
P1 Companion Standard

Dutch Smart Meter Requirements

By order of: **Netbeheer Nederland**

Date: **September 1st, 2013**

Version: **4.0.6**

Status: **Final**

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1 INTRODUCTION

1.1 Scope

This document provides a companion standard for an Automatic Meter Reading (AMR) system for electricity, thermal (heat & cold), gas, water and hot water meters. The scope of this standard is the end-consumer (P1) interface for:

- Residential electricity meters
- Residential thermal (heat & cold) meters
- Residential gas meters and gas valve
- Residential water meters

This companion standard focuses on the P1 interface for gas, gas valve, thermal (heat / cold), and water meters. There is no separate interface for electricity meters since these meters are technically part of the metering system.

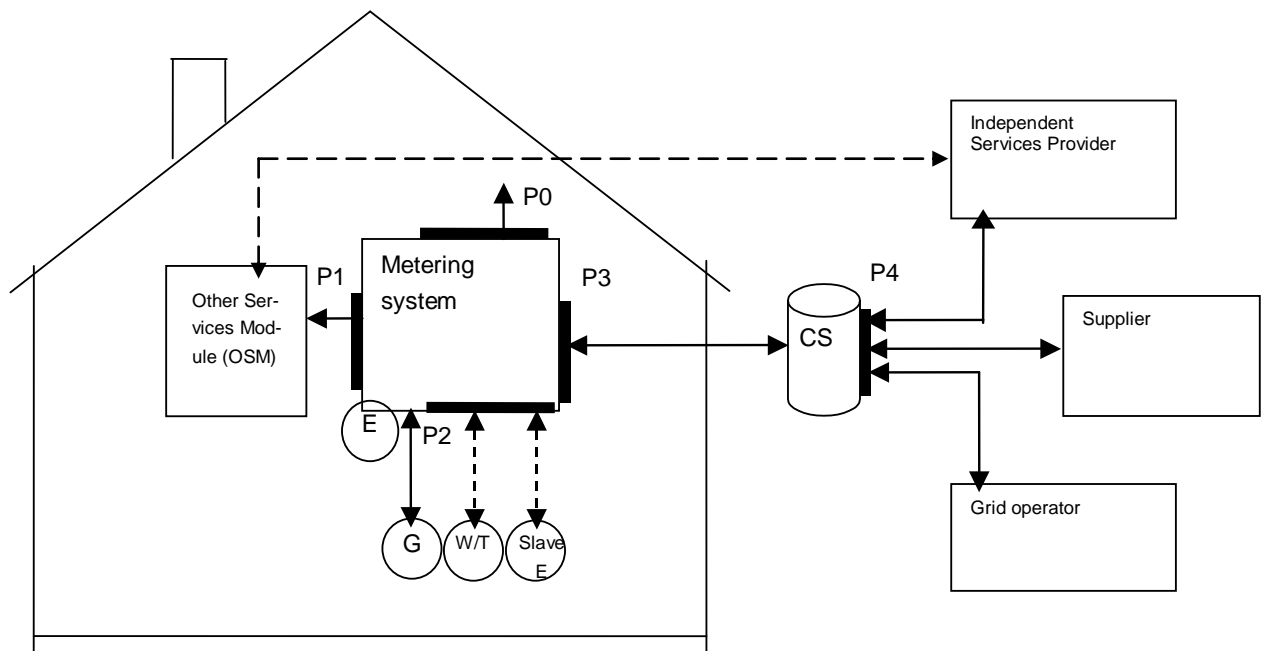


Figure 1. : Meter interfaces overview.

The goal of this companion standard is to reach an open, standardized protocol implementation and functional hardware requirements related to the communication between several types of Service Modules and a Metering System. Any specification in this standard is intended to encourage suppliers to develop their hardware and software in a common direction. Standardised protocols and hardware specifications are referred to as much as possible.

This companion standard is the result of a combined effort of the major Dutch grid operators.

2 SYSTEM ARCHITECTURE

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 interface is based on NEN-EN-IEC 62056-21 (Electrical metering-Data exchange for meter reading, tariff and load control – Part 21: direct local data exchange, 2002-05).

Functional and technical requirements are given in the NTA 8130 document. This companion standard holds physical characteristics and protocol definitions for the interface.

3 NORMATIVE REFERENCES

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

| Ref.No. | Document | Description |
|---------|------------------|--|
| 1. | IEC 62056-21 | Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange |
| 2. | IEC 62056-61 | Electricity metering - Data exchange for meter reading, tariff and load control – Part 61: OBIS Object Identification System |
| 3. | NTA 8130 NL:2007 | Basisfuncties voor de meetinrichting voor elektriciteit, gas en thermische energie voor kleinverbruikers |
| 4. | DSMR 4.0.6 | Dutch Smart Meter Requirements Version 4.0.6 |
| 5. | AmvB | Algemene maatregel van Bestuur “Besluit op afstand uitleesbare meet- inrichtingen” |

Table 3-1: Normative References

4 PHYSICAL INTERFACE CHARACTERISTICS

The interface must be energy efficient and protected against fraud, OVP and ESD.

