# Main Document

*Dutch Smart Meter Requirements*

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| By order of: | **Netbeheer Nederland** |
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# 1 INTRODUCTION

## 1.1 The Dutch standard for smart metering (NTA 8130)

The Ministry of Economic Affairs has at first commissioned the Netherlands Normalization Institute, NEN, to formulate and describe a standardized minimum set of basic functions for remotely readable metering for electricity, slave E meters, gas, thermal energy (heat) and water for domestic consumers (in this document we use the expression *domestic consumers* although *small scale consumers* might be more appropriate). Under the auspices of the NTA 8130 project group, set up for this purpose by NEN, work has been performed on the drafting of requirements that 'smart metering systems' must satisfy. During the formulation process, the formal field of view of mandatory functions has been reduced to electricity and gas. For water and thermal energy, recommendations are given in an appendix. This process has been finalized in April 2007, as its result, a so-called National Technical Agreement called *"Minimum set of functions for metering of electricity, gas and thermal energy for domestic customers"* has been brought out. The reference number of this Netherlands Technical Agreement is *NTA 8130*.

In March 2011 the ministry of EL&I has issued the Algemene maatregel van Bestuur "Besluit op afstand uitleesbare meet- inrichtingen" (AMvB) as an amendment to the Dutch E and G acts. Where the NTA8130 and the AMvB are in conflict, the AMvB takes precedence.

The document "Dutch Smart Meter Requirements" is an elaboration of the NTA8130 and the AMvB, commissioned by the Dutch grid companies, and aimed at meter interoperability. Also requirements have been added, mainly with respect to installation & maintenance, privacy & security, and performance.

## 1.2 Short description of the metering installation

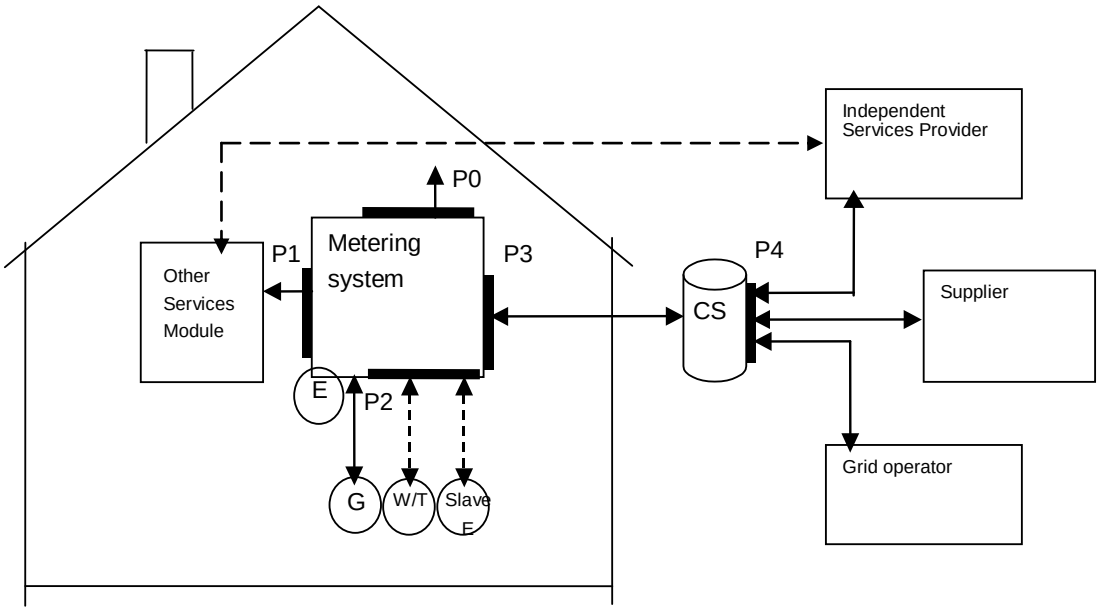



*Figure 1-1 – Communication ports, part of the metering installation*

As well as the displays on various parts of equipment, the metering installation has the following communication ports:

- **Port P0** for communication with external devices (e.g. hand-held terminal) during installation and on-site maintenance of the metering installation. The P0 port is only present on the E meter.
- **Port P1** for the communication between the metering installation and auxiliary equipment (a maximum of 5 appliances can be connected). P1 is a read-only interface, i.e. it cannot be used for sending data to the metering system. The specification of P1 is included in the relevant companion standard.
- **Port P2** for the communication between the metering system and one to four metering instruments and/or grid operator equipments. The specification of P2 is included in the relevant companion standard.
- **Port P3** for the communication between the metering installation and the Central System (CS).
- **Port P4** for the communication between the CS and independent service providers, suppliers and grid companies. Note that P4 is outside the scope of this document.

## 1.3 Business Use cases

The structure of the document is largely based on the business use cases that the smart meter product will support. These use cases are used as the framework in which the detailed requirements are placed. Regarding these business use cases, largely two main parts can be distinguished:

- Use cases based on operational requirements derived from the NTA 8130 and Novelle;
- Use cases with respect to the topics Installation and Maintenance (I&M).

This document provides the requirements for metering and switching equipment (henceforth the term ‘M&S equipment’ will be used) with respect to installation and maintenance processes.

## 1.4 Installation and Maintenance functionality

The base set of functionalities for the equipment is described in NTA 8130. As the functionalities with respect to installation and maintenance (I&M) in that document are incomplete, this document provides the complete set of requirements for I&M. The scope for the requirements in this document has been defined in the project initiation document as described below.

### 1.4.1 Installation and Deployment

Requirements for installation are focussed on facilitating a fast, safe and flawless installation and deployment of equipment. Furthermore the requirements shall be specified in such a way that personnel that performs installation, deployment and maintenance need not be highly qualified. Deployment means integrating the metering device in the operational metering chain. The requirements include physical characteristics and functionality to configure equipment.

### 1.4.2 Maintenance

Requirements for maintenance are focused on enabling remote maintenance. The equipment shall facilitate remote maintenance through functionality for:

- Automatic error detection (hardware, software, metrology etc.) and reporting
- Gathering diagnostics;
- Configuration of the metering installation (as a whole and individual components);
- Gathering the state of the metering installation (parameters).

Although on-site maintenance shall be kept to a minimum, it is important that the requirements address on-site maintenance, especially planned maintenance including replacement of components.

Chapter 6 of this document provides use cases for equipment, network and communication. These use cases are presented in a generic form, i.e. are not focused on any specific network or communication technology.

## 1.5 Presentation of processes

The metering and switching equipment responds to triggers. Each trigger initiates a process. The triggers for the presented use cases originate in CS or metering installation itself, or are time-initiated triggers. Typical examples of external events are a supply company (dis)connecting a meter, a request for actual data, the detection of an outage, the installation of a meter, and so on. Trigger descriptions as used in the different use cases are presented in tabular form like in the example below.

| Trigger | Description |
|---|---|
| Deploy E meter | On installation the E meter starts registering periodic meter readings and on deployment these meter readings are made available to the CS. |

## 1.6 Presentation of requirements

In this document all requirements originating from the NTA 8130, or additionally added by the Technical Specification Team of Netbeheer Nederland, are presented in tables. Each requirement is tightly connected to one or more business use cases presented in the document. The ultimate goal of this procedure is to prevent ambiguity of the requirements due to a better understanding of the requirement. The table below presents the template for a requirement; the explanation for the attributes in the table is given in brackets.

*[Unique identifier for the requirement.]*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | [This is the general description of the requirement. The description itself gives a general idea of what is required. Other attributes will provide the specifics for the requirement.] | | | | | | |
| **Rationale** | [This attribute provides information on why the requirement is defined; it provides the background for the requirement.] | | | | | | |
| **Fit criterion** | [This attribute provides insight on the criteria that will be used to verify if the requirement is met. It provides the framework for the logical test case that will be used to verify the requirement.] | | | | | | |
| **History** | [Date the requirement was accepted] | **Origin** | [Indicates the originator of the requirement, e.g. NTA 8130.] | **Port** | [Port that is being addressed by requirement] | **Applicable** | [Indicates the applicability of the requirement, e.g. E meter, G meter etc. |

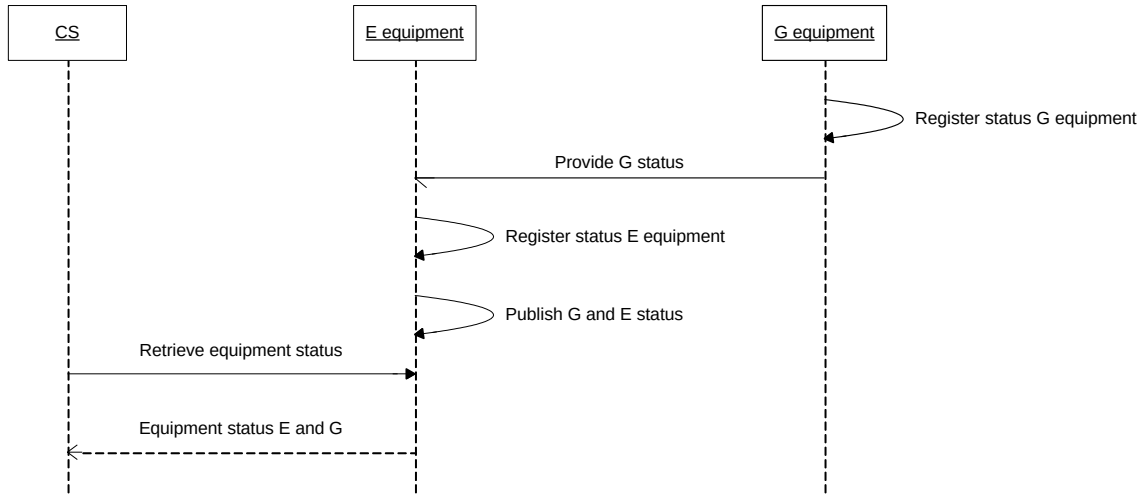
**Table 1-1: Presentation of requirements**

The Unique identifier for the requirement is constructed as follows: [DSMR version].[Chapter].[Number].

Although in the applicable field the parties are mentioned for which the requirements are applicable, this does not mean that other parties should not take note of these requirements and consider the direct or indirect consequences for their products and/or services.

The requirements description in this document is based on the business processes of the grid operators. The processes are provided as use cases. As a result the requirements are grouped based on functional relationships. The actual requirements are provided in a format based on the *Volere* requirements template.

## 1.7 Explanation of sequence diagrams



This document refers to sequence-diagrams according to the UML-method (Unified Modelling Language). UML is frequently used for software and system design. This example / model describes various, so-called ‘’entities’’ as the CS (Central System), the ”E equipment’’ and ”G equipment’’ for the meter infrastructure.

A function-call from one to the other entity is shown as a solid line with brackets (see ‘Retrieve equipment status()’’). The result of the function-call, a message, is shown in case this will be handed over to another entity as a dotted line (see ‘Equipment status E and G’). These two arrows show the function-call and the response.

In other cases such as ‘Register status E equipment()’ a function call will be made within an entity. The response is not transferred to another entity, so in this case the dotted line is absent.

The half arrow (see ‘Provide G status’) represents non synchronized communication. The recipient has no request but receives uninvited information from another entity.

## 1.8 General remarks

### 1.8.1 Use cases for thermal, water and electricity sub-meters

In this document only the requirements and use cases for the electricity and gas equipment are specified. The functional requirements and use cases for thermal, water and electricity sub-meters (slave E meters) could be specified in a similar way (i.e. comparable to gas). The general requirements (see Chapter 2) will differ for thermal and water meters, yet these are not described in this document.

### 1.8.2 Dependency of use cases on medium

**P2 interface**

The communication on P2 will optionally be wired or RF. The meter readings will be collected once every hour. (Dis)connecting the gas meter will occur immediately after the next communication with the specific device (taking into account the delay of the medium)..

**P3 interface**

The medium for P3 will be GPRS, as described in the NTA 8130 (§5.5.3.2). The P3 companion standard describes the communication between a central infrastructure (CS) and the metering system. The specific GPRS requirements are described in the separate DSMR GPRS requirements document.

### 1.8.3 Modularity of E equipment

This document presumes that the Communication module, Electricity meter and Electricity switch are integrated. Therefore the terms “Electricity meter” and “Electricity equipment” are interchangeable.

### 1.8.4 Referenced documents

This document provides the requirements for metering and switching equipment and for shared communication equipment. The process of determining the requirements is conducted by multiple parties and disciplines. In order to enable maintenance on the requirements each requirement has an associated origin. The origin indicates the party or discipline that introduced or accepted the requirement and therefore is responsible for it.
All references in this document to “NTA” or “NTA 8130” refer to: Netherlands Technical Agreement, NTA 8130 (e), “Minimum set of functions for metering of electricity, gas and thermal energy for domestic customers”, Netherlands Normalization Institute (NEN), August 2007, reference ICS 17.120.10.

The origin used for the requirements are stated in the table below:

| Origin | Description |
|---|---|
| EN | Derived from EN 50470. |
| NTA | Derived from the NTA 8130. |
| I&M | Based on information from the installation and maintenance work group. |
| Q&P | Based on information from the performance and quality work group. |
| TST | Technical Specification Team of Netbeheer Nederland |
| P&S | Based on the guidelines from the privacy and security work group version 1.5. |

**Table 1-2: Origin of Requirements**

## 1.9 Document list

Following table shows the complete set of documents that build up the Dutch Smart Meter Requirements, of which this main 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. |

**Table 1-3: Document List**

# 2 DEFINITIONS AND ABBREVIATIONS

## 2.1 General definitions

This section provides general definitions for terms used throughout this text.

| Name | Description |
|---|---|
| Timestamp | A timestamp is used to indicate a moment in time. In order to be useful the time stamp shall include the date as well as the time. The time in a timestamp shall be specified including hours, minutes and seconds. The format of a time stamp is defined as: yyyy-mm-dd h24:min:sec. The timestamps in the E meter are always in Local Time and include Deviation to UTC. Only on P2 level the time stamp is in UTC time. |
| Local time | This is the National Standard Time related to UTC time.<br>In the Netherlands during the winter this equals UTC+1 hour, in summer it equals UTC+2 hours (Daylight Savings Time). |
| Batch identifier | A vendor delivers goods in batches. Each batch has a unique identifier assigned by the vendor. The batch identifier is part of the configuration information of equipment. This enables a GO to determine which equipment was part of a batch. |
| Meter data | Meter readings that can be used to determine the quantity of electricity or gas that was consumed. Meter data thus includes daily and monthly meter readings, interval readings and actual meter readings. |
| Legally Relevant | Programs, data and type specific parameters that belong to the measuring instrument or sub-assembly, and define or fulfil functions, which are subject to legal control. |
| Logical Component | All functionalities belonging to each other in an object (in DLMS this is called OBIS objects) |
| Installation mode | When in installation mode, the E-meter scans for physically wired connected M-Bus devices, the E-meter accepts and processes installation mode requests from wireless M-Bus devices. |

**Table 2-1: General Definitions**

## 2.2 Parties involved

This section provides general definitions for involved parties, used throughout this text.

| Name | Description | Abbreviation |
|---|---|---|
| Consumer | The consumers of electricity and/or gas where smart meters are installed. | _ |
| Grid operator | The grid operator responsible for the equipment and the services delivered through the equipment. | GO |
| Grid operator gas | The grid operator responsible for the gas equipment and the services delivered through that equipment. | GOG |
| Grid operator electricity | The grid operator responsible for the installation of equipment for electricity and gas and the services delivered through the electricity equipment. | GOE |
| Independent service provider | A company independent of grid operators, supply companies or metering companies that provides a service to the connections in the grid using the infrastructure provided by the grid operator and the metering company. | ISP |
| Supply company | The company that is responsible for delivery of electricity and/or gas to the connections. | SC |

**Table 2-2: Parties Involved**

## 2.3 Meter readings

This section provides general definitions for meter readings, used throughout this text.

