x7E.

| | | | | | | | | |
|------|--------------|--------------|--------------|---------|-----|-------------|-----|------|
| Flag | Frame format | Dest.address | Src. address | Control | HCS | Information | FCS | Flag |
|------|--------------|--------------|--------------|---------|-----|-------------|-----|------|

Figure 1 HDLC Frame format type 3

2.6.1 Frame format field

The length of the frame format field is two bytes. It consists of three sub-fields referred to as the Format type sub-field (4 bit), the Segmentation bit (S, 1 bit) and the frame length sub-field (11 bit), as it is shown in Figure 7.

⁶ GSM8i 2G from SW revision A4

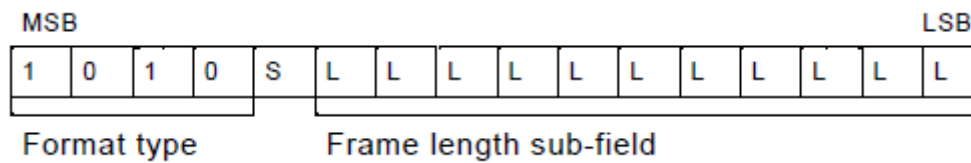


Figure 7 Frame format field

The value of the format type sub-field is 1010 (binary), which identifies a frame format type 3.

2.6.2 Destination and source address fields

There are exactly two address fields in this frame: a destination and a source address field.

2.6.3 Control field

The length of the control field is one byte. It indicates the type of commands or responses, and contains sequence numbers, where appropriate (frames I, RR and RNR).

2.6.4 Header check sequence (HCS) field

The length of the HCS field is two bytes. This check sequence is applied to only the header, i.e., the bits between the opening flag sequence and the header check sequence. Frames that do not have an information field or have an empty information field, e.g., as with some supervisory frames, do not contain an HCS and FCS, only an FCS.

2.6.5 Information field

The information field may be any sequence of bytes. In the case of data frames (I and UI frames), it carries the MSDU.

2.6.6 Frame check sequence (FCS) field

The length of the FCS field is two bytes. Unless otherwise noted, the frame checking sequence is calculated for the entire length of the frame, excluding the opening flag, the FCS and any start and stop elements (start/stop transmission).

2.6.7 Address field structure

The HDLC frame format contains two address fields: a destination and a source HDLC address.

The client address is always expressed using one byte.

The server address – to enable addressing more than one logical device within a single physical device and to support the multi-drop configuration – is divided into two parts:

- The upper HDLC address which is used to address a Logical Device (a separately addressable entity within a physical device);
- The lower HDLC address which is used to address a Physical Device (a physical device on the multi-drop).

The upper HDLC address is always present. The lower HDLC address may be omitted if it is not required.

The HDLC address extension mechanism applies to both parts. This mechanism specifies variable length address fields, but for the purpose of this protocol, the length of a complete server address field is restricted to be one, two or four bytes long, as shown on Figure 8.

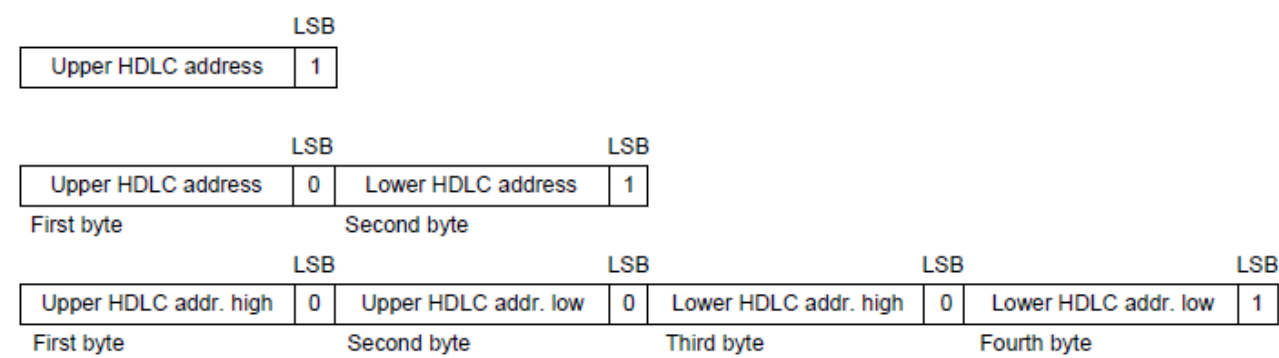


Figure 8 Valid server address structures

3 Object list

In the following sub paragraphs all objects with access rights and data types are listed for each implemented class. All objects are available via Module Interface or Optical Interface associations. Attr. 2 access rights indicated with R(W) means that write access is limited to only the primary module port.

3.1 Data Class (Class_id: 1)

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPOWER 1- and 3 phase | OMNIPOWER CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 1 | 0 | Modulport UART setup | 0.1.96.3.0.255 | 0 | R | Unsigned8 | • | - | - | - |
| 1 | 0 | ModulPortIOCfg (1102). 00 = No function 01 = 4-tariff input 02 = 2-tariff input / alarm Input 03 = 2-tariff input / A+ output 04 = Pulse input / 2-tariff Input 05 = Pulse input / alarm input 06 = Pulse input / A+ output 07 = R+ output / A+ output 08 = A- output / A+ output 09 = Debiting pulse out / A+ output 10 = Load ctrl. status / load ctrl. 11 = Alarm input / A+ output 12 = Pulse in / Load tariff sync 13 = 4-tariff sync. load control 14 = reserved 15 = reserved 16 = Load control 1 / Load control 2 17 = Pulse in / Load control 18 = Pulse in / Toggle Load ctrl. 1&2 Input and output may be inverted. | 0.1.96.3.1.255 | 0 | RW | Unsigned8 | • | • | • | • |
| 1 | 0 | EventStatusA See 1.1.134.0.6.255 (EventMaskA) for details | 0.1.96.10.1.255 | 0xCA7F2400 | R | Unsigned32 | • | • | • | • |
| 1 | 0 | EventStatusB See 1.1.134.0.7.255 (EventMaskB_PosEdge) for details | 0.1.96.10.2.255 | 0x000003A0 | RW | Unsigned32 | • | • | • | • |
| 1 | 0 | MeterNoLow | 1.1.0.0.0.255 | 69855 | RW | Octet-String | • | • | • | • |
| 1 | 0 | MeterNo1 | 1.1.0.0.1.255 | 17882969 | RW | Unsigned32 | • | • | • | • |

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|---|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 1 | 0 | MeterNo2 | 1.1.0.0.2.255 | 0 | RW | Unsigned32 | ● | ● | ● | ● |
| 1 | 0 | MeterNo3 | 1.1.0.0.3.255 | 0 | RW | Unsigned32 | ● | ● | ● | ● |
| 1 | 0 | IdentificationNumber | 1.1.0.0.4.255 | 1KAS00000000000 | R | Visible-String | - | - | ● | ● |
| 1 | 0 | BillingPeriodCnt | 1.1.0.1.0.255 | 5 | R | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | Force Billing Stop. Writing value 1 to attribute 2 triggers a billing stop. The values of the billing stop can be read via profile object 1.1.98.1.0.255. Writing to this object acts like calling action Capture of this profile object | 1.1.0.1.5.128 | | W | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | LogInterval_DebitLog2. Capture period for Profile Generic object 1.1.98.2.0.255 (Billing Stop 2). 0: Capture every day at 00:00:00 1: Capture every Monday at 00:00:00 2: Capture every 1. of a month at 00:00:00 | 1.1.0.1.6.128 | 0 | RW | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | SoftwareNumberRevisionAscii. Contains the firmware number and the actual version of the firmware. | 1.1.0.2.0.255 | 5098736-Q1 | R | Visible-String | ● | ● | ● | ● |
| 1 | 0 | SW revision (e.g. 60001001) | 1.1.0.2.1.128 | 75000801 | R | Unsigned32 | ● | ● | - | - |
| 1 | 0 | SoftwareRevision. Contains the actual version of the firmware. | 1.1.0.2.2.128 | Q1 | R | Visible-String | ● | ● | ● | ● |
| 1 | 0 | Trafo ratio before change numerator | 1.1.0.4.2.1 | 1 | R | Unsigned16 | ● | - | - | ● |
| 1 | 0 | Trafo ratio current numerator | 1.1.0.4.2.255 | 60 | R(W) | Unsigned16 | ● | - | - | ● |
| 1 | 0 | Trafo ratio current denominator | 1.1.0.4.5.255 | 1 | R | Unsigned16 | ● | - | - | ● |
| 1 | 0 | TrafoRatioLock | 1.1.0.4.128.255 | 0 | R | Unsigned8 | ● | - | - | ● |
| 1 | 0 | PulseInput1. Value attribute contains the accumulated pulses from pulse input, multiplied with a given factor | 1.1.0.128.1.255 | 0 | RW | Unsigned32 | ● | ● | ● | ● |
| 1 | 0 | ConfigurationNo1. Meter configuration data | 1.1.0.129.1.255 | 11000162 | R | Unsigned32 | ● | ● | - | - |

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|---|-------------------------|------------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 1 | 0 | ConfigurationNo2. Meter configuration data | 1.1.0.129.2.255 | 42301011 | R | Unsigned32 | ● | ● | - | - |
| 1 | 0 | ConfigurationNo3. Meter configuration data | 1.1.0.129.3.255 | 1100 | R | Unsigned32 | ● | ● | - | - |
| 1 | 0 | ConfigurationNo4. Meter configuration data | 1.1.0.129.4.255 | 10000101 | R | Unsigned32 | ● | ● | - | - |
| 1 | 0 | ConfigurationNo5. Meter configuration data | 1.1.0.129.5.255 | 34906011 | R | Unsigned32 | ● | ● | - | - |
| 1 | 0 | SpecialData | 1.1.0.130.1.255 | 0 | RW | Unsigned32 | ● | ● | ● | ● |
| 1 | 0 | SpecialData2 | 1.1.0.130.2.255 | 0 | RW | Unsigned32 | ● | ● | ● | ● |
| 1 | 0 | SerialNo | 1.1.96.1.0.255 | 17882969 | R | Unsigned32 | ● | ● | ● | ● |
| 1 | 0 | CompleteMeterTypeNo | 1.1.96.1.1.255 | 6841138BN14 3002084 | R | Visible-String | ● | ● | ● | ● |
| 1 | 0 | ModuleId | 1.1.96.1.2.255 | 0 | RW | Octet-String | ● | ● | ● | ● |
| 1 | 0 | OperationState Register to set Verification mode. 1 : Normal operation (LED = A+) 2: Verification mode A+ 3: Verification mode A- 4: Verification mode R+ 5: Verification mode R- | 1.1.96.5.1.255 | 1 | RW | Unsigned8 | ● | ● | ● | - |
| 1 | 0 | PowerThresholdCnt. If the average power P14 exceeds a limit, the value is incremented. | 1.1.96.51.2.255 | 0 | R | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | Load1Active | 1.1.96.52.1.255 | 0 | RW | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | Load1ConvertTariffToPos | 1.1.96.52.2.255 | 0 | RW | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | Load2Active | 1.1.96.52.3.255 | 0 | RW | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | Load2ConvertTariffToPos | 1.1.96.52.4.255 | 0 | RW | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | LoadDelay | 1.1.96.52.5.255 | 3600 | RW | Unsigned16 | ● | ● | ● | ● |
| 1 | 0 | WorkingdaysSetup | 1.1.96.52.6.255 | 63 | RW | Unsigned8 | ● | ● | - | - |
| 1 | 0 | Load1DelayCnt | 1.1.96.52.7.255 | 0 | R | Unsigned16 | ● | ● | ● | ● |
| 1 | 0 | Load2DelayCnt | 1.1.96.52.8.255 | 0 | R | Unsigned16 | ● | ● | ● | ● |
| 1 | 0 | Load1Mode | 1.1.96.52.9.255 | 0 | R | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | Load2Mode | 1.1.96.52.10.255 | 0 | R | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | DaylightSavingConfig | 1.1.96.52.11.255 | 1 | RW | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | ModeSelector_TariffCtrl | 1.1.96.52.21.255 | 0 | RW | Unsigned8 | - | - | ● | ● |

