SC-M&M-DCT

Technical Prescriptions
TAU-301.4-TV03

eMUCS-P1

Version 2.1.1

Revisions

The Belgian P1 interface specification evolves resulting from changing regulation to support the energy transition. The on-going evolution leads to several versions of the P1 specification. For each interface version a new eMUCs-P1 specification document (this document) is created.

The interface specification is included in the eMUCS P1 document. The interface specification has a version number, that unambiguously determines the properties of the interface including the set of data elements. An increment of the interface specification requires an implementation change of the E-meter and - to achieve full support for the new version – also of the OSM.

The eMUCS P1 document includes the interface specification but has other chapters like the introduction and revision history. The eMUCS P1 document has also a version number.

Both the interface version number and document version number are explained below:

The interface version number is formatted X.Y where and are increased as follows:

- X reflects a major version change, e.g. introduced with a new generation of E-meters.
- Y reflects a minor version change, e.g. extra data-objects, telegram change with backwards compatibility from OSM perspective. In other words, only data elements will be added. Existing data elements will not be removed or changed.

Changes with respect to the previous published interface version 1.7 are highlighted. Interface version 2.1 is backwards compatible from OSM perspective with 1.7.

Note: The interface version number is also part of the P1-telegram itself: X and Y are published as the last 2 characters of the Version information field, see chapter 8.1.

Note: The interface major version numbers (X) starting with 1 up until 4 are used for the residential segment (scope of this document) while major version numbers starting with 5 until 9 are used for the industrial AMR segment (scope of eMUCS-A1).

The version of the eMUCS – P1 document is composed as follows: X.Y.Z, with X and Y the interface version, and Z the optional additional document version. The Z-position allows to release a new document version with clarifications or corrections while the interface specification remains the same.

Version	Modification	Date	Author(s)
2.0	• Increment of major version with **HW-compatibility to major version 1** • Addition of Maximum demand register • Addition of maximum demand register history (13 months) • Addition of Grid configuration • Addition of EAN objects • Addition of Virtual Relays	15/01/2021	Fluvius
2.1	• General textual clean up	N.A.	Fluvius

Version	Modification	Date	Author(s)
	• Embedding DSMR P1 V5.0.2 instead of cross-reference • Change wording: Output state virtual relay -> virtual relay state (to be consistent with breaker state and published attribute. Note: Only (0) and (1) can be published) • 7.2: Maximum demand – Active energy import of the last 13 months, attributes corrected. • 7.2: Current average value A+ added.		
2.1.1	• 8.2: Comma replaced by dot in limiter and fuse supervision values. (Examples were ok already). • Clarification: P1 version information (A5 instead of S4.) • Clarification: Specification of tariff indicator fixed. • Chapter 8: Clarification. Specification of variable length octet strings completed. • Chapter 8: Correction. Specification of EAN code. • EAN Code in examples corrected. • Integration of DSMR P1 document. • Data model presented in one table in chapter 8. (Merge of eMUCS P v2.1 section 2.2 and 2.3) • Chapter 8: Datatypes have been specified as precise as possible. Ranges replaced by actual fixed lengths for Equipment identifier and EAN. • Chapter 7: Representation An introduced, to distinguish between raw hex-string and ascii interpretation. Note: All changes in document version 2.1.1 are clarifications, corrections and textual changes. P1 Interface version is 2.1.	28/07/2023	Fluvius

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1 Context

1.1 Introduction

This document is part of a set of interface companion specification documents for a digital meter system intended for electricity, gas, water, and possibly other provisions. The system architecture and related specification documents for this digital meter system are documented in eMUCS-System Architecture.

In 2016, “Netbeheer Nederland” published the DSMR-P1 V5.0.2 companion specification. The goal of this specification was to achieve a standardized interface to provide measurement data from the Automatic Meter Reading System for electricity, thermal, gas and water meters towards the consumers.

All Dutch DSO’s in (,the members of Netbeheer Nederland,) were committing to this interface specification to facilitate the market of Consumer Energy Management Systems (CEMS) and to avoid different variations of the interface.

At the start of the digital meter roll-out in Belgium, the Belgian DSOs agreed to re-use the DSMR P1 V5.0.2. as much as possible to facilitate the already existing market of Consumer Energy Management System based on DSMR P1 V5.0.2. The equivalents for the Belgian market of the companion specifications for the Dutch market (DSMR documents), are the eMUCS documents.

Due to Belgian legislation and country specific needs for digital meters, the eMUCS P1 interface specification is not identical to the DSMR P1 specification. The P1 specification differences are limited to the set of data elements in the P1 telegram. The physical interface and the protocol are identical to the DSMR P1 V5.0.2.

1.2 Document Scope

The goal of the eMUCS companion specifications is to reach an open, standardised protocol implementation related to the communication of several types of electricity meters with other metering systems and devices.

This document (eMUCs-P1) specifies the communication protocol layers and the application interface P1 between a Other Service Module (OSM) like an ‘Consumer Energy Management System’ (CEMS) and the electricity meter. In the remainder of this document, the generic term OSM is used to indicate a device connected to the P1 port of the electricity meter.

The application layer and data model are based on ‘DSMR-P1’. From chapter 2 to chapter 6.3, this document follows the DSMR P1 V5.0.2 document structure and incorporates integral parts from the DSMR P1 V5.0.2. Additional text with respect to the DSMR P1 V5.0.2 in these chapters is labeled in **green.**

Chapter 7 specifies the representation of COSEM objects in the P1 telegram and Chapter 8 specifies the data elements of the P1 interface for the Belgium market. These chapters replace the chapters 6.4 and further of the DSMR P1 V5.0.2.

Note: This document (eMUCS – P1) describes the local consumer interface for the residential installations, so called digital meters. Next to the residential segment, also the non-residential segment (industrial AMR meters) implements a local consumer interface based on the DSMR P1 V5.0.2. This interface is described in the document eMUCS-A1.

2 Design principles

Note: only the title of this chapter deviates from DSMR P1 5.0.2.

The interface is based on the following:

- Simple installation by customer;
- Simple and clearly defined interface;
- Low cost for the installation itself;
- Low cost for the customer installing, operating and maintaining the interface;
- Safe for the customer;
- The metering system or the data in it cannot be compromised.

The P1 interface is based on IEC 62056-21.

3 Abbreviation list

The content of this DSMR P1 chapter has been included in Abbreviations.

4 Normative references

The content of this DSMR P1 chapter has been included in appendix A - References.

5 Physical interface characteristics

This specification is based on the use of one OSM-device. It is however possible to use more devices by using an active or passive hub or repeater (not in scope of this document).

5.1 Physical connector

The P1 port connector type is RJ12. The Metering System holds a female connector; the OSM (Other Service Module) connects via standard RJ12 male plug.

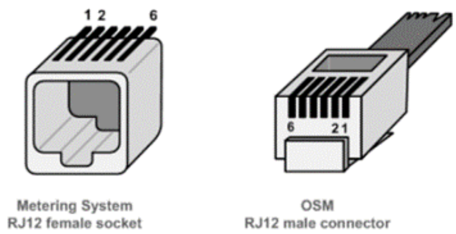

Figure 1: Physical connectors

Note: The Belgian P1 port is always located behind a cover. Under normal circumstances this cover is not sealed by an installation seal and the physical port is accessible for the consumer. In some use-cases, the DSO can decide to seal the P1.

The P1 pin assignment is detailed in table below:

Pin#	Signal name	Description	Remark
1	+5V	+5V power supply	Power supply line
2	Data Request	Data Request	Input
3	Data GND	Data ground	
4	n.c.	Not Connected	
5	Data	Data line	Output. Open Collector
6	Power GND	Power ground	Power supply line

Table 1 P1 – Physical connector pin assignment

5.2 User safety

5.2.1 Installation Category

The P1 interface (being integral part of the entire Metering System) has to fulfil the requirements for Installation Category IV, meaning impulse withstand voltages = 6000 V. See IEC standard – Ref [5].