4.1 Galvanic Isolation

To protect the Metering System against reversed connection and over-voltage, and to lower the possibility of influencing the Metering System through the P1 port, the data lines of the P1 port will be equipped with an opto-coupler.

The opto-coupler must adhere to the relevant legislation and standards for measuring equipment. . The power lines are galvanically isolated from the power supply that powers the other parts of the meter.

4.2 Power supply

The power supply for the P1 port shall be able to withstand short circuits. Manipulation of the power supply lines shall never influence any other part of the meter,

When no device is connected through the P1 port, the power consumption of the P1 circuitry shall not be included in the register values. When a device is connected to the P1 port, the power consumption of the P1 circuitry shall be included in the register values. The P1 port will function and supply power independent of the state of the E breaker.

The power supply will supply a maximum current of 100 mA at 5 Volt. Overload protection shall be implemented as a current limiting mechanism.

4.3 Connection

To ensure a safe, stable solution the data connection will consist of three wires: one request signal, one data signal and signal ground. Activating the port is by activating (raising) the request signal (5V). While receiving data the requesting Service Module will keep the request port activated (raised).

Dropping the request line by connecting to ground is not allowed, to prevent short circuit.

Modulating the request signal is not allowed. Data transfer will stop immediately after the request signal is dropped.

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

More than one system can be connected to the measuring device, each system can request data input and all systems will receive the same data sent by the measuring device.

The power supply lines shall be isolated from the data connection.

4.4 Addressing the measuring device

Since a measuring device will have no more than one P1 port, there is no need to address it. The P1 port must be able to handle up to 5 connected P1 devices, and such P1 devices must be able to handle partial messages. The meter has only one P1 port, connecting more

devices will need a hub. The hub is outside the scope of the P1 document, but a basic schematic is shown in Appendix I.

4.5 Measuring device transfer time

The measuring device must complete a data transfer to the P1 device within eight seconds, because the data has to be sent by the P1 port to the P1 device every ten seconds. This means at a minimum there is a pause of two seconds between messages.

4.6 Signals

All signals are compliant with following levels (different from the NTA8130!) Operating range per (P1) device as seen from the meter:

| Symbol | Parameter | Meter | | | OSM | | | Units |
|------------|--|-------|-----|-----|-----|-----|-----|-------|
| | | Min | Typ | Max | Min | Typ | Max | |
| Vi request | Request voltage | | | | 4 | 5 | 5.5 | V |
| Ii request | Current supplied to the request pin | | | | 4 | 5 | 10 | mA |
| Vol data | Low level output voltage of the Data pin | | | 1 | | | | V |
| Ii data | Input current sinked, supplied by the Data pin per OSM | | 5 | 6 | | | | mA |

Table 4-1: Signal Levels

Limit values:

Max Voltage: opto coupler: 15V, driver 6V

Max current sink (data output) : max = 30mA

Logical levels are specified as follows:

SPACE "0" as > 4V

MARK "1" as < 1 V

4.7 Physical connector

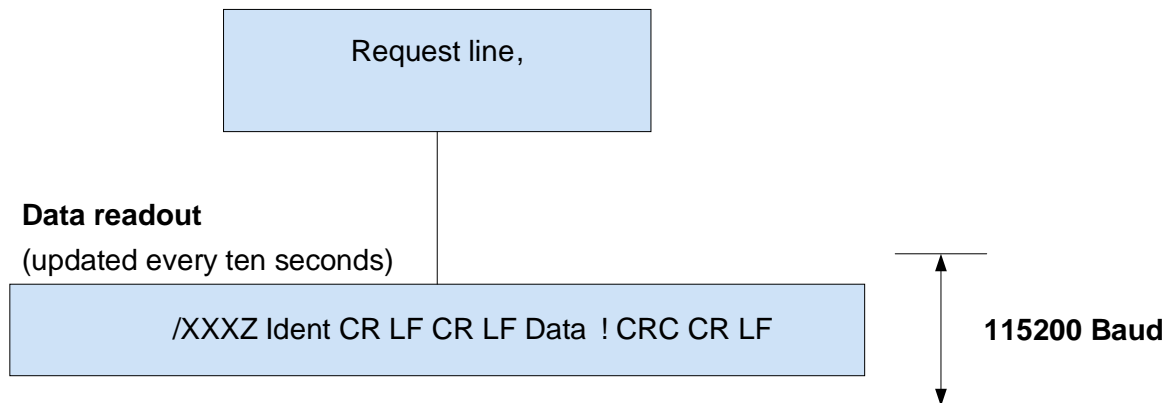
The connector type is RJ11. The Metering System holds a female connector, the customer can plug in a standard RJ11 plug. Note that the connector in the metering system is physically accessible at all times and should not be sealed or protected by a sealed cover.

| Pin # | Signal name | Description |
|-------|-------------|---------------|
| 1 | + 5V | Power supply |
| 2 | Request | Input |
| 3 | Data GND | Ground |
| 4 | N.C. | Not Connected |
| 5 | Data | Output |
| 6 | Power GND | Power supply |

Table 4-2: Physical Connector

5 PROTOCOL DESCRIPTION

The protocol is based on NEN-EN-IEC 62056-21 Mode D. Data transfer is requested with request line and automatically initiated every ten seconds until request line is released.