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|---|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| | | 0: Disabled 1: Module Port control 2: Register control (1.1.129.0.0.2155) 3: Internal control | | | | | | | | |
| 1 | 0 | DefaultTariff_TariffCtrl | 1.1.96.52.22.255 | 1 | RW | Unsigned8 | - | - | ● | ● |
| 1 | 0 | ActiveUsageProfileInfo_TariffCtrl | 1.1.96.52.23.255 | | R | Visible-String | - | - | ● | ● |
| 1 | 0 | ActiveUsageProfile_TariffCtrl | 1.1.96.52.24.255 | 1 | R | Unsigned8 | - | - | ● | ● |
| 1 | 0 | ActiveSeasonProfile_TariffCtrl | 1.1.96.52.25.255 | 0 | R | Unsigned8 | - | - | ● | ● |
| 1 | 0 | ModeSelector_LoadCtrl1 | 1.1.96.52.31.255 | 0 | RW | Unsigned8 | - | - | ● | ● |
| | | 0: Disabled 1: Active Tariff Control 2: Register Control (1.1.96.52.1.255) 3: Internal control | | | | | | | | |
| 1 | 0 | DefaultRelayState_LoadCtrl1 | 1.1.96.52.32.255 | 0 | RW | Unsigned8 | - | - | ● | ● |
| 1 | 0 | ActiveUsageProfileInfo_LoadCtrl1 | 1.1.96.52.33.255 | | R | Visible-String | - | - | ● | ● |
| 1 | 0 | ActiveUsageProfile_LoadCtrl1 | 1.1.96.52.34.255 | 1 | R | Unsigned8 | - | - | ● | ● |
| 1 | 0 | ActiveSeasonProfile_LoadCtrl1 | 1.1.96.52.35.255 | 0 | R | Unsigned8 | - | - | ● | ● |
| 1 | 0 | ModeSelector_LoadCtrl2 | 1.1.96.52.41.255 | 0 | RW | Unsigned8 | - | - | ● | ● |
| | | 0: Disabled 1: Active Tariff Control 2: Register Control (1.1.96.52.3.255) 3: Internal control | | | | | | | | |
| 1 | 0 | DefaultRelayState_LoadCtrl2 | 1.1.96.52.42.255 | 0 | RW | Unsigned8 | - | - | ● | ● |
| 1 | 0 | ActiveUsageProfileInfo_LoadCtrl2 | 1.1.96.52.43.255 | | R | Visible-String | - | - | ● | ● |
| 1 | 0 | ActiveUsageProfile_LoadCtrl2 | 1.1.96.52.44.255 | 1 | R | Unsigned8 | - | - | ● | ● |
| 1 | 0 | ActiveSeasonProfile_LoadCtrl2 | 1.1.96.52.45.255 | 0 | R | Unsigned8 | - | - | ● | ● |
| 1 | 0 | PulsInputLevel | 1.1.96.53.1.255 | 0 | R | Unsigned8 | ● | ● | ● | ● |
| 1 | 0 | RomChecksum | 1.1.96.54.1.255 | 1918003608 | R | Unsigned32 | ● | ● | ● | ● |
| | | Only last 4 byte shown in Display. E.g.: 1918003609 = 0x72526998 -> 0x6998 = 27032. | | | | | | | | |
| 1 | 0 | MeterStatus | 1.1.97.97.0.255 | 0 | R | Unsigned8 | ● | ● | ● | ● |
| | | Bit 0 = 1: Meter Reset Bit 1 = 1: Error in EEPROM or data | | | | | | | | |

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| | | backup/restore Bit 2 = 1: Magnetic detection Bit 3 = 1: RAM error Bit 4 = 1: ROM checksum error Bit 5 = 1: External Alarm input (if enabled) Bit 6 = 1: Opening of the meter cover Bit 7 = 1: APS | | | | | | | | |
| 1 | 0 | CouplingState Set/write 1: Disconnect relays 2: Release relays for reconnection. Only possible from state 1 3: Reconnect relays. Only possible from state 8 Read/state 1: Relays disconnected by command 4: Relays connected 5: Pre cutoff warning 6: Cutoff 7: Cutoff Prepayment 8: Cutoff await reconnect 9: Cutoff Prepayment, LowMax expired 11: Relays disconnected by push button 12: Relays disconnected by Neutral Fault Detection 13: Log-only state (Cutoff without disconnecting breaker) 14: Relays disconnected by Overvoltage Detection | 1.1.128.0.0.255 | 4 | RW | Unsigned8 | - | ● | ● | - |
| 1 | 0 | I_ShortCircuit | 1.1.128.0.1.255 | 100 | RW | Unsigned8 | - | ● | ● | - |
| 1 | 0 | K1_Const | 1.1.128.0.2.255 | 10 | RW | Unsigned8 | - | ● | ● | - |
| 1 | 0 | K2_Const | 1.1.128.0.3.255 | 10 | RW | Unsigned8 | - | ● | ● | - |
| 1 | 0 | K3_Const | 1.1.128.0.4.255 | 10 | RW | Unsigned8 | - | ● | ● | - |
| 1 | 0 | T1_Time | 1.1.128.0.5.255 | 30 | RW | Unsigned16 | - | ● | ● | - |
| 1 | 0 | T2_Time | 1.1.128.0.6.255 | 30 | RW | Unsigned16 | - | ● | ● | - |
| 1 | 0 | T3_Time | 1.1.128.0.7.255 | 30 | RW | Unsigned16 | - | ● | ● | - |
| 1 | 0 | T_ConnectWait | 1.1.128.0.8.255 | 60 | RW | Unsigned16 | - | ● | ● | - |

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 1 | 0 | T_PrepaymentLowMax | 1.1.128.0.9.255 | 255 | RW | Unsigned8 | - | ● | ● | - |
| 1 | 0 | Coupling 0: Manual 1: Automatic | 1.1.128.0.10.255 | 0 | RW | Unsigned8 | - | ● | ● | - |
| 1 | 0 | CutoffBasis Bit 0 = 0: Disable load controlled cutoff Bit 0 = 1: Enable load controlled cutoff Bit 1 = 0: Disable prepayment cutoff Bit 1 = 1: Enable prepayment cutoff Bit 2 = 0: Cutoff from current Bit 2 = 1: Cutoff from power Bit 3 = 0: Disable Neutral Fault cutoff Bit 3 = 1: Enable Neutral Fault cutoff Bit 4 = 0: Disable SmartDisc log only Bit 4 = 1: Enable SmartDisc log only Bit 5* = 0: Disable PrepaymentNoRestriction - Disconnect Bit 5* = 1: Enable PrepaymentNoRestriction - Disconnect Bit6 = 0 Disable Overvoltage Discon. Bit6 = 1 Enable Overvoltage Discon. Bit 7: Reserved | 1.1.128.0.11.255 | 0 | R(W) | Unsigned8 | - | ● | ● | - |
| 1 | 0 | ThresholdLow | 1.1.128.0.12.255 | 0 | RW | Unsigned8 | - | ● | ● | - |
| 1 | 0 | ThresholdHigh | 1.1.128.0.13.255 | 0 | RW | Unsigned8 | - | ● | ● | - |
| 1 | 0 | ThresholdDisconnect | 1.1.128.0.14.255 | 0 | R | Unsigned8 | - | ● | ● | - |
| 1 | 0 | CouplingFeedback Bit 0-2: Voltage L1, L2 og L3. 0 = No voltage 1 = Voltage Bit 3 = 0: Bit 0-2 are not valid Bit 3 = 1: Bit 0-2 are valid Bit 4 = 0: Communication error Bit 4 = 1: Communication OK Bit 5 = 0: ThDisconnect follows ThLow Bit 5 = 1: ThDisconnect follows ThHigh Bit 6 = 0: No transition pending Bit 6 = 1: Transition pending Bit 7 = 0: No switch error | 1.1.128.0.18.255 | 63 | R | Unsigned8 | - | ● | ● | - |

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|---|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| | | Bit 7 = 1: Switch error | | | | | | | | |
| 1 | 0 | OvervoltageDisconnectThreshold Range is 260 – 320 VAC Level for disconnect meter – can only be changed to a value greater than OvervoltageReconnectThreshold | 1.1.128.0.19.255 | 285 | RW | Unsigned16 | - | - | • | • |
| 1 | 0 | OvervoltageSampleTimeDisconnect Time before disconnect | 1.1.128.0.20.255 | 1 | RW | Unsigned16 | - | - | • | • |
| 1 | 0 | OvervoltageReconnectThreshold Range is 250 – 270 VAC Level for reconnect meter – can only be changed to a value smaller than OvervoltageDisconnectThreshold | 1.1.128.0.21.255 | 265 | RW | Unsigned16 | - | - | • | • |
| 1 | 0 | OvervoltageSampleTimeReconnect Time before reconnect | 1.1.128.0.22.255 | 60 | RW | Unsigned16 | - | - | • | • |
| 1 | 0 | ActualTariff. Contains the number of the active tariff. Writing to the value attribute forces a change of the active tariff. The value of attribute 2 can therefore be from 1 to 8 | 1.1.129.0.0.255 | 1 | RW | Unsigned8 | • | • | • | • |
| 1 | 0 | ExceptionDayInfo | 1.1.129.0.40.255 | | R | Visible-String | - | - | • | • |
| 1 | 0 | PrepaymentExceptionStart | 1.1.130.0.2.255 | 0 | RW | Unsigned32 | - | - | • | - |
| 1 | 0 | PrepaymentExceptionEnd | 1.1.130.0.3.255 | 0 | RW | Unsigned32 | - | - | • | - |
| 1 | 0 | PrepaymentTimeRemaining | 1.1.130.0.6.255 | 0 | R | Unsigned16 | - | - | • | - |
| 1 | 0 | PrepaymentAlarmLimit | 1.1.130.0.7.255 | 0 | RW | Unsigned16 | - | - | • | - |
| 1 | 0 | VQ_Counter_F1 Occurrence counter for Fmean (-1%) | 1.1.133.0.1.255 | 0 | R | Unsigned16 | - | - | • | • |
| 1 | 0 | VQ_Counter_F2 Occurrence counter for Fmean (+1%) | 1.1.133.0.2.255 | 5736 | R | Unsigned16 | - | - | • | • |
| 1 | 0 | VQ_Counter_F3 Occurrence counter for Fmean (-6%) | 1.1.133.0.3.255 | 0 | R | Unsigned16 | - | - | • | • |
| 1 | 0 | VQ_Counter_F4 Occurrence counter for Fmean (+4%) | 1.1.133.0.4.255 | 5736 | R | Unsigned16 | - | - | • | • |
| 1 | 0 | VQ_Counter_F5 Occurrence counter for Fmean (-2%) | 1.1.133.0.5.255 | 0 | R | Unsigned16 | - | - | • | • |