5.2.2 Galvanic Isolation

The P1 port lines must be galvanically isolated from the mains, Including +5V power supply line.

To secure a user of P1 port from electric shock, and at the same time to protect the Metering System against any kind of reversed connection, and to avoid the possibility of influencing the Metering System through the P1 port, **all the lines** of P1 port must be galvanically isolated from the mains (Including +5V power supply line).

To achieve galvanic isolation and to lower the possibility of influencing the Metering System through the P1 port, the signal lines (Data and Data Request) must be equipped with optocouplers.

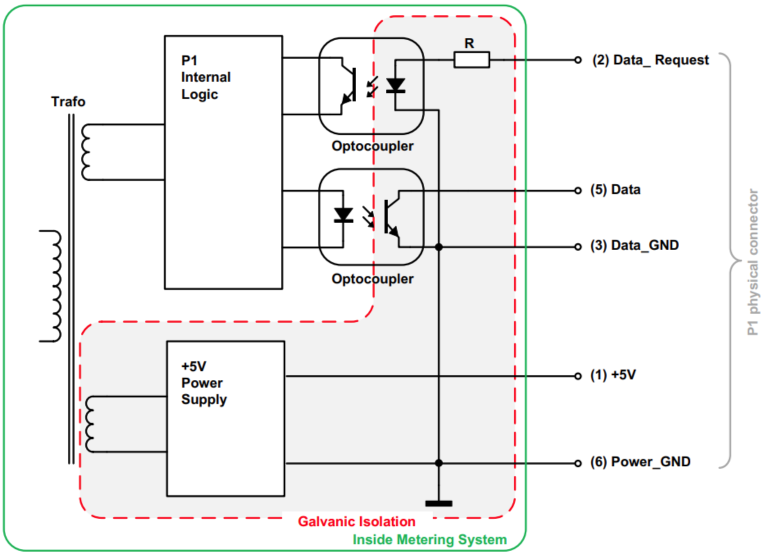

Figure 2 Galvanic isolation from the mains

The P1 port design (including optocouplers) must adhere to the relevant IEC standards for measurement equipment.

Especially:

IEC 60747-5-5 - Electrical safety standard.
IEC 61010 - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use.

5.3 Power supply

The “+5V” power supply line is meant to provide a power source to OSM devices, to enable their ability to process and transfer received metering data further wired or wireless (i.e. via Bluetooth or Wi-Fi technologies).

The power consumption of the P1 circuitry shall **NOT** be included in the register values of the Electricity meter.

Note: The Belgian P1 interface can be disabled by the DSO. In case the P1 interface is disabled, the power supply on the physical interface is switched off.

5.3.1 Voltage characteristics

The P1 interface must provide stable +5V DC power supply via “+5V” (pin 1) and “Power GND” (pin 6) lines.

“+5V” voltage and its tolerances are defined as follows:

- Nominal voltage U_L = 5,0 V
- Maximum voltage allowed U_{L_MAX} <= 5,5 V at I_L = 0 mA
- Minimum voltage allowed U_{L_MIN} >= 4,9 V at I_L = I_{L_CONT} = 250 mA

The “Allowed Voltage” window is presented on the picture below:

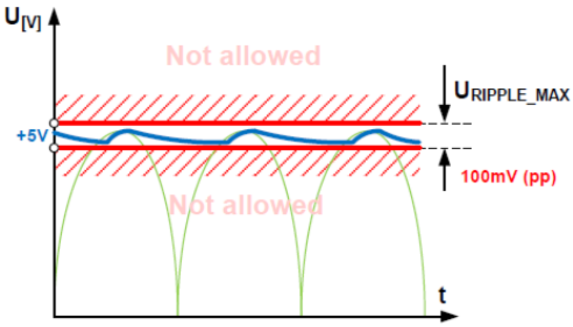

Figure 3: Allowed voltage window

The “Ripple Voltage” U_{RIPPLE_MAX} at I_{L_CONT} = 250 mA must not exceed 2% of a nominal volt-age (U_L). U_{RIPPLE_MAX} <= 100mV (pp - peak to peak), for frequencies lower or equal to 100 Hz. Defined at pure resistive load.

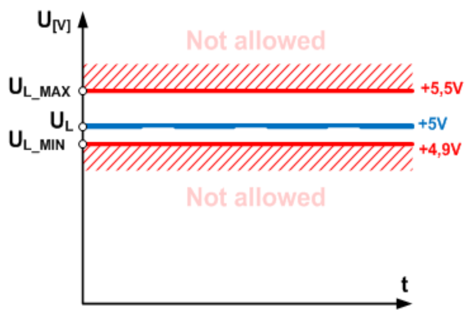

Figure 4: Ripple voltage window

The “Noise Level” U_{NOISE_MAX} must not exceed <= 50mV peak to peak, for frequencies higher than 50 kHz. Defined at pure resistive load.

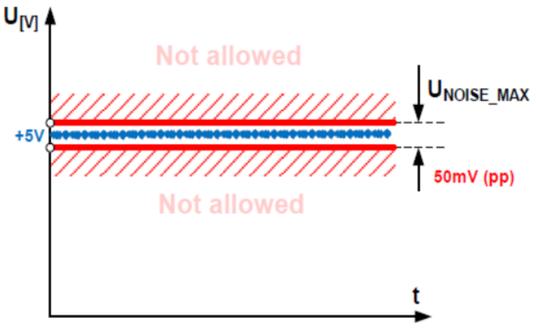

Figure 5 Noise level window

5.3.2 Current characteristics

The power supply must be able to continuously supply current I_{L_CONT} <= 250 mA.

The power supply line must be equipped with an overload / overcurrent mechanism, protecting P1 interface from excessive current by immediately shutting off the flow of current when it exceeds a level of I_{L_MAX} >= 300 mA.

The tolerance of triggering the overload / overcurrent mechanism should stay between I_{L_CONT}

+ 10mA >= 260 mA and I_{L_MAX} <= 300 mA.

The overload / overcurrent mechanism must be implemented as a "fold back" technology (see section 5.5.2).

5.3.2.1 Inrush current

Once the OSM device is connected to the P1 port (depends on OSM internal design), its power supply unit may require to use an excessive current for a very short period of time (usually for less than 1 ms). Such current is often called: an "Inrush current".

The power supply must be able to cope with an Inrush current, caused by the OSM.

The E-meter must be able to withstand a typical "Inrush current" from a circuit as presented in the picture below.

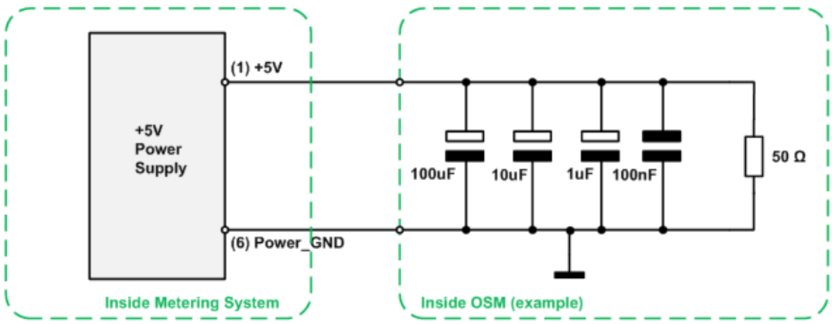

Figure 6 Inrush current circuit example

5.4 Variable load on power supply

The OSM devices may incorporate radio technologies such as Bluetooth and Wi-Fi. Such devices usually have a specific characteristic of power consumption.

To ensure the correct operation of these type of devices, the P1 "+5V" power supply must be able to cope with variable load.

If the load at OSM side remains within acceptable range (up to 250 mA), the power supply must provide accurate and continuous voltage regardless of the nature of load changes.