5.1 Transfer speed and character formatting

The interface will use a fixed transfer speed of 115200 baud. For character formatting a start bit, 8 data bits, no parity bit and a stop bit are used (8N1). Note this is not conforming to EN-IEC 62056-21 Mode D.

5.2 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: $x^{16}+x^{15}+x^2+1$). 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).

5.3 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.

5.4 Representation of COSEM objects

IEC 62056-61 [2] specifies the logical names of COSEM objects using OBIS, the Object Identification System. Value group F is not used. The following Value Formats are used for P1 Data Readout value representations:

| Value Format | Format/Example | Meaning |
|--------------|--|---|
| Fn(x,y) | F7(3,3) – YYYY.YYY | Floating decimal number with a fixed number of decimals behind the decimal point (in this case 3) |
| Fn(x,y) | F7(0,3) – YYYY.YYY or YYYYYY.YY or YYYYYYY.Y or YYYYYYYY | Floating decimal number with a variable number of decimals behind the decimal point (with a maximum of 3) |
| In | I4 - YYYY | Integer number |
| Sn | S6 - CCCCCC | Alphanumeric string |
| TST | YYMMDDhhmmssX | ASCII presentation of Time stamp with Year, Month, Day, Hour, Minute, Second, and an indication whether DST is active (X=S) or DST is not active (X=W). |

Note: n is the number of characters in the string.

Table 5-1: Value Formats

COSEM object attribute values are using the following Value Formats:

| COSEM Data Type | Tag | Value Format |
|----------------------|-----|--------------|
| null-data | 0 | Empty |
| boolean | 3 | I1 |
| bit-string | 4 | Sn |
| double-long | 5 | Fn(x,y) |
| double-long-unsigned | 6 | Fn(x,y) |
| floating-point | 7 | Fn(x,y) |
| octet-string | 9 | Sn |
| visible-string | 10 | Sn |
| bcd | 13 | S2 |
| integer | 15 | In |
| long | 16 | Fn(x,y) |
| unsigned | 17 | Fn(x,y) |
| long-unsigned | 18 | Fn(x,y) |
| long64 | 20 | Fn(x,y) |
| long64-unsigned | 21 | Fn(x,y) |
| enum | 22 | In |
| float-32 | 23 | Fn(x,y), I |
| float-64 | 24 | Fn(x,y), I |

Table 5-2: Cossem Object Attributes

5.5 Representation of COSEM Data Type octet-string (tag 9)

COSEM Data Type octet-string is represented with Sn format where octets are formatted with hexadecimal characters. Octet-string length is implicit.

(XXXX..XX)

1) 2) 3)

- 1) XX Hexadecimal characters for first octet
- 2) XX Hexadecimal characters for second octet
- 3) XX Hexadecimal characters for m-th octet (m is octet-string length).

Note: An octet string or bit string with a length of m, will result in a Alphanumeric string Sn with a length of n, where n is 2 times m

5.6 Representation of COSEM Data Type bit-string (tag 4)

COSEM Data Type bit-string is represented with Sn format where bit-string is formatted with hexadecimal characters. First two hexadecimal characters represent number of unused bits in bit-string. The remaining hexadecimal characters represent bit-string bit values. Bit-string length is implicit.

(XXXX..XX)

1) 2) 3)

- 1) XX Hexadecimal characters for first octet (number of unused bits)
- 2) XX Hexadecimal characters for second octet (first 8 bits)
- 3) XX Hexadecimal characters for m-th octet (last 8 -number of unused bits).

Note: An octet string or bit string with a length of m, will result in a Alphanumeric string Sn with a length of n, where n is 2 times m

5.7 Representation of COSEM Data Type boolean

COSEM Data Type boolean is represented with I1 format where value false is represented as 0 and value true as 1.

5.8 Representation of COSEM Data Type enum

COSEM Data Type enum is represented with In format where enum values are represented as integer values.