### 2.3.1 Meter reading electricity (E)

A meter reading for E contains the register values for all tariffs in both energy directions. As E meters support two tariffs for both energy directions, each meter reading E contains four register values with an indication for tariff and direction associated to each register value. The meter reading E also contains two registers for interval data (totals).

| Attribute | Description |
|---|---|
| Equipment identifier | Identifier for the equipment that registered the meter reading, i.e. the equipment identifier for the E meter. |
| Time stamp | Date and time of the meter reading in local time (see table 2.1). |
| Tariff | In case of a periodic meter read or an actual meter read:<br>- Identifier for the tariff that the register value applies to.<br>In case of an interval meter read:<br>- Not applicable. |
| Energy direction | The energy direction (delivery or consumption) that the register value applies to. |
| State | Meter state (for example logging information, error reports) at the time of the meter read. |
| Register value | In case of a periodic meter read or an actual meter read:<br>- The register value is the value of the (periodic or actual) meter reading.<br>In case of an interval meter read:<br>- The register value contains 960 values of the 15 minutes interval data. |
| Unit of measurement | The unit of measurement that applies to the register value. |

**Table 2-3: Meter Readings Electricity**

### 2.3.2 Meter reading gas (G)

| Attribute | Description |
|---|---|
| Equipment identifier | Identifier for the equipment that registered the meter reading, i.e. the equipment identifier for the G meter. |
| Time stamp | Date and time of the meter reading in UTC time (see table 2.1). |
| State | Meter state (for example logging information, error reports) at the time of the meter read. |
| Register value | In case of a periodic meter read or an actual meter read:<br>- The register value is the last available meter reading.<br>In case of an interval meter read:<br>- The register value contains 240 values of the hourly interval data. |
| Unit of measurement | The unit of measurement that applies to the register value. |
| Converted | Indication if the meter reading was converted for temperature (yes/no). |

**Table 2-4: Meter Readings Gas**

## 2.4 Equipment

This section provides general definitions for the equipment, used throughout this text. This document differentiates between equipment and the place where equipment can be installed. Throughout the document the following terminology is used for equipment:

| Name | Description | Abbrev. |
|---|---|---|
| Measuring and switching equipment | All equipment installed at the premises of the consumer for measuring consumption of commodities or for (dis)connecting the consumer. The equipment therefore includes: E meter, E-breaker, G meter, G-valve and a communication module. | M&S equipment |
| Metering instrument | Equipment with measurement functions for electricity or gas. The equipment therefore includes E meters and G meters. | |
| E-equipment | All equipment installed at the premises of the consumer for measuring consumption of electricity or for (dis)connecting electricity. E-equipment therefore includes: E meter and E-breaker. | |
| G-equipment | All equipment installed at the premises of the consumer for measuring consumption of gas or for (dis)connecting gas. G-equipment therefore includes: G meter and G-valve (when fitted). | |
| Meter | Residential measuring device for either electricity or gas. Meters include E meters and G meters. | |
| E meter | Residential measuring device for registration of electricity consumption and communication. The communication module is an integrated part of the E meter. | |
| G meter | Residential measuring device for registration of gas consumption. | |
| Switch | Switching device for either electricity or gas. Switching devices for E are called (E-) breakers, switching devices for G as called (G-) valves. | |
| Communication module | The equipment that is responsible for communication between M&S equipment at a connection and other entities (i.e. central systems). | |
| Central System | The ICT infrastructure, equipment and software used by the GO for meter management, meter readings and handling requests of ISP and SC. | CS |
| Equipment identifier | A global identifier for the equipment. The equipment identifier is composed of three parts: meter type, serial number and year of manufacturing. Equipment identifiers are represented as bar codes and also human readable codes. | |
| Local host | The equipment installed on a connection is composed of multiple pieces of equipment. This equipment is connected through a local network (P2). The E meter functions as a local host for this network and is referred to as the local host in the context of its function as a network component. | |
| Auxiliary equipment | Equipment provided by an Independent Service Provider or Supply Company that can be attached to the P1 port and can receive and process the information provided on P1, e.g. an in-house Energy Monitor. Also referenced as “Other Service Module” (OSM). | OSM |
| Installation mode | Installation mode is the state of the E- and G-meter where it is possible to bind a G-meter to an E-meter. | |

**Table 2-5: Equipment Terminology**

This document minimizes the assumptions on the physical design of the equipment. For this reason, NTA 8130 introduces the notion of a metering installation. This metering installation provides a number of interfaces with other equipment. The interfaces are provided through ports. The table below provides a description of these ports.

| Port | Origin | Description |
|---|---|---|
| P0 | I&M | Port P0 for communication with external devices (e.g. hand-held terminal) during installation and on-site maintenance of the metering installation. The P0 port is only available on the E meter. |
| P1 | NTA | Port P1 for the communication between the metering installation and auxiliary equipment (a maximum of 5 appliances can be connected). P1 is a read-only interface, i.e. it cannot be used for sending data to the metering system. The specification of P1 is included in the relevant companion standard. |
| P2 | NTA | Port P2 for the communication between the metering system and one to four metering instruments. The specification of P2 is included in the relevant companion standard. |
| P3 | NTA | Port P3 for the communication between the metering installation and the Central System (CS). |

**Table 2-6: Port Description**

In NTA 8130 another port, P4, is defined as well. This port is not relevant for the equipment for which the requirements are presented in this document as this port handles communication between the CS and external parties.

For a functional description of the ports P1 through P4 is referred to NTA 8130.

## 2.5 Equipment state

Throughout the text the term ‘equipment state’ is used. Each piece of equipment is considered to have a state. The following sections present the definitions of the state of the various types of equipment.

### 2.5.1 M&S equipment state

The equipment state for M&S equipment is divided in two groups of information: operational parameters and configuration. The operational parameters are configuration items indicated as changeable by the GO in tables 2-7 and 2-8 and can be explicitly changed via the client service interface.

The configuration items indicated as “initially filled by the manufacturer” are set in the equipment by the manufacturer on behalf of the GO. The parameters for both operational parameters and configuration differ for E and G. The tables below provide the definition of the state for both E and G equipment.

#### 2.5.1.1 E configuration

| Name | Description | Initially filled by manufacturer | Changeable by GO |
|---|---|---|---|
| Equipment identifier | The GO decides to use the equipment identifier or the serial number as the value for the equipment identifier in the E configuration. | Yes | No |
| Operational hardware version | The version identifier of the hardware in the meter. | Yes | No |
| Operational firmware version | The version identifier of the firmware that is operational in the meter. | Yes | No |
| Non-operational firmware version | The version identifier for the firmware that is uploaded in the meter for a future firmware upgrade. This version of the firmware is not operational yet. | No | No |
| Initial hw/sw configuration version | Device initial hardware, software and configuration information | Yes | No |
| Ordering info | Grid operators device ordering information | Yes | No |
| Location information | The location information of the meter, i.e. an indication of where the meter is installed. Typical examples are GPS coordinates or zip code and house number. | No | Yes |
| Hosted equipment | List of equipment identifiers for equipment connected to the E meter by means of P2 (M-Bus). The E meter functions as a host for equipment connected to P2. | No | Yes |
| Control Mode | Indicates if the E connection can be disconnected. For some connections the GO wants to prevent the breaker to be operational. Setting the value for this attribute to ‘false’ actually disables the breaker. | Yes | Yes |
| Date - Time | Date and time of the internal clock. | Yes | Yes |
| Daylight savings | Indication if the clock in the meter has applied daylight savings time (DST) active | Yes | Yes |
| Duration of voltage swells | Definition of voltage swell in terms of duration, cf. use case “Provide power quality information”. | Yes | Yes |
| Threshold for voltage swells | Definition of voltage swell in terms of threshold, cf. use case “Provide power quality information”. | Yes | Yes |
| Duration of voltage sags | Definition of voltage sag in terms of duration, cf. use case “Provide power quality information”. | Yes | Yes |
| Threshold for voltage sags | Definition of voltage sag in terms of threshold, cf. use case “Provide power quality information”. | Yes | ‘Yes |
| Duration long power outage | Definition of long power outage (upper bound for duration), cf. use case “Provide power information”. | Yes | No |

| Name | Description | Initially filled by manufacturer | Changeable by GO |
|---|---|---|---|
| Maximum time adjustment | Definition of time adjustment allowed without generating an event, cf. use case “Synchronise time E-equipment”. | Yes | No |
| Threshold value | The value for threshold E, specified in Watt | Yes | Yes |
| Breaker position | The position of the breaker (on / off). | Yes | Yes |
| Tariff information | Time table indicating during which times of day and on what weekdays the various tariffs apply. | Yes | Yes |
| Special days table | List of days where the tariff deviates from the standard (low instead of normal) | Yes | Yes |
| Alarm Filter | Indicates what events will be handled as alarm | Yes | Yes |
| Limiter threshold value | The threshold above the breaker is activated after a certain time | Yes | Yes |
| Limiter threshold time | Duration of exceeding the threshold witch activates the breaker | Yes | Yes |
| Local port readout list | List of objects that is output to the P1 interface | Yes | Yes |
| Administrative in/out on P3 | Indicates whether the meter will be read out via P3 | No | Yes |
| Connection watchdog timer for P3 | The duration after which the P3 connection is reset | Yes | Yes |
| Discover on open cover | Indicates whether the M-Bus discovery process is automatically started when the cover is opened | Yes | Yes |
| Discover on power on | Indicates whether the M-Bus discovery process is automatically started when the power of the E meter is switched on | Yes | Yes |
| Dynamic M-BUS address | Indicates whether M-Bus devices that are installed have their address initially configured as 0 or as a predefined value | Yes | Yes |
| Send commissioning notification | Indicates whether an alarm should be raised when a new M-Bus device is discovers | Yes | Yes |
| Send power up notification | Indicates whether an alarm when the device is powered on | Yes | Yes |
| Allow local disconnect | Indicates whether the electricity meter can be switched off locally. | Yes | Yes |
| P0 enabled | Indicates whether communication via P0 is enabled or not. | Yes | Yes |
| HLS 3 and 4 enabled on P3 | Indicates which security levels are enabled on the P3 port | Yes | Yes |
| IP message content | A configurable attribute that contains contents of the IP message send when a PDP context is established. | Yes | Yes |
| IP message target | A configurable attribute that defines the ad- | Yes | Yes |

| Name | Description | Initially filled by manufacturer | Changeable by GO |
|---|---|---|---|
| address | dress of the receiver of the IP message, which is send after establishing PDP context | | |
| GPRS operation mode | Defines the GPRS operation mode: always on, external trigger or internal trigger | Yes | Yes |
| PPP set up | Defines username and password for GPRS connectivity | Yes | Yes |
| Master key | The key used to exchange new encryption keys | Yes | No |
| Encryption key | The key used to encrypt / decrypt messages | Yes | Yes |

**Table 2-7: E Configuration**

#### 2.5.1.2 G configuration

| Name | Description | Initially filled by manufacturer | Changeable by GO |
|---|---|---|---|
| Equipment identifier | The GO decides to use the equipment identifier or the serial number as the value for the equipment identifier in the G configuration. | Yes | No |
| Operational firmware | The version identifier of the firmware that is operational in the meter. | Yes | No |
| Time | Date and time of the internal clock (if present). | Yes | Yes |
| Valve position | The position of the valve: open / closed / released (ready to be turned on). | Yes | Yes |
| Encryption key | The key used to encrypt / decrypt messages | Depending on GO | Yes |

**Table 2-8: G Configuration**

## 2.6 Auxiliary reference information

Additionally, the following abbreviations will be used:

| Abbreviation | Description |
|---|---|
| DSMR | Dutch Smart Meter Requirements (Main) |
| E | Electricity |
| FMEA | Failure Mode Effect Analysis |
| G | Gas |
| MTBF | Mean Time Between Failures |
| PQ | Power Quality |

**Table 2-9: Auxiliary Reference Information**

Other information entities are defined as:

| Name | Description |
|---|---|
| Interval values E | The interval values (register readings) provided for E shall at least contain the following information:<br>▪ Time stamp of the interval value;<br>▪ E status<br>▪ Interval value specified in kWh (three decimals);<br>▪ Indication for energy direction (consumption or production).<br>The interval has been chosen to be 15 minutes.<br>In Annex A of the P3 document the minimal numbers of digits used throughout the whole metering chain are shown. |
| Interval values G | The interval values (register readings) for G shall contain the following information:<br>▪ Time stamp of the interval values;<br>▪ G status<br>▪ Interval values specified in $m^3$ (two or three decimals);<br>The interval has been chosen to be 60 minutes.<br>In Annex A of the P3 document the minimal numbers of digits used throughout the whole metering chain are shown. |
| Power Quality information | Power Quality information shall contain the following information:<br>▪ Number of power swells;<br>▪ Number of power sags;<br>▪ Identification of the period in which this information has been registered.<br>See also the specifications in NEN-EN 50160:2000. |
| Instantaneous Voltage information | The instantaneous voltage information shall contain the following information:<br>▪ Instantaneous voltage specified in V (with a precision of 1 V). |
| Average Voltage information | The average voltage information shall contain the following information:<br>▪ Average voltage specified in V (with a precision of 1 V). |
| Outages information | The actual voltage information shall contain the following information:<br>▪ The number of short power outages (<T seconds);<br>▪ For outages >T seconds:<br>– Time stamp of the end of the outage.<br>The electricity meter shall provide the outage information for each phase. |
| (Dis)connect request | A (dis)connect request is used to remotely (de)activate a meter. Such a request contains the following parameters:<br>▪ Connect or disconnect;<br>▪ Time stamp of connect or disconnect (optional);<br>▪ Reason of disconnect (optional), for example “on demand”, “Code Red” |
| (Dis)connect logging information | The logging information for (dis)connects shall contain the following information:<br>▪ Position of the breaker after the (dis)connect has been applied;<br>▪ Reason, e.g. “on demand”, “exceed threshold” (in case of disconnect);<br>▪ Time stamp of the moment the (dis)connect has been applied.<br>In case of a (dis)connect of a gas meter, the position of the valve must be given (instead of the position of the breaker). |
| Apply threshold log- | The Apply threshold (electricity) logging information shall contain the following information: |

| | |
|---|---|
| ging information | ▪ New threshold value (specified in Watt);<br>▪ Time stamp of the moment at which the threshold was applied. |

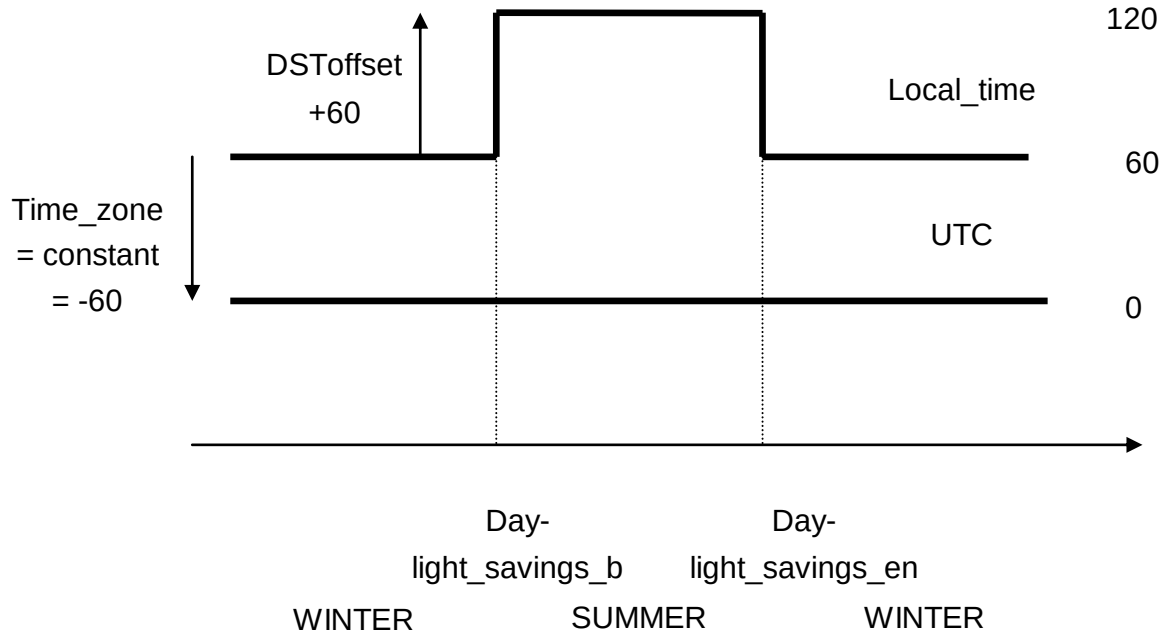
**Table 2-10: Other Information Entities**

## 2.7 Relation between the various time parameters

This section provides general definitions for time parameters, used throughout this text.

Time_zone: Attribute 3 of IC Clock in minutes. It is a constant depending on the geographic location (eg. Amsterdam: -60 minutes) = UTC – local time in winter (DST not active)
Deviation: Part of type “date_time” in minutes. It is dynamic and changes depending on the time_zone and if DST is active or not. It is calculated by the CS
Local_time: Local time (current time)
DSToffset: Daylight saving time offset in minutes (“summer time” – “winter time”)
DST active: Clock status bit 7 is set to true when DST is active (summer)
UTC: Universal Time Code

The following relations apply:
Deviation = UTC - local_time
Deviation = time_zone – DSToffset (if DST is active)



| Example Amsterdam July: | Example Amsterdam December: |
|---|---|
| SUMMER TIME (Daylight Saving Time active)<br>local time = 15:00<br>UTC = 13:00<br>Deviation = -120<br>DST offset = +60<br>Time_zone = -60 | WINTER TIME (DST not active)<br>local time = 15:00<br>UTC = 14:00<br>Deviation = -60<br>DST offset = +60 but not active<br>Time_zone = -60 |

The table below shows an overview of the time definitions for different purposes.

| | Timestamps registervalues in E meter | Timestamps registervalues in G meter | Synchronisation E meter | Synchronisation of G meter by E meter | Execution time of commands |
|---|---|---|---|---|---|
| E meter | Local Time | n.a. | Local Time | UTC Time | Local Time |
| G meter | Local Time | UTC Time | n.a. | UTC Time | Local Time[1] |
| P1 port | Local Time | n.a. | n.a. | n.a. | n.a. |

**Table 2-11: Overview of the time definitions for the different purposes**.

The device shall always be able to deduce the UTC time from the timestamp in the synchronisation command. Therefore the timestamp shall contain the deviation.
When the E meter receives a time synchronisation it shall calculate the UTC time based on the deviation. The deviation will show the total deviation between the timestamp in the synchronisation command and the UTC time. The deviation can be added to the timestamp in the synchronisation command to calculate the UTC time.

The G-Meter shall use UTC time for time synchronisation and for time stamping of the register values. The E meter shall convert the time stamps from the G meter register values from UTC time into local time.

E meter clock synchronisation:
The time in the Electricity meters is set by applying the SET service to the attribute “time” of the “clock” object. The time attribute can be written as:

| Date & Time | Deviation | Clock status |
|---|---|---|
| Date & Time according to the local time at the location of the device. | *Deviation* of the device local time *to UTC* | 0x80 or 0x00 representing whether DST is active or not active at the date & time of the chosen location. |

**Table 2-12: Time attribute in type date-time**

[1] The E meter is responsible for the execution time of the command.

# 3 GENERAL REQUIREMENTS

This section provides the requirements that apply to all M&S equipment in this document.