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|---|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 1 | 0 | VQ_Counter_F6 Occurrence counter for Fmean (+2%) | 1.1.133.0.6.255 | 5736 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_F7 Occurrence counter for Fmean (-15%) | 1.1.133.0.7.255 | 0 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_F8 Occurrence counter for Fmean (+15%) | 1.1.133.0.8.255 | 5735 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_VoltageVariation_Low1 Occurrence counter 10% undervoltage | 1.1.133.0.9.255 | 190 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_VoltageVariation_Low2 Occurrence counter undervoltage (Configurable like VQ1 undervoltage) | 1.1.133.0.10.255 | 190 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_VoltageVariation_High Occurrence counter overvoltage (Configurable like VQ1 overvoltage) | 1.1.133.0.11.255 | 78 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_RapidVoltageChanges Occurrence counter for changes that exceeds 5% | 1.1.133.0.12.255 | 2 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_Voltage_Unbalance Occurrence counter for voltage unbalance | 1.1.133.0.13.255 | 0 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_Interupts_Long Occurrence counter for long interruptions | 1.1.133.0.14.255 | 0 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_Interupts_Short Occurrence counter for short interruptions | 1.1.133.0.15.255 | 0 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_THD_U_L1 Occurrence counter for THDU-Lx,mean > 8% phase 1 | 1.1.133.0.16.255 | 0 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_THD_U_L2 Occurrence counter for THDU-Lx,mean > 8% phase 2 | 1.1.133.0.17.255 | 0 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_THD_U_L3 Occurrence counter for THDU-Lx,mean > 8% phase 3 | 1.1.133.0.18.255 | 0 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_Dips Occurrence counter for number og voltage dips | 1.1.133.0.19.255 | 26 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_Swells Occurrence counter for number og voltage swells | 1.1.133.0.20.255 | 0 | R | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VQ_Counter_THD_I_L1 Occurrence counter for THDI-Lx,mean | 1.1.133.0.21.255 | 0 | R | Unsigned16 | - | - | ● | ● |

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPOWER 1- and 3 phase | OMNIPOWER CT |
|----------|------|---|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| | | > 8% phase 1 | | | | | | | | |
| 1 | 0 | VQ_Counter_THD_I_L2 Occurrence counter for THDI-Lx,mean > 8% phase 2 | 1.1.133.0.22.255 | 0 | R | Unsigned16 | - | - | • | • |
| 1 | 0 | VQ_Counter_THD_I_L3 Occurrence counter for THDI-Lx,mean > 8% phase 3 | 1.1.133.0.23.255 | 0 | R | Unsigned16 | - | - | • | • |
| 1 | 0 | Format_KMP_Energy Reserved / Not used | 1.1.134.0.1.255 | 5 | R | Unsigned8 | • | • | • | • |
| 1 | 0 | AlarmCallConfig Used to enable/disable alarm call 0 = Disabled 128 = Enabled | 1.1.134.0.3.255 | 128 | RW | Unsigned8 | - | - | • | • |
| 1 | 0 | AlarmEndPointAddress 4 bytes Unit IPv4-Address Ex. 172.16.4.120 = 0xAC100478 = 2886730872 | 1.1.134.0.4.255 | 2886730872 | RW | Unsigned32 | - | - | • | • |
| 1 | 0 | AlarmEndPointPort | 1.1.134.0.5.255 | 5001 | RW | Unsigned16 | - | - | • | • |
| 1 | 0 | EventMaskA Mask for EventStatusA Bit 0 = Meter was reset Bit 1 = EEPROM restore failed Bit 2 = Magnetic field detected Bit 3 = RAM test failed Bit 4 = ROM test failed Bit 5 = Alarm is active Bit 6 = Tampering detected Bit 7 = APS detected Bit 8 = RF Data Ready Bit 9 = User Forced Call Bit 10 = Clock adjust Bit 11 = EventStatusB Bit 12 = Disconnect Bit 13 = Flash Error Bit 14 = Not used Bit 15 = Not used Bit 16 = Billing Log available Bit 17 = RTC Log available | 1.1.134.0.6.255 | 64 | RW | Unsigned32 | - | - | • | • |

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| | | Bit 18 = Status Log available Bit 19 = Supply Quality Log available Bit 20 = Cut Off Log available Bit 21 = Load Profile Log available Bit 22 = Billing 2 Log available Bit 23 = Trafo ratio Log available Bit 24 = P0 sign on Bit 25 = Not used Bit 26 = Not used Bit 27 = Upload Audit success Log available Bit 28 = Upload Audit fail Log available Bit 29 = NeutraFault Log available Bit 30 = Analysis Log available Bit 31 = Load Profile event Log available | | | | | | | | |
| 1 | 0 | EventMaskB_PosEdge Mask for EventStatusB bit = 1 Bit 0 = AuditTrailSuccess Bit 1 = AuditTrailFail Bit 2 = Not used Bit 3 = NeutralFault Bit 4 = ROMChecksumFail Bit 5 = PowerFail Bit 6 = MissingPhaseL1 Bit 7 = MissingPhaseL2 Bit 8 = MissingPhaseL3 Bit 9 = OverVoltageL1 Bit 10 = UnderVoltageL1 Bit 11 = OverVoltageL2 Bit 12 = UnderVoltageL2 Bit 13 = OverVoltageL3 Bit 14 = UnderVoltageL3 Bit 15 = AlarmInput Bit 16 = NoPhaseCurrentL1 Bit 17 = NoPhaseCurrentL2 Bit 18 = NoPhaseCurrentL3 Bit 19 = PhaseVoltageSequence Bit 20 = EarthFaultDetected Bit 21 = MagneticDetection | 1.1.134.0.7.255 | 64 | RW | Unsigned32 | - | - | • | • |

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| | | Bit 22 = CoverOpenDetection Bit 23 = APSDetection Bit 24 = ReversePhaseCurrentL1 Bit 25 = ReversePhaseCurrentL2 Bit 26 = ReversePhaseCurrentL3 Bit 27 = VoltageAsymmetryStatus Bit 28 = PrepaymentAlarm Bit 29 = BreakerOpenedManual Bit 30 = BreakerOpenedAutomatic Bit 31 = BreakerOpenedRemote | | | | | | | | |
| 1 | 0 | EventMaskB_NegEdge Mask for EventStatusB bit = 0 Same as EventMaskB_PosEdge above | 1.1.134.0.8.255 | 64 | RW | Unsigned32 | - | - | ● | ● |
| 1 | 0 | NeutralFaultTime Time for NeutralFault to be detected before event | 1.1.134.0.11.255 | 60 | RW | Unsigned16 | - | - | ● | ● |
| 1 | 0 | VoltageLimitTimeThreshold Time before detection over/under voltage in VoltageLimitsDetection | 1.1.134.0.14.255 | 600 | RW | Unsigned16 | - | - | ● | ● |
| 1 | 0 | Threshold_PowerFaultTime Time before Powerfault is detected in voltage limit | 1.1.134.0.15.255 | 180 | RW | Unsigned16 | - | - | ● | ● |
| 1 | 0 | SouthernHemisphere Is the meter placed in southern hemisphere | 1.1.134.0.21.255 | 0 | R | Unsigned8 | - | - | ● | ● |

Attributes:

- 1) logical_name
- 2) value

3.2 Register Class (Class_id: 3)

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 3 | 0 | HourCounter | 0.1.96.8.0.255 | 1485 hour | R | Unsigned32 | • | • | • | • |
| 3 | 0 | P14_MaxAcc | 1.1.1.2.0.255 | 0 W | R | Unsigned32 | • | • | • | • |
| 3 | 0 | P14 - peak,akk T1 | 1.1.1.2.1.255 | 0 W | R | Unsigned32 | • | - | • | • |
| 3 | 0 | P14 - peak,akk T2 | 1.1.1.2.2.255 | 0 W | R | Unsigned32 | • | - | • | • |
| 3 | 0 | P14 | 1.1.1.7.0.255 | 0 W | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A14_Veri | 1.1.1.8.0.128 | 0 kWh | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A14 – secondary | 1.1.1.8.0.129 | 0 kWh | R | Unsigned32 | • | - | - | • |
| 3 | 0 | A14 | 1.1.1.8.0.255 | 0 kWh | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A14 - tariff 1 - secondary | 1.1.1.8.1.129 | 0 kWh | R | Unsigned32 | • | - | - | • |
| 3 | 0 | A14_Tariff1 | 1.1.1.8.1.255 | 0 kWh | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A14 - tariff 2 - secondary | 1.1.1.8.2.129 | 0 kWh | R | Unsigned32 | • | - | - | • |
| 3 | 0 | A14_Tariff2 | 1.1.1.8.2.255 | 0 kWh | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A14 - tariff 3 - secondary | 1.1.1.8.3.129 | 0 kWh | R | Unsigned32 | • | - | - | • |
| 3 | 0 | A14_Tariff3 | 1.1.1.8.3.255 | 0 kWh | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A14 - tariff 4 - secondary | 1.1.1.8.4.129 | 0 kWh | R | Unsigned32 | • | - | - | • |
| 3 | 0 | A14_Tariff4 | 1.1.1.8.4.255 | 0 kWh | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A14 - tariff 5 - secondary | 1.1.1.8.5.129 | 0 kWh | R | Unsigned32 | • | - | - | • |
| 3 | 0 | A14_Tariff5 | 1.1.1.8.5.255 | 0 kWh | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A14 - tariff 6 - secondary | 1.1.1.8.6.129 | 0 kWh | R | Unsigned32 | • | - | - | • |
| 3 | 0 | A14_Tariff6 | 1.1.1.8.6.255 | 0 kWh | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A14 - tariff 7 - secondary | 1.1.1.8.7.129 | 0 kWh | R | Unsigned32 | • | - | - | • |
| 3 | 0 | A14_Tariff7 | 1.1.1.8.7.255 | 0 kWh | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A14 - tariff 8 - secondary | 1.1.1.8.8.129 | 0 kWh | R | Unsigned32 | • | - | - | • |
| 3 | 0 | A14_Tariff8 | 1.1.1.8.8.255 | 0 kWh | R | Unsigned32 | • | • | • | • |
| 3 | 0 | P14_Avg | 1.1.1.25.0.255 | 0 W | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A14_TripCounter. Imported active energy accumulated since last manual reset (with pushbutton on the meter). | 1.1.1.128.0.255 | 0 kWh | R | Unsigned32 | • | • | • | • |
| 3 | 0 | P23_MaxAcc | 1.1.2.2.0.255 | 0 W | R | Unsigned32 | • | • | • | • |
| 3 | 0 | P23_Max_Tariff1_Acc | 1.1.2.2.1.255 | 0 W | R | Unsigned32 | - | - | • | • |
| 3 | 0 | P23_Max_Tariff2_Acc | 1.1.2.2.2.255 | 0 W | R | Unsigned32 | - | - | • | • |
| 3 | 0 | P23 | 1.1.2.7.0.255 | 0 W | R | Unsigned32 | • | • | • | • |
| 3 | 0 | A23_Veri | 1.1.2.8.0.128 | 0 kWh | R | Unsigned32 | • | • | • | • |