An example of a "Load Test Pattern" is presented on the picture below.

The exemplary "load change periods" could be: 2 ms, 20 ms, 200 ms, and 2 s.

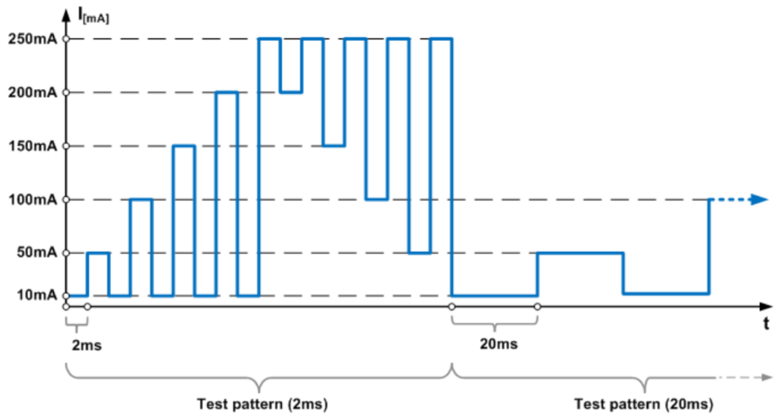

Figure 7: Variable load – test pattern example

5.5 Metering system protection

This section describes the protection of the metering system seen from the P1 port side.

5.5.1 Avoidance of influencing the Metering System through P1 port

It must not be possible to influence the Metering system in any way through the P1 port (except from requesting and receiving data, and getting +5V power supply as specified in section

Power supply on page 10).

Especially it shall not be possible to interrupt or block in any way the other modules/ports/parts of the Metering System (i.e. by maliciously manipulate the “Data Request” line).

See also section 5.2.2. – Galvanic isolation.

5.5.2 Short circuits

The “+5V” power supply line of the P1 port shall be able to withstand long lasting short circuits. The maximum “short circuit current” has to be limited to 50 mA. ISC <= 50 mA.

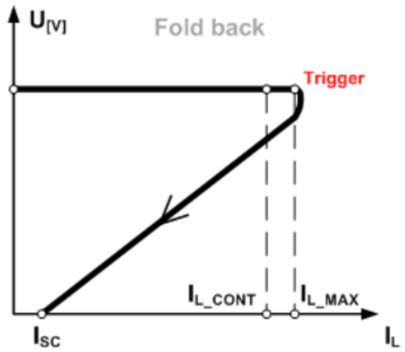

Figure 8: Over current / short circuit graph example

Once the short circuit / over current situation does no longer occur, the power supply has to return automatically to normal operation.

5.5.3 External OVP (Overvoltage Protection)

To protect the “+5V” power line from an external overvoltage, caused by or a failure at OSM side or by an incorrect (i.e. by mistake) connection of a higher voltage source to “+5V” line, an OVP (Overvoltage Protection) mechanism must be implemented.

The OVP mechanism for “+5V” line should be triggered at a level not lower than:

5,9 V (± 100 mV). V_{OVP} = 5,9 V and will protect the interface against voltages up to 15 V.

5.5.4 ESD – Electrostatical Discharge

All the lines of the P1 port have to be ESD protected.

ESD protection has to comply with IEC 61000-4-2 Applicable model - HBM Human Body Model.

5.6 P1 OSM protection

To protect the OSM device (connected via P1 port) from an overvoltage caused by a failure at Metering System side, an OVP (Overvoltage Protection) mechanism should be implemented, which will limit the voltage to less than 15V.

Note: The above requirement is only applicable for the “+5V” line, as the other lines (Data Request and Data) cannot be physically influenced by the Metering System due to the use of optocouplers.

5.7 P1 Data interface specification

To ensure a safe, stable solution the data connection will consist of three lines:

- “Data Request” line,
- “Data” line and
- “Data ground” line

Note: the protocol is based on IEC 62056-21 Mode D, exceptions are documented below where applicable.

5.7.1 “Data Request” line specification

The P1 port is activated (start sending data) by setting “Data Request” line high (to +5V).

Note: The E-meter will only start sending data on the P1 port, if the port is enabled by the DSO.

While receiving data, the requesting OSM must keep the “Data Request” line activated (set to +5V).

To stop receiving data OSM needs to drop “Data Request” line (set it to “high impedance” mode). Data transfer will stop immediately in such case. For backward compatibility reason, no OSM is allowed to set “Data Request” line low (set it to GND or 0V).

Data Request line HIGH level:
The voltage range for HIGH level for Data Request line must be between 4,0 V. ($U_{DR\_1\_MIN}$ >= 4,0 V) and 5,5 V. ($U_{DR\_1\_MAX}$ <= 5,5 V).

Data Request line current consumption:
Depending on the voltage on the “Data Request” line, power consumption may vary between 4,0 mA ($I_{DR\_1\_MIN}$ >= 4,0 mA) and 10 mA ($I_{DR\_1\_MAX}$ <= 10 mA).

The Data Request line needs to be OVP protected. This OVP mechanism for Data Request line should be triggered at a level not lower than 5,9 V (± 100 mV). U_{OVP} = 5,9 V and will protect the interface against voltages up to 15 V.

5.7.2 “Data” line specification

Due to the use of optocouplers, the “Data” line must be designed as an OC (Open Collector) output, the “Data” line must be logically inverted.

“Data” line LOW level:
The voltage range for LOW level for Data line must be between 0 V ($U_{D\_0\_MIN}$ >= 0 V) and 1,0 V ($U_{D\_0\_MAX}$ <= 1,0 V).

“Data” line (while in LOW state) must be able to handle current up to and not exceeding 30 mA. ($I_{D\_0\_MAX}$ <= 30 mA).

From an OSM perspective, the maximum current flowing towards the “Data” line must not exceed 5 mA.

5.7.3 Addressing of the Metering System

Since a Metering System has only one P1 port, there is no need to address it.

5.8 P1 signal levels

		Requirement for the Meter			Requirement for OSM			
Symbol	**Description**	**Min**	**Typical**	**Max**	**Min**	**Typical**	**Max**	**Units**
U_{DR_1}	"Data request" line - HIGH level	-	-	5,5	4,0	5,0	5,5	V
I_{DR_1}	"Data request" line current	-	5	10	4	5	10	mA
U_{D_0}	"Data" line – LOW level	0	0,2	1	0	0,2	1	V
U_{D_1}	"Data" line – HIGH level	-	5,0	-	-	5,0	-	V
$I_{D\_0\_MAX}$	"Data" line max current	-	-	30	-	-	5	mA
U_L	"+5V" power supply – voltage	4,9	5	5,5	4,9	5	5,5	V
U_{RIPPLE_MAX}	"+5V" line maximum ripple voltage	-	-	100	-	-	100	mV
U_{NOISE_MAX}	"+5V" line- maximum noise	-	-	50	-	-	100	mV
V_{OVP}	OVP level ("+5V" and "Data request" lines)	5,8	5,9	15	-	-	-	V
I_{L_CONT}	"+5V" maximum continuous current	250	-	260	-	-	250	mA
I_{L_MAX}	"+5V" line overload protection trigger	260	-	300	-	-	-	mA
I_{SC}	"+5V" line Short Circuit current	-	-	50	-	-	-	mA

Table 2 P1 signal levels

Logical levels are specified as follows:
SPACE "0" usually > 4V
MARK "1" as < 1 V

6 Protocol description

The protocol is based on IEC 62056-21 Mode D. Data transfer is requested with request line and automatically initiated every second until request line is released. The information in the P1 telegram must be updated every second.