5.9 Representation of COSEM objects

COSEM objects identified with OBIS Reduced ID use the following Dataset formatting for representation:

| | |
|----|--------|
| ID | (Mv*U) |
|----|--------|

1) 2)3) 4)5)

- 1) OBIS Reduced ID-code
- 2) Separator “(”, ASCII 28_h
- 3) COSEM object attribute value
- 4) Unit of measurement values (Unit of capture objects attribute) – only if applicable
- 5) Separator “)”, ASCII 29_h

5.10 Representation of M-Bus values

COSEM Profile Generic objects identified with OBIS Reduced ID use the following Dataset formatting for representation.

| | | |
|----|-------|----------|
| ID | (TST) | (Mv1*U1) |
|----|-------|----------|

1) 2) 3) 4)

- 1) OBIS Reduced ID-code
- 2) Time Stamp (TST) of capture time of measurement value
- 3) Measurement value 1 (most recent entry of buffer attribute without unit)
- 4) Unit of measurement values (Unit of capture objects attribute)

5.11 Representation of Profile Generic – Power failure logs

COSEM Profile Generic objects identified with OBIS Reduced ID use the following Dataset formatting for representation.

| | | | | | | |
|----|-----|-------|-------|----------|-------|----------|
| ID | (z) | (ID1) | (TST) | (Bv1*U1) | (TST) | (Bvz*Uz) |
|----|-----|-------|-------|----------|-------|----------|

1) 2) 3) 4) 5) 6) 7) 8) 9)

- 1) OBIS Reduced ID-code
- 2) Number of values z (max 10).
- 3) Identifications of buffer values (OBIS Reduced ID codes of capture objects attribute)

- 4) Time Stamp (TST) of power failure end time
- 5) Buffer value 1 (most recent entry of buffer attribute without unit)
- 6) Unit of buffer values (Unit of capture objects attribute)
- 7) Time Stamp (TST) of power failure end time
- 8) Buffer value 2 (oldest entry of buffer attribute without unit)
- 9) Unit of buffer values (Unit of capture objects attribute)

5.12 Representation of P1 telegram

The following table holds data objects represented with P1 Interface together with OBIS reference including object Attribute and Value Format for Reduced ID codes.

Every line (except the last one) is ended with a CR/LF (Carriage Return / Line Feed).

Note:

The OBIS reference Channel number (n) will be defined by the installing order of the M-Bus devices. So for example a Gas meter can be installed on channel 1, 2, 3 or 4. For that reason the Device-Type is sent first to identify the medium on P1. A slave E-meter can also be an M-Bus device.

Only when a M-Bus device is installed, its data will be exported on the P1 interface.

| Value | OBIS reference | Attribute | Class ID | Value Format | Value Unit |
|---|----------------|------------|---------------|-----------------------|---------------|
| Header information | - | - | - | Manufacturer specific | |
| Version information for P1 output | 1-3:0.2.8.255 | 2 | 1 Data | S2, tag 9 | |
| Date-time stamp of the P1 message | 0-0:1.0.0.255 | 2 | 8 | TST | YYMMDDhhmmssX |
| Equipment identifier | 0-0:96.1.1.255 | 2 Value | 1 Data | Sn (n=0..96), tag 9 | |
| Meter Reading electricity delivered to client (Tariff 1) in 0,001 kWh | 1-0:1.8.1.255 | 2 Value | 3 Register | F9(3,3), tag 6 | kWh |
| Meter Reading electricity delivered to client (Tariff 2) in 0,001 kWh | 1-0:1.8.2.255 | 2 Value | 3 Register | F9(3,3), tag 6 | kWh |
| Meter Reading electricity delivered by client (Tariff 1) in 0,001 kWh | 1-0:2.8.1.255 | 2 Value | 3 Register | F9(3,3), tag 6 | kWh |
| Meter Reading electricity delivered | 1-0:2.8.2.255 | 2 Value | 3 Register | F9(3,3), tag 6 | kWh |

| Value | OBIS reference | Attribute | Class ID | Value Format | Value Unit |
|---|-----------------|-----------------------|----------------------------|---|---|
| by client (Tariff 2) in 0,001 kWh | | | | | |
| Tariff indicator electricity. The tariff indicator can also be used to switch tariff dependent loads e.g boilers. This is the responsibility of the P1 user | 0-0:96.14.0.255 | 2 Value | 1 Data | S4, tag 9 | |
| Actual electricity power delivered (+P) in 1 Watt resolution | 1-0:1.7.0.255 | 2 Value | 3 Register | F5(3,3), tag 18 | kW |
| Actual electricity power received (-P) in 1 Watt resolution | 1-0:2.7.0.255 | 2 Value | 3 Register | F5(3,3), tag 18 | kW |
| The actual threshold Electricity in kW | 0-0:17.0.0.255 | 3 Threshold active | 71 Limiter Class | F4(1,1), tag 18 | kW |
| Switch position Electricity (in/out/enabled). | 0-0:96.3.10.255 | 3 Control State | 70 Disconnector Control | I1, tag 22 | |
| Number of power failures in any phase | 0-0:96.7.21.255 | 2 Value | 1 Data | F5(0,0), tag 18 | |
| Number of long power failures in any phase | 0-0:96.7.9.255 | 2 Value | 1 Data | F5(0,0), tag 18 | |
| Power Failure Event Log (long power failures) | 1-0:99.97.0.255 | 2 Buffer | 7 Profile Generic | TST, F10(0,0) - tag 6 Format applicable for the value within the log (OBIS code 0-0:96.7.19.255) | Timestamp (end of failure) –duration in seconds |
| Number of voltage sags in phase L1 | 1-0:32.32.0.255 | 2 Value | 1 Data | F5(0,0), tag 18 | |
| Number of voltage sags in phase L2 (polyphase meters only) | 1-0:52.32.0.255 | 2 Value | 1 Data | F5(0,0), tag 18 | |