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 3 | 0 | A23 – secondary | 1.1.2.8.0.129 | 0 kWh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | A23 | 1.1.2.8.0.255 | 0 kWh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23 - tariff 1 - secondary | 1.1.2.8.1.129 | 0 kWh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | A23_Tariff1 | 1.1.2.8.1.255 | 0 kWh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23 - tariff 2 - secondary | 1.1.2.8.2.129 | 0 kWh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | A23_Tariff2 | 1.1.2.8.2.255 | 0 kWh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23 - tariff 3 - secondary | 1.1.2.8.3.129 | 0 kWh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | A23_Tariff3 | 1.1.2.8.3.255 | 0 kWh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23 - tariff 4 - secondary | 1.1.2.8.4.129 | 0 kWh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | A23_Tariff4 | 1.1.2.8.4.255 | 0 kWh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23 - tariff 5 - secondary | 1.1.2.8.5.129 | 0 kWh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | A23_Tariff5 | 1.1.2.8.5.255 | 0 kWh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23 - tariff 6 - secondary | 1.1.2.8.6.129 | 0 kWh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | A23_Tariff6 | 1.1.2.8.6.255 | 0 kWh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23 - tariff 7 - secondary | 1.1.2.8.7.129 | 0 kWh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | A23_Tariff7 | 1.1.2.8.7.255 | 0 kWh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23 - tariff 8 - secondary | 1.1.2.8.8.129 | 0 kWh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | A23_Tariff8 | 1.1.2.8.8.255 | 0 kWh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | P23_Avg | 1.1.2.25.0.255 | 0 W | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23_TripCounter. Exported active energy accumulated since last manual reset (with pushbutton on the meter). | 1.1.2.128.0.255 | 0 kWh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | Q12_MaxAcc | 1.1.3.2.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | Q12 | 1.1.3.7.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R12_Veri | 1.1.3.8.0.128 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R12 - secondary | 1.1.3.8.0.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R12 | 1.1.3.8.0.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R12 - tariff 1 - secondary | 1.1.3.8.1.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R12_Tariff1 | 1.1.3.8.1.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R12 - tariff 2 - secondary | 1.1.3.8.2.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R12_Tariff2 | 1.1.3.8.2.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R12 - tariff 3 - secondary | 1.1.3.8.3.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R12_Tariff3 | 1.1.3.8.3.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R12 - tariff 4 - secondary | 1.1.3.8.4.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPOWER 1- and 3 phase | OMNIPOWER CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 3 | 0 | R12_Tariff4 | 1.1.3.8.4.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R12 - tariff 5 - secondary | 1.1.3.8.5.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R12_Tariff5 | 1.1.3.8.5.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R12 - tariff 6 - secondary | 1.1.3.8.6.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R12_Tariff6 | 1.1.3.8.6.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R12 - tariff 7 - secondary | 1.1.3.8.7.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R12_Tariff7 | 1.1.3.8.7.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R12 - tariff 8 - secondary | 1.1.3.8.8.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R12_Tariff8 | 1.1.3.8.8.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | Q12_Avg | 1.1.3.25.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R12_TripCounter. Imported reactive energy accumulated since last manual reset (with pushbutton on the meter). | 1.1.3.128.0.255 | 0 kvarh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | Q34_MaxAcc | 1.1.4.2.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | Q34 | 1.1.4.7.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R34_Veri | 1.1.4.8.0.128 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R34 – secondary | 1.1.4.8.0.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R34 | 1.1.4.8.0.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R34 - tariff 1 - secondary | 1.1.4.8.1.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R34_Tariff1 | 1.1.4.8.1.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R34 - tariff 2 - secondary | 1.1.4.8.2.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R34_Tariff2 | 1.1.4.8.2.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R34 - tariff 3 - secondary | 1.1.4.8.3.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R34_Tariff3 | 1.1.4.8.3.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R34 - tariff 4 - secondary | 1.1.4.8.4.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R34_Tariff4 | 1.1.4.8.4.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R34 - tariff 5 - secondary | 1.1.4.8.5.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R34_Tariff5 | 1.1.4.8.5.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R34 - tariff 6 - secondary | 1.1.4.8.6.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R34_Tariff6 | 1.1.4.8.6.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R34 - tariff 7 - secondary | 1.1.4.8.7.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R34_Tariff7 | 1.1.4.8.7.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R34 - tariff 8 - secondary | 1.1.4.8.8.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R34_Tariff8 | 1.1.4.8.8.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 3 | 0 | Q34_Avg | 1.1.4.25.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R34_TripCounter. Exported reactive energy accumulated since last manual reset (with pushbutton on the meter). | 1.1.4.128.0.255 | 0 kvarh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | R1 – secondary | 1.1.5.8.0.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R1 | 1.1.5.8.0.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | R2 | 1.1.6.8.0.255 | 0 kvarh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | R3 | 1.1.7.8.0.255 | 0 kvarh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | R4 – secondary | 1.1.8.8.0.129 | 0 kvarh | R | Unsigned32 | ● | - | - | ● |
| 3 | 0 | R4 | 1.1.8.8.0.255 | 0 kvarh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | S14 | 1.1.9.7.0.255 | 0 VA | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | E14 | 1.1.9.8.0.255 | 0 kVAh | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | E14_Tariff1 | 1.1.9.8.1.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E14_Tariff2 | 1.1.9.8.2.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E14_Tariff3 | 1.1.9.8.3.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E14_Tariff4 | 1.1.9.8.4.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E14_Tariff5 | 1.1.9.8.5.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E14_Tariff6 | 1.1.9.8.6.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E14_Tariff7 | 1.1.9.8.7.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E14_Tariff8 | 1.1.9.8.8.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | S14_Avg | 1.1.9.25.0.255 | 0 VA | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | E14_TripCounter. Imported energy accumulated since last manual reset (with pushbutton on the meter). | 1.1.9.128.0.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | S23 | 1.1.10.7.0.255 | 0 VA | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | E23 | 1.1.10.8.0.255 | 0 kVAh | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | E23_Tariff1 | 1.1.10.8.1.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E23_Tariff2 | 1.1.10.8.2.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E23_Tariff3 | 1.1.10.8.3.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E23_Tariff4 | 1.1.10.8.4.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E23_Tariff5 | 1.1.10.8.5.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E23_Tariff6 | 1.1.10.8.6.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | E23_Tariff7 | 1.1.10.8.7.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|---|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 3 | 0 | E23_Tariff8 | 1.1.10.8.8.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | S23_Avg | 1.1.10.25.0.255 | 0 VA | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | E23_TripCounter. Exported energy accumulated since last manual reset (with pushbutton on the meter). | 1.1.10.128.0.255 | 0 kVAh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | PF_Total | 1.1.13.7.0.255 | 1 | R | Unsigned16 | ● | - | ● | ● |
| 3 | 0 | PowerFactor_Avg_Total | 1.1.13.25.0.255 | 1 | R | Unsigned16 | ● | - | ● | ● |
| 3 | 0 | Freq_Instant | 1.1.14.7.0.255 | 50 Hz | R | Unsigned16 | - | - | ● | ● |
| 3 | 0 | Freq_Avg | 1.1.14.25.0.255 | 50,01 Hz | R | Unsigned16 | - | - | ● | ● |
| 3 | 0 | A1234 | 1.1.15.8.0.255 | 0 kWh | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A_Net | 1.1.16.8.0.255 | 0 kWh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | P14_L1 | 1.1.21.7.0.255 | 0 W | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A14_L1 | 1.1.21.8.0.255 | 0 kWh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | P14_Avg_L1 | 1.1.21.25.0.255 | 0 W | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | P23_L1 | 1.1.22.7.0.255 | 0 W | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23_L1 | 1.1.22.8.0.255 | 0 kWh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | P23_Avg_L1 | 1.1.22.25.0.255 | 0 W | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | Q12_L1 | 1.1.23.7.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | Q12_Avg_L1 | 1.1.23.25.0.255 | 0 var | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | Q34_L1 | 1.1.24.7.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | Q34_Avg_L1 | 1.1.24.25.0.255 | 0 var | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | S14_L1 | 1.1.29.7.0.255 | 0 VA | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | S14_Avg_L1 | 1.1.29.25.0.255 | 0 VA | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | S23_L1 | 1.1.30.7.0.255 | 0 VA | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | S23_Avg_L1 | 1.1.30.25.0.255 | 0 VA | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | I_L1 | 1.1.31.7.0.255 | 0 A | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | THD_Instant_I_L1 | 1.1.31.7.124.255 | 0% | R | Unsigned16 | - | - | ● | - |
| 3 | 0 | THD_Avg_I_L1 | 1.1.31.24.124.255 | 0% | R | Unsigned16 | - | - | ● | - |
| 3 | 0 | I_Avg_L1 | 1.1.31.25.0.255 | 0 A | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | U_L1 | 1.1.32.7.0.255 | 234 V | R | Unsigned16 | ● | ● | ● | ● |
| 3 | 0 | THD_Instant_U_L1 | 1.1.32.7.124.255 | 2,03% | R | Unsigned16 | - | - | ● | ● |
| 3 | 0 | THD_Avg_U_L1 | 1.1.32.24.124.255 | 2,69% | R | Unsigned16 | - | - | ● | ● |

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--------------------|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 3 | 0 | U_Avg_L1 | 1.1.32.25.0.255 | 232 V | R | Unsigned16 | ● | ● | ● | ● |
| 3 | 0 | PF_L1 | 1.1.33.7.0.255 | 1 | R | Unsigned16 | ● | - | ● | ● |
| 3 | 0 | PowerFactor_Avg_L1 | 1.1.33.25.0.255 | 1 | R | Unsigned16 | ● | - | ● | ● |
| 3 | 0 | P14_L2 | 1.1.41.7.0.255 | 0 W | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A14_L2 | 1.1.41.8.0.255 | 0 kWh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | P14_Avg_L2 | 1.1.41.25.0.255 | 0 W | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | P23_L2 | 1.1.42.7.0.255 | 0 W | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23_L2 | 1.1.42.8.0.255 | 0 kWh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | P23_Avg_L2 | 1.1.42.25.0.255 | 0 W | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | Q12_L2 | 1.1.43.7.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | Q12_Avg_L2 | 1.1.43.25.0.255 | 0 var | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | Q34_L2 | 1.1.44.7.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | Q34_Avg_L2 | 1.1.44.25.0.255 | 0 var | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | S14_L2 | 1.1.49.7.0.255 | 0 VA | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | S14_Avg_L2 | 1.1.49.25.0.255 | 0 VA | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | S23_L2 | 1.1.50.7.0.255 | 0 VA | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | S23_Avg_L2 | 1.1.50.25.0.255 | 0 VA | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | I_L2 | 1.1.51.7.0.255 | 0 A | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | THD_Instant_I_L2 | 1.1.51.7.124.255 | 0% | R | Unsigned16 | - | - | ● | - |
| 3 | 0 | THD_Avg_I_L2 | 1.1.51.24.124.255 | 0% | R | Unsigned16 | - | - | ● | - |
| 3 | 0 | I_Avg_L2 | 1.1.51.25.0.255 | 0 A | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | U_L2 | 1.1.52.7.0.255 | 0 V | R | Unsigned16 | ● | ● | ● | ● |
| 3 | 0 | THD_Instant_U_L2 | 1.1.52.7.124.255 | 0% | R | Unsigned16 | - | - | ● | ● |
| 3 | 0 | THD_Avg_U_L2 | 1.1.52.24.124.255 | 0% | R | Unsigned16 | - | - | ● | ● |
| 3 | 0 | U_Avg_L2 | 1.1.52.25.0.255 | 0 V | R | Unsigned16 | ● | ● | ● | ● |
| 3 | 0 | PF_L2 | 1.1.53.7.0.255 | 1 | R | Unsigned16 | ● | - | ● | ● |
| 3 | 0 | PowerFactor_Avg_L2 | 1.1.53.25.0.255 | 1 | R | Unsigned16 | ● | - | ● | ● |
| 3 | 0 | P14_L3 | 1.1.61.7.0.255 | 0 W | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A14_L3 | 1.1.61.8.0.255 | 0 kWh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | P14_Avg_L3 | 1.1.61.25.0.255 | 0 W | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | P23_L3 | 1.1.62.7.0.255 | 0 W | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A23_L3 | 1.1.62.8.0.255 | 0 kWh | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | P23_Avg_L3 | 1.1.62.25.0.255 | 0 W | R | Unsigned32 | - | - | ● | ● |