## 3.1 M&S equipment

DSMR-M 4.3.1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | All M&S equipment shall comply with NTA 8130. | | | | | | |
| **Rationale** | NTA 8130 defines the minimal set of requirements that apply to M&S equipment. | | | | | | |
| **Fit criterion** | The GO's will jointly develop a test program for verifying the equipment according to the NTA. Equipment that passes this test will be considered NTA compliant. Vendors of equipment will receive the specifications of the test program to verify compliancy. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.3.2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | All metering instruments shall comply with the Dutch 'Metrologiewet' (Metrology Act). | | | | | | |
| **Rationale** | The 'Metrologiewet' is the Dutch implementation of the EU Measurement Instruments Directive (MID). Hence, it is concerned with reliable and accurate measurement of commodities in the Dutch market. | | | | | | |
| **Fit criterion** | The vendor shall supply a certificate from a notified body for the metering instrument stating that it complies with the Dutch 'Metrologiewet'. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.3.3

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The type plate of metering instruments shall provide standardised information. | | | | | | |
| **Rationale** | For operational convenience the type plate shall show standardised information. The layout of the type plate and the information shown will be determined in consultation with the grid operator. | | | | | | |
| **Fit criterion** | The meter type plate shall clearly show the following information (in consultation with the grid operator):<br>▪ Legally required information;<br>▪ Equipment identifier (includes meter code, serial number and year of manufacturing. The internal digital ID number must match the number shown on the type plate);<br>▪ Barcode specified by the grid operator<br>▪ For E meters the meter code<br>▪ For G meters the meter code<br><br>Furthermore if the grid operator requires this the type plate shall also show:<br>▪ A description of the communication medium (GPRS)<br>▪ Ownership identification (text or logo) of grid operator | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.3.4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The vendor of equipment has to meet the requirements for life time expectancy. | | | | | | |
| **Rationale** | The minimum life time expectancy must be 20 years | | | | | | |
| **Fit criterion** | Suppliers should clearly show the expected life time of their products. The minimum technical lifetime for all the components of E and G meters is 20 years without maintenance or replacement of the battery.<br>Life time expectancy of the battery of the G meter is calculated using the following conditions:<br>▪ The use of the display<br>▪ Hourly communication between G meter and E meter<br>▪ Valve operation 10 times a year.<br>▪ Yearly update of software (if applicable)<br>▪ Normal operation of the meter under normal operating conditions<br>Reliability predictions must be done as described in IEC 62059-41. Estimation of the product life time must be done as described in IEC 62059-31-1.<br>For FMEA calculations MIL-HDBK-217 (Electronic Reliability Design handbook) must be used.<br>The results shall be clearly documented and must be available for the grid operator or an external party representing the grid operator. | | | | | | |
| **History** | Dec. 2008 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter, Comm. unit |

DSMR-M 4.3.5

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Each clock that is part of the metering instrument shall be accurate. | | | | | | |
| **Rationale** | The accuracy of the measurements depends on the accuracy of the registration time of the measurement. For this reason all clocks in the system shall be accurate. | | | | | | |
| **Fit criterion** | Any clock in a metering instrument shall meet the following criteria:<br>▪ Any clock that is NOT part of a P2 device shall deviate no more than 0.5 seconds per 24 hours. (According to NEN-EN-IEC 62054-21 Electricity metering (a.c.) Tarif and Load Control Part 21: Particular requirements for time switches, Clause 7.5.2.2 Requirements for crystal controlled time switches)<br>▪ Any clock that is part of a P2 device shall deviate no more than 10 seconds per 24 hours. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.3.6

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | During power outage the clock time and date will remain within specifications. | | | | | | |
| **Rationale** | Normally the clock is synchronised during communication. Sometimes communication is not possible during several days. When during a power outage the clock time becomes inaccurate, and after a power outage there is no communication for some time, the registration of the energy, registration of alarms and logs is not correct. | | | | | | |
| **Fit criterion** | It is guaranteed that during a power outage of 5 days the clock time and date will remain within specifications (See IEC 62054-21). | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.3.7

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The metrological functionality of the metering instrument shall not be affected by power outages. | | | | | | |
| **Rationale** | An outage shall not lead to a loss of data in any way. This means that during the outage no meter data shall be lost or that information on the configuration of the meter or operational parameters are lost or modified even with an empty battery or a discharged supercap. | | | | | | |
| **Fit criterion** | The following information shall be available after the outage as it was available before the outage:<br>▪ Meter data;<br>▪ E/G configuration;<br>▪ E/G operational parameters. | | | | | | |
| **History** | Nov. 2007 | **Origin** | EN | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.3.8

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Metering instruments shall re-connect to all communication channels automatically after a power outage in case the medium is available, using a randomising algorithm to reconnect. | | | | | | |
| **Rationale** | A power outage can affect a large number of connections. It is therefore required that the equipment can re-establish communication channels without any intervention from external entities. In order to prevent that many disconnected meters re-establish a connection simultaneously, a randomising reconnect algorithm is to be used. | | | | | | |
| **Fit criterion** | Metering instrument shall start the reconnect algorithm within 5 minutes after power was re-established after an outage using a randomising algorithm to reconnect. | | | | | | |
| **History** | Nov. 2007 | **Origin** | EN | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.3.9

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Metering instruments shall issue a tamper alarm when exposed to a magnetic field for which the meter is susceptible (metrological and functional). | | | | | | |
| **Rationale** | Metering instruments shall not be susceptible for static magnetic fields from permanent magnets (as described in EN 50470-1 7.4.11 Immunity to continuous magnetic fields of external origin). However, very strong permanent magnets that can influence the metrological or the functional part of the meter are readily available. These magnets can even permanently damage meters. | | | | | | |
| **Fit criterion** | Meters shall not be susceptible to magnetic fields up to 200 mT. The manufacturer has to define the value of the intensity of the magnetic field for which the meter is susceptible. The alarm needs to be adjusted to 90% of this value. If the meter is not susceptible, or the value by which the meter becomes susceptible for magnetic fields is not defined, the alarm value will be 500 mT. The alarm shall comply with the requirements for error handling defined in this document. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.3.10

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The metering instruments must be able to safely and correctly operate within the temperature range of -25 °C till 55 °C, for G meters a range of -10°C till 40 °C applies. | | | | | | |
| **Rationale** | When selecting metering equipment, attention shall be paid to the fact that the climatic conditions inside buildings depend on the outside (open-air) conditions, which can vary widely throughout the year. The metering equipment must be able to operate safely and correctly within the temperature range as described in EN 60721-3-3 and described in the MID. | | | | | | |
| **Fit criterion** | The metering equipment must be able to operate safely and correctly within the temperature range as described in EN 60721-3-3 Table 1: 3K6 (-25 °C till 55 °C) and for G meters as described in the MID -10 °C till 40 °C applies. If the metering equipment is compliant to a higher class, the manufacturer must indicate which class. | | | | | | |
| **History** | Aug. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.3.11

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The M-Bus cable between the Electricity meter and the M-Bus device shall be standardized. | | | | | | |
| **Rationale** | The M-Bus cable shall be standardized to avoid interoperability problems and prevent having to use different type's op M-Bus cables depending on the meter manufacturers. The cable can then safely be used in a wide range of configurations and installations. | | | | | | |
| **Fit criterion** | The M-Bus cable shall meet the following criteria:<br>▪ Standard 2-core cable LiYY cross section of 0,25 mm2<br>▪ Exterior diameter maximum 4.5mm<br>▪ Length 2 meter (As a result of the short length there is no need to use the specified 0.5 mm2 cross section as described in EN 13757-2:2004)<br>▪ Color coded according DIN 47100 (White, Brown)<br>▪ Exterior color shall be yellow (RAL 1021) for Gas meters*.<br>▪ Exterior color shall be grey (RAL 7001) for Water meters<br>▪ Exterior color shall be red (RAL 3020) for Thermal meters<br>▪ Exterior color shall be blue (RAL 5015) for other M-Bus devices<br>▪ The cable must have cable end sleeves for the connection with the E meter<br>▪ The terminal connection shall be constructed to ensure strain relief and simple installation of the products but prevent access to the terminal connection by non-certified persons. When an increasing tensile force is applied on the cable, after installation in accordance with the manufacturer's instruction, either the cable shall break or the cable shall disconnect from the terminal connection, without any further damage to the gas* meter or electricity meter.<br>▪ Flame behavior in accordance with IEC 60332-1 | | | | | | |
| **History** | May 2009 | **Origin** | TST WG1 | **Port** | P2 | **Applicable** | G meter |

DSMR-M 4.3.12

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The M-Bus terminals shall have unified coding. | | | | | | |
| **Rationale** | During installation it will be necessary to have the same terminal coding on every device. | | | | | | |
| **Fit criterion** | On both E meters and M-Bus devices, terminals will be clearly coded using M1 M2. Whenever it is possible to connect multiple M-Bus devices, the coding shall be repeated. | | | | | | |
| **History** | Oct 2010 | **Origin** | TST | **Port** | P2 | **Applicable** | E meter, G meter |

DSMR-M 4.3.13

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The noise produced by the M&S equipment will remain within acceptable limits. | | | | | | |
| **Rationale** | Some meters produce noise as a result of the measuring method. The sound level produced by the M&S equipment shall not annoy consumers. | | | | | | |
| **Fit criterion** | The E meter shall not produce noise exceeding 35dB(A) measured at a distance of 1 m from the meter. At half of the maximum flow rate the G meter shall not produce noise exceeding 35dB(A) measured at a distance of 1 m from the meter. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.3.14

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The design of the devices must take in account that the security functionality is future proof. | | | | | | |
| **Rationale** | In the design of devices (i.e. processing power, memory) consideration must be given to the following possible changes.<br>○ Asymmetric security algorithms<br>○ Key size<br>○ Key generation in the meter<br>○ Authentication on P2<br>○ Firmware upgrade of M-Bus devices<br>○ Signed measurements<br>○ Up to 16 energy registers for E meters, 2 register for G meters (including storage)<br>○ Extend the number of M-Bus devices | | | | | | |
| **Fit criterion** | The design of the device allows the mentioned future changes. | | | | | | |
| **History** | Jan. 2011 | **Origin** | P&S 1.5 | **Port** | , P3 | **Applicable** | E meter |

## 3.2 E-equipment

DSMR-M 4.3.16

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Power consumption of E equipment shall be minimised and shall not be registered by the E equipment. | | | | | | |
| **Rationale** | From both an environmental and economical point of view, the energy consumption shall be minimized. In case there is no load at the customer premises the register values of the E equipment shall not increase. | | | | | | |
| **Fit criterion** | The average power consumed by E equipment shall meet the following criteria:<br>▪ The maximum allowed power consumption without communication and unconnected P1 device is for:<br>- Single Phase Meters 2W / 10 VA<br>- Poly phase Meters 4W / 20 VA<br>▪ For single phase meters, average power consumption shall not exceed 4 W during communication.<br>For poly phase meters, average power consumption shall not exceed 8 W during communication.<br>▪ Power consumption of the E equipment itself shall not lead to increasing register values of the E equipment.<br>▪ M-Bus transmitters and receivers shall be switched off when no M-Bus devices are attached. During the M-Bus discovery process the transmitters and receivers shall be switched on. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.17

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | A connection diagram for the E meter shall be available on the meter. | | | | | | |
| **Rationale** | For safe installation and maintenance it is convenient to have a connection diagram readily available. | | | | | | |
| **Fit criterion** | The connection diagram (as described in DIN 43856) shall be place on either the type plate of the meter or in the cover of the terminal block. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.18

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Non-mechanical displays on the E meter shall provide functionality to display meter readings, standardized messages and other required information in a convenient way. | | | | | | |
| **Rationale** | For consumers the display is the only means to communicate with the meter. The meter shall therefore provide information in a convenient format. | | | | | | |
| **Fit criterion** | The non-mechanical display for metering instruments shall meet the following criteria:<br>▪ Characters on the display shall have a minimal height of 8 mm;<br>▪ The display shall be able to display minimally 8 characters simultaneously. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.19

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Several configurable readout definitions are needed to define display output in several modes (manual, auto and service) and the P1 output. The Standard Readout Object List is shown in P3, Annex B. | | | | | | |
| **Rationale** | For the customer the display of the meter must have two readouts. In 'auto scroll mode', on the display a defined (minimal) set of items is visible. By the use of a button 'manual scroll mode' is activated. In manual scroll mode it is possible to show a second set of items. By pressing the button a new item will be shown.<br>For P1 output is must be possible to define a third set of items.<br>For service or test purposes it must be possible to define a fourth set of items. These items are only visible when the terminal cover is removed. | | | | | | |
| **Fit criterion** | It must be possible to define four configurable readouts:<br>▪ P1 output (general local port read out).<br>▪ Auto scroll mode (general display readout).<br>▪ Manual scroll mode (alternate display readout).<br>▪ Service mode (service display readout). | | | | | | |
| **History** | Apr. 2011 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.20

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | In auto-scroll mode of the display, register values, instantaneous power and a display test are shown. | | | | | | |
| **Rationale** | In auto-scroll mode of the display the register values for the defined tariffs, instantaneous power and a display test are shown. | | | | | | |
| **Fit criterion** | In auto-scroll mode of the display is shown:<br>▪ The register values for the defined tariffs in both energy directions<br>▪ Active instantaneous power delivered and received (resolution 1 Watt).<br>▪ Blinking display test.<br>The values are displayed simultaneously with the relevant tariff number including an identification for the energy direction. Each value is visible during a period of 5 seconds. | | | | | | |
| **History** | Apr. 2011 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.21

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | In manual-scroll mode of the display more information as the basic information showed in auto-scroll mode is shown. | | | | | | |
| **Rationale** | In manual-scroll mode of the display the basic information shown in auto-scroll mode is extended with the ID's of the connected M-Bus devices | | | | | | |
| **Fit criterion** | In manual-scroll mode of the display, the information of auto-scroll mode is extended with M-BUS ID's of connected M-Bus devices.<br>Manual scroll mode is activated by pressing a button.<br>Every time the button is pressed, a new item is shown.<br>When the button is not touched during a period of 30 seconds, display mode changes from manual mode to auto scroll mode. | | | | | | |
| **History** | Apr. 2011 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.22

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Service mode of the display is activated when the terminal cover is removed. | | | | | | |
| **Rationale** | During installation (while the terminal cover is removed) most detailed information is needed for a quick installation, trouble shooting and testing. | | | | | | |
| **Fit criterion** | Service mode of the display is activated when the terminal cover is removed.<br>In service mode the next information should be visible:<br>▪ Actual date and time<br>▪ The register values for all tariffs in both energy directions in Wh resolution<br>▪ ID's of connected M-Bus devices<br>▪ Version of Legally Relevant and Non Legally Relevant Software<br>▪ Active instantaneous power per phase for both energy directions.<br>During installation of M-Bus devices, if there are more than 10 devices available to choose from, at least 10 device ID's must be shown.<br>Every time a button is pressed, a new item is shown.<br>When the terminal cover is installed the display changes to auto scroll mode.<br>The values are displayed simultaneously with the relevant reduced OBIS codes (value group C,D,E i.e.1.8.1) whenever the second display row is not occupied for other specified information. | | | | | | |
| **History** | Apr. 2011 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.22a

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | It must be possible to set E meters into "Installation mode" at the moment of installing metering instruments at a customer's premises. | | | | | | |
| Rationale | During installation, G meters have to be commissioned to the E meter according to the P2 companion standard. Only after this process, regular communication between the E meter and the G meter will be able to start. | | | | | | |
| Fit criterion | The method (power up and/or removal of the M-Bus cover), by which the E meter is set to "installation mode" is configurable via the configuration object. | | | | | | |
| History | June 2011 | Origin | TST | Port | n.a. | Applicable | E meter |

DSMR-M 4.3.23

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide electromagnetic compatibility (EMC). | | | | | | |
| **Rationale** | For more reliability the meter shall be immune to all disturbances that can happen in practice. | | | | | | |
| **Fit criterion** | In order for the E meter to be considered electro magnetically compatible, it shall meet the EMC criteria in the following standards:<br>▪ EN 50470-1 Electricity Metering Equipment (a.c.) – Part 1 General Requirements paragraph 7.4 Electromagnetic compatibility<br>▪ Special test levels for Immunity to damped oscillatory waves.<br>IEC 61000-4-12, Ring wave immunity test (Chapter 5, testlevel x)<br>Test levels for ring wave: Line to ground: 6 kV<br>Line to line: 6 kV | | | | | | |
| **History** | Nov. 2007 | **Origin** | EN | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.24

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall be compliant with NEN-EN-50470 | | | | | | |
| **Rationale** | The E meter is compliant with NEN-EN 50470-1 Electricity Metering Equipment (a.c.) – Part 1 General Requirements, and the E meter is compliant with NEN-EN 50470-3 Electricity Metering Equipment (a.c.) – Part 3: Particular requirements, Static meters class index A, B en C. | | | | | | |
| **Fit criterion** | The E meter is compliant with NEN-EN-50470-1 and NEN-EN 50470-3 | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.25

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall not be susceptible for electrostatic discharge. | | | | | | |
| **Rationale** | For more reliability the meter shall be immune to all disturbances that can happen in practice. | | | | | | |
| **Fit criterion** | The E meter shall be immune for electrostatic fields. The test shall be carried out according EN 50470-1 par. 7.4.5. | | | | | | |
| **History** | Nov. 2007 | **Origin** | EN | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.26

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The poly-phase E meter shall be suitable to use in installations with right or left phase sequence. | | | | | | |
| **Rationale** | The meter must be safely usable in a wide range of configurations and installations. | | | | | | |
| **Fit criterion** | The MID approval or the test reports belonging to the MID approval should mention that there are no significant differences between failures using a right or a left phase sequence.<br>The meter documentation shall clearly state that reversed phase sequence does not influence the accuracy of the energy measurement.<br>No blinking indication on the display is allowed to identify phase sequence. | | | | | | |
| **History** | Nov. 2007 | **Origin** | EN | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.27

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The poly-phase E meter shall use the Ferraris energy measurement method. | | | | | | |
| **Rationale** | Poly-phase E meter shall use the Ferraris method in which both energy directions of the 3 phases are summed and depending of the results, stored in a “+” or “-” register. The integration period shall be small enough for an accurate registration of delivered (A-) and consumed (A+) energy in separate registers. | | | | | | |
| **Fit criterion** | The poly-phase E meter shall use the Ferraris energy measurement method. | | | | | | |
| **History** | Nov. 2007 | **Origin** | EN | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.28