| Value | OBIS reference | Attribute | Class ID | Value Format | Value Unit |
|--|-----------------|------------------|--------------------|-----------------------|------------|
| Number of voltage sags in phase L3 (polyphase meters only) | 1-0:72:32.0.255 | 2 Value | 1 Data | F5(0,0), tag 18 | |
| Number of voltage swells in phase L1 | 1-0:32:36.0.255 | 2 Value | 1 Data | F5(0,0), tag 18 | |
| Number of voltage swells in phase L2 (polyphase meters only) | 1-0:52:36.0.255 | 2 Value | 1 Data | F5(0,0), tag 18 | |
| Number of voltage swells in phase L3 (polyphase meters only) | 1-0:72:36.0.255 | 2 Value | 1 Data | F5(0,0), tag 18 | |
| Text message codes: numeric 8 digits | 0-0:96:13.1.255 | 2 Value | 1 Data | Sn (n=0..16),, tag 9 | |
| Text message max 1024 characters. | 0-0:96:13.0.255 | 2 Value | 1 Data | Sn (n=0..2048), tag 9 | |
| Device-Type | 0-n:24.1.0.255 | 9 Device type | 72 M-Bus client | F3(0,0), tag 17 | |
| Instantaneous current L1 in A resolution. | 1-0:31.7.0.255 | 2 Value | 3 Register | F3(0,0), tag 18 | A |
| Instantaneous current L2 in A resolution. | 1-0:51.7.0.255 | 2 Value | 3 Register | F3(0,0), tag 18 | A |
| Instantaneous current L3 in A resolution. | 1-0:71.7.0.255 | 2 Value | 3 Register | F3(0,0), tag 18 | A |
| Instantaneous active power L1 (+P) in W resolution | 1-0:21.7.0.255 | 2 Value | 3 Register | F5(3,3), tag 18 | kW |
| Instantaneous active power L2 (+P) in W resolution | 1-0:41.7.0.255 | 2 Value | 3 Register | F5(3,3), tag 18 | kW |
| Instantaneous active power L3 (+P) in W resolution | 1-0:61.7.0.255 | 2 Value | 3 Register | F5(3,3), tag 18 | kW |
| Instantaneous active power L1 (-P) in W resolution | 1-0:22.7.0.255 | 2 Value | 3 Register | F5(3,3), tag 18 | kW |

| Value | OBIS reference | Attribute | Class ID | Value Format | Value Unit |
|---|----------------|--------------------|--------------------------|--------------------------------------|----------------|
| Instantaneous active power L2 (-P) in W resolution | 1-0:42.7.0.255 | 2 Value | 3 Register | F5(3,3), tag 18 | kW |
| Instantaneous active power L3 (-P) in W resolution | 1-0:62.7.0.255 | 2 Value | 3 Register | F5(3,3), tag 18 | kW |
| Device-Type | 0-n:24.1.0.255 | 9 Device type | 72 M-Bus client | F3(0,0), tag 17 | |
| Equipment identifier (Gas) | 0-n:96.1.0.255 | 2 Value | 1 Data | Sn (n=0..96), tag 9 | |
| Last hourly value (temperature converted), gas delivered to client in m3, including decimal values and capture time | 0-n:24.2.1.255 | 5 Capture time | 4 Extended Register | TST | |
| | 0-n:24.2.1.255 | 2 Value | 4 Extended Register | F8(2,2)/F8(3,3), tag 18 (See note 2) | m ³ |
| Valve position Gas (on/off/released). (See Note 3) | 0-n:24.4.0.255 | 3 Control state | 70 Disconnect Control | I1, tag 22 | |
| | | | | | |
| Equipment identifier (Thermal: Heat or Cold) | 0-n:96.1.0.255 | 2 Value | 1 Data | Sn (n=0..96), tag 9 | |
| Last hourly Meter reading Heat or Cold in 0,01 GJ and capture time | 0-n:24.2.1.255 | 5 Capture time | 4 Extended Register | TST | |
| | 0-n:24.2.1.255 | 2 Value | 4 Extended Register | Fn(2,2) (See note 1) | GJ |
| Valve position (on/off/released). (See Note 3) | 0-n:24.4.0.255 | 3 Control state | 70 Disconnect Control | I1, tag 22 | |
| Device-Type | 0-n:24.1.0.255 | 9 Device type | 72 M-Bus client | F3(0,0), tag 17 | |
| Equipment identifier (Water) | 0-n:96.1.0.255 | 2 Value | 1 Data | Sn (n=0..96), tag 9 | |
| Last hourly Meter | 0-n:24.2.1.255 | 5 | 4 | TST | |