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 3 | 0 | Q12_L3 | 1.1.63.7.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | Q12_Avg_L3 | 1.1.63.25.0.255 | 0 var | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | Q34_L3 | 1.1.64.7.0.255 | 0 var | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | Q34_Avg_L3 | 1.1.64.25.0.255 | 0 var | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | S14_L3 | 1.1.69.7.0.255 | 0 VA | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | S14_Avg_L3 | 1.1.69.25.0.255 | 0 VA | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | S23_L3 | 1.1.70.7.0.255 | 0 VA | R | Unsigned32 | ● | - | ● | ● |
| 3 | 0 | S23_Avg_L3 | 1.1.70.25.0.255 | 0 VA | R | Unsigned32 | - | - | ● | ● |
| 3 | 0 | I_L3 | 1.1.71.7.0.255 | 0 A | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | THD_Instant_I_L3 | 1.1.71.7.124.25 5 | 0% | R | Unsigned16 | - | - | ● | - |
| 3 | 0 | THD_Avg_I_L3 | 1.1.71.24.124.2 55 | 0% | R | Unsigned16 | - | - | ● | - |
| 3 | 0 | I_Avg_L3 | 1.1.71.25.0.255 | 0 A | R | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | U_L3 | 1.1.72.7.0.255 | 0 V | R | Unsigned16 | ● | ● | ● | ● |
| 3 | 0 | THD_Instant_U_L3 | 1.1.72.7.124.25 5 | 0% | R | Unsigned16 | - | - | ● | ● |
| 3 | 0 | THD_Avg_U_L3 | 1.1.72.24.124.2 55 | 0% | R | Unsigned16 | - | - | ● | ● |
| 3 | 0 | U_Avg_L3 | 1.1.72.25.0.255 | 0 V | R | Unsigned16 | ● | ● | ● | ● |
| 3 | 0 | PF_L3 | 1.1.73.7.0.255 | 1 | R | Unsigned16 | ● | - | ● | ● |
| 3 | 0 | PowerFactor_Avg_L3 | 1.1.73.25.0.255 | 1 | R | Unsigned16 | ● | - | ● | ● |
| 3 | 0 | Angle_I_U_L1 | 1.1.81.7.40.255 | 0 deg | R | Integer16 | ● | - | ● | ● |
| 3 | 0 | Angle_I_U_L2 | 1.1.81.7.51.255 | 0 deg | R | Integer16 | ● | - | ● | ● |
| 3 | 0 | Angle_I_U_L3 | 1.1.81.7.62.255 | 0 deg | R | Integer16 | ● | - | ● | ● |
| 3 | 0 | Angle_I_U_Ln | 1.1.81.7.128.25 5 | 0 deg | R | Integer16 | ● | - | ● | ● |
| 3 | 0 | NeutralVoltage Voltage between zero and virtual zero calculated by NeutralFault | 1.1.92.7.0.255 | 0 V | R | Integer16 | - | - | ● | ● |
| 3 | 0 | PowerThresholdValue. Defines the limit for the average power P14. If the measured power exceeds this limit, Power threshold counter is incremented with one. | 1.1.96.51.1.255 | 99000 W | RW | Unsigned32 | ● | ● | ● | ● |
| 3 | 0 | A14_Prepayment | 1.1.130.0.0.255 | 0 kWh | R(W) | Unsigned32 | - | ● | ● | - |
| 3 | 0 | A14_PrepaymentCredit | 1.1.130.0.1.255 | 0 kWh | R | Unsigned32 | - | - | ● | - |

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 3 | 0 | NeutralFaultVNThreshold Threshold for neutral voltage in NeutralFault detection | 1.1.134.0.9.255 | 40 V | RW | Unsigned16 | - | - | ● | ● |
| 3 | 0 | NeutralFaultVLThreshold Threshold for Line voltage in NeutralFault detection | 1.1.134.0.10.255 | 253 V | RW | Unsigned16 | - | - | ● | ● |
| 3 | 0 | VoltageLimitHighThreshold Threshold for high voltage in VoltageLimitsDetection | 1.1.134.0.12.255 | 253 V | RW | Unsigned16 | - | - | ● | ● |
| 3 | 0 | VoltageLimitLowThreshold Threshold for low voltage in VoltageLimitsDetection | 1.1.134.0.13.255 | 207 V | RW | Unsigned16 | - | - | ● | ● |

Attributes:

- 1) logical_name
- 2) value
- 3) scaler_unit

3.3 Extended Register Class (Class_id: 4)

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|---------------------|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 4 | 0 | P14_Max | 1.1.1.6.0.255 | 0 W | R | Unsigned32 | • | • | • | • |
| 4 | 0 | P14_Ex_Max_Tariff1 | 1.1.1.6.1.255 | 0 W | R | Unsigned32 | • | • | • | • |
| 4 | 0 | P14_Ex_Max_Tariff2 | 1.1.1.6.2.255 | 0 W | R | Unsigned32 | • | • | • | • |
| 4 | 0 | P14_Ex_Max_Tariff3 | 1.1.1.6.3.255 | 0 W | R | Unsigned32 | - | - | • | • |
| 4 | 0 | P14_Ex_Max_Tariff4 | 1.1.1.6.4.255 | 0 W | R | Unsigned32 | - | - | • | • |
| 4 | 0 | P14_Ex_Max_Tariff5 | 1.1.1.6.5.255 | 0 W | R | Unsigned32 | - | - | • | • |
| 4 | 0 | P14_Ex_Max_Tariff6 | 1.1.1.6.6.255 | 0 W | R | Unsigned32 | - | - | • | • |
| 4 | 0 | P14_Ex_Max_Tariff7 | 1.1.1.6.7.255 | 0 W | R | Unsigned32 | - | - | • | • |
| 4 | 0 | P14_Ex_Max_Tariff8 | 1.1.1.6.8.255 | 0 W | R | Unsigned32 | - | - | • | • |
| 4 | 0 | P14_Ex_Min24H | 1.1.1.13.0.255 | 0 W | R | Unsigned32 | • | • | • | • |
| 4 | 0 | P14_Ex_Max24H | 1.1.1.16.0.255 | 0 W | R | Unsigned32 | • | • | • | • |
| 4 | 0 | P23_Max | 1.1.2.6.0.255 | 0 W | R | Unsigned32 | • | • | • | • |
| 4 | 0 | P23_Ex_Max_Tariff1 | 1.1.2.6.1.255 | 0 W | R | Unsigned32 | - | - | • | • |
| 4 | 0 | P23_Ex_Max_Tariff2 | 1.1.2.6.2.255 | 0 W | R | Unsigned32 | - | - | • | • |
| 4 | 0 | Q12_Max | 1.1.3.6.0.255 | 0 var | R | Unsigned32 | • | • | • | • |
| 4 | 0 | Q12_Ex_Max_Tariff1 | 1.1.3.6.1.255 | 0 var | R | Unsigned32 | • | - | • | • |
| 4 | 0 | Q12_Ex_Max_Tariff2 | 1.1.3.6.2.255 | 0 var | R | Unsigned32 | • | - | • | • |
| 4 | 0 | Q34_Max | 1.1.4.6.0.255 | 0 var | R | Unsigned32 | • | • | • | • |
| 4 | 0 | S14_Ex_Max | 1.1.9.6.0.255 | 0 VA | R | Unsigned32 | • | - | • | • |
| 4 | 0 | S14_Ex_Max_Tariff1 | 1.1.9.6.1.255 | 0 VA | R | Unsigned32 | - | - | • | • |
| 4 | 0 | S14_Ex_Max_Tariff2 | 1.1.9.6.2.255 | 0 VA | R | Unsigned32 | - | - | • | • |
| 4 | 0 | S14_Ex_Max_Tariff3 | 1.1.9.6.3.255 | 0 VA | R | Unsigned32 | - | - | • | • |
| 4 | 0 | S14_Ex_Max_Tariff4 | 1.1.9.6.4.255 | 0 VA | R | Unsigned32 | - | - | • | • |
| 4 | 0 | S14_Ex_Max_Tariff5 | 1.1.9.6.5.255 | 0 VA | R | Unsigned32 | - | - | • | • |
| 4 | 0 | S14_Ex_Max_Tariff6 | 1.1.9.6.6.255 | 0 VA | R | Unsigned32 | - | - | • | • |
| 4 | 0 | S14_Ex_Max_Tariff7 | 1.1.9.6.7.255 | 0 VA | R | Unsigned32 | - | - | • | • |
| 4 | 0 | S14_Ex_Max_Tariff8 | 1.1.9.6.8.255 | 0 VA | R | Unsigned32 | - | - | • | • |
| 4 | 0 | S23_Ex_Max | 1.1.10.6.0.255 | 0 VA | R | Unsigned32 | • | - | • | • |
| 4 | 0 | LastPrepaymentValue | 1.1.130.0.4.255 | 0 kWh | R | Unsigned32 | - | - | • | - |

Attributes:

- 1) logical_name
- 2) value
- 3) scaler_unit
- 4) status (Not supported)
- 5) capture_time (Attribute 2 of RTC object, see paragraph 3.5.1)