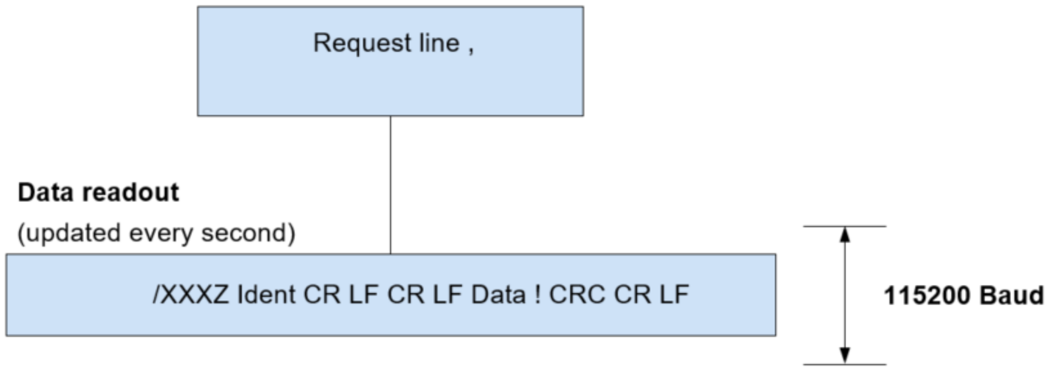

Figure 9: High level Protocol overview

6.1 Transfer speed and character formatting

The interface must use a fixed transfer speed of 115200 baud.

The Metering System must send its data to the OSM device every single second and the transmission of the entire P1 telegram must be completed within 1s.

The format of transmitted data must be defined as “8N1”. Namely:

- 1 start bit,
- 8 data bits,
- no parity bit and
- 1 stop bit.

Note:
This is not conforming to IEC 62056-21 Mode D.

6.2 Data readout

The Metering System transmits the data message, as described below, immediately following the activation through the Request signal.

/	X	X	X	5	Identification	CR	LF	CR	LF	Data	!	CRC	CR	LF

One of the COSEM object attribute values in the data blocks could be used for firmware updates or parameter update of a P1 device. Because of this it is not allowed to split the large data block (which can contain up to 1024 characters).

CRC is a CRC16 value calculated over the preceding characters in the data message (from “/” to “!” using the polynomial: x16+x15+x2+1). CRC16 uses no XOR in, no XOR out and is computed with least significant bit first. The value is represented as 4 hexadecimal characters (MSB first). XOR is a bit operation that results in true if and only if one of the inputs is true.

6.3 End of transmission

The data transmission is complete after the data message has been transmitted by the Metering System. An acknowledgement signal is not provided for.

7 Representation of COSEM objects in the P1 telegram

All functions and data elements of the E-meter are modelled by using object modelling techniques. The Blue book contains an extensive library of COSEM interface class definitions. These class definitions are the templates or 'blueprints' for the interface objects which together realize the 'functional data model' of the E-meter. See Blue book section 'Object modelling and data identification' for more information. For each interface class definition, a class identifier (class ID) is assigned and the set of attributes and methods are specified.

This chapter specifies how the COSEM objects are represented in the P1 telegram. In section 7.1 the representation of attribute values is specified. Section 7.2 specifies which attributes of COSEM objects of several class IDs are represented in the P1 telegram and how these attributes are formatted.

Chapter 8 defines which COSEM objects of the E-meter data model are published on the P1 telegram.

7.1 Representation of attribute values

The values stored in the attributes of the COSEM objects have a specified data type which fits to the purpose of the attribute (e.g. enumeration for status, or double-long-unsigned for measurement values). This section specifies for each data type how these values are represented in the P1 telegram. These representations are referred to as 'value formats'.

This specification is limited to the data types and value formats that are used in the current version of the P1 interface.

The following value formats are used in the P1 telegram:

Value Format	Legenda	Example
Fn(x,y)	F = indicator for floating decimal number n = total number of decimal digits x = minimum number of decimals behind the decimal point. y = maximum number of decimals behind the decimal point.	F7(3,3): YYYY.YYY F7(0,3): YYYY.YYY or YYYYY.YY or YYYYYY.Y or YYYYYYY
In	I = indicator for integer number n = maximum number of decimal digits. The minimum is 1.	Value 1 - I3: 1 Value 255 - I3: 255
Sn	S = indicator for alphanumeric string without ASCII code interpretation. n = number of characters.	S10: 482E313233
An	A = indicator for alphanumeric string with ASCII code interpretation.	A5: H.123
TST	TST = indicator for time stamp with format: YYMMDDhhmmssX Year, Month, Day, Hour, Minute, Second, and an indication whether DST is active (X=S) or DST is not active (X=W).	TST: 230704112259S
U	U = indicator of the unit of the measurement value. Possible values: kWh, kW, V, A, m3.	U: kWh
ID	ID = reduced OBIS Identifier. This is the OBIS code without value group F.	ID: 1-0:1.8.0
Z	Z = number of published entries. Represents the entries in use, but maximized to the maximum number of published entries, of a profile generic object.	Z: (3)

Table 3: Value formats used for COSEM attribute value representation in the P1 telegram

In the table below, the relation is established between the COSEM data type of the attributes, and the value format (= representation) of the value in the P1 telegram. The data type and tag refer to the COSEM data type and its tag, as specified in Blue book Table 2 – Common data types. For the E-meter developer, the data type, tag and value format are relevant for correct 'construction' of the P1 telegram from the COSEM data model in the E-meter. For the OSM developer, only the published value formats are relevant. COSEM attribute values with following data types are published in the P1 telegram with the following the value formats:

Data type	Tag	Value format(s)
double-long-unsigned (0…4 294 967 295)	6	Fn(x,y) or Z
octet-string	9	Sn, An, TST or ID. The value shall be compatible with the selected representation.
unsigned (0…255)	17	Fn(x,y)
long-unsigned (0…65535)	18	Fn(x,y)
enum (0…255)	22	In
scalar_unit_type (struct of scalar, unit)	2{15, 22}	U
array capture_object_definition (array of struct with class id, logical_name, attribute_index and data_index)	1{2{18,9,15,18}	(ID_1)..(ID_n)

Table 4 Value formats per data type of the COSEM attribute

Additional clarifications on the representation of data types are provided in the next sections.

7.1.1 Representation of COSEM data type octet-string

7.1.1.1 Representation with Sn

COSEM data type octet-string (tag 9) can be represented with Sn value format where octets are formatted with hexadecimal characters. Octet-string length is implicit. This representation does not impose restrictions on the value.

Note: An octet string with a length of m octets, will result in an Alphanumeric string Sn with a length of n, where n is 2 times m. In other words, the length in the value format Sn is the number of characters published in the P1 telegram. Each octet has 2 characters (0x23 is published as '23').

7.1.1.2 Representation with An

COSEM data type octet-string (tag 9) can be represented with value format An. In this case, the ASCII characters that correspond with the octet values are published. This representation is only possible if the octet values are in the range of ASCII codes.

An octet string with length n, will result in an Alphanumeric string An with length n. Example: A COSEM attribute with tag 9 (octet string), length 2 and content '0x31, 0x32' is on the P1 interface specified as A2 and is represented as '12'.

7.1.1.3 Representation with TST

Timestamps in COSEM are stored in attributes with COSEM tata type octet-string (tag 9). Their value format on the P1 interface is TST. This representation is only possible if the octet string contains a value that complies to the COSEM date-time format according to Blue book section 4.1.6.1, which is an octet string of 12 bytes. The DST indication is taken from the status byte.

7.1.1.4 Representation with ID

Logical names (= OBIS codes) are stored in attributes with COSEM data type octet-string (tag 9). Their value format on the P1 interface is ID, which is formatted as follows: A-B:C.D.E. In this reduced OBIS identifier, value group F is missing.

This representation is only possible if the octet string contains a value that complies to the logical name specification, which is an octet string with 6 bytes (one byte for value group A-F).