| Value | OBIS reference | Attribute | Class ID | Value Format | Value Unit |
|---|----------------|-----------------|-----------------------|-------------------------|------------|
| reading in 0,001 m3 and capture time | | Capture time | Extended Register | | |
| | 0-n:24.2.1.255 | 2 Value | 4 Extended Register | Fn(3,3) (See Note 1) | m3 |
| Valve position (on/off/released). (See Note 3) | 0-n:24.4.0.255 | 3 Control state | 70 Disconnect Control | I1, tag 22 | |
| Device-Type | 0-n:24.1.0.255 | 9 Device type | 72 M-Bus client | F3(0,0), tag 17 | |
| Equipment identifier | 0-n:96.1.0.255 | 2 Value | 1 Data | Sn (n=0..96), tag 9 | |
| Last hourly Meter reading and capture time (e.g. slave E meter) | 0-n:24.2.1.255 | 5 Capture time | 4 Extended Register | TST | |
| | 0-n:24.2.1.255 | 2 Value | 4 Extended Register | Fn(3,3) (See Note 1) | kWh |
| Valve/Switch position (on/off/released). (See Note 3) | 0-n:24.4.0.255 | 3 Control state | 70 Disconnect Control | I1, tag 22 | |

Table 5-3: P1 Telegram Representation

Note 1: Where n is the number of digits before the decimal point on the display of the meter + the required number of decimals. So for example if on the physical display of a Heat meter is shown 1234 GJ (without decimals) the n=6 and the format of the P1 output will be 1234,56 GJ.

Note 2: 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.

Note 3: Valve position only applicable when present.

5.13 Example P1 telegram

The following table shows an example of the P1 telegram which is in accordance to IEC 62056-21 Mode D.

Be aware of the fact that the number of OBIS codes and the order of OBIS codes is not fixed. The P1 device must be able to interpret the OBIS codes and understand the representation.

For example: depending on installation, the OBIS codes for a heat/cold meter might be sent before the OBIS codes of a Gas meter.

The example telegram below is based on:

- DSMR version 4.0 (value 40 behind OBIS code 1-3:0.2.8.255)
- It is send at 2010, December 9th, 11h30m20s
- Gas value of 2010, December 9th, 11:00h is presented
- Standard message is in this case 01 61 81
- Limiter value is 16.1 kW
- 4 power failures in any phase
- 2 long power failure in any phase
- Power Failure Event log:
 - Failure at 2010, December 8th, 15h20m15s, duration 240 seconds
 - Failure at 2010, December 8th, 15h05m03s, duration 301 seconds
- 2 voltage sags in phase L1
- 1 voltage sag in phase L2 (polyphase meters only)
- 0 voltage sags in phase L3 (polyphase meters only)
- 0 voltage swells in phase L1
- 3 voltage swells in phase L2 (polyphase meters only)
- 0 voltage swells in phase L3 (polyphase meters only)
- Only one M-Bus device (in this case a Gas meter with a valve) is connected to the Electricity meter. The register value of the Gas meter is 12785,123 m³. This value is captured by the G meter at 2010, December 9th, at 11h00m00s Wintertime.
- Instantaneous current per phase
- Instantaneous active power (+P) per phase
- Instantaneous active power (-P) per phase

```
/ISk5\2MT382-1000
```

```
1-3:0.2.8(40)
0-0:1.0.0(101209113020W)
0-0:96.1.1(4B384547303034303436333935353037)
1-0:1.8.1(123456.789*kWh)
1-0:1.8.2(123456.789*kWh)
1-0:2.8.1(123456.789*kWh)
1-0:2.8.2(123456.789*kWh)
0-0:96.14.0(0002)
1-0:1.7.0(01.193*kW)
1-0:2.7.0(00.000*kW)
0-0:17.0.0(016.1*kW)
0-0:96.3.10(1)
0-0:96.7.21(00004)
0-0:96.7.9(00002)
1-0:99.97.0(2)(0-0:96.7.19)(101208152415W)(0000000240*s)(101208151004W)(0000000301*s)
1-0:32.32.0(00002)
1-0:52.32.0(00001)
```


| | | |
|------------|--|------------------|
| File name: | Dutch Smart Meter Requirements v4.0.6 Final P1.doc | Date: 01-09-2013 |
| Author: | Netbeheer Nederland | |
| Version: | 4.0.6 Final | |

6 DATA OBJECTS

Data Objects are defined in NEN-EN-IEC 62056-61:2002 Electricity metering – Data exchange for meter reading, tariff and load control – Part 61: OBIS Object Identification System. The following tables hold data objects and references to the OBIS. Note that this table assumes two tariffs. Currently two tariffs (Rate 1 low tariff and Rate 2 normal/high tariff) are defined, support for up to sixteen tariffs should be included.