3.4 Profile Generic Class (Class_id: 7)

| Class_id | Ver. | Name | Attr. 1 Logical Name | Attr 2-3. Access | Attr 4. Access | Attr 5-8. Access | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|---------------------------|-------------------------|---------------------|-------------------|---------------------|-------|-------|-----------------------------|--------------|
| 7 | 1 | Billing logger | 1.1.98.1.0.255 | R | R | R | ● | ● | ● | ● |
| 7 | 1 | Billing logger 2 | 1.1.98.2.0.255 | R | R | R | ● | ● | ● | ● |
| 7 | 1 | Load Profile logger | 1.1.99.1.0.255 | R | RW | R | ● | ● | ● | ● |
| 7 | 1 | Analysis logger | 1.1.99.1.1.255 | R | RW | R | ● | ● | ● | ● |
| 7 | 1 | Status logger | 1.1.99.98.2.255 | R | R | R | ● | ● | ● | ● |
| 7 | 1 | RTC logger | 1.1.99.98.3.255 | R | R | R | ● | ● | ● | ● |
| 7 | 1 | Voltage quality logger | 1.1.99.98.4.255 | R | R | R | ● | ● | - | - |
| 7 | 1 | Cut Off logger | 1.1.99.98.5.255 | R | R | R | - | ● | ● | - |
| 7 | 1 | Trafo ratio logger | 1.1.99.98.9.255 | R | R | R | ● | - | - | ● |
| 7 | 1 | Load Profile event logger | 1.1.99.98.10.255 | R | R | R | ● | ● | ● | ● |
| 7 | 1 | NeutralFault eventlogger | 1.1.99.98.12.255 | R | R | R | ● | ● | ● | ● |
| 7 | 1 | Upload Audit success | 1.1.99.98.13.255 | R | R | R | ● | ● | ● | ● |
| 7 | 1 | Upload Audit fail | 1.1.99.98.14.255 | R | R | R | ● | ● | ● | ● |
| 7 | 1 | VoltageQualityLogger1 | 1.1.99.98.16.255 | R | R | R | - | - | ● | ● |
| 7 | 1 | VoltageQualityLogger2 | 1.1.99.98.17.255 | R | R | R | - | - | ● | ● |

Attributes:

- 1) logical_name
- 2) buffer
- 3) capture_objects
- 4) capture_periode (300s, 900s, 1800s or 3600s)
- 5) sort_method
- 6) sort_object
- 7) entries_in_use
- 8) profile_entries

Table 3-1 shows the generic layout of all loggers within the electricity meters. The two manufacture specific attributes which are available for the debiting loggers, load profile logger and analysis logger (Data loggers) are described in paragraph 3.4.1 and 3.4.2. For details on the logger specific register values refer to Technical description for actual electricity meter or read the capture objects for the specific Profile generic object.

| Generic Profile buffer layout | | |
|-------------------------------|-------|--------------------------------|
| Logical_name | Attr. | |
| 0.1.1.0.0.255 | 2 | RTC |
| Profile logical_name | 255 | LoggerStatus |
| Profile logical_name | 254 | DataQuality |
| 1.1.134.0.1.255 | 2 | Reserved / Not Used |
| 1 | 2 | Logger specific register value |
| .. | 2 | Logger specific register value |
| n | 2 | Logger specific register value |

Table 3-1 Generic Profile buffer layout (data loggers)

3.4.1 Manufacture specific LoggerStatus attribute

| Value | Description | |
|-------------------|-------------|--|
| 2bytes 0-65535 | Bit 0 | Unused |
| | Bit 1 | Unused |
| | Bit 2 | Unused |
| | Bit 3 | 1 = Log invalid due to incorrect crc |
| | Bit 4 | Unused |
| | Bit 5 | Unused |
| | Bit 6 | 1 = Time discontinuity – Log's are not filled up after SetClk or PowerOutage |
| | Bit 7 | 1 = Logger is reconfigured |
| | Bit 8 | 1 = Log interval changed |
| | Bit 9 | 1 = LogId has reached 0xFFFFFFFF – no further logs |
| | Bit 12-15 | Unused |

Figure 9 LoggerStatus

3.4.2 Manufacture specific DataQuality attribute

| Value | Description | |
|---------|-------------|---|
| 4 bytes | Bit 0 | Clock set between 7-15s (default values) |
| | Bit 1 | Clock set between 15-30s (default values) |
| | Bit 2 | Clock set between 30-60s (default values) |
| | Bit 3 | Clock set more than 60s (default values) |
| | Bit 4 | Clock set forward |
| | Bit 5 | Clock set backward |
| | Bit 6 | Legal Param error |
| | Bit 7 | Overvoltage |
| | Bit 8 | Undervoltage |
| | Bit 9 | Neutral Error |
| | Bit 10 | Power Outage |
| | Bit 11-31 | For future use |

Figure 10 DataQuality in loggers

3.4.3 Parameters for selective access to the buffer attribute

Selective access using access selector 0, 1 or 2 is possible, see Table 3-2.

| Access selector | Access parameter | Comment |
|-----------------|--|---|
| 0 | | All buffer elements is returned in the response |
| 1 | range_descriptor (From Time, To Time) | Only buffer elements corresponding to the range_descriptor is returned in the response. |
| 2 | entry_descriptor (From Entry, To Entry) | Only buffer elements corresponding to the entry_descriptor is returned in the response. |

Table 3-2 Selective acces used when reading buffers / logger

3.4.3.1 Selective access Entry range (Assecc selector = 2)

Only Buffer elements corresponding to the entry_descriptor are returned in the buffer attribute response:

Entry_descriptor structure:

| | |
|---------------------|---|
| From_entry | First entry (row) to retrieve |
| To_entry | Last entry (row) to retrieve To_entry==0: The newest log |
| From_selected_value | Index of first value (column) to retrieve |
| To_selected_value | Index of last value (column) to retrieve To_selected_value==0: highest possible selected_value |

Example 1:

This example does readout the logger backward from entry 1 to entry 3

From_entry = 1, To_Entry = 3

From_selected_value = 2, To_selected_value = 4

The entries marked with gray in the logger layout below are readout starting with entry 1 and selected value 2:

| Profile Logger | Selected value (Column) | | | | |
|----------------|-------------------------|---------------|---------------|---------------|----------------|
| Entry (Row) | 1 | 2 | 3 | 4 | 5 (0: Highest) |
| 4 (Oldest log) | | | | | |
| 3 | | Buffer idx[2] | Buffer idx[2] | Buffer idx[2] | |
| 2 | | Buffer idx[1] | Buffer idx[1] | Buffer idx[1] | |
| 1 | | Buffer idx[0] | Buffer idx[0] | Buffer idx[0] | |
| 0 (Newest log) | | | | | |

Example 2:

This example does readout the logger forward from entry 1 to entry 0 by using wildcard for selected value which means the last column.

From_entry = 1, To_Entry = 0

From_selected_value = 1, To_selected_value = 0

The entries marked with gray in the logger layout below are readout starting with entry 1 and selected value 1:

| Profile logger | Selected value (Column) | | | | |
|----------------|-------------------------|---------------|---------------|---------------|----------------|
| Entry (Row) | 1 | 2 | 3 | 4 | 5 (0: Highest) |
| 4 (Oldest log) | | | | | |
| 3 | | | | | |
| 2 | | | | | |
| 1 | Buffer idx[0] | Buffer idx[0] | Buffer idx[0] | Buffer idx[0] | Buffer idx[0] |
| 0 (Newest log) | Buffer idx[1] | Buffer idx[1] | Buffer idx[1] | Buffer idx[1] | Buffer idx[1] |

3.4.4 RTC logger

Description of logged objects not part of the Object list:

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr 2. Access | Attr 4- 7,9. Access | Attr 8. Access | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|---------------------------------------|-------------------------|-------------------|---------------------------|----------------|-------|-------|-----------------------------|--------------|
| 8 | 0 | RTC2 Date/Time prior to change | 0.1.1.0.1.255 | - | - | - | • | • | • | • |

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|---|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 1 | 0 | RTCState Set by external command. Always set to 1 | 0.1.96.10.3.255 | - | - | Unsigned8 | • | • | • | • |

3.4.5 NeutralFault eventlogger

Description of logged objects not part of the Object list:

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 1 | 0 | NeutralFaultLogEvent 0 = Not detected 1 = Detected | 1.1.132.0.6.255 | - | - | Unsigned8 | • | • | • | • |

3.4.6 Load Profile event logger

Description of logged objects not part of the Object list:

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 1 | 0 | LoadProfileEventStatus 0 = Reserved 1 = Reserved 2 = Load Profile logger deleted if the configuration of registers are changed 3 = Reserved 4 = Load Profile logger deleted manually (e.g. during production) 5 = Load Profile logger interval changed 6 = Load Profile logger is disabled 7 = Load Profile logger is enabled | 1.1.96.5.3.255 | - | - | Unsigned8 | • | • | • | • |

3.4.7 Upload Audit success and Upload Audit fail

Description of logged objects not part of the Object list:

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPOWER 1- and 3 phase | OMNIPOWER CT |
|----------|------|---|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 1 | 0 | SoftwareUploadInformationPart 0 = Nothing 1 = Non-metrological software uploaded 2 = Metrological software uploaded 3 = Metrological and non-metrological software uploaded | 1.1.96.54.2.255 | - | - | Unsigned8 | • | • | • | • |
| 1 | 0 | Upload_SoftwareVariantRevision_old Old Software revision | 1.1.96.54.3.255 | - | - | Visible-String | • | • | • | • |
| 1 | 0 | OriginatorID Unique identifier | 1.1.96.54.4.255 | - | - | Octet-String | | | • | • |
| 1 | 0 | Upload_DownloadingPartyAddress | 1.1.96.54.5.255 | - | - | Octet-String | • | • | | |
| 1 | 0 | Upload_StartUploadInterface 0 = RF interface 1 = Primary Module interface, CCC Module interface or Optical interface | 1.1.96.54.6.255 | - | - | Unsigned8 | • | • | | |
| 1 | 0 | Upload_StartUploadInterface 0 = Always 1 = Not used | 1.1.96.54.6.255 | - | - | Unsigned8 | | | • | • |

3.4.8 VoltageQualityLogger1

Description of logged objects not part of the Object list:

| Class id | Ver. | Name / Description | Attr. 1 Logical Name | Attr. 2 (example) | Attr. 2 Access | Attr. 2 Data Type | K351C | K382M | OMNIPOWER 1- and 3 phase | OMNIPOWER CT |
|----------|------|---|-------------------------|----------------------|-------------------|----------------------|-------|-------|-----------------------------|--------------|
| 1 | 0 | VoltageQuality1Phase The phase (system) for the event 0 = All phases 1 = L1 only 2 = L2 only 3 = L3 only | 1.1.132.0.1.255 | - | - | Unsigned8 | • | • | • | • |
| 1 | 0 | VoltageQuality1Event Contains description of event type of the log. 0 = Under voltage (Mean value voltage variation) 1 = Over voltage (Mean value voltage variation) 2 = Single value – Minimum Peak 3 = Single value – Maximum Peak 4 = Power outage (Voltage Interruption) 5 = Power re-established (Voltage Interruption) 6 = Single value – Minimum Start 7 = Single value – Minimum Stop 8 = Single value – Maximum Start 9 = Single value – Maximum Stop | 1.1.132.0.2.255 | - | - | Unsigned8 | • | • | • | • |
| 3 | 0 | VoltageQuality1MeanValue Contains mean voltage registered in the log period | 1.1.132.0.3.255 | - | - | Unsigned16 | • | • | • | • |
| 3 | 0 | VoltageQuality1MaxValue Contains maximum voltage registered in the log period | 1.1.132.0.4.255 | - | - | Unsigned16 | • | • | • | • |
| 3 | 0 | VoltageQuality1MinValue Contains minimum voltage registered in the log period | 1.1.132.0.5.255 | - | - | Unsigned16 | • | • | • | • |

3.5 Clock Class (Class_id: 8)

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr 2. Access | Attr 4-7,9. Access | Attr 8. Access | K351C | K382M | OMNIPOWER 1- and 3 phase | OMNIPOWER CT |
|----------|------|--------------------|-------------------------|-------------------|-----------------------|-------------------|-------|-------|-----------------------------|--------------|
| 8 | 0 | RTC | 0.1.1.0.0.255 | RW | R | RW | • | • | • | • |