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The display shall indicate every connected phase. | | | | | | |
| **Rationale** | The network of the grid operators can have both right and left phase sequence. In both cases the phase indicators on the display shall show normal operation and not start flashing since this will cause unnecessary calls from customers to the GO. | | | | | | |
| **Fit criterion** | Phase indicator will light constantly when phase is connected. For example: when L1 is disconnected, only indicators for L2 and L3 are shown. | | | | | | |
| **History** | Jun 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.29

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The display shall indicate the energy flow of each phase during installation when the terminal cover is removed. | | | | | | |
| **Rationale** | To prevent wrong connection of “phase in” and “phase out” we must have a mechanism in the meter to indicate the energy flow at each phase during installation. | | | | | | |
| **Fit criterion** | Phase indicator will light constantly when energy is delivered to the customer. Phase indicator will blink when energy is received from the customer at this phase. This functionality is only present while the terminal cover is removed. | | | | | | |
| **History** | Oct 2010 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.30

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | It must be possible to read the actual value and direction of the energy flow of each phase. | | | | | | |
| Rationale | There must be a method to check the proper wiring of an E meter during normal operation on distance, because an installer can make mistakes. By combining information from the customer and the actual power of each phase, it is possible to determine the right order of the phase in – phase out connections of each phase. | | | | | | |
| Fit criterion | The actual power of each phase must be available for readout. | | | | | | |
| History | Nov 2010 | Origin | TST | Port | P0, P3 | Applicable | E meter |

DSMR-M 4.3.31

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | The registration of energy shall start at a load as low as possible. | | | | | | |
| Rationale | Energy efficient equipment makes it necessary to start an accurate registration of energy at low loads. This can be achieved by choosing a low value for Iref. | | | | | | |
| Fit criterion | The current range for direct connected kWh meters will be: Imin=0,25A; Iref= 5A<br>The current range will be: 0,25 - 5(*I*max) A.<br>(Compliant with NEN-EN50740-1) | | | | | | |
| History | Jan 2011 | Origin | TST | Port | n.a. | Applicable | E meter |

DSMR-M 4.3.32

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall be protective class II. | | | | | | |
| **Rationale** | The meter must be safely usable in a wide range of installations. | | | | | | |
| **Fit criterion** | The E meter shall comply with EN 50470-1 sub clause 5.7 (Insulating encased meter of protective class II) | | | | | | |
| **History** | Nov. 2007 | **Origin** | EN | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.33

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | AC Voltage Test according to an E meter protective class II | | | | | | |
| **Rationale** | The meter must be safely usable in a wide range of installations. | | | | | | |
| **Fit criterion** | The test shall be carried out according EN 50470-3 sub clause 7.2 (AC voltage test) table 3. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.34

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall be class B, with class A mentioned on the type plate. | | | | | | |
| **Rationale** | Class A instruments are sufficient for the purpose of residential usage. GO's however want a higher accuracy than class A and therefore require the metering instrument to fulfil class B requirements. | | | | | | |
| **Fit criterion** | Testing for class A and B will be performed in two steps:<br>▪ A notified body for certifying meters will test the equipment to fulfil class A requirements;<br>▪ The GO will test the equipment to fulfil class B requirements. | | | | | | |
| **History** | Nov. 2007 | **Origin** | EN | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.35

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The status information displayed on the E meter by flags shall be standardised. | | | | | | |
| **Rationale** | Through standardization of the status information on the display, the customer processes can be standardized. | | | | | | |
| **Fit criterion** | For status information flags are required:<br>• An indication if the meter is administrative on or off.<br>Two flags for three possibilities<br>Undefined (Factory setting) (value attribute 2 = 0); flag 1 and 2 off<br>Administrative off (value attribute 2 = 1): flag 1 on or<br>Default (value attribute 2 = 2): flag 2 on<br><br>Identification is based on OBIS code 0-1:94.31.0.255 attribute 2<br>• An indication if the limiter function is active or not.<br>Limiter on: (value attribute 3 ≠ 999999): flag on<br>Limiter off: (value attribute 3 = 999999): flag off<br>Identification is based on OBIS code 0-0:17.0.0.255 attribute 3<br>• An indication if the communication module is attached to the network<br>• An indication per phase if the voltage is present<br>• An indication for a successful self-check (Only visible in service mode)<br>• Minimal 3 reserved flags for future use<br><br>Flags are (together with register values) always visible in manual scroll mode, auto-scroll mode and service mode. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.36

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The information displayed on the E meter other than mentioned in DSMR-M 4.3.35 shall be standardised. | | | | | | |
| **Rationale** | Through standardization of the information displayed on the E meter, the customer processes can be standardized. | | | | | | |
| **Fit criterion** | Additional to flags, the display shall at least contain the following symbols:<br>▪ GPRS Signal Strength (4 levels).<br>▪ Actual energy Direction.<br>▪ Breaker Open/Closed (based on OBIS code 0-0:96.3.10.255 attribute 2) | | | | | | |
| **History** | Apr. 2011 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.37

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Terminal screws shall be of sufficient quality. | | | | | | |
| **Rationale** | Screws shall not be worn during or after mounting. | | | | | | |
| **Fit criterion** | The tightening torque to ensure a good connection shall be less then 3 Nm. This value shall be specified by the manufacturer. With a value of 1.5 times the value specified by the manufacturer, with a minimum of 3.5 Nm, it shall be possible to tighten and loose the screws 25 times without damage. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.38

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Meters shall be able to withstand currents related to the main fuses | | | | | | |
| **Rationale** | The related currents to the main fuses are specified in the Meetcode. | | | | | | |
| **Fit criterion** | Poly phase meters must be delivered in an Imax ≥ 100A version.<br>Single phase meters must be delivered in an Imax ≥ 80A version. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.39

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have an E breaker as an integrated part. | | | | | | |
| **Rationale** | In order to reduce costs for installation the E meter shall incorporate the E breaker. | | | | | | |
| **Fit criterion** | The E meter and E breaker shall be delivered as a single installable unit. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.40

| | |
|---|---|
| **Description** | The E breaker shall be able to perform a sufficient number of (dis)connections during its lifecycle without any maintenance and failures. |
| **Rationale** | As maintenance on equipment is expensive, planned maintenance has to be reduced to nil under circumstances of normal usage. In normal usage also short circuit currents can occur, therefore the equipment must:<br>▪ Withstand minimal conditions without being damaged<br>▪ Withstand minimal conditions without causing damage or danger to its direct environment<br>▪ Endurance 1: the meter shall be capable of at least 3000 operation cycles at 80 Ampère at PF1<br>▪ Endurance 2: In addition to “Endurance 1” , the meter shall be capable of at least 2000 operation cycles at 80 Ampère at PF0.5 |
| **Fit criterion** | The Circuit Breaker in the E meter must comply with the following criteria from IEC 62055-31 Annex C<br>▪ C5: Fault Current making capacity at UC2 level (2,5 kA)<br>▪ C6: Short-circuit current carrying capacity at UC2 level (2,5 kA)<br>o Test 2 : at UC2 level (2,5 kA)<br>o Test 1 : at UC3 level (6 kA)<br>▪ C8: Dielectric strength<br><br>The Circuit Breaker in the E meter must meet the following endurance requirements, derived from IEC 62055-31 Annex C/C3:<br>- 3000 operation cycles at 80 Ampère, PF1.<br>- 2000 operation cycles at 80 Ampère, PF 0,5 inductive<br>In domestic installations the circuit-breaker will be protected by a protection device. In |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | combination with a protection device the circuit-breaker must be able to withstand short circuits of 10 kA according the following conditions:<br>▪ Prospected Short-circuit current: 10 kA; U= 230VAC: PF0,5<br>▪ Meter circuit protected by an electromechanical protection relay 80 A<br>▪ A short circuit connection: 2 * 0,5 m; 16 $mm^2$<br>▪ 5 tests short-circuit carrying and 5 tests short circuit making capacity | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.41

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E breaker shall affect all phases as the result of a position change. | | | | | | |
| **Rationale** | Poly-phase meters use a single breaker for all phases as there is no need to (dis)connect individual phases independently. | | | | | | |
| **Fit criterion** | All phases on a connection are either all connected or all disconnected at any time. Neutral shall not be switched. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.42

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Switching equipment shall always be in a defined state. | | | | | | |
| **Rationale** | All switch equipment (electricity breakers) has two positions and shall only change position as the result of a switching activity. | | | | | | |
| **Fit criterion** | Switching equipment shall be bi-stable. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.3.43

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall convert the time stamps of the M-Bus register values from UTC time to Local Time. | | | | | | |
| **Rationale** | The G meter has only UTC time information available while the interface on P1 and P3 is based on Local Time. | | | | | | |
| **Fit criterion** | The E meter shall convert the time stamps of the M-Bus register values from UTC time to the Local Time of the E meter at the moment these register values are received via P2. | | | | | | |
| **History** | Apr. 2011 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

## 3.3 G equipment

DSMR-M 4.3.45

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|---|---|---|---|---|---|---|---|
| **Description** | G meters that are implemented as diaphragm meters shall comply with the latest release of EN 1359. | | | | | | |
| **Rationale** | Multiple methods exist for measuring the amount of gas consumer. For each of these methods a specific standard is defined. | | | | | | |
| **Fit criterion** | The vendor shall supply a certificate from a notified body for the metering instrument stating that it complies with the latest release of EN 1359. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.46

| | |
|---|---|
| **Description** | G meters that are implemented as ultrasonic meters shall comply with EN 14236. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Rationale** | Multiple methods exist for measuring the amount of gas consumer. For each of these methods a specific standard is defined. | | | | | | |
| **Fit criterion** | The vendor shall supply a certificate from a notified body for the metering instrument stating that it complies with EN 14236. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.47

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | G meters that are implemented as rotary displacement meters shall comply with EN 12480. | | | | | | |
| **Rationale** | Multiple methods exist for measuring the amount of gas consumer. For each of these methods a specific standard is defined. | | | | | | |
| **Fit criterion** | The vendor shall supply a certificate from a notified body for the metering instrument stating that it complies with EN 12480. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.48

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G meter is equipped with temperature conversion. | | | | | | |
| **Rationale** | The G meter is equipped with temperature conversion. The G meter will convert the uncorrected measured volume to a volume at 0°C. and an average atmospheric pressure of 1013,25 mbar taking into account a pressure of 1041,25 mbar (average atmospheric pressure + working pressure; 1013,25+28mbar,) i.e.using the following formula: $\frac{273{,}15 * 1041{,}25}{tgas \quad 1013{,}25}$ | | | | | | |
| **Fit criterion** | The G meter will convert the uncorrected measured volume to a volume at 0°C and 1013,25 mbar taking into account a pressure of 1041,25 mbar | | | | | | |
| **History** | Jan. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.49

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | G meters that are implemented with an electronic index and temperature conversion shall comply with MID (Measuring Instruments Directive), appendix MI-002, part 1, § 2.2 en part 2. | | | | | | |
| **Rationale** | Multiple methods exist for temperature conversion, electronically or mechanically. For each of these methods a specific standard is defined. All new gas meters in The Netherlands such as diaphragm meters, ultrasonic meters etc. with an electronic index and temperature conversion need to comply with MID appendix MI-002, part 1, § 2.2 en part 2. The MID in turn refers to EN 1359:1998/A1:2006 (annex B) and EN 14236 (annex C) | | | | | | |
| **Fit criterion** | The vendor shall supply a certificate from a notified body for the metering instrument stating that it complies with the MID, appendix MI-002, part 1, § 2.2 en part 2. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.50

| | |
|---|---|
| **Description** | G meters that are implemented with a mechanical index and mechanical temperature conversion must have a MID approval and comply with EN 1359:1998 Annex-B sup- |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | plemented with EN 1359:1998/A1:2006 Annex-B. | | | | | | |
| **Rationale** | Multiple methods exist for temperature conversion, electronically or mechanically. For each of these methods a specific standard is defined. | | | | | | |
| **Fit criterion** | The vendor shall supply a certificate from a notified body for the metering instrument stating that it complies with the MID, appendix MI-002, part 1, § 2.2 en part 2 and complies with EN 1359:1998 Annex-B supplemented with EN 1359:1998/A1:2006 Annex-B. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.51

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | G meter shall transmit only the temperature converted interval value ( the temperature converted interval value is also the only value indicated on the display). | | | | | | |
| **Rationale** | In the Netherlands there are two types of temperature converted meters, G meters that are implemented with a mechanical temperature conversion and G meters that are implemented with an electronic temperature conversion. Only the temperature converted interval values will be transmitted to the CS. The unconverted interval values may only be used internally by the G meter. | | | | | | |
| **Fit criterion** | By default only the temperature converted interval value will be transmitted and shown on the display. The unconverted interval values may only be used internally by the G meter. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P2, P3 | **Applicable** | G meter |

DSMR-M 4.3.52

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | G meters shall comply with the latest release of EN 12405 | | | | | | |
| **Rationale** | In the standards for measuring volume conversion is not included. G-meters that convert the volume to $m_n^3$ shall comply with the latest release of EN 12405 | | | | | | |
| **Fit criterion** | The vendor shall supply a certificate from a notified body for the metering instrument stating that it complies with the latest release of EN 12405 | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.53

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The meter shall withstand a vertical drop as described in NEN-EN 1359 and keep full functionality. | | | | | | |
| **Rationale** | In case of a vertical drop as described in NEN-EN 1359, not only metrological performance has to work properly but also other functions like communication and valve (dis)connect. | | | | | | |
| **Fit criterion** | All functions of the G meter must be able to withstand a vertical drop of the meter as described in NEN-EN 1359. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.54

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | It should be possible to activate additional functions of the G meter. | | | | | | |
| **Rationale** | Only one button is used for all functions. | | | | | | |
| **Fit criterion** | Only one button is used to operate the valve manually, to activate service mode and show Legally Relevant software versions. | | | | | | |
| **History** | Mar. 2011 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.54a

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | It must be possible to set wireless G-meters into “installation mode” at the moment of installing metering instruments at a customers premises. | | | | | | |
| Rationale | During installation G meters have to be commissioned to the E meter according to the P2 companion standard. Only after this process, regular communication between the E meter and the G meter will be able to start. | | | | | | |
| Fit criterion | It must be possible to set G meters into installation mode with the button functionality. | | | | | | |
| History | June. 2011 | Origin | TST | Port | n.a. | Applicable | G meter |

DSMR-M 4.3.55

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | As required by MID the software version identification of Legally Relevant software shall be easily provided by the measuring instrument. | | | | | | |
| **Rationale** | The version identification of Legally Relevant software shall easily be shown on the display. | | | | | | |
| **Fit criterion** | The version identification of Legally Relevant software must be shown on the display in the service mode of the G-meter. | | | | | | |
| **History** | Mar. 2011 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.56

| | |
|---|---|
| **Description** | It must be possible to activate a service mode in the G meter. |
| **Rationale** | Testing of a meter must be done in a reasonable time. This is not possible if the standard resolution is not precise enough. In that case it must be possible to activate a service mode in the G meter during which the registers have a 0,1 litre resolution for G4 meters and a 1 litre resolution for meters > G6.<br>In service mode the Legally Relevant Software is shown in the display |
| **Fit criterion** | It must be possible to activate a service mode in the G meter during which the registers have a 0,1 litre resolution for G4 meters and a 1 litre resolution for meters > G6. In this service mode also the Legally Relevant Software is shown in the display.<br><br>In case of a display with sleeping mode functionality:<br>▪ After activating the display by pushing the button, service mode is activated by a manufacturer specific action.. The code for the LR software is shown in service mode in the next sequence: Display test → Index value → LR → Display test →……<br>▪ Return to sleeping mode after a manufacturer specific timeout (and optional by an action)<br><br>In the case of a display without sleeping mode functionality activating of the service mode is done: |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | ▪ by a manufacturer specific action. The code for the LR software is shown in service mode in the next sequence: Display test → Index value → LR → Display test → …..<br>▪ Return to normal mode after a manufacturer specific timeout (and optional by an action).<br>▪ Testing at Qmin may not take more than 30 minutes.<br>▪ Test results shall be reproducible and repeatable (as described in MID). | | | | | | |
| **History** | Nov. 2010 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.57

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Power consumption of G meter shall be minimised. | | | | | | |
| **Rationale** | For economic and environmental reasons the power consumption of the meter shall be minimized. Besides this it is important to reduce power consumption in G meters that are powered by a battery as replacement of batteries is expensive. Finally the power used by G meters that use M-Bus as a power source shall not exceed the maximum power delivered by M-Bus. Please note that operation of the valve consumes power too. | | | | | | |
| **Fit criterion** | The lifetime of the battery in the G meter shall exceed the lifetime of the G meter in situations where communication is restricted to the requirements stated in this document. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.58

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G meter shall be compatible with the PN-class ≥ 0.2 bar. | | | | | | |
| **Rationale** | The G meters will be used to connect customers to 30 and 100 mbar grids. In some cases standard 100 mbar grids are operated at 200 mbar. In case the household pressure regulator fails, the G meter can be subjected to 200 mbar. | | | | | | |
| **Fit criterion** | No leakage and no permanent damage shall occur and all functionalities (e.g. opening and closing the valve) will be maintained in a 200 mbar pressure test. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.59

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G meter must comply with the standard G series. | | | | | | |
| **Rationale** | Only meters in the standard G range 1.6 to 25 are considered, as meters that can handle larger volumes require different installation environments than the ones envisioned for the product. | | | | | | |
| **Fit criterion** | The respective G meters shall in accordance with the G series have maximum flow rates of:<br>▪ G1.6 2.5 $m^3/h$<br>▪ G2.5 4.0 $m^3/h$<br>▪ G4 6.0 $m^3/h$<br>▪ G6 10.0 $m^3/h$<br>▪ G10 16.0 $m^3/h$<br>▪ G16 25.0 $m^3/h$<br>▪ G25 40.0 $m^3/h$ | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.60