6.1 Electricity data

Electricity –P1 transfers every ten seconds

| Value | OBIS reference | NTA Use Case reference |
|--|-----------------|---|
| Equipment identifier | 0-0:96.1.1.255 | Use case 3: Provide actual meter reads through P1 Use case 5: Provide equipment status to P1 |
| Meter Reading electricity delivered to client (low tariff) in 0,001 kWh | 1-0:1.8.1.255 | Use case 3: Provide actual meter reads through P1 |
| Meter Reading electricity delivered to client (normal tariff) in 0,001 kWh | 1-0:1.8.2.255 | Use case 3: Provide actual meter reads through P1 |
| Meter Reading electricity delivered by client (low tariff) in 0,001 kWh | 1-0:2.8.1.255 | Use case 3: Provide actual meter reads through P1 |
| Meter Reading electricity delivered by client (normal tariff) in 0,001 kWh | 1-0:2.8.2.255 | Use case 3: Provide actual meter reads through P1 |
| Tariff indicator electricity. The tariff indicator can be used to switch tariff dependent loads e.g boilers. This is responsibility of the P1 user | 0-0:96.14.0.255 | Use case 5: Provide equipment status to P1 |
| Actual electricity power delivered (+P) in 1 Watt resolution | 1-0:1.7.0.255 | Use case 3: Provide actual meter reads through P1 |
| Actual electricity power received (-P) in 1 Watt resolution | 1-0:2.7.0.255 | Use case 3: Provide actual meter reads through P1 |
| The actual threshold Electricity in kW | 0-0:17.0.0.255 | Use case 5: Provide equipment status to P1 |
| Switch position Electricity (in/out/enabled). | 0-0:96.3.10.255 | Use case 5: Provide equipment status to P1 |
| Number of power failures in any phases | 0-0:96.7.21.255 | Use case 7: Provide power quality information to P1 |
| Number of long power failures in any phases | 0-0:96.7. 9.255 | Use case 7: Provide power quality information to P1 |
| Power failure event log | 1-0:99:97.0.255 | Use case 7: Provide power |

| Value | OBIS reference | NTA Use Case reference |
|--|-----------------|---|
| | | quality information to P1 |
| Number of voltage sags in phase L1 | 1-0:32.32.0.255 | Use case 7: Provide power quality information to P1 |
| Number of voltage sags in phase L2 (polyphase meters only) | 1-0:52.32.0.255 | Use case 7: Provide power quality information to P1 |
| Number of voltage sags in phase L2 (polyphase meters only) | 1-0:72.32.0.255 | Use case 7: Provide power quality information to P1 |
| Number of voltage swells in phase L1 | 1-0:32.36.0.255 | Use case 7: Provide power quality information to P1 |
| Number of voltage swells in phase L2 (polyphase meters only) | 1-0:52.36.0.255 | Use case 7: Provide power quality information to P1 |
| Number of voltage swells in phase L3 (polyphase meters only) | 1-0:72.36.0.255 | Use case 7: Provide power quality information to P1 |
| Instantaneous current L1 | 1-0:31.7.0.255 | Use case 3: Provide actual meter reads through P1 |
| Instantaneous current L2 | 1-0:51.7.0.255 | Use case 3: Provide actual meter reads through P1 |
| Instantaneous current L3 | 1-0:71.7.0.255 | Use case 3: Provide actual meter reads through P1 |
| Instantaneous active power L1 (+P) | 1-0:21.7.0.255 | Use case 3: Provide actual meter reads through P1 |
| Instantaneous active power L2 (+P) | 1-0:41.7.0.255 | Use case 3: Provide actual meter reads through P1 |
| Instantaneous active power L3 (+P) | 1-0:61.7.0.255 | Use case 3: Provide actual meter reads through P1 |
| Instantaneous active power L1 (-P) | 1-0:22.7.0.255 | Use case 3: Provide actual meter reads through P1 |
| Instantaneous active power L2 (-P) | 1-0:42.7.0.255 | Use case 3: Provide actual meter reads through P1 |
| Instantaneous active power L3 (-P) | 1-0:62.7.0.255 | Use case 3: Provide actual meter reads through P1 |

Note: Tariff code 1 is used for low tariff and tariff code 2 is used for normal tariff.

6.2 Messages

Text messages, transfer every ten seconds

| Value | OBIS reference | NTA Use Case reference |
|--------------------------------------|-----------------|---|
| Text message codes: numeric 8 digits | 0-0:96.13.1.255 | Use case 12: Display standard messages on meter display |

| Value | OBIS reference | NTA Use Case reference |
|-----------------------------------|-----------------|---|
| | | play and P1 |
| Text message max 1024 characters. | 0-0:96.13.0.255 | Use case 13: Sending long messages to port P1 |

The Meter will have storage capacity for one numeric message code (up to 8 numeric characters) and one 1024 character text message. Message codes and text messages are handled independently, but in the same way.