7.1.2 Representation of COSEM data type (double-)long-unsigned

For measurement values and thresholds, COSEM data type (double-)long-unsigned is represented as a floating point decimal, value format Fn(x,y). The total number of decimal digits is fixed by n. If x is smaller than y, the number decimal digits behind the point may vary depending on the attribute value. In this specification, x and y are always equal. Note that the number of decimals behind the decimal point may differ from the scalar of the corresponding COSEM attribute.

The attribute value of attribute 7 of the Profile Generic class has data type double-long-unsigned and is represented as Z, with Z a positive number indicating the number of buffer entries in use, maximized to the specified maximum number that can be published.

7.1.3 Representation of COSEM data type unsigned

COSEM data type double-long-unsigned is represented as a floating point decimal Fn(x,y). The total number of decimal digits is fixed by n. If x is smaller than y, the number decimal digits behind the point may vary depending on the attribute value. In this specification, x and y are always 0 for representations of values of data type unsigned. If the actual value needs less positions than n, leading zeros shall be inserted.

7.1.4 Representation of COSEM data type enum

COSEM data type enum is represented with value format In. Enum values are represented as integer values. The n defines the maximum number of decimals and shall correspond with the maximum attribute value. No leading zeros are published if the actual value needs less positions than the maximum value.

7.1.5 Representation of COSEM data type scalar_unit_type

The COSEM data type scalar_unit_type is a struct of a scalar and a unit. It is the data type of scalar-unit attributes of register objects that store measurement values. Only the unit part of this struct is included in the P1 telegram. Table 5 lists the units that are used in the current version of the P1 interface.

Note that for Active power and Active energy, the unit is preceded by a fixed scalar indicator. This is not the scalar taken from the attribute value.

Enum-unit-quantity from table 4 in Blue Book	Representation of the unit U in the P1 telegram
13 – Volume – m3	**m3**
27 – Active power – W	**kW**
30 – Active energy – Wh	**kWh**

Enum-unit-quantity from table 4 in Blue Book	Representation of the unit U in the P1 telegram
33 – Current – A	**A**
35 – Voltage - V	**V**

Table 5 Representation of units in P1 telegram

7.1.6 Representation of COSEM data type 'array capture_object_definition'

The data type 'array capture_object_definition' is the data type of the attribute capture objects of the Profile Generic class. This data type is an array of structs holding the class id, logical_name, attribute_index and data_index. The array elements define the sources of the buffered entries in the buffer attribute.

Only the logical_name struct-elements are included in the P1 telegram, as list of reduced OBIS codes, in the following formatting: $(ID_1)..(ID_n)$

7.2 Representation of COSEM objects

This section specifies per class ID which object attributes are published on the P1 interface and how these attributes are represented in the P1 telegram. This specification is limited to the class id's that are used in the current version of the P1 interface. Table 6 lists per class ID the attributes that are included in the P1 telegram.

Class ID	Attributes in P1 telegram
1 - Data	1 - logical_name 2 - value
3 - Register	1 - logical_name 2 - value
4 - Extended Register	1 - logical_name 2 - value 3 - scaler_unit 5 - capture_time
5 - Demand Register	1 - logical_name 2 - value 3 - scaler_unit
7 - Profile Generic	1 - logical_name 2 - buffer 3 - capture_objects 7 - entries_in_use
8 - Clock	1 - logical_name 2 - time
21 - Register Monitor	1 - logical_name 2 - thresholds 4 - scaler_unit of object referred to in attribute 3 (monitored_value) The monitored_value of a Register Monitor object that is published on the P1 interface is in this version of the P1 interface the value of a Demand Register (Class ID 5). As a consequence, the 'scaler_unit' is located in attribute 4 of the referred object.
70 - Disconnect Control	1 - logical_name 3 - control_state

Class ID	Attributes in P1 telegram
71 - Limiter	1 - logical_name 3 - threshold_active 4 - scaler_unit of object referred to in attribute 2 (monitored_value) The monitored_value of a Limiter object that is published on the P1 interface is in this version of the P1 interface the value of a Demand Register (Class ID 5). As a consequence, the 'scaler_unit' is located in attribute 4 of the referred object.
72 - M-Bus Client	1 - logical_name 9 - device_type

Table 6 Attributes in P1 telegram per class id

For each class ID, the following formatting of the attributes apply, with Mv a value with the applicable value format from Table 3.

7.2.1 Class ID 1 - Data

Formatting of objects of Class ID 1 - Data	
P1 telegram element:	**Source:**
ID(Mv) Example: 0-0:96.1.4 (50221)	ID: Attribute 1 (logical_name) Example: 0-0:96.1.4.255
	Mv: Attribute 2 (value) Example: 50221

7.2.2 Class ID 3 - Register

Formatting of objects of Class ID 3 - Register	
P1 telegram element:	**Source:**
ID(Mv*U) Example: 1-0:1.8.0(000123.456*kWh)	ID: Attribute 1 (logical_name) Example: 0-0:1.8.1.255
	Mv: Attribute 2 (value) Example: 000123456
	U: Unit part of attribute 3 (scaler_unit) Example: {0,30}

7.2.3 Class ID 4 - Extended Register

Formatting of objects of Class ID 4 – Extended Register	
P1 telegram element:	**Source:**
ID(TST)(Mv*U) Example: 0-2:24.2.3(200512134558S)(00872.234*m3)	ID: Attribute 1 (logical_name) Example: 0-2:24.2.3.255
	Mv: Attribute 2 (value) Example: 872234
	U: Unit part of attribute 3 (scaler_unit) Example: {0,30}

<table>
<tr><th colspan="2">Formatting of objects of Class ID 4 – Extended Register</th></tr>
<tr><th>P1 telegram element:</th><th>Source:</th></tr>
<tr><td></td><td>TST: Attribute 5 (capture_time)
Example: 200512134558S</td></tr>
</table>

7.2.4 Class ID 5 - Demand Register

<table>
<tr><th colspan="2">Formatting of objects of Class ID 5 – Demand Register</th></tr>
<tr><th>P1 telegram element:</th><th>Source:</th></tr>
<tr><td rowspan="3">ID(Mv*U)
Example: 1-0:1.24.0(00872.234*kW)</td><td>ID: Attribute 1 (logical_name)
Example: 0-2:24.2.3.255</td></tr>
<tr><td>Mv: Attribute 2 (current_average_value)
Example: 872234</td></tr>
<tr><td>U: Attribute 4 (scaler_unit)
Example: {0,27}</td></tr>
</table>

7.2.5 Class ID 7 – Profile Generic

<table>
<tr><th colspan="2">Formatting of objects of Class ID 7 – Profile Generic</th></tr>
<tr><th>P1 telegram element:</th><th>Source:</th></tr>
<tr><td rowspan="4">ID(Z)(ID$_1$)…(ID$_n$)(TST$_1$)(Mv$_{11}$*U$_{11}$)…(Mv$_{n1}$*U$_{n1}$)…(TST$_Z$)(Mv$_{1z}$*U$_{1z}$)…(Mv$_{nz}$*U$_{nz}$) with n the included capture objects and z the rows in the buffer.

Example: 1-0:99.1.0(2)(1-0:1.8.0)(1-0:2.8.0)(200512140000S)(000000.234kWh)(000000, 567)(200512134500S)(000000.123kWh)(000000, 456)</td><td>ID: Attribute 1 (logical_name)
Example: 1 0:99.1.0.255</td></tr>
<tr><td>ID$_{1..n}$: Attribute 3 (capture_objects)
Example:
{
{8,1-0:1.0.0.255,2,0}
{1,1-0:96.10.1.255,2,0}
{3,1-0:1.8.0.255,2,0}
{3,1-0:2.8.0.255,2,0}
}</td></tr>
<tr><td>(TST)(Mv*U): Attribute 2 (Buffer)
Example:
{
[200512140000S, 0x08, 234,567]
[200512134500S, 0x08, 123,456]
}
U: Unit part of attribute 3 (scalar unit) of the respective capture object in attribute 3 (capture objects)</td></tr>
<tr><td>Z: Attribute 7 (entries_in_use)
Example: 2</td></tr>
</table>

Notes:

- Only buffers with a clock and an AMR status byte in the capture objects can be published on the P1.
- The clock and AMR profile status are not included in the P1 telegram element that represent the capture objects.
- The AMR profile status is not included in the P1 telegram elements that represent the buffer entries.