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | No leakage and no permanent damage shall occur in a 500 mbar pressure test. | | | | | | |
| **Rationale** | G meters of G series 10 or higher will be used to connect customers to grids with higher pressures than 100 mbar. In case the pressure regulator fails, the G meter can be subjected to 500 mbar. | | | | | | |
| **Fit criterion** | G meters of G series 10 or higher shall be compatible with the PN-class ≥ 0.5 bar. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.61

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | G meters of G series 10 or higher the resolution will be in 0.01 m3 | | | | | | |
| **Rationale** | The NTA specifies 0.001 m3 resolution but these gas meters do not supply this resolution. | | | | | | |
| **Fit criterion** | The G meters of G series 10 or higher use a resolution of 0.01 m3. The E meter shall handle automatically the proper M-Bus attribute (VIF) | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter, E meter |

DSMR-M 4.3.62

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The metering instrument shall be class 1, with class 1.5 mentioned on the type plate. | | | | | | |
| **Rationale** | Class 1.5 instruments are sufficient for the purpose of residential usage. GO's however want a higher accuracy than class 1.5 and therefore require the metering instrument to fulfil class 1 requirements. | | | | | | |
| **Fit criterion** | Testing for class 1 and 1.5 will be performed in two steps:<br>▪ A notified body for certifying meters will test the equipment to fulfil class 1.5 requirements;<br>▪ The GO will test the equipment to fulfil class 1 requirements. | | | | | | |
| **History** | Nov. 2007 | **Origin** | Q&P | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.63

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The frequency of planned onsite maintenance on the G meter shall be minimized. | | | | | | |
| **Rationale** | Onsite maintenance activities on the meter disturbs the consumer and shall therefore be kept to a minimum. Another reason to keep maintenance on location to a minimum is that it is very expensive. | | | | | | |
| **Fit criterion** | No planned maintenance needed during the lifetime of the meter. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.64

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G meter shall be suitable for Dutch Gas of second family group L. | | | | | | |
| **Rationale** | In the Netherlands low calorific gas is used. In order to measure correctly, the meter needs to be suitable for this gas. | | | | | | |
| **Fit criterion** | The G meter shall be suitable for Dutch Gas of second family group L. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.65

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Gas meters shall comply with Nederlandse Praktijk Richtlijn (NPR) 7028. | | | | | | |
| **Rationale** | NPR 7028 contains the Dutch standards for diaphragm meters but is also considered applicable for ultrasonic gas meters. This standard contains some requirements (mainly about dimensions and connections) which are not described in EN 1359. | | | | | | |
| **Fit criterion** | G meters shall comply with the requirements for connections and dimensions in NPR 7028.<br>In contradiction to NPR 7028; for a G25 gasmeter the maximum width of the gasmeter is 540 mm. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.66

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | All G meters shall be supplied with removable end caps installed. | | | | | | |
| **Rationale** | The end caps serve to prevent ingress of dust and dirt into the meter during transport and installation. | | | | | | |
| **Fit criterion** | Removable end caps will be installed on both inlet and outlet | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.67

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | For G meters ≤ G6 a G valve as an integrated part is mandatory. For G meters > G6 a G valve is not allowed. | | | | | | |
| **Rationale** | In order to reduce costs for installation the G meter shall incorporate the G valve. | | | | | | |
| **Fit criterion** | When applicable, the G meter and G valve shall be delivered as a single installable unit. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.68

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The controlling of the G valve must be electronically. | | | | | | |
| **Rationale** | Controlling of the G valve shall be possible local and remotely. Mechanical controlling is not allowed. | | | | | | |
| **Fit criterion** | Controlling of the G valve must be electronically in a safe and reliable way. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.69

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Switching equipment shall be bi-stable. | | | | | | |
| **Rationale** | The gas valve has two positions and shall only change position as the result of a switching activity. | | | | | | |
| **Fit criterion** | The gas valve will only change position as the result of a switching command. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.70

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G valve must be able to withstand at least a pressure of 200mbar in the closed position. | | | | | | |
| **Rationale** | The G valve shall be safe and reliable and must be able to withstand a certain pressure in the closed position. | | | | | | |
| **Fit criterion** | A pressure of at least 200mbar is withstood by the G valve in the closed position. | | | | | | |
| **History** | Aug. 2010 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.71

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G valve shall only open if it has been determined that the gas installation uses less than 13 litres per hour. | | | | | | |
| **Rationale** | The valve shall only open after a leakage control. | | | | | | |
| **Fit criterion** | After opening of the G valve the amount of gas measured may not be greater then 1 litre. The measuring time starts 5 seconds after opening and will be 5 minutes.<br>If the accuracy of the G meter is high enough to determine the allowed flow in a shorter time period then this is allowed.<br>In case the flow is greater than is allowed, the valve has to be shut immediately.<br>This applies to both automatic or manual (re)connection<br>If it has been determined that the gas installation uses less than 13 litres per hour, the G valve can be opened. | | | | | | |
| **History** | Aug. 2010 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.72

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | With the G valve in the closed position and with a pressure of 20 mbar, the leakage of the gas valve must be less than 1 litre per hour. At Pmax of the meter, the leakage of the gas valve must be less than 5 litres per hour. | | | | | | |
| **Rationale** | Any equipment with the gas supply switched off can have a certain amount of leakage. The gas meter must be safe and reliable, therefore this leakage at Pmax must remain within the limits. | | | | | | |
| **Fit criterion** | At a pressure of 20 mbar and with a closed gas valve, the leakage of the gas valve must be less than 1 litre per hour. At Pmax of the meter, the leakage of the gas valve must be less than 5 litres per hour. | | | | | | |
| **History** | Aug. 2010 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.73

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G valve must be able to open with a counter pressure of at least 50 mbar | | | | | | |
| **Rationale** | The G valve shall be safe and reliable and must be able to open and close at certain pressures. | | | | | | |
| **Fit criterion** | The G valve must be able to open with a counter pressure of at least 50 mbar | | | | | | |
| **History** | Aug. 2010 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.74

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G valve must be able to close at Qr and a counter pressure of 50 mbar. | | | | | | |
| **Rationale** | The G valve shall be safe and reliable and must be able to open and close at certain flow rates and pressures.<br>(Qr is defined as the overload flow rate 1,2Qmax) | | | | | | |
| **Fit criterion** | The G valve must be able to close at Qr and a counter pressure of 50 mbar. | | | | | | |
| **History** | Jan. 2011 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.75

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G valve shall perform a sufficient amount of switching operations. | | | | | | |
| **Rationale** | The G valve shall be safe and reliable, and shall operate with minimum manual interaction. | | | | | | |
| **Fit criterion** | The switching equipment shall be able to perform at least 3.000 operations during its lifetime. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.76

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | G meters shall have a flow direction from left (Gas in) to right (Gas out) when looking at the index. | | | | | | |
| **Rationale** | The G meters have a standardized flow direction from left to right when looking at the index. | | | | | | |
| **Fit criterion** | G meters shall comply with the standardized flow direction of left (Gas in) to right (Gas out) when looking at the index. | | | | | | |
| **History** | Dec. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.77

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | G meters shall have reverse flow protection or prevent the register value (for gas delivery) to change in case of a reversed flow direction. | | | | | | |
| **Rationale** | Since the G meter has a standardized flow direction from left to right it could be possible to mount the meter in a reversed flow direction. If the G meter is mounted in a reversed flow direction the register values (for gas delivery) shall not change. | | | | | | |
| **Fit criterion** | G meters shall have reverse flow protection or prevent the register value (for gas delivery) to change in case of a reversed flow direction. | | | | | | |
| **History** | Dec. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.78

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | In case a reversed flow direction is detected the G meter shall register this as a fraud attempt. | | | | | | |
| **Rationale** | Since the G meter has a standardized flow direction from left to right it could be possible to mount the meter in a reversed flow direction. If the G meter is mounted in a reversed flow direction the G meter shall register an event. | | | | | | |
| **Fit criterion** | The G meter shall register a fraud attempt in case a reversed flow direction is detected. | | | | | | |
| **History** | Dec. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.3.79

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Displays shall provide easy to read values. | | | | | | |
| **Rationale** | The characteristics of mechanical displays are defined in EN 1359. This document specifies the size of numerals for meter readings. Electronic displays shall conform to the sizing requirements. | | | | | | |
| **Fit criterion** | The digits of displays shall have a minimal height of 4 mm and a minimal width of 2.4 mm. The distinction between the numbers before and after the decimal point must be clearly marked with for example a red frame on the meter plate. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

## 3.4 Communication channels

DSMR-M 4.3.80

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter ***shall*** have a standardized local port for installation and maintenance purposes (P0). | | | | | | |
| **Rationale** | The maintenance personnel want to access all meters in a similar fashion. | | | | | | |
| **Fit criterion** | The P0 interface shall be implemented as an optical port. Only 1 local maintenance port P0 will be present per device. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0 | **Applicable** | E meter |

DSMR-M 4.3.80a

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The protocol to be used on the P0 interface shall be standardized. | | | | | | |
| **Rationale** | The maintenance personnel want to access all meters in a similar fashion. | | | | | | |
| **Fit criterion** | The protocol on the P0 interface shall be IEC 62056-21, mode E using 8 data bits. The application level shall be according to the P3 companion standard. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0 | **Applicable** | E meter |

DSMR-M 4.3.81

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Communication on the P1 interface shall be standardized. | | | | | | |
| **Rationale** | The OSM is provided by a third party, therefore interoperability on P1 is required. | | | | | | |
| **Fit criterion** | The P1 interface shall be implemented according to the P1 Companion Standard. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P1 | **Applicable** | E meter |

DSMR-M 4.3.82

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Communication on the P2 interface shall be standardized. | | | | | | |
| **Rationale** | Interoperability is required on the P2 interface, to allow for communication with different Gas (and water and thermal) meters. | | | | | | |
| **Fit criterion** | The P2 interface shall be implemented according to the P2 Companion Standard. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P2 | **Applicable** | E meter, G meter |

DSMR-M 4.3.83

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Communication on the P3 interface shall be standardized. | | | | | | |
| **Rationale** | Interoperability is required on the P3 interface, to prevent vendor lock-in and to simplify the data acquisition process in the CS. | | | | | | |
| **Fit criterion** | The P3 interface shall be implemented according to the P3 Companion Standard. The P3 Companion Standard is based on the DLMS/Cosem protocol. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

## 3.5 Event logging and error reporting

This section describes mandatory constraints from the point of view of installation and maintenance.

### 3.5.1 Logging

DSMR-M 4.3.84

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|---|---|---|---|---|---|---|---|
| **Description** | The log items shall facilitate the verification of the state of equipment and the process of troubleshooting. | | | | | | |
| **Rationale** | Logging information is used in combination with the state of equipment to verify the correct functioning of M&S and communication equipment. The logging shall therefore facilitate the construction of a history of activities that took place in the equipment. | | | | | | |
| **Fit criterion** | Each log item shall contain at least the following information:<br>▪ Timestamp of the logged event;<br>▪ Activity type of the logged event (event code);<br>▪ Parameters of the logged event (if specified in use case). | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a | **Applicable** | E meter, |

DSMR-M 4.3.85

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Equipment shall log all activities that modify the state of equipment. | | | | | | |
| **Rationale** | The GO may need to determine what caused the state of equipment to change. In case of problems with equipment he can derive the possible cause of the problem by 'walking back' through the logging information and derive the state of the equipment 'along the way'. | | | | | | |
| **Fit criterion** | The logging information for a designated period shall enable the reconstruction of the state at the start of that period given the state at the end of the period. All event codes shall have a value from a pre-defined range as defined in the Companion Standards for P2 and P3. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a | **Applicable** | E meter |

### 3.5.2 Errors

In this section we will distinguish between:

- Normal errors: The term normal error is used for errors which occur during operation of the meter. These are logged as normal errors, i.e. an event log entry is generated and an error or alarm bit is set in the corresponding register, i.e. flat battery, memory errors, communication errors.

- Logical errors: The term logical error is used in case of errors in command parameters, i.e. the start date is after the end date, the activation date lies in the past, etc. These errors always lead to an error message sent back in the answer to the command. This kind of errors is not logged in the event log and no error bit is set in the error register.
- Software errors: General wisdom states that all software contains defects. This will be true for firmware that is part of the equipment too. People involved in maintenance of the equipment shall therefore be informed on any software error that occurs. Examples of software errors include: index out of range, out of memory, invalid parameter etc.

DSMR-M 4.3.86

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall support a uniform description for errors exchanged through P3. | | | | | | |
| **Rationale** | In order to facilitate error handling by central systems, the equipment shall exchange uniform errors. This may involve functionality for the E meter for converting errors received through P2 before these errors are forwarded through P3. For individual errors presented throughout the document, additional attributes may be defined. | | | | | | |
| **Fit criterion** | All errors exchanged with external entities shall at least contain the following information:<br>▪ Error code for the type of error.<br>▪ A corresponding event shall be stored, including the timestamp of when the error was raised. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.3.87

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The error code used in errors shall have a value from a pre-defined range as defined in the Companion Standards for P2 and P3. | | | | | | |
| **Rationale** | For maintenance purposes a uniform error code for errors facilitates the process of handling the error. In case of uniform error codes the personnel does not need any knowledge of the equipment in order to determine what type of error occurred. | | | | | | |
| **Fit criterion** | The value of error codes shall be in the range of error codes as defined in the Companion Standards for P2 and P3. Vendor specific alarms are not allowed. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a | **Applicable** | E meter, G meter |

### 3.5.3 Error reporting

The equipment shall support two methods of event reporting. The first method is based on a request of a time frame specified by the CS. The second is a direct way of sending errors to a central system. The latter method is referred to as alarms.

DSMR-M 4.3.88

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall include an event report through P3 if the M&S equipment state is retrieved. | | | | | | |
| **Rationale** | The personnel involved in maintenance of the equipment shall be regularly informed on new events. The event report is used for this purpose. Based on the error report maintenance personnel can decide on further actions. Events are retrieved from the equipment by<br><br>Use case: Retrieve M&S equipment state<br>. | | | | | | |
| **Fit criterion** | It shall be possible to retrieve a list of events through the P3 port. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P3 | **Applicable** | E meter |

### 3.5.4 Software errors

DSMR-M 4.3.89

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall raise an error in case a malfunction of the software occurs. | | | | | | |
| **Rationale** | General wisdom states that all software contains defects. This will be true for firmware that is part of the equipment too. People involved in maintenance of the equipment shall therefore be informed on any software error that occurs. Examples of software errors include: index out of range, out of memory, invalid parameter etc. | | | | | | |
| **Fit criterion** | A watchdog that checks software activity shall detect software errors. If the watchdog detects an anomaly, the event is logged and the corresponding error is set in the error register. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P3 | **Applicable** | E meter, G meter |

# 4 ACCESS AND SECURITY

Cyber-security is a well-known issue in classical IT systems. For some years, attention has been focussed on cyber-security concerning industrial systems which are more complex, independent and interconnected.

Authorities put a special emphasis on Critical Infrastructure Protection and Industrial Automation Control Systems, especially infrastructure supporting energy, transport, telecommunications, and water. At the moment, collaboration between European countries is being organized, and special directives about security of vital infrastructures are likely to be enforced.

Metering is directly affected by this focus. Security is everywhere in the metering process, from the meter to the central system, including each network and media used to communicate (home network, public network and enterprise network). All partners, from manufacturers to suppliers and regulation authorities have to worked together in raising awareness and securing the metering systems.

## 4.1 Threats and critical actions

Risks for actors of an Automated Meter Infrastructure (grid operator, supply company, customer) are multiple and of different natures:

- Access or alteration of information by unauthorized persons: intrusions and illicit changes.
- Willful actions by intruders, resulting in modifying settings of assets, or disconnecting the customer by operating the electricity-breaker or gas-valve: risks to public health and confidence.
- Denial of service on a component of the system (meter, back-office, communication system): loss of system availability, leading to compromised process functionality or security.
- Privacy and legislation: many countries protect customer's and people's rights by laws, to ensure that personal and confidential information will not be disclosed within communicating systems; Grid systems shall not be a way to reveal information: theft and publication of information to unauthorized destinations should be prevented.

Intrusions could result in critical problems for people who depend on the energy supplier. Compromising security for a company could lead to Millions of Euros in damages (for equipment and responsibility).

For all these reasons, the entire metering infrastructure has to be protected and shall offer security services for all data, networks, and the components of which it is composed.

## 4.2 Assumptions

It is recommended that proven standards and industry best practices used for IT systems are implemented. This includes technologies deployed in other domains, such as the finance sector. Existing systems should be considered and adapted, and security measures not reinvented. As

threats and risks evolve along the life-span of the metering infrastructure, special attention shall be given to updating the security mechanisms.
The concept of “defense in depth” shall be applied to the entire system: security at each layer of the metering infrastructure, from the centralized system to the end-point meter, including networks. The WELMEC Software Guide 7.2 issue 4 gives guidance about software security which is extended to data communications networks (extension T). The requirements below are in accordance with Welmec Guide, taking into consideration that the metering infrastructure must offer the functionality necessary to cover risk categories B-C-D (requirements T1 to T6) of the Welmec Guide.

Security Assumptions:

- If physical intrusion of a meter happens, the compromising of one device shall not permit compromising all of the system.
- Sensitive information and commands will have to be protected.
- Most communications at application level between the device and the CS is encrypted, using the published and acknowledged encryption mechanism AES-128. Usage of trusted equipments, such as cryptographic processor embedded in smart-cards shall be considered because they are tamper resistant.
- Since security standards are available for IT systems and Industrial Automation and Control Systems, they shall be applied, from the very conception of the systems to the deployment of devices and system.

The metering infrastructure shall prevent:

- Unauthorized access, theft or misuse of confidential information (data cannot be read or altered in the meter or in transit across all networks).
- Loss of integrity or reliability of process data and production information.
- Loss of system availability (back-office and data processing is secured).
- Intrusions and illicit changes – for example illicit firmware upgrade.
- Process upsets leading to compromising of process functionality or loss of system capacity (separation of responsibilities for appropriate actions).