An example of a standard message code is: 01. This means that the electricity is disconnected by the grid operator. Another example of a standard message code is 01 61 81. This standard message consists out of the maximum of 8 characters. The standard message codes can be found in the document describing the P4 port (see the document list)

If a device is connected, the meter will send the message (code and/or text) over the P1 interface every ten seconds. The text message can not be extended with CR,LF (0A,0Dh) to split the message

6.3 Gas Data

The following is only applicable if Gas meters are connected. The OBIS reference Channel number (n) will be defined by the installing order of the M-Bus devices. So a Gas meter can be installed on channel 1, 2, 3 or 4.

Gas – P1 transfers every ten seconds the latest received hourly value & timestamp

| Value | OBIS reference | NTA Use Case reference |
|---|----------------|---|
| Device-Type | 0-n:24.1.0.255 | |
| Equipment identifier | 0-n:96.1.0.255 | Use case 3: Provide actual meter reads through P1 |
| Last hourly value (temperature converted), gas delivered to client in m3, including decimal values and capture time | 0-n:24.2.1.255 | Use case 3: Provide actual meter reads through P1 |
| Valve position gas (on/off/released). (see note 1) | 0-n:24.4.0.255 | Use case 5: Provide equipment status to P1 |

Note 1: Valve position only applicable when present.

6.4 Thermal Data

The following is only applicable if Thermal (Heat or Cold) meters are connected. Combined Heat and Cold meters are not supported. The OBIS reference Channel number (n) will be defined by the installing order of the M-Bus devices. So a Thermal meter can be installed on channel 1, 2, 3 or 4.

Thermal (Heat or Cold)– P1 transfers every ten seconds the latest received hourly value & timestamp

| Value | OBIS reference | NTA Use Case reference |
|--|----------------|--|
| Device-Type | 0-n:24.1.0.255 | |
| Equipment identifier | 0-n:96.1.0.255 | Use case 3: Provide actual meter reads through P1 (x=5:Heat; x=6: Cooling) |
| Last hourly Meter reading Heat or Cold in 0,01 GJ and capture time | 0-n:24.2.1.255 | Use case 3: Provide actual meter reads through P1 |
| Valve position Thermal (on/off/released). (See note 1) | 0-n:24.4.0.255 | Use case 5: Provide equipment status to P1 |

Note 1: Valve position only applicable when present.

6.5 Water Data

The following is only applicable if water meters are connected. The OBIS reference Channel number (n) will be defined by the installing order of the M-Bus devices. So a water meter can be installed on channel 1, 2, 3 or 4.

Water –P1 transfers every ten seconds the latest received hourly value & timestamp

| Value | OBIS reference | NTA Use Case reference |
|--|----------------|---|
| Device-Type | 0-n:24.1.0.255 | |
| Equipment identifier | 0-n:96.1.0.255 | Use case 3: Provide actual meter reads through P1 |
| Last hourly Meter reading in 0,001 m3 and capture time | 0-n:24.2.1.255 | Use case 3: Provide actual meter reads through P1 |
| Valve position Water (on/off/released). (See note 1) | 0-n:24.4.0.255 | Use case 5: Provide equipment status to P1 |

Note 1: Valve position only applicable when present.

6.6 M-Bus Data of a fourth M-Bus device (for example a slave E-meter to measure electricity production)

The following is only applicable if a fourth M-Bus device is connected. The OBIS reference Channel number (n) will be defined by the installing order of the M-Bus devices. So the fourth M-Bus device can be installed on channel 1, 2, 3 or 4.

Fourth M-Bus device –P1 transfers every ten seconds the latest received hourly value & timestamp

| Value | OBIS reference | NTA Use Case reference |
|---|----------------|---|
| Device-Type 4 th M-Bus device | 0-n:24.1.0.255 | |
| Equipment identifier | 0-n:96.1.0.255 | Use case 3: Provide actual meter reads through P1 |
| Last hourly Meter reading and capture time | 0-n:24.2.1.255 | Use case 3: Provide actual meter reads through P1 |
| If applicable, Valve/Switch position (on/off/released). (See note 1) | 0-n:24.4.0.255 | Use case 5: Provide equipment status to P1 |

Note 1: Valve/Switch position only applicable when present.

6.7 Change of M-Bus device

If an M-Bus device is exchanged by another device type, the OBIS codes on P1 have to be changed accordingly.

7 DOCUMENT LIST

Following table shows the complete set of documents that build up the Dutch Smart Meter Requirements, of which this Companion standard P1 document is a part of.

| # | Document name postfix | Description |
|-------|--------------------------|--|
| [1] | Main | The main document of the Dutch Smart Meter Requirements, containing all definitions and most of the use cases and requirements |
| [2] | P1 | Companion standard P1 |
| [3] | P2 | Companion standard P2 |
| [4] | P3 | Companion standard P3 |
| [5] | GPRS | Additional document describing the requirements for the GPRS infrastructure as part of the Dutch Smart Meter Specification. |
| [6] | P4 | Detailed Procesmodel P4 (Central Access Server) ALV NEDU 20081001-022 |

Table 7-1: Document List

APPENDIX I HUB BASIC SCHEMATIC DATA LINES