- The maximum number of published entries is 15. If more entries are in use, the 15 most recent entries are published.

An additional example is given below, for the buffer with content of Table 7.

1-0:96.1.0(15)(1-0.1.8.1)(1-0:1.8.2)(200101044500W)(2000*kWh)(200*kWh)(200101043000W)(1900*kWh)(190*kWh)(200101041500W)(1800*kWh)(180*kWh)…….(200101011500W)(600*kWh)(60*kWh)

The example shows, that according to the specification, the Clock and AMR status are not listed in the set of identifiers and the AMR status is not included in the entries published on the P1 port.

		Buffer of 1-0:96.1.0.255			
		Clock 0-0:1.0.0.255	AMR-status 0-0:96.10.1.255	Value 1 1-0:1.8.1.255	Value 2 1-0:1.8.2.255
Entries	1	1/01/2020 4:45	0x08	2000	200
	2	1/01/2020 4:30	0x08	1900	190
	3	1/01/2020 4:15	0x08	1800	180
	4	1/01/2020 4:00	0x08	1700	170
	5	1/01/2020 3:45	0x08	1600	160
	6	1/01/2020 3:30	0x08	1500	150
	7	1/01/2020 3:15	0x08	1400	140
	8	1/01/2020 3:00	0x08	1300	130
	9	1/01/2020 2:45	0x08	1200	120
	10	1/01/2020 2:30	0x08	1100	110
	11	1/01/2020 2:15	0x08	1000	100
	12	1/01/2020 2:00	0x08	900	90
	13	1/01/2020 1:45	0x08	800	80
	14	1/01/2020 1:30	0x08	700	70
	15	1/01/2020 1:15	0x08	600	60
	16	1/01/2020 1:00	0x08	500	50
	17	1/01/2020 0:45	0x08	400	40
	18	1/01/2020 0:30	0x08	300	30
	19	1/01/2020 0:15	0x08	200	20
	20	1/01/2020 0:00	0x08	100	10

Table 7: Example time stamped buffer content of Profile Generic class (ClassID7)

7.2.6 Class ID 8 - Clock

Formatting of objects of Class ID 8 - Clock	
P1 telegram element:	**Source:**
ID(TST) Example: 0-0:1.0.0 (200512140000S)	ID: Attribute 1 (logical_name) Example: 0-0:1.0.0.255
	TST: Attribute 2 (time) Example: 200512140000S

7.2.7 Class ID 21 – Register Monitor

Formatting of objects of Class ID 21 – Register Monitor	
P1 telegram element:	**Source:**
ID(Mv*U) Example: 1-0:31.4.0(10,0*A)	ID: Attribute 1 (logical_name) Example: 0-0:31.4.0.255
	Mv: Attribute 2 (Thresholds) Example: 10,0

Formatting of objects of Class ID 21 – Register Monitor	
P1 telegram element:	**Source:**
	U: Unit part of attribute 4 (scaler_unit) of object referred to in Attribute 3 (monitored_value) Example: {-1,33}

7.2.8 Class ID 70 – Disconnect Control

Formatting of objects of Class ID 70 – Disconnect Control	
P1 telegram element:	**Source:**
ID(Mv) Example: 0-0:96.3.10(1)	ID: Attribute 1 (logical_name) Example: 0-0:96.3.10.255
	Mv: Attribute 3 (control_state) Example: 1

7.2.9 Class ID 71 - Limiter

Formatting of objects of Class ID 71 - Limiter	
P1 telegram element:	**Source:**
ID(Mv*U) Example: 0-0:17.0.0(2.300*kW)	ID: Attribute 1 (logical_name) Example: 0-0:17.0.0.255
	Mv: Attribute 3 (Threshold_active) Example: 2300
	U: Unit part of attribute 4 (scalar unit) of object referred to in attribute 2 (monitored_value) Example: {0,27}

7.2.10 Class ID 72 – M-Bus Client

Formatting of objects of Class ID 72 – M-Bus Client	
P1 telegram element:	**Source:**
ID(Mv) Example: 0-n:24.1.0(003)	ID: Attribute 1 (logical_name) Example: 0-n:24.1.0.255
	Mv: Attribute 9 (device_type) Example: 003

8 P1 telegram representation and data elements

This section specifies the data elements that are published on the Belgium P1 interface together with their reduced OBIS reference including attribute data type and Value Format.

The electricity meter sends the P1 telegram every second with updated information for the electricity meter related objects. For the M-Bus related objects, the information is updated every five minutes. This means that within an interval of five minutes, every second the same information is published for the M-Bus submeters.

A submeter is installed on an M-Bus channel on the electricity meter. Per channel number (n), a set of COSEM objects with measurement values and device related data (like equipment identifiers) is defined. The channel number is the value in value group B of the OBIS codes that relate to measurement values and device related data from the submeter.

The channel number (n) on which a submeter is installed, is only defined by the installation sequence of the submeter. A new submeter is installed on the first available empty channel. To support interpretation of device- and measurement data by the OSM, the Device-Type is published first to identify the medium (gas, water, etc).

Up to eight submeters can be installed on the electricity meter so the P1 telegram can contain information for up to eight submeters. The E-meter publishes only submeter data for channels that are occupied and for which the measurement data can be correctly decrypted.

Note that the number of objects published on the P1 telegram is not fixed. It depends on the device type of the electricity meter (polyphase or monophase) and the number of installed submeters. For electricity related objects, the values for L2 and L3 will only be available in a P1 telegram of a poly phase meter. The OBIS code reflecting the grid configuration is also only available on polyphase meters.

Note that order of OBIS codes is not fixed. The OSM must be able to interpret the OBIS Reduced ID codes and understand the representation. To support correct interpretation of the telegram content by an OSM, the E-meter shall publish the active P1 version (data element 'Version information'), as the first line of the telegram.

Every line (data element) of the P1 telegram ends with a CR/LF (Carriage Return / Line Feed).

8.1 General data elements

The table below lists the general data elements. These data elements are not related to any device.

Data element	OBIS Reduced ID	Attri-bute	Class ID	Tag	Value Format	Value unit	Additional information
Header	-	-	-	-	-	-	Manufacturer specific field.
Version information	0-0:96.1.4	2 Value	1 Data	9	A5	-	Encoded as DDDXY, where DDD is the 'DSMR-P1' version number and XY the major and minor version of the e-MUCs – P1 interface specification. Current version: 50221.
Date-time stamp of the P1 message	0-0:1.0.0	2 Time	8 Clock	9	TST	-	This timestamp originates from the E-meter clock. This clock is synchronized from the Head-end systems timeserver. The meter-clock is the reference for all time-related measurements.
Text message max. 1024 characters	0-0:96.13.0	2 Value	1 Data	9	Sn n= 0..2048	-	The text message shall not contain CR, LF (0A,0Dh) to split the message. If length is 0, the OBIS reduced ID shall be published followed by '()'.

Table 8: General data elements

8.2 Electricity meter related data elements

The table below lists the electricity meter related data elements.