Identified requirements to complete these needs are:

- Access and Use Control
- Authenticity
- Data integrity
- Data Confidentiality

## 4.3 Access, Use Control and Authenticity

Only the grid operator is allowed to have access to the P3 port. In case there is a separate grid operator for electricity and for gas, only the electricity grid operator shall have direct access to the metering installation via the P3 port. The electricity grid operator is responsible for the correct data communication between the electricity meter and M-Bus devices, and is also responsible for the correct data communication from the metering installation to the central system and vice versa. The manufacturer of equipment must ensure the correct implementation of the *iden-*

*tification*, *authentication* and *authorization* concerning the metering installation, and *confidentiality* of the data communication from the metering installation to the central system and between the metering installation and the connected Gas, Water, Thermal, end Slave E meterer (P2 port), regardless of the communication medium used.

DSMR-M 4.4.1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | No physical port or interface can be accessed without opening the cover(s), except for P0 and P1. | | | | | | |
| **Rationale** | For security reasons and to avoid any unauthorized person from accessing or modifying system components or data, it is necessary that no physical port or interface can be accessed without opening the cover(s), except for P0 and P1. | | | | | | |
| **Fit criterion** | Physical ports or interfaces cannot be accessed without opening the cover(s), except for P0 and P1 | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | P2, P3 | **Applicable** | E meter |

DSMR-M 4.4.2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The system shall be capable of automatically generating an event when the terminal cover is opened. | | | | | | |
| **Rationale** | For security reasons and to avoid any unauthorized person from accessing or modifying system components or data, it is necessary to detect physical intrusion. The system must therefore be capable of automatically generating an event when the terminal-cover is opened. | | | | | | |
| **Fit criterion** | An event for opening the terminal cover will be generated. Adequate measures must be taken to prevent false alarms (i.e by vibrations, humidity). | | | | | | |
| **History** | July. 2009 | **Origin** | P&S 1.5 | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.4.3

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The construction of the E meter shall prevent intruding into the E meter and tampering with the E meter. | | | | | | |
| **Rationale** | Intrusion and tamper attempts shall be visible on visual inspection. | | | | | | |
| **Fit criterion** | The E meter and the block cap are protected by separate seals in order to prevent intruding into the E meter and tampering with the E meter. | | | | | | |
| **History** | Nov. 2007 | **Origin** | P&S 1.5 | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.4.4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The construction of the G meter shall prevent intruding into the G meter and tampering with the G meter. | | | | | | |
| **Rationale** | Intrusion and tamper attempts shall be visible on visual inspection. | | | | | | |
| **Fit criterion** | The connections of the G meter can be sealed on both sides (inlet and outlet). Any communication cables, batteries and similar, shall be locked behind sealable covers. | | | | | | |
| **History** | Nov. 2007 | **Origin** | P&S 1.5 | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.4.5

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The M-Bus terminals on the E meter must be safely accessible. | | | | | | |
| **Rationale** | Connecting the cable of the M-Bus device should be possible in a safe way. It should not be possible to touch live parts of the meter. | | | | | | |
| **Fit criterion** | The M-Bus terminals on the E meter shall be accessible without breaking the seal of the terminal cover of the E meter. The M-Bus terminals on the E meter shall be separately sealable from the other terminals. For every M-Bus device separate terminals are required. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | P2 | **Applicable** | E meter |

DSMR-M 4.4.6

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall provide functionality for authentication on the communication ports P0 and P3. | | | | | | |
| **Rationale** | For security reasons it is important that equipment is able to determine authenticity of communication partners to ensure that data is not modified or compromised by any unauthorized entity. | | | | | | |
| **Fit criterion** | No port can be accessed without correct authentication by applying an encryption algorithm that includes authentication mechanisms. | | | | | | |
| **History** | Nov. 2007 | **Origin** | P&S 1.5 | **Port** | P0, P3 | **Applicable** | E meter |

DSMR-M 4.4.7

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall support functionality to configure whether the P0 port is usable or not usable. | | | | | | |
| **Rationale** | Some Grid Operators use a PDA connected to the P0 port for commissioning the E-Meter, or for some local maintenance tasks (e.g. Calibration Rack). | | | | | | |
| **Fit criterion** | When the P0 port is configured as not usable then there shall be no method, including brute force attack, to gain access to the meter via the P0 port. | | | | | | |
| **History** | Jan. 2011 | **Origin** | | **Port** | P0 | **Applicable** | E Meter |

DSMR-M 4.4.8a

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall support functionality to configure the supported authentication mechanism on P0 and P3 port. | | | | | | |
| **Rationale** | This functionality give the opportunity to the Central System to select another authentication mechanism when one authentication mechanism is not safe anymore. | | | | | | |
| **Fit criterion** | It shall be possible to configure for HLS mechanism 3,4 and 5 or any combination for both P0 and P3 whether the meter accepts the authentication request or reject the authentication request. | | | | | | |
| **History** | Jan. 2011 | **Origin** | | **Port** | P0, P3 | **Applicable** | E Meter |

DSMR-M 4.4.8b

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall support functionality to configure different HLS mechanisms for P0 and P3 port. . | | | | | | |
| **Rationale** | Some Grid Operators use a PDA connected to the P0 port for commissioning the E-Meter using HLS mechanism 4 with a secret that is shared with a group of meters. Access to the meter via the P3 port using such shared secret shall be prevented. | | | | | | |
| **Fit criterion** | The HLS mechanism on P0 and P3 port can be configured independently from each other. | | | | | | |
| **History** | Jan. 2011 | **Origin** | | **Port** | P0, P3 | **Applicable** | E Meter |

DSMR-M 4.4.9

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment must be capable of managing access rights for any of its logical components, with an adequate granularity. | | | | | | |
| **Rationale** | Users shall be authenticated and authorized to access the logical components of the equipment. | | | | | | |
| **Fit criterion** | Access control will be offered for any of its logical components on attribute level. . | | | | | | |
| **History** | July. 2009 | **Origin** | TST | **Port** | P0, P3 | **Applicable** | E meter |

DSMR-M 4.4.10

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall provide functionality for the authorisation of data communications on all of its communication interfaces. | | | | | | |
| **Rationale** | For security reasons it is important that equipment is able to determine the authorisation of all communication partners. | | | | | | |
| **Fit criterion** | Authorisation functionality shall be provided by access control mechanisms. | | | | | | |
| **History** | July. 2009 | **Origin** | P&S 1.5 | **Port** | P0, P3 | **Applicable** | E meter |

DSMR-M 4.4.11

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | All communications interfaces shall only support DSMR specified functionality. All other functionality on the communication interfaces shall be disabled. This also is applicable for the developer interface (e.g. JTAG). | | | | | | |
| **Rationale** | It is important that the equipment does not respond to and is not adversely affected by communications using protocols and functionality other than those required for communications with other metering infrastructure equipment. | | | | | | |
| **Fit criterion** | All communications interfaces shall only support DSMR specified functionality. All other functionality on the communication interfaces shall be disabled (Read and Write). This also is applicable for the developer interface (e.g. JTAG). | | | | | | |
| **History** | July. 2009 | **Origin** | P&S 1.5 | **Port** | P0, P2 P3 | **Applicable** | E meter, G meter |

DSMR-M 4.4.12

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Interfaces shall not accept unauthorized or erroneous communications and are capable of handling (dropping) such communication (including TCP) without adverse effects on the operation of the equipment or the interface. | | | | | | |
| **Rationale** | It is important that the interfaces do not accept unauthorized or erroneous communications and are capable of handling (dropping) such communication (including TCP) without adverse effects on the operation of the equipment or the interface. | | | | | | |
| **Fit criterion** | Interfaces shall not accept unauthorized or erroneous communication and unauthorised communications will not adversely affect the operation of the remainder of the equipment. | | | | | | |
| **History** | July. 2009 | **Origin** | P&S 1.5 | **Port** | P0, P2 P3 | **Applicable** | E meter, G meter |

DSMR-M 4.4.13

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Unused physical interfaces will be disabled by default, including the installation mode of the meter. | | | | | | |
| **Rationale** | For security reasons it is important that management of physical interfaces shall be possible to enforce the security for local access. | | | | | | |
| **Fit criterion** | Unused ports and interfaces are disabled by default. Mechanisms are implemented for enabling or disabling the interfaces. | | | | | | |
| **History** | July. 2009 | **Origin** | P&S 1.5 | **Port** | P0, P2 | **Applicable** | E meter |

DSMR-M 4.4.14

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | All keys (except the master key) that can be used by the grid operator can be changed via either the local maintenance port P0 or remotely via P3. | | | | | | |
| **Rationale** | It must always be possible to change keys. This ensures that compromised keys do not lead to uncontrollable exposure of a (large group of) meter(s). A compromised master/default key alone does not allow the change of; software, settings, meter readings, etc. | | | | | | |
| **Fit criterion** | Functionality must be implemented to change all keys (except the master/default key) via either the local maintenance port P0 or remotely via P3. | | | | | | |
| **History** | July. 2009 | **Origin** | P&S 1.5 | **Port** | P0, P2, P3 | **Applicable** | E meter, G meter |

DSMR-M 4.4.15

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter will forward the key as soon as possible to the M-Bus device. | | | | | | |
| **Rationale** | The new key needs to be used for communication as soon as possible. For wireless communication this means that it will be included in the next communication session that is initiated by the M-Bus device. | | | | | | |
| **Fit criterion** | The E meter will forward the key at the first opportunity to communicate to the M-Bus device. | | | | | | |
| **History** | May 2010 | **Origin** | TST | **Port** | P2 | **Applicable** | E meter |

DSMR-M 4.4.16

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Every attempt to access ports and components with an incorrect key must result in locking the port or component for 10 seconds and a message in a log file. | | | | | | |
| **Rationale** | For security reasons it is important that for every attempt made to access port or components with an incorrect key, the port or component is locked for 10 seconds before another attempt can be made. Also this event must be logged in a log file. | | | | | | |
| **Fit criterion** | The port or component must be locked for 10 seconds for every access attempt made with an incorrect key. Also this event must be logged in a log file. | | | | | | |
| **History** | July. 2009 | **Origin** | P&S 1.5 | **Port** | P0, P3 | **Applicable** | E meter |

DSMR-M 4.4.17

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Illegal access to one device shall not lead to gaining access to multiple devices | | | | | | |
| **Rationale** | Intercommunication between E meters is not allowed. M-Bus devices are only allowed to communicate with their designated E meter. | | | | | | |
| **Fit criterion** | Illegal access to one device shall not lead to gaining access to multiple deployed devices. | | | | | | |
| **History** | Jan. 2011 | **Origin** | P&S 1.5 | **Port** | n.a. | **Applicable** | E meter, G meter |

## 4.4 Data Integrity

DSMR-M 4.4.18

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall provide functionality to preserve the integrity of data storage, including integrity of equipment firmware. | | | | | | |
| **Rationale** | It is important that the integrity of data and firmware stored in the equipment is maintained. | | | | | | |
| **Fit criterion** | Security mechanisms shall be implemented to ensure the protection of data and encryption keys stored on the equipment. For example, keys shall be located in a dedicated place of the system and access shall be restricted to avoid alteration. | | | | | | |
| **History** | July 2009 | **Origin** | P&S 1.5 | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.4.19

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall provide functionality to report and log loss of integrity of data storage, including loss of integrity of equipment firmware. | | | | | | |
| **Rationale** | It is important that any loss of integrity of data and firmware stored in the equipment is reported and logged, i.e. it shall provide some method of indicating when data or firmware has been changed without its control (for example report firmware hash). | | | | | | |
| **Fit criterion** | Loss of integrity of data storage, including loss of integrity of equipment firmware is reported and logged. For example a regular hash check is performed to identify firmware changes and perhaps also a hash of metering data. For the G meter this is reported as a Fraud attempt, for the E meter this is reported as a specific memory error. | | | | | | |
| **History** | July. 2009 | **Origin** | P&S 1.5 | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.4.20

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall raise an event if the configuration is changed after the meter is deployed. | | | | | | |
| **Rationale** | When the configuration of the meter is altered after it is deployed, it may indicate that the meter is hacked or has been tampered with. This has to be detected and an event shall be raised to inform the GO of this occurrence. | | | | | | |
| **Fit criterion** | The E meter shall raise an event if the configuration is changed after the meter is deployed.<br>The following read/write items are not considered as a configuration change:<br>- Change of the clock of the meter<br>- Change of the IP address of the meter<br>- Change of the Error register<br>- Change of the Alarm register<br>- Change of the Consumer Short message<br>- Change of the Consumer Long message | | | | | | |
| **History** | Jan. 2011 | **Origin** | P&S1.5 | **Port** | P0, P2, P3 | **Applicable** | E Meter |

DSMR-M 4.4.21

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall implement anti-replay mechanism. | | | | | | |
| **Rationale** | It is necessary to prevent message replay. For example critical messages such as disconnects, alarms, etc. must be prevented from being replayed. | | | | | | |
| **Fit criterion** | Classical encryption mechanisms (including time stamp or numbering with initial vector) based on open standards will be implemented to ensure the identification of each message and its uniqueness. | | | | | | |
| **History** | July. 2009 | **Origin** | P&S 1.5 | **Port** | P0, P2, P3 | **Applicable** | E meter, G meter |

## 4.5 Data Confidentiality

DSMR-M 4.4.22

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E-Meter and all connected devices (connected via P0, P2 and P3) shall provide functionality to prevent eavesdropping. | | | | | | |
| **Rationale** | It is necessary to ensure confidentiality for data that have been identified as critical by owners, or legal authorities (commercial data, nominative data, etc). Implementation of encryption mechanisms is necessary on appropriate layers of the communication system to prevent eavesdropping. | | | | | | |
| **Fit criterion** | All communication at application-level between the E-Meter and all connected devices (connected via P0, P2 and P3)is encrypted, using AES-128 as the encryption mechanism. | | | | | | |
| **History** | Nov. 2007 | **Origin** | P&S 1.5 | **Port** | P0, P2, P3 | **Applicable** | E meter |

DSMR-M 4.4.23

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The device provides functionality for management of security keys, including safe storage and change. | | | | | | |
| **Rationale** | Encryption keys must be managed such that they can be exchanged, stored, used and replaced, all in a secure manner. | | | | | | |
| **Fit criterion** | Functionality for management of the security keys is provided. | | | | | | |
| **History** | July. 2009 | **Origin** | P&S 1.5 | **Port** | P2, P3 | **Applicable** | E meter, G meter |

DSMR-M 4.4.24

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | All communication pertaining to privacy sensitive data shall be secured so that integrity, authenticity, confidentiality and uniqueness are guaranteed. | | | | | | |
| **Rationale** | Privacy sensitive data shall be protected at all times | | | | | | |
| **Fit criterion** | ○ No common secrets (including cryptographic keys) shall be present in smart meters. Thus, each smart meter shall have its own unique meter master key.<br>○ The meter master and encryption keys shall be stored on meters in a secure manner which resists attempts to discover them.<br>○ The message encryption key and message authentication key shall be updated using the meter master key with a secure key wrapping function.<br>○ The authentication secrets shall be updated using the meter master key with a secure key wrapping function.<br>○ The message encryption key and authentication key shall be unique per meter and shall be stored in a secure manner that resists attempts to discover them.<br>○ All cryptographic keys and random data involved in any cryptographic operation shall be cryptographically random.<br>○ Software which implements the security functions (e.g., authentication handshake protocol, message encryption/decryption, access control, etc) shall be protected from unauthorized access and modification.<br>○ Smart meter software for the E meter shall be renewable/updatable in case that a security compromise or a security vulnerability is found or there is a need to update meter functionality including cryptographic algorithm update.<br>○ Smart meter software for the E meter (as a whole or only a module) shall be updated in a secure manner that only authorized software can be loaded into the meter. | | | | | | |
| **History** | Dec. 2010 | **Origin** | P&S 1.5 | **Port** | n.a. | **Applicable** | E meter, G meter |

# 5 REQUIREMENTS DERIVED FROM NTA 8130

This chapter provides the business use cases for metering and switching equipment installed at the premises of the customers. Some of the requirements will occur in multiple use cases, to avoid confusion they are numbered separately.

## 5.1 Use case 1: Provide periodic meter reads

This section describes the process of gathering and providing periodic meter reads (see NTA 8130, §5.2.1). This process is triggered on the installation of the E meter.