Note: Access rights are shown for interface Association with Low Level security (Password protected).

| Name | Value | Time Stamp | DataType | Access Right |
|--|-------------------------------------|--------------|--------------|--------------|
| 0-1-1-0-0-255_logical_name [A] | 0,1,1,0,0,255 | 21 : 15 : 20 | OCTET_STRING | Read Only |
| 0-1-1-0-0-255_time [A] | 7,221,10,9,3,21,19,46,255,128,0,128 | 21 : 15 : 20 | OCTET_STRING | Read Write |
| 0-1-1-0-0-255_status [A] | 128 | 21 : 15 : 20 | UNSIGNED | Read Only |
| 0-1-1-0-0-255_daylight_savings_begin [A] | 7,221,3,31,7,2,0,0,255,128,0,0 | 21 : 15 : 20 | OCTET_STRING | Read Only |
| 0-1-1-0-0-255_daylight_savings_end [A] | 7,221,10,27,7,3,0,0,255,128,0,128 | 21 : 15 : 20 | OCTET_STRING | Read Only |
| 0-1-1-0-0-255_daylight_savings_deviation [A] | 60 | 21 : 15 : 20 | INTEGER | Read Only |
| 0-1-1-0-0-255_daylight_savings_enabled [A] | 1 | 21 : 15 : 20 | BOOLEAN | Read Write |
| 0-1-1-0-0-255_clock_base [A] | 1 | 21 : 15 : 20 | ENUM | Read Only |

Figure 11 Example of Clock Class (K351C, Optical interface)

Attributes:

- 1) logical_name
- 2) date_time
- 3) time_zone, not used.
- 4) status
- 5) daylight_savings_begin
- 6) daylight_savings_end
- 7) daylight_savings_deviation
- 8) daylight_savings_enabled
- 9) clock_base

3.5.1 Date and time formats

Date and time information is represented with date_time format, as defined below:

| | |
|------------------|--|
| <i>date_time</i> | <p>OCTET STRING (SIZE(12))</p> <p>{</p> <p>year highbyte,</p> <p>year lowbyte,</p> <p>month,</p> <p>day of month,</p> <p>day of week,</p> <p>hour,</p> <p>minute,</p> <p>second,</p> <p>hundredths of second,</p> <p>deviation highbyte,</p> <p>deviation lowbyte,</p> <p>clock status⁷</p> <p>}</p> <p>Individual fields of date_time are encoded as defined in "blue book".</p> <p>Some may be set to "not specified" as described.</p> |
|------------------|--|

Figure 12 RTC date and time format

3.5.2 Clock status

Clock status is used in relation to day light saving time to adjust the internal RTC time which is used by the electricity meter for loggers.

When setting the time between daylight_savings_begin and daylight_savings_end bit 7 needs to be set and setting the time outside DST bit 7 needs to be cleared.

When reading RTC values the clock status (bit7) indicates if the time is adjusted for daylight saving or not.

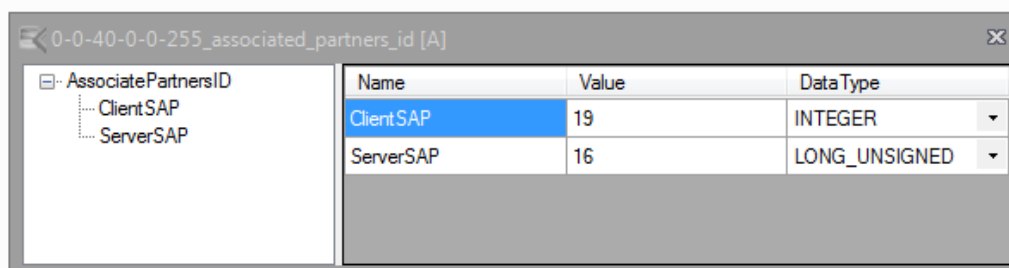
⁷ Note: Only Bit0 (Invalid) & Bit7 (DST) in clock status are supported.

3.6 Association LN Class (Class_id: 15)

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr 2-6. Access | Attr 7. Access | Attr 8. Access | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|----------------------|-------------------------|---------------------|-------------------|-------------------|-------|-------|-----------------------------|--------------|
| 15 | 0 | Association LN class | 0.0.40.0.0.255 | R | W | R | • | • | • | • |

Note: Access rights are shown for interface Association with Low Level security (Password protected).

| Name | Value | Time Stamp | DataType | Access Right |
|---|----------------------------|--------------|--------------|--------------|
| 0-0-40-0-0-255_logical_name [A] | 0,0,40,0,0,255 | 21 : 15 : 20 | OCTET_STRING | Read Only |
| 0-0-40-0-0-255_associated_partners_id [A] | Click Here | 21 : 15 : 20 | STRUCTURE | Read Only |
| 0-0-40-0-0-255_application_context_name [A] | 1 | 21 : 15 : 20 | UNSIGNED | Read Only |
| 0-0-40-0-0-255_xDLMS_context_info [A] | | 21 : 15 : 20 | UNKNOWN_TYPE | Read Only |
| 0-0-40-0-0-255_authentication_mechanism [A] | | 21 : 15 : 20 | UNKNOWN_TYPE | Read Only |
| 0-0-40-0-0-255_association_status [A] | 2 | 21 : 15 : 20 | ENUM | Read Only |



| Name | Value | DataType |
|-----------|-------|---------------|
| ClientSAP | 19 | INTEGER |
| ServerSAP | 16 | LONG_UNSIGNED |

Figure 13 Example of Association LN Class (K351C, Optical interface)

Attributes:

- 1) logical_name
- 2) object_list
- 3) associated_partners_id
- 4) application_context_name
- 5) xDLMS_context_info
- 6) authentication_mechanism_name
- 7) LLS_secret
- 8) Association_status

3.7 SAP Class (Class_id: 17)

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr 2. Access | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--------------------|-------------------------|-------------------|-------|-------|-----------------------------|--------------|
| 8 | 0 | SAP Class | 0.0.41.0.0.255 | RW | • | • | • | • |

Note: Access rights are shown for all interface Associations.

| Name | Value | Time Stamp | DataType | Access Right |
|---------------------------------|----------------------------|--------------|--------------|--------------|
| 0-0-41-0-0-255_logical_name ... | 0,0,41,0,0,255 | 21 : 15 : 20 | OCTET_STRING | Read Only |
| 0-0-41-0-0-255_SAP_assignm... | Click Here | 21 : 15 : 20 | ARRAY | Read Only |

| Name | Value | DataType |
|----------------|----------------------------|---------------|
| SAP | 16 | LONG_UNSIGNED |
| LogicalDevName | 75,65,77,69,0,0,1,21,23,57 | OCTET_STRING |

Figure 14 Example of SAP Class (K351C, Optical interface)

Attributes:

- 1) logical_name
- 2) SAP_assignment_list

3.8 Image transfer Class (Class_id: 18)

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr 2. Access | Attr 3-7. Access | K351C | K382M | OMNIPOWER 1- and 3 phase | OMNIPOWER CT |
|----------|------|----------------------|-------------------------|-------------------|---------------------|-------|-------|-----------------------------|--------------|
| 18 | 0 | Image transfer class | 0.0.44.0.0.255 | RW | R | | | ● | ● |

Note: Access rights are shown for interface Association with Low Level security (Password protected).

| Name | Value | Time Stamp | DataType | Access Right |
|--|----------------|--------------|----------------------|--------------|
| 0-0-44-0-0-255_logical_name [A] | 0,0,44,0,0,255 | 13 : 14 : 29 | OCTET_STRING | Read Only |
| 0-0-44-0-0-255_image_block_size [A] | 985 | 13 : 14 : 29 | DOUBLE_LONG_UNSIGNED | Read Write |
| 0-0-44-0-0-255_image_transferred_blocks_status [A] | | 13 : 14 : 29 | BIT_STRING | Read Only |
| 0-0-44-0-0-255_image_first_not_transferred_block [A] | 0 | 13 : 14 : 29 | DOUBLE_LONG_UNSIGNED | Read Only |
| 0-0-44-0-0-255_image_transfer_enabled [A] | 1 | 13 : 14 : 29 | BOOLEAN | Read Only |
| 0-0-44-0-0-255_image_transfer_status [A] | 0 | 13 : 14 : 29 | ENUM | Read Only |
| 0-0-44-0-0-255_image_to_activate_info [A] | Click Here | 13 : 14 : 29 | ARRAY | Read Only |
| 0-0-44-0-0-255_image_transfer_initiate [M] | Click Here | 13 : 14 : 29 | STRUCTURE | Execute |
| 0-0-44-0-0-255_image_block_transfer [M] | Click Here | 13 : 14 : 29 | STRUCTURE | Execute |
| 0-0-44-0-0-255_image_verify [M] | 0 | 13 : 14 : 29 | INTEGER | Execute |
| 0-0-44-0-0-255_image_activate [M] | 0 | 13 : 14 : 29 | INTEGER | Execute |

Figure 15 Example of Image transfer Class (OMNIPOWER, Primary Module interface)

Attributes:

- 1) logical_name
- 2) image_block_size⁸
- 3) image_transferred_blocks_status
- 4) image_first_not_transferred_block_number
- 5) image_transfer_enabled
- 6) image_transfer_status
- 7) image_to_activate_info

⁸ Max recommended block size using GPRS is 983 (without segmentation)

Methods:

- 1) `image_transfer_initiate`
- 2) `image_block_transfer`
- 3) `image_verify`
- 4) `image_activate`

3.8.1 Image transfer process description

Precondition: The Image transfer has to be enabled: *image_transfer_enabled* = TRUE.

Step 1: Get/modify ImageBlockSize

The client can either read the current value of the *image_block_size* attribute and use this value during the Image transfer process or modify the *image_block_size* attribute to the desired value.

The range of *image_block_size* is 32 – 985 octets.

Step 2: Client initiates Image transfer

The client initiates the Image transfer process by invoking the *image_transfer_initiate* method. The method invocation parameter holds the identifier and the size of the Image to be transferred:

image_identifier: 0xHHHHHHHHOooooooooooooooooooooooooooooooooooooo,

where H = Hash of the Image and O = originatorID

image_size: holds the total ImageSize in octets, max. value is 512 kB

After a successful initiation the value of the *image_transfer_status* attribute is (1). The *image_transferred_block_status*, *image_first_not_transferred_block_number* and *image_to_activate_info* attributes are all reset.

Step 3: Client transfers ImageBlocks

The client transfers ImageBlocks to server by invoking the *image_block_transfer* method. The method invocation parameters include the ImageBlockNumber and one ImageBlock:

image_block_number: is checked by the server to be within the expected range

image_block_value: is checked by the server – must be equal the *image_block_size* attribute, except for the final ImageBlock.

Step 4: Client checks completeness of the Image

The client checks the completeness of the Image transferred. If the Image is not complete, it transfers the ImageBlocks not (yet) transferred. This is an iterative process, continued until the whole Image is successfully transferred.

To identify and transfer the ImageBlocks not transferred, two mechanisms are available.

- the client may retrieve the status of each ImageBlock: either not transferred or transferred. This is performed by retrieving the value of the *image_transferred_blocks_status* attribute. The client transfers then the ImageBlocks not (yet) transferred;
- alternatively, the client may retrieve the ImageBlockNumber of the first block not transferred. This is performed by retrieving the value of the *image_first_not_transferred_block_number* attribute. The client transfers then this ImageBlock not (yet) transferred;
- after this, the client checks again the completeness of the Image.