Data element	OBIS Reduced ID	Attribute	Class ID	Tag	Value Format	Value unit	Additional information
Equipment identifier	0-0:96.1.1	2 Value	1 Data	9	S28	-	Equipment identifier of 14 characters according to DIN 43863-5.
Meter Reading Active energy import[1] (Tariff 1)	1-0:1.8.1	2 Value	3 Register	6	F9(3,3)	kWh	T1 = high/normal T2 = low
Meter Reading Active energy import[1] (Tariff 2)	1-0:1.8.2	2 Value	3 Register	6	F9(3,3)	kWh	T1 = high/normal T2 = low
Meter Reading Active energy export[2] (Tariff 1)	1-0:2.8.1	2 Value	3 Register	6	F9(3,3)	kWh	T1 = high/normal T2 = low
Meter Reading Active energy export[2] (Tariff 2)	1-0:2.8.2	2 Value	3 Register	6	F9(3,3)	kWh	T1 = high/normal T2 = low
Electricity tariff indicator	0-0:96.14.0	2 Value	1 Data	9	A4	-	0001, for high/normal 0002, for low
Instantaneous active power import[1] in 1 Watt resolution	1-0:1.7.0	2 Value	3 Register	6	F5(3,3)	kW	When there is simultaneous power consumption in one phase and power injection in another phase, the meter determines the net value (= algebraic sum of the energy in the 3 phases) and stores it in the appropriate single register (1.x.0 or 2.x.0).
Instantaneous active power export[2] in 1 Watt resolution	1-0:2.7.0	2 Value	3 Register	6	F5(3,3)	kW	When there is simultaneous power consumption in one phase and power injection in another phase, the meter determines the net value (= algebraic sum of the energy in the 3 phases) and stores it in the appropriate single register (1.x.0 or 2.x.0).

Instantaneous active power import[1] L1	1-0:21.7.0	2 Value	3 Register	6	F5(3,3)	kW	In case the polyphase meter is connected to a 3x230V grid, the power of L1 shall be the result of the power measurement by the meter configured in a two-wattmeter setup for power measurement (Aron connection) with L2 as reference.
Instantaneous active power import[1] L2	1-0:41.7.0	2 Value	3 Register	6	F5(3,3)	kW	In case the polyphase meter is connected to a 3x230V grid, the value is 0. In a 3x230V grid, the meter sensors are configured in a two-wattmeter setup for power measurement (Aron connection). L2 is the common connection/reference.
Instantaneous active power import[1] L3	1-0:61.7.0	2 Value	3 Register	6	F5(3,3)	kW	In case the polyphase meter is connected to a 3x230V grid, the power of L3 shall be the result of the power measurement by the meter configured in a two-wattmeter setup for power measurement (Aron connection) with L2 as reference.
Instantaneous active power export[2] L1	1-0:22.7.0	2 Value	3 Register	6	F5(3,3)	kW	In case the polyphase meter is connected to a 3x230V grid, the power of L1 shall be the result of the power measurement by the meter configured in a two-wattmeter setup for power measurement (Aron connection) with L2 as reference.
Instantaneous active power export[2] L2	1-0:42.7.0	2 Value	3 Register	6	F5(3,3)	kW	In case the polyphase meter is connected to a 3x230V grid, the value is 0. In a 3x230V grid, the meter sensors are configured in a two-wattmeter setup for power measurement (Aron connection). L2 is the common connection/reference.

Instantaneous active power export[2] L3	1-0:62.7.0	2 Value	3 Register	6	F5(3,3)	kW	In case the polyphase meter is connected to a 3x230V grid, the power of L3 shall be the result of the power measurement by the meter configured in a two-wattmeter setup for power measurement (Aron connection) with L2 as reference
Instantaneous voltage L1	1-0:32.7.0	2 Value	3 Register	18	F4(1,1)	V	
Instantaneous voltage L2	1-0:52.7.0	2 Value	3 Register	18	F4(1,1)	V	In case the polyphase meter is connected to a 3x230V grid, the value is 0. In a 3x230V grid, the meter sensors are configured in a two-wattmeter setup for power measurement (Aron connection). L2 is the common connection/reference.
Instantaneous voltage L3	1-0:72.7.0	2 Value	3 Register	18	F4(1,1)	V	
Instantaneous current L1	1-0:31.7.0	2 Value	3 Register	18	F5(2,2)	A	
Instantaneous current L2	1-0:51.7.0	2 Value	3 Register	18	F5(2,2)	A	
Instantaneous current L3	1-0:71.7.0	2 Value	3 Register	18	F5(2,2)	A	
Grid configuration	1-0:94.32.1	2 Value	1 Data	6	F3(0,0)	-	Provides the grid-configuration for the polyphase meter. In case the meter is connected to a 3x230V grid, the meter is configured in a two-wattmeter setup with L2 as common connection/reference (value = 230). In case the meter is connected to a 3N400V grid, the meter is configured in a three-wattmeter setup (value = 400)
Breaker state	0-0:96.3.10	3 control state	70 disconnector control	22	I1	-	0 = disconnected 1 = connected 2 = Ready for reconnection
Limiter threshold	0-0:17.0.0	3 Threshold active	71 Limiter	6	F5(3,3)	kW	0-99.998 = threshold 99.999 = deactivated

Fuse supervision threshold (L1)	1-0:31.4.0	2 Thresholds	21 Register Monitor	18	F5(2,2)	A	Only the fuse supervision threshold for phase 1 (L1) is published. In case of a polyphase meter, the same threshold is applicable for phase 2 and 3. 0-999.98 = threshold 999.99 = deactivated
Virtual relay x state	0-x:96.3.10	3 control state	70 disconnector control	22	I1	-	The virtual relay number is indicated with 'x' in the OBIS code. x = 1..4. 0 = disconnected 1 = connected
Current average demand active energy import	1-0:1.4.0	2 current average value	5 Demand Register	6	F5(3,3)	kW	
Maximum demand Active energy import of the current month	1-0:1.6.0	5 capture time	4 Extended register	9	TST	-	
		2 Value	4 Extended register	6	F5(3,3)	kW	
Maximum demand history (last 13 months)	0-0:98.1.0	2 Buffer-capture object 3 {4,1-0:1.6.0.255,5,0}	7 Profile Generic	9	TST	-	
		2 Buffer capture object 4 {4,1-0:1.6.0.255,2,0}	7 Profile Generic	6	F5(3,3)	kW	
EAN code	0-0:96.1.2	2 Value	1 Data	9	S36	-	All valid attribute values, including the default/uninitialized value, have 18 characters.

Table 9 Electricity related data elements

Note 1 Import means: delivered from grid to customer.
Note 2 Export means: delivered from customer to grid.

8.3 Gas meter related data elements

The table below lists the gas meter related data elements.

Data elements	OBIS Reduced ID[1]	Attribute	Class ID	Tag	Value Format	Value unit	Additional information
Device type	0-n:24.1.0	9 Device Type	72 M-Bus Client	17	F3(0,0)	-	Device type, as specified in OMS Volume 2 table 2, column 'Code'.
Equipment identifier	0-n:96.1.1	2 Value	1 Data	9	S28	-	Equipment identifier of 14 characters according to DIN 43863-5.
Last 5-minute value (not temperature corrected) volume and capture time	0-n:24.2.3	5 Capture Time	4 Extended Register	9	TST	-	For gas meters with a capacity up to 10 m3/h (G4 and G6), F8(3,3) is applicable. For gas meters with higher capacities F8(2,2) is applicable.
		2 Value	4 Extended Register	6	F8(2,2) /F8(3,3)	m3	
EAN code	0-n:96.1.2	2 Value	1 Data	9	S36	-	All valid attribute values, including the default/uninitialized value, have 18 characters.
Valve state	0-n:24.4.0	3 control state	70 Disconnector control	22	I1	-	0 = disconnected 1 = connected 2 = ready for reconnection

Table 10 Gas meter related data elements

Note 1: The value of n is the channel number on which the gas meter installed.

8.4 Water meter related data elements

The table below lists the water meter related data elements.