This use case is concerned with periodic meter readings. Periodic meter readings are daily and monthly meter readings. Definitions for meter readings for E and G are provided in Chapter 2. All meter readings mentioned in this use case shall comply with these definitions. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-1.

| Trigger | Description |
|---|---|
| Deploy E meter | On installation the E meter starts registering periodic meter readings (also for G, and, if desired, for W and T) and on deployment these meter readings are made available to the CS. |

**Figure 5-1a: Provide periodic meter reads – trigger description**

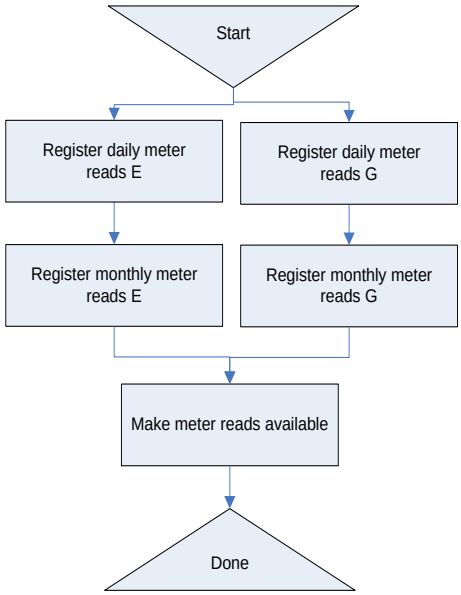


**Figure 5-1b: Provide periodic meter reads – block diagram**

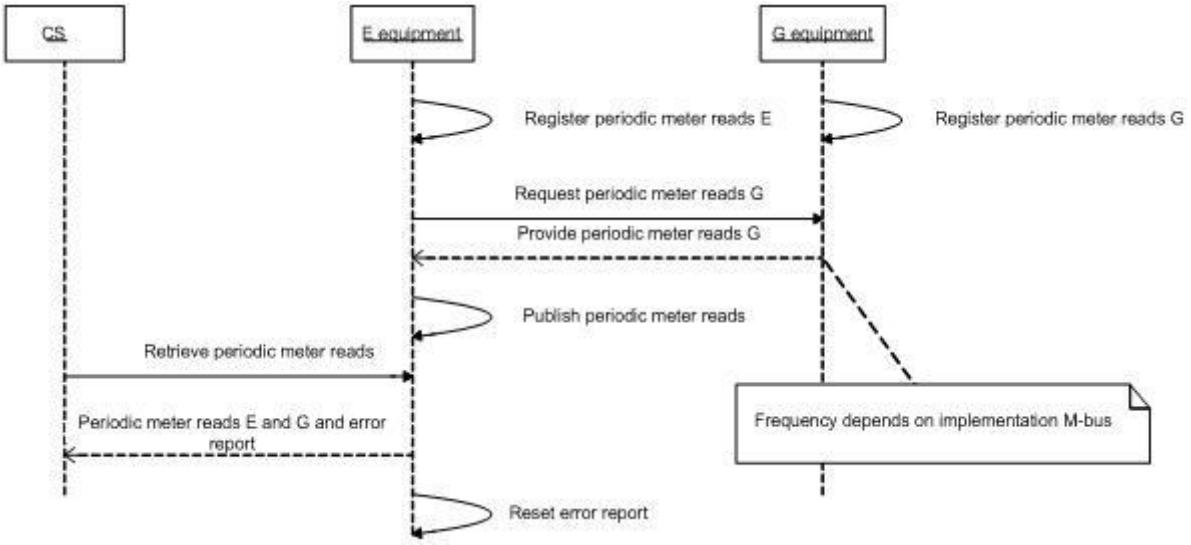


**Figure 5-1c: Provide periodic meter reads – UML sequence diagram**

*Pre-conditions*

- Not all necessary periodic meter reads are available in the E meter. The internal trigger to gather periodic meter reads occurred.

*Parameters*

- Equipment identifier for the E meter.
- The interval for which the periodic meter readings are requested.

*Post-conditions*

- All necessary meter reads are available.
- Error report.

### 5.1.1 Requirements for electricity

DSMR-M 4.5.1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall register a meter reading E at 00:00 hours every day. | | | | | | |
| **Rationale** | This is required in NTA 8130 (see §5.2.1 in conjunction with definition of “daily meter reading”). Market processes (switching, moving, etc.) require the availability of daily meter reads. | | | | | | |
| **Fit criterion** | The E meter shall register a meter reading as defined in Chapter 2 at 00:00 hours every day. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.1) | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide the *40* most recent daily meter readings for E. | | | | | | |
| **Rationale** | The period of forty days guarantees that no meter readings will be lost within a period of forty days in cases where the data can not be collected immediately after it was registered. The minimum and maximum retaining period for daily meter readings for E in the meter is 40 days. | | | | | | |
| **Fit criterion** | The E meter shall have available meter readings E for the 40 most recent days in the past. The minimum and maximum retaining period for daily meter readings for E in the meter is 40 days. The information provided as periodic meter readings shall at least contain the following information:<br>▪ Meter readings E for the designated period using kWh as the unit of measurement<br>▪ Event report for the designated period. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.1) | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.3

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide the *13* most recent monthly meter reads for E. | | | | | | |
| **Rationale** | It is necessary to keep a one-year history of E consumption and/or production data available in the meter, e.g. in case of disturbances and data loss in the CS or on behalf of the customer. The minimum and maximum retaining period for E consumption and/or production data in the meter is 13 months. | | | | | | |
| **Fit criterion** | The E meter shall have available meter readings E for each first day of the 13 most recent calendar months in the past. The minimum and maximum retaining period for monthly meter reads in the meter is 13 months. The information provided as periodic meter readings shall at least contain the following information:<br>▪ Meter readings E for the designated period using kWh as the unit of measurement<br>▪ Event report for the designated period. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.1) | **Port** | P3 | **Applicable** | E meter |

### 5.1.2 Requirements for gas

DSMR-M 4.5.4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The 00.00 reading of the G meter is also used as daily meter reading. | | | | | | |
| **Rationale** | The hourly readings are stored in the E-meter in the hourly load profile and the 00.00 reading is copied into the daily load profile (combined).<br>This is required in NTA 8130 (see §5.2.1 in conjunction with definition of “daily meterreading”). Market processes (switching, moving etc.) require the availability of dailymeter reads. | | | | | | |
| **Fit criterion** | The 00:00 hour reading is stored in the E-meter copied into the daily load profile. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.1) | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.5.5

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The exchange of meter reading between E meter and G meter takes place once an hour. | | | | | | |
| **Rationale** | To extend the life time of the battery of the G meter, the communication between E meter and G meter is minimized. | | | | | | |
| **Fit criterion** | The exchange of meter readings between the E meter and G meter takes place only once an hour. | | | | | | |
| **History** | Mar. 2011 | **Origin** | TST | **Port** | P2 | **Applicable** | E meter, G meter |

DSMR-M 4.5.6

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide the *40* most recent daily meter readings for G. | | | | | | |
| **Rationale** | The period of forty days guarantees that no meter readings will be lost within a period of forty days in cases where the data can not be collected immediately after it was registered. The minimum and maximum retaining period for daily meter readings for G in the meter is 40 days. | | | | | | |
| **Fit criterion** | The E meter shall have available meter readings G for the 40 most recent days in the past. The minimum and maximum retaining period for daily meter readings for G in the meter is 40 days. The information provided as periodic meter readings shall contain the following information:<br>▪ Meter readings G for the designated period using $m^3$ as the unit of measurement;<br>▪ Event report for the designated period.<br>The E meter will store the most recent captured M-Bus master value at 11 minutes past the hour in the profile(s). The 11 minutes gives the E Meter sufficient time to receive or to capture the recent hourly value from the G meter. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.1) | **Port** | P3 | **Applicable** | E meter, G meter |

DSMR-M 4.5.7

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Wireless devices must prevent congestion on the frequency band. | | | | | | |
| **Rationale** | It can happen that a number of G meters are installed next to each other (for example in apartment buildings). To prevent congestion on the wireless frequency band, all wireless communication sessions shall be randomized. | | | | | | |
| **Fit criterion** | Wireless devices shall randomly start their communication sessions within a window of 10 minutes past each whole hour. | | | | | | |
| **History** | Jan. 2011 | **Origin** | TST | **Port** | P2 | **Applicable** | E meter, G meter |

DSMR-M 4.5.8

| | |
|---|---|
| **Description** | The E meter shall provide the *13* most recent monthly meter readings for G. |
| **Rationale** | It is necessary to keep a one-year history of G consumption data available in the E meter, e.g. in case of disturbances and data loss in the CS or on behalf of the customer. The minimum and maximum retaining period for monthly meter readings for G in the E meter is 13 months. |
| **Fit criterion** | The E meter shall have available meter readings G for each first day of the 13 most recent calendar months in the past. The minimum and maximum retaining period for monthly meter readings for G in the E meter is 13 months. The information provided as periodic meter readings shall at least contain the following information:<br>▪ Meter readings G for the designated period using $m^3$ as the unit of measurement; |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | ▪ Event report for the designated period. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.1) | **Port** | P3 | **Applicable** | E meter, G meter |

### 5.1.3 Error reporting

DSMR-M 4.5.9

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide an indication that an error was registered by the equipment as part of a periodic meter read. | | | | | | |
| **Rationale** | By providing error information the CS will be informed that the metering installation registered an error. | | | | | | |
| **Fit criterion** | The meter shall provide information indicating an error was registered. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.8.5) | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.10

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall issue a logical error in case the end date of the requested period is prior to the begin date. | | | | | | |
| **Rationale** | The current use case has a parameter indicating for which period meter readings shall be retrieved. The interval can be provided as open or closed interval. For an open interval the timestamp for either the start or for the end of the interval is provided. In case of a closed interval timestamps for both start and for the end are provided. In the latter case the timestamp for the start shall be before the timestamp of the end of the interval otherwise a logical error is issued. | | | | | | |
| **Fit criterion** | The logical error issued shall at least contain the generic attributes for errors. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

### 5.1.4 Performance

DSMR-M 4.5.11

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall supply the periodic meter reads on P3 soon after the request was received. | | | | | | |
| **Rationale** | If the information retrieval takes too much time, this will cause delays in the meter data collection process. | | | | | | |
| **Fit criterion** | Total time to retrieve all requested information from the meter and publish it through P3 shall be less than 5 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

## 5.2 Use case 2: Provide actual meter reads through P3

This section describes the process of gathering and providing actual meter reads in the metering and switching equipment to the CS (see NTA 8130: § 5.2.4). This process is triggered on the request of an actual meter read by a market participant. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-2.
Definitions for meter readings for E and G are provided in Chapter 2. All meter readings mentioned in this use case shall comply with these definitions.

| Trigger | Description |
|---|---|
| Request for actual meter read | A market participant requests an actual meter read. |

**Figure 5-2a: Provide actual meter reads – trigger description.**

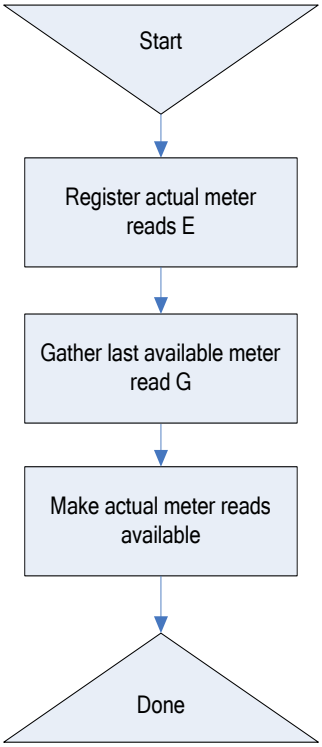


**Figure 5-2b: Provide actual meter reads – block diagram.**

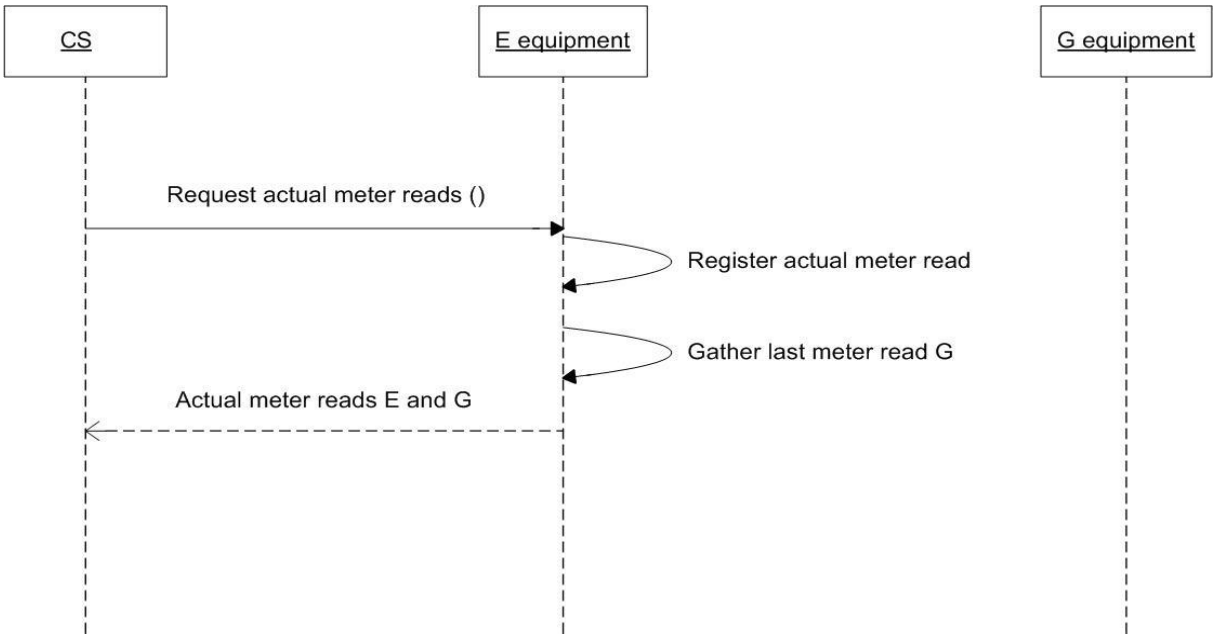

**Figure 5-2c: Provide actual meter reads – UML sequence diagram.**

*Pre-conditions*

- A market participant requires actual meter reads for a connection.

*Parameters*

- Equipment identifier for the E meter.

*Post-conditions*

- The actual meter reads are available.

### 5.2.1 Requirements for electricity and gas

DSMR-M 4.5.12

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to register the actual meter readings E on request. | | | | | | |
| **Rationale** | An actual meter reading is a meter reading on request. The E meter registers a meter reading at the moment it receives the request. Actual meter readings can be used to handle complaints from customers. | | | | | | |
| **Fit criterion** | The E meter shall register a meter reading as defined in Chapter 2. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.4) | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.13

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to retrieve actual meter reads. | | | | | | |
| **Rationale** | Under some circumstances an actual meter read is needed (for example, consider a call-centre agent handling a customer complaint). This is required in NTA 8130 (see § 5.2.4). | | | | | | |
| **Fit criterion** | The information provided as actual meter readings shall at least contain the following information:<br>▪ Actual meter reading E using kWh as the unit of measurement;<br>▪ Most recent meter reading G available in the E meter using $m^3$ as the unit of measurement; | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.4) | **Port** | P3 | **Applicable** | E meter |

### 5.2.2 Error reporting

DSMR-M 4.5.14

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall issue an error as soon as the scheduled G meter reading was not possible. | | | | | | |
| **Rationale** | The communication between the E meter and the G meter is not ‘always on’, depending on the communication medium. For this reason the E meter provides the most recent meter reading G it has available. If the most recent scheduled meter reading G is not available an error is generated. | | | | | | |
| **Fit criterion** | The E meter shall issue an error as soon as the scheduled G meter reading was not possible. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 | **Port** | n.a. | **Applicable** | E meter, G meter |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | ((§5.2.4) | | | | |

### 5.2.3 Performance

DSMR-M 4.5.15

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have actual meter reads available on P3 immediately after the request was received. | | | | | | |
| **Rationale** | Actual meter readings can be used to handle complaints from customers. An actual meter reading is a meter reading on request. The E meter registers a meter reading at the moment it receives the request; these must be provided immediately. The information needs to be actual. | | | | | | |
| **Fit criterion** | Total time to retrieve all requested information from the meter and publish it through P3 shall be less than 5 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

## 5.3 Use case 3: Provide actual meter reads through P1

This section describes the process of gathering and providing actual meter reads in the metering and switching equipment to the other services module (port P1). See also §5.2.5, §5.5.1.1 and Appendix B of NTA 8130. Port P1 is intended to be used simultaneously by multiple types of equipment (a maximum of 5 appliances can be connected), and is implemented using a RJ11 physical interface. This process is triggered if an external device is connected to the RJ11 plug (connector #2 – see Appendix B of NTA 8130). The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-3.

| Trigger | Description |
|---|---|
| Request input of RJ11 plug is high. | Actual meter reads are requested by connecting an external device. The metering installation will henceforth deliver the actual (for E) and most recent (for G) meter data. |

**Figure 5-3a: Provide actual meter reads through P1 – trigger description.**

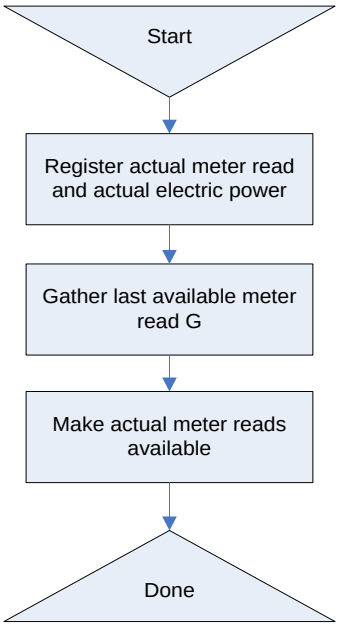

**Figure 5-3b: Provide actual meter reads through P1 – block diagram.**

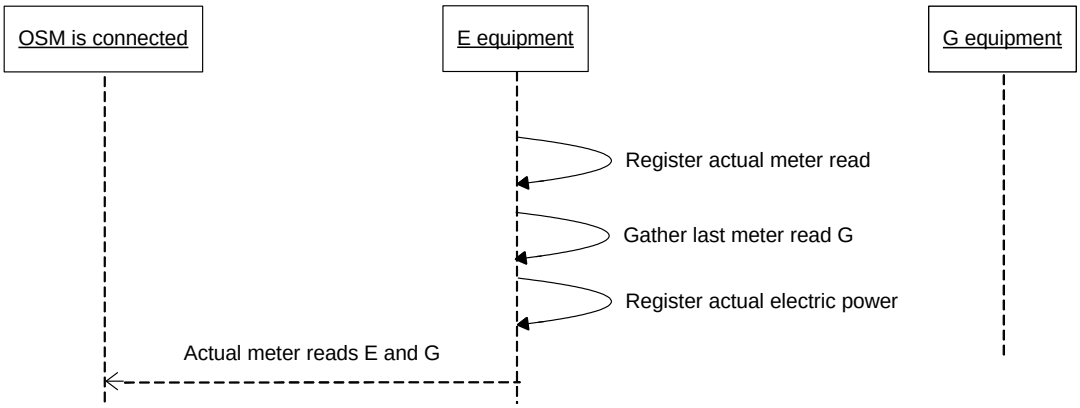


**Figure 5-3c: Provide actual meter reads through P1 – UML sequence diagram.**

*Pre-conditions*

- Actual meter reads are requested by the other services module (through P1).

*Parameters*

- None.

*Post-conditions*

- The actual meter reads are available to auxiliary equipment connected to P1.