Step 5: Server verifies the Image

The Image is verified by the server. The client is initiating the verification by invoking the *image_verify* method. The result can be:

- temporary-failure, if the verification could be started - *image_transfer_status* attribute is (2);
- other-reason (or other value), if the verification could not be started - *image_transfer_status* attribute remains untouched.

In case the verification could be started (verification takes some seconds) the result can be either success or failed. If success - *image_transfer_status* attribute is (3). If failed - *image_transfer_status* attribute is (4).

Furthermore if success – the *image_to_activate_info* attribute is updated with the information on the Image ready for activation:

image_to_activate_size: is the size of the Image to be activated, expressed in octets

image_to_activate_identification: 0xNNNNNNNNRRRRRRRR, where N = software number and R = Revision

image_to_activate_signature: Hash calculated on the Image ready for activation

Step 6 (Optional): Client checks the information on the image to activate

If the information in the *image_to_activate_info* attribute is not what is expected, the client can restart the image transfer process.

Otherwise it goes to the next step, activation of the Image

Step 7: Server activates the Image

The Image is activated by the server. The client is initiating the activation by invoking the *image_activate* method. The result of the invocation of the *Image_activate* method can be:

- success, if the Image activation has been successfully started - *image_transfer_status* attribute is (6);
- temporary-failure, if the activation has not been successfully started - *image_transfer_status* attribute is (7);
- other-reason (or other value), if the activation failed - *image_transfer_status* attribute remains untouched.

In case of success, the server will reboot after 10 seconds and activate the new Image if possible. During this process, it is not accessible.

After the reboot - *image_transfer_status* attribute is (0) independent of the result of the activation.

The result of the activation may be checked by the client by retrieving the SoftwareRevision of the active firmware.

Image transfer cancellation

A running image transfer process can be cancelled at any time in two ways:

- Write the *image_block_size* attribute - *image_transfer_status* attribute is (0);
- Restart the image transfer process by invoking the *image_transfer_initiate* method - *image_transfer_status* attribute is (1).

3.9 HDLC Setup Class (Class_id: 23)⁹

| Class_id | Ver. | Name / Description | Attr. 1 Logical Name | Attr 2. Access | Attr 3-9. Access | K351C | K382M | OMNIPower 1- and 3 phase | OMNIPower CT |
|----------|------|--------------------|-------------------------|-------------------|---------------------|-------|-------|-----------------------------|--------------|
| 23 | 1 | HDLC Setup class | 0.0.22.0.0.255 | R | RW | • | • | • | • |

Note: Access rights are shown for interface Association with Low Level security (Password protected).

| Name | Value | Time Stamp | DataType | Access Right |
|---|----------------|--------------|---------------|--------------|
| 0-0-22-0-0-255_logical_name [A] | 0,0,22,0,0,255 | 21 : 15 : 20 | OCTET_STRING | Read Only |
| 0-0-22-0-0-255_comm_speed [A] | 5 | 21 : 15 : 20 | ENUM | Read Only |
| 0-0-22-0-0-255_window_size_transmit [A] | 1 | 21 : 15 : 20 | UNSIGNED | Read Write |
| 0-0-22-0-0-255_window_size_receive [A] | 1 | 21 : 15 : 20 | UNSIGNED | Read Write |
| 0-0-22-0-0-255_max_info_field_length_transmit [A] | 512 | 21 : 15 : 20 | LONG_UNSIGNED | Read Write |
| 0-0-22-0-0-255_max_info_field_length_receive [A] | 128 | 21 : 15 : 20 | LONG_UNSIGNED | Read Write |
| 0-0-22-0-0-255_inter_octet_time_out [A] | 500 | 21 : 15 : 20 | LONG_UNSIGNED | Read Write |
| 0-0-22-0-0-255_inactivity_time_out [A] | 20 | 21 : 15 : 20 | LONG_UNSIGNED | Read Write |
| 0-0-22-0-0-255_device_address [A] | 32 | 21 : 15 : 20 | LONG_UNSIGNED | Read Write |

Figure 16 Example of HDLC Setup Class (K351C, Optical interface)

Attributes:

- 1) Logical_name
- 2) Comm_speed
- 3) Window_size_Transmit
- 4) Window_size_Recieve
- 5) Max_info_field_length_transmit
- 6) Max_info_field_length_receive
- 7) Inter_octet_Timeout
- 8) Inactivity_Timeout
- 9) Device_Address

⁹ For OMNIPower M1 attributes 3 – 6 were changed to Read Only values.

4 Examples of communication

For details in each example, please refer to the IEC 62056-xx standards and DLMS UA blue and Green books.

4.1 Read Meter number without security

The following example shows how to read the meter number 12345679 (attribute 2 of OBIS 1.1.0.0.1.255)) from a K351C using default DLMS address and **Public Association without security** using the primary module port.

Connect:

```
--> 7E A0 20 03 21 93 7D D9 81 80 14 05 02 02 00 06 02 02 00 07 04 00 00 00 01 08 04 00 00 00 01 6F EF 7E
<-- 7E A0 20 21 03 73 73 98 81 80 14 05 02 02 00 06 02 00 80 07 04 00 00 00 01 08 04 00 00 00 01 19 D4 7E
```

Association:

```
--> 7E A0 2B 03 21 10 FB AF E6 E6 00 60 1D A1 09 06 07 60 85 74 05 08 01 01 BE 10 04 0E 01 00 00 00 06 5F 1F
    04 00 00 18 1D FF FF 5F AF 7E
<-- 7E A0 37 21 03 30 6C 7C E6 E7 00 61 29 A1 09 06 07 60 85 74 05 08 01 01 A2 03 02 01 00 A3 05 A1 03 02 01
    00 BE 10 04 0E 08 00 06 5F 1F 04 00 00 10 10 00 7D 00 07 7D EE 7E
```

Request Data:

```
--> 7E A0 19 03 21 32 6F D8 E6 E6 00 C0 01 81 00 01 01 01 00 00 01 FF 02 00 A8 E3 7E
<-- 7E A0 15 21 03 52 5D 8A E6 E7 00 C4 01 81 00 06 00 BC 61 4F E4 36 7E
```

Disconnect:

```
--> 7E A0 07 03 21 53 03 C7 7E
<-- 7E A0 07 21 03 73 01 40 7E
```

4.2 Read Load Profile logger using Level security

The following example shows how to read the load profile logger (attribute 2 of OBIS 1.1.99.1.0.255) from a K351C using default DLMS address and **Primary Module interface Association with Low Level security**. This example is using selective access (Access Selector =1). Read Buffer from date 25 Okt. 2013 to date 26 Okt. 2013.

Connect:

```
--> 7E A0 20 21 25 93 9E 08 81 80 14 05 02 02 00 06 02 02 00 07 04 00 00 00 01 08 04 00 00 00 01 6F EF 7E
<-- 7E A0 20 25 21 73 91 EB 81 80 14 05 02 02 00 06 02 00 80 07 04 00 00 00 01 08 04 00 00 00 01 19 D4 7E
```

Association:

```
--> 7E A0 41 21 25 10 52 3B E6 E6 00 60 33 A1 09 06 07 60 85 74 05 08 01 01 8A 02 07 80 8B 07 60 85 74 05 08
    02 01 AC 07 80 05 31 32 33 34 35 BE 10 04 0E 01 00 00 00 06 5F 1F 04 00 00 FE 1F FF FF 0C FF 7E
<-- 7E A0 37 25 21 30 8E 0F E6 E7 00 61 29 A1 09 06 07 60 85 74 05 08 01 01 A2 03 02 01 00 A3 05 A1 03 02 01
    00 BE 10 04 0E 08 00 06 5F 1F 04 00 00 10 1C 00 7D 00 07 4D 99 7E
```

Request Data:

```
--> 7E A0 4C 21 25 32 CD B2 E6 E6 00 C0 01 81 00 07 01 01 63 01 00 FF 02 01 01 02 04 02 04 12 00 08 09 06 00
    01 01 00 00 FF 0F 02 12 00 00 09 0C 07 DD 0A 19 FF 00 00 00 00 80 00 80 09 0C 07 DD 0A 1A FF 00 00 00 00
    80 00 80 01 00 2F 84 7E
<-- 7E A1 E6 25 21 52 1D A0 E6 E7 00 C4 02 81 00 00 00 00 01 00 82 01 CE 01 3B 02 08 09 0C 07 DD 0A 19 05 00
    00 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00
    01 02 08 09 0C 07 DD 0A 19 05 00 0F 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00
    00 00 06 00 00 00 00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 00 1E 00 FF 80 00 80 12 00 00 06 00 00 05
    00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 00 2D 00
    FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 02
    08 09 0C 07 DD 0A 19 05 01 00 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00
    06 00 00 00 00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 01 0F 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F
    01 06 00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 01 1E 00 FF 80
    00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 02 08 09
    0C 07 DD 0A 19 05 01 2D 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00
    00 00 00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 02 00 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06
    00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 02 0F 00 FF 80 00 80
    12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 45 3D 7E
```

```
--> 7E A0 13 21 25 54 12 D3 E6 E6 00 C0 02 81 00 00 00 01 73 7F 7E

<-- 7E A1 E4 25 21 74 5F DD E6 E7 00 C4 02 81 00 00 00 00 02 00 82 01 CC 02 08 09 0C 07 DD 0A 19 05 02 1E 00
FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 02
08 09 0C 07 DD 0A 19 05 02 2D 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00
06 00 00 00 00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 03 00 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F
01 06 00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 03 0F 00 FF 80
00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 02 08 09
0C 07 DD 0A 19 05 03 1E 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00
00 00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 03 2D 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06
00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 04 00 00 FF 80 00 80
12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 02 08 09 0C 07
DD 0A 19 05 04 0F 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00 00 00
00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 04 1E 00 FF 80 00 80 12 00 00 06 00 00 05 00 0F 01 06 00 00
00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 02 08 09 0C 07 DD 0A 19 05 04 2D 00 FF 80 00 80 12 00
00 06 00 00 05 00 0F 01 06 00 00 00 03 06 00 00 00 00 06 00 00 00 00 06 00 00 00 01 3C 23 7E

--> < Continue requesting blocks until last block >
<-- < Reading blocks >
```

```
--> 7E A0 13 21 25 FE 42 D9 E6 E6 00 C0 02 81 00 00 00 06 CC 0B 7E

<-- 7E A0 74 25 21 1E 88 F4 E6 E7 00 C4 02 81 01 00 00 00 07 00 82 00 5C 02 08 09 0C 07 DD 0A 19 05 0F 00 00
FF 80 00 80 12 00 00 06 00 00 00 00 0F 01 06 00 02 E3 0D 06 00 00 00 00 06 00 00 0D 2F 06 00 00 00 01 02
08 09 0C 07 DD 0A 19 05 0F 0F 00 FF 80 00 80 12 00 00 06 00 00 00 00 0F 01 06 00 03 43 F8 06 00 00 00 00
06 00 00 0E E9 06 00 00 00 01 4F D9 7E
```

Disconnect:

```
--> 7E A0 07 21 25 53 E0 16 7E

<-- 7E A0 07 25 21 73 E3 33 7E
```