Data elements	OBIS Reduced ID[1]	Attribute	Class ID	Tag	Value Format	Value unit	Additional information
Device-Type	0-n:24.1.0	9 Device Type	72 M-Bus Client	17	F3(0,0)	-	Device type, as specified in OMS Volume 2 table 2, column 'Code'.
Equipment identifier	0-n:96.1.1	2 Value	1 Data	9	S28	-	Equipment identifier of 14 characters according to DIN 43863-5.
Last 5-minute volume and capture time	0-n:24.2.1	5 Capture Time	4 Extended Register	9	TST	-	Where n in the value format is the number of digits before the decimal point on the display of the meter + the required number of decimals.
		2 Value	4 Extended Register	6	F8(3,3)	m3	
EAN code	0-n:96.1.2	2 Value	1 Data	9	S36	-	All valid attribute values, including the default/uninitialized value, have 18 characters.

Table 11 Water meter related data elements

Note 1: The value of n is the channel number on which the water meter installed.

Abbreviations

Abbreviation	Meaning
CEMS	**Consumer energy management system**
COSEM	**Comprehensive Semantic Model for Energy Management**
CRC	**Cyclic Redundancy Check**
DIN	**Deutsches Institut für Normung**
DLMS	**Device Language Message Specification**
DSO	**Distribution System Operator**
DSMR	**Dutch Smart Meter Requirements**
DST	**Daylight Saving Time**
ESD	**Electro-static Discharge**
GND	**Ground**
HES	**Head End System**
IEC	**International Electrotechnical Committee**
EAN	**European Article Numbering**
eMUCS	**Extended Multi-Utility Companion Specification**
M-Bus	**Meter Bus**
MSB	**Most significant byte**
OBIS	**Object Identification System**
OMS	**Open Metering System**
OSM	**Other Service Module**
OVP	**Over Voltage Protection**
XOR	**Exclusive OR**

Table 12 Abbreviations

Appendices

A - References

This appendix lists all referenced standards and eMUCS documents.

A.1 - Standards

The following standards are referred to in this company specification. For undated references the latest edition applies.

Identification	Description	Author
IEC 62056-21	Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange	IEC
IEC 62056-61	Electricity metering - Data exchange for meter reading, tariff and load control – Part 61: OBIS Object Identification System	IEC
IEC 60747-5-5	Electrical Safety Standard	IEC
IEC 61000-4-2	Electromagnetic compatibility (EMC) Part 4-2: Testing and measurement techniques—Electrostatic discharge	IEC
IEC 61010	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use	IEC

Table 13 Normative references (copied from DSMR P1 v5.0.2)

Identification	Description	Author	Version
DIN 43863-5	Identification number for measuring devices applying for all manufacturers	DIN	2012
Blue book	DLMS UA 1000-1 'Blue Book'. COSEM Interface Classes and Object Identification system.	DLMS User Association	14
DSMR-P1	Dutch Smart Meter Requirements (DSMR) for the P1 port	Netbeheer Nederland	Ed. 5.0.2
OMS Volume 2	Open Metering System Specification, Generation 4, Volume 2 - Primary Communication.	OMS Group	Version 4.2.1

Table 14 Additional referenced standards

A.2 – eMUCS documents

The actual versions are listed in eMUCS-System Architecture.

Identification	Description	Author
eMUCS-A1	extended Multi-Utility Companion Specification of the P1 consumer interface	Fluvius
eMUCs-P1	extended Multi-Utility Companion Specification of the P1 consumer interface	Fluvius
eMUCS-System Architecture	extended Multi-Utility Companion Specification for System Architecture	Fluvius

Table 15 List of referenced eMUCS documents

B - Examples

B.1 - Single phase meter

Example of P1 telegram published by single phase meter with gas meter on channel 1 and water meter on channel 2.

```
/FLU5\253770234_A

0-0:96.1.4(50221)
0-0:96.1.1(3153414731313030303030323331)
0-0:96.1.2(353431343430303132333435363738393030)
0-0:1.0.0(200512145552S)
1-0:1.8.1(000000.915*kWh)
1-0:1.8.2(000001.955*kWh)
1-0:2.8.1(000000.000*kWh)
1-0:2.8.2(000000.030*kWh)
0-0:96.14.0(0001)
1-0:1.4.0(02.351*kW)
1-0:1.6.0(200509134558S)(02.589*kW)
0-
0:98.1.0(3)(1-0:1.6.0)(1-0:1.6.0)(200501000000S)(200423192538S)(03.695*kW)(
200401000000S)(200305122139S)(05.980*kW)(200301000000S)(200210035421W)(04.3
18*kW)
1-0:1.7.0(00.000*kW)
1-0:2.7.0(00.000*kW)
1-0:21.7.0(00.000*kW)
1-0:22.7.0(00.000*kW)
1-0:32.7.0(234.6*V)
1-0:31.7.0(000.00*A)
0-0:96.3.10(1)
0-0:17.0.0(99.999*kW)
1-0:31.4.0(999.99*A)
0-1:96.3.10(0)
0-2:96.3.10(0)
0-3:96.3.10(0)
0-4:96.3.10(0)
0-0:96.13.0()
0-1:24.1.0(003)
0-1:96.1.1(37464C4F32313139303333373333)
0-1:96.1.2(353431343430303132333435363738393030)
0-1:24.4.0(1)
0-1:24.2.3(200512134558S)(00112.384*m3)
0-2:24.1.0(007)
0-2:96.1.1(3853414731323334353637383930)
0-2:96.1.2(353431343430303132333435363738393033)
0-2:24.2.3(200512134558S)(00872.234*m3)

!XXX
```

B.2 - Polyphase meter

Example of P1 telegram published by polyphase meter with gas meter on channel 1 and water meter on channel 2.

```
/FLU5\253769484_A

0-0:96.1.4(50221)
1-0:94.32.1(400)
0-0:96.1.1(3153414733313031303231363035)
0-0:96.1.2(353431343430303132333435363738393030)
0-0:1.0.0(200512135409S)
1-0:1.8.1(000000.034*kWh)
1-0:1.8.2(000015.758*kWh)
1-0:2.8.1(000000.000*kWh)
1-0:2.8.2(000000.011*kWh)
0-0:96.14.0(0001)
1-0:1.4.0(02.351*kW)
1-0:1.6.0(200509134558S)(02.589*kW)
0-0:98.1.0(3)(1-0:1.6.0)(1-0:1.6.0)(200501000000S)(200423192538S)(03.695*kW
)(200401000000S)(200305122139S)(05.980*kW)(200301000000S)(200210035421W)(04
.318*kW)
1-0:1.7.0(00.000*kW)
1-0:2.7.0(00.000*kW)
1-0:21.7.0(00.000*kW)
1-0:41.7.0(00.000*kW)
1-0:61.7.0(00.000*kW)
1-0:22.7.0(00.000*kW)
1-0:42.7.0(00.000*kW)
1-0:62.7.0(00.000*kW)
1-0:32.7.0(234.7*V)
1-0:52.7.0(234.7*V)
1-0:72.7.0(234.7*V)
1-0:31.7.0(000.00*A)
1-0:51.7.0(000.00*A)
1-0:71.7.0(000.00*A)
0-0:96.3.10(1)
0-0:17.0.0(99.999*kW)
1-0:31.4.0(999.99*A)
0-1:96.3.10(0)
0-2:96.3.10(0)
0-3:96.3.10(0)
0-4:96.3.10(0)
0-0:96.13.0()
0-1:24.1.0(003)
0-1:96.1.1(37464C4F32313139303333373333)
0-1:96.1.2(353431343430303132333435363738393030)
0-1:24.4.0(1)
0-1:24.2.3(200512134558S)(00112.384*m3)
0-2:24.1.0(007)
0-2:96.1.1(3853414731323334353637383930)
0-2:96.1.2(353431343430303132333435363738393033)
0-2:24.2.3(200512134558S)(00872.234*m3)

!XXX
```