### 5.3.1 Requirements for electricity and gas

DSMR-M 4.5.16

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | On connecting an auxiliary equipment (on P1), the E meter shall register actual meter reads for electricity with a regular interval. | | | | | | |
| **Rationale** | The actual meter readings are provided to give the consumer insight in the amount of electrical energy he uses in a near real-time fashion. The auxiliary equipment is responsible for providing the information to the consumer in a convenient way. | | | | | | |
| **Fit criterion** | The E meter shall register actual meter readings every 10 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.5) | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.17

| | |
|---|---|
| **Description** | On connecting auxiliary equipment (on P1), the E meter shall determine the actual electrical power. |
| **Rationale** | The actual power is provided to the consumer in order to inform in a near real-time fashion. The auxiliary equipment is responsible for providing the information to the consumer in a convenient way. |
| **Fit criterion** | The E meter shall determine the average electrical power (delivery and consumption) for every 10 second interval. |

| History | Nov. 2007 | Origin | NTA 8130 ((§5.2.5) | Port | n.a. | Applicable | E meter |
|---|---|---|---|---|---|---|---|

DSMR-M 4.5.18

| Description | The E meter shall provide the actual meter readings and actual power to the OSM every 10 seconds. |
|---|---|
| Rationale | For the benefit of the customer, actual meter reads and the actual power are to be provided to the OSM through P1. |
| Fit criterion | The information provided at P1 shall at least contain the following information:<br>▪ Equipment identifier(s);<br>▪ Actual meter reading E using kWh (three decimals) as the unit of measurement;<br>▪ Actual electrical power (delivery and consumption) specified with a resolution of 1 W;<br>▪ Most recent hourly meter reading G available in the metering equipment using $m^3$ as the unit of measurement (number of decimals depending on G meter type).<br>When a utility service person is at a customer's premise and is communicating to the meter over its optical port (P0), the P1 port can be temporarily interrupted. |

| History | Nov. 2007 | Origin | NTA 8130 ((§5.2.5) | Port | P1 | Applicable | E meter |
|---|---|---|---|---|---|---|---|

### 5.3.2 Performance

DSMR-M 4.5.19

| Description | The E meter shall have the actual meter reads available on P1. |
|---|---|
| Rationale | For the benefit of the customer, actual meter reads are to be provided to the auxiliary equipment through P1. This information needs to be actual; therefore the information will be refreshed every 10 seconds. |
| Fit criterion | Total time to retrieve all information from the meter and publish it through P1 shall be less than 10 seconds. |

| History | Nov. 2007 | Origin | TST | Port | P1 | Applicable | E meter |
|---|---|---|---|---|---|---|---|

## 5.4 Use case 4: Provide interval values

This section provides the description of the process of making interval values available to the CS. The interval values are made available through the E meter (both interval values for electricity and gas). The process of providing interval values is an uninterrupted process that runs throughout the lifecycle of the metering equipment. This process is hence triggered on the deployment of the electricity meter. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-4.

Interval values are in fact time series composed of meter readings. This means that interval values differ from periodic meter reads only in the density of the measurements. As a result the interval values presented in this use case shall comply with the definitions of meter readings. Definitions for meter readings for E and G are provided in Chapter 2.

| Trigger | Description |
|---|---|

| | |
|---|---|
| Deploy E meter | On installation the E meter starts registering interval meter reads and on deployment these meter reads are made available to the CS. |

**Figure 5-4a: Provide interval values – trigger description**

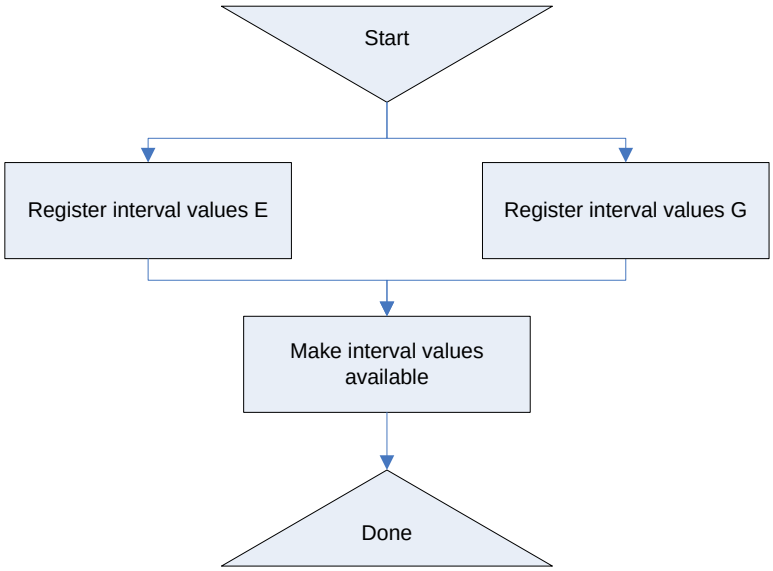


**Figure 5-4b: Provide interval values – block diagram**

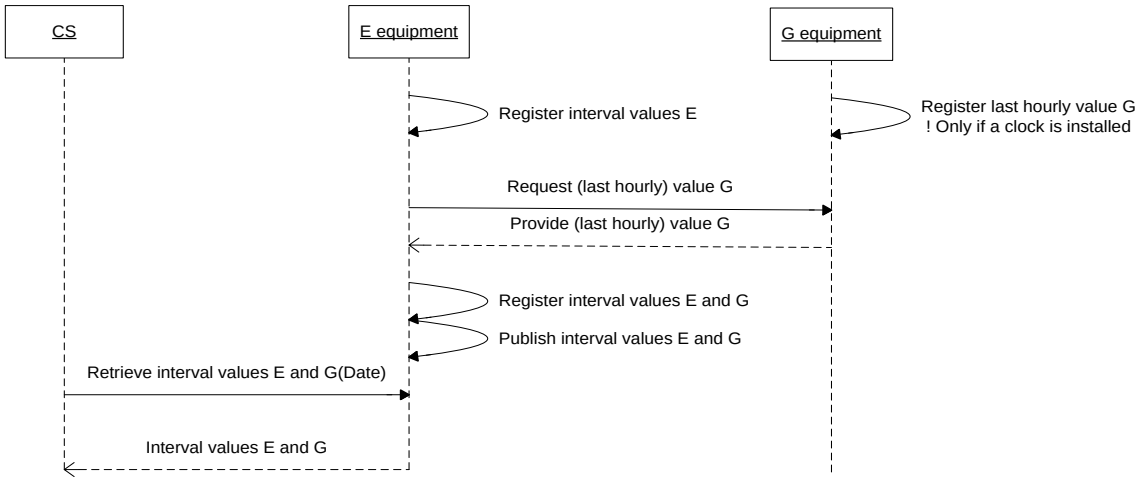


**Figure 5-4c: Provide interval values - UML sequence diagram**

*Pre-conditions*

Interval values E and G have been registered in the E meter. The G meter shall register the last hourly meter reading in case the gas meter has a clock.

In case the gas meter doesn't have a clock, the gas meter doesn't register the last hourly value, but the E meter requests the actual value and registers this value.

*Parameters*

- Equipment identifier for the E meter.
- The interval for which the interval values are requested.

*Post-conditions*

- Interval values for the requested period are provided on the designated ports.

*Assumptions*

-

### 5.4.1 Requirements for electricity

DSMR-M 4.5.20

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall register meter readings E (from the total consumption and delivery registers) for 15 minute intervals. | | | | | | |
| **Rationale** | Interval values are useful for both grid operator and supplier. The grid operator can use the interval values for fraud detection; the supplier can use the interval values for energy advice to customers or for analysis of consumption patterns. | | | | | | |
| **Fit criterion** | The E meter shall register a meter reading E as defined in Chapter 2 every 15 minutes. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.6) | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.21

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to retrieve the interval values for a designated period. | | | | | | |
| **Rationale** | Interval values are useful for both grid operator and supplier. The grid operator can use the interval values for fraud detection; the supplier can use the interval values for energy advises to customers or for analysis of consumption patterns. | | | | | | |
| **Fit criterion** | The interval values for the designated period shall at least contain the following information:<br>▪ Meter readings E with a measurement period of 15 minutes using kWh (3 decimals) as the unit of measurement;<br>▪ Meter readings G with a measurement period of 60 minutes using $m^3$ (three decimals for <= G6, two decimals for > G6) as the unit of measurement. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.6) | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.22

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide on request interval data E for the 10 most recent days. | | | | | | |
| **Rationale** | Interval data is used for analysis purposes. In order to be able to perform an analysis on interval data, interval data has to be available for a reasonable period. The interval data for that period can then be retrieved in a single request. The minimum and maximum retaining period for interval data for E in the meter is 10 days. | | | | | | |
| **Fit criterion** | The E meter shall store a minimum and maximum of 10 days of interval data E. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.6) | **Port** | P1, P3 | **Applicable** | E meter |

DSMR-M 4.5.23

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The meter shall register interval data for the most 10 recent days. The meter shall also provide partly available interval data, for example if only 5 days are available, the meter shall give this data back on a request of 10 days. | | | | | | |
| **Rationale** | If the requested interval data is only partly available in the meter then the meter must provide the available interval data.<br>For example: The CS request 10 day's interval data and only 5 days are available, the meter shall provide the 5 days load profile | | | | | | |
| **Fit criterion** | The meter shall also provide partly available interval data, and no logical error shall be issued. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

### 5.4.2 Requirements for gas

DSMR-M 4.5.24

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | G meters shall register the last hourly meter reading. | | | | | | |
| **Rationale** | Interval values are useful for both grid operator and supplier. The grid operator can use the interval values for fraud detection; the supplier can use the interval values for energy advises to customers or for analysis of consumption patterns. The G meter interval values will be stored in the E meter. | | | | | | |
| **Fit criterion** | The G meter shall register a meter reading (as defined in Chapter 2) each whole hour (xx:00). | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.6) | **Port** | n.a. | **Applicable** | G meter, E meter |

DSMR-M 4.5.25

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide on request interval data G for the 10 most recent days. | | | | | | |
| **Rationale** | Interval data is used for analysis purposes. In order to be able to perform an analysis on interval data, interval data has to be available for a reasonable period. The interval data for that period can then be retrieved in a single request. The minimum and maximum retaining period for interval data for G in the E meter is 10 days. | | | | | | |
| **Fit criterion** | The E meter shall store a minimum and maximum of 10 days of interval data G. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.6) | **Port** | P1, P3 | **Applicable** | E meter, G meter |

### 5.4.3 Error reporting

DSMR-M 4.5.26

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall issue a logical error in case the end date of the requested period is prior to the begin date. | | | | | | |
| **Rationale** | In the function call to provide interval meter reads two parameters are given to identify the requested period. If (end date < begin date) a logical error will occur. | | | | | | |
| **Fit criterion** | The equipment shall issue a logical error in case the end date of the requested period is prior to the begin date. The logical error issued shall at least contain the generic attributes for logical errors. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

### 5.4.4 Performance

DSMR-M 4.5.27

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have interval values available on P3 soon after the request was received (by the metering installation). | | | | | | |
| **Rationale** | If the information retrieval takes too much time, this will cause delays in the meter data collection process. | | | | | | |
| **Fit criterion** | Total time of retrieving the interval data for 1 day (both E and G) and publishing it on P3 shall be less than 5 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter, G meter |

## 5.5 Use case 5: Provide equipment status to P1

This use case provides a description of the process of providing the state of the metering and switching equipment to auxiliary equipment. See also §5.2.7.2, §5.5.1.1 and Appendix B of NTA 8130. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-5.

| Trigger | Description |
|---|---|
| Request input of RJ11 plug is high. | Equipment status is requested by auxiliary equipment. The metering installation will provide the equipment status every 10 seconds. |

**Figure 5-5a: Provide equipment status to P1 – trigger description.**

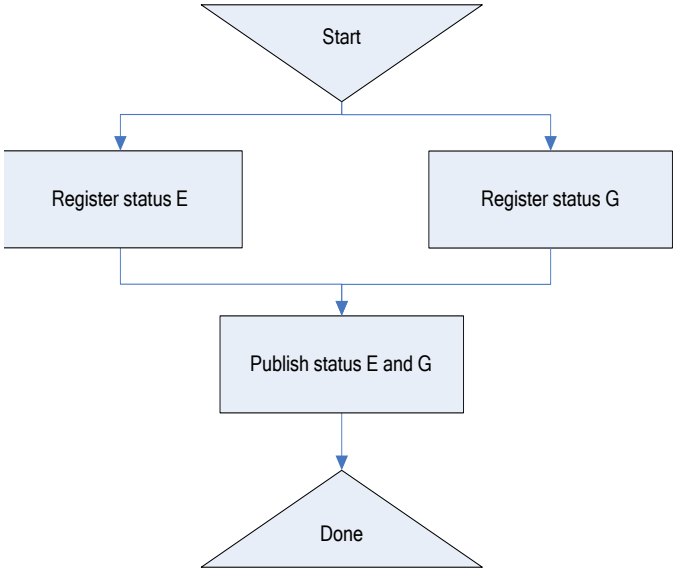


**Figure 5-5b: Provide equipment status to P1 – block diagram.**

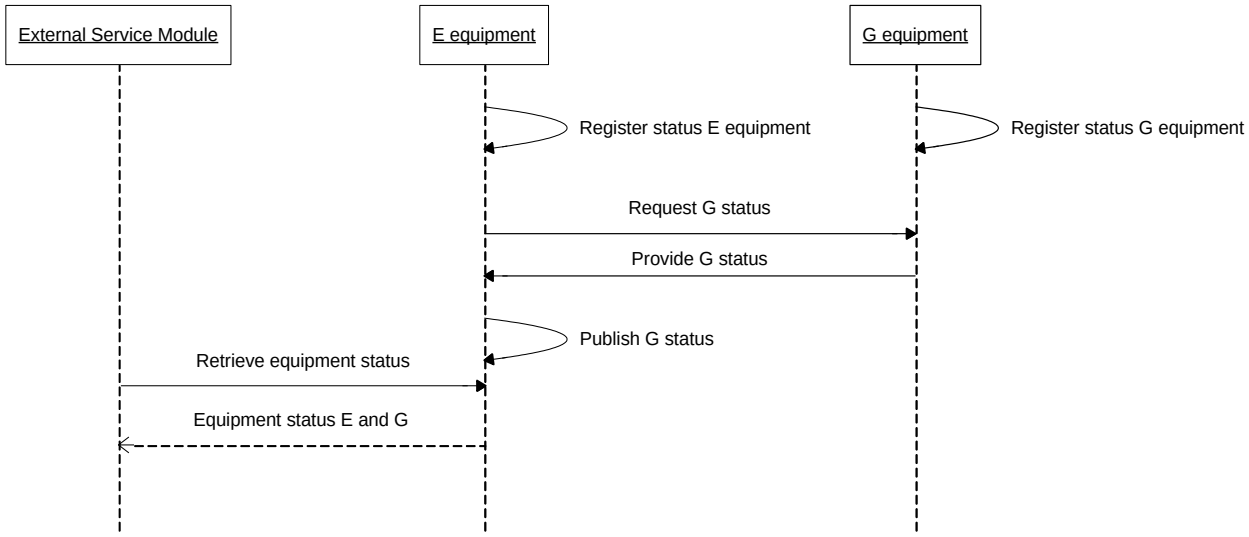


**Figure 5-5c: Provide equipment status to P1 – UML sequence diagram.**

*Pre-conditions*

- Request is activated by auxiliary equipment.

*Parameters*

- None.

*Post-conditions*

- The current status of the equipment is available to auxiliary equipment.

*Assumptions*

- None.

### 5.5.1 Requirements for electricity and gas

DSMR-M 4.5.28

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide on the P1 port every 10 seconds the actual status of E equipment and the last known status for G equipment available in the E meter. | | | | | | |
| **Rationale** | The actual status of the metering and switching equipment is to be provided to the external service module through the P1 port. | | | | | | |
| **Fit criterion** | The current status of the equipment is provided on the P1 port:<br>▪ Equipment identifier for the E meter;<br>▪ Equipment identifier for the G meter;<br>▪ Actual tariff E;<br>▪ Actual switch position E breaker (on/off/released);<br>▪ Actual threshold E;<br>▪ Actual switch position gas valve (on/off/released) (When available). | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.7.2, §5.5.1.1 and Appendix B) | **Port** | P1 | **Applicable** | E meter |

### 5.5.2 Performance

DSMR-M 4.5.29

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have the actual status available on P1. | | | | | | |
| **Rationale** | For the benefit of the customer, the actual status reads is to be provided to the auxiliary equipment through P1. This information needs to be actual; therefore the information will be refreshed every 10 seconds. | | | | | | |
| **Fit criterion** | Total handling time of registering E meter status, retrieving most recent G meter status and publish all information on P1 shall be less than 10 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P1 | **Applicable** | E meter |

## 5.6 Use case 6: Provide power quality information

This use case describes the process of gathering power quality measurements. Figure 5-6d provides the power quality parameters. See also §5.2.8.2 of the NTA 8130. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-6.

| Trigger | Description |
|---|---|
| Deployment of E meter | On installation the E meter starts registering information on power quality and on deployment this information is made available to the CS. The Grid operator uses the power quality information for monitoring the grid for distribution of electricity. |

**Figure 5-6a: Provide power quality information – trigger description**

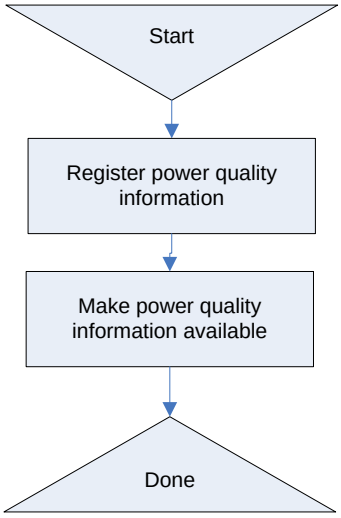


**Figure 5-6b: Provide power quality information – block diagram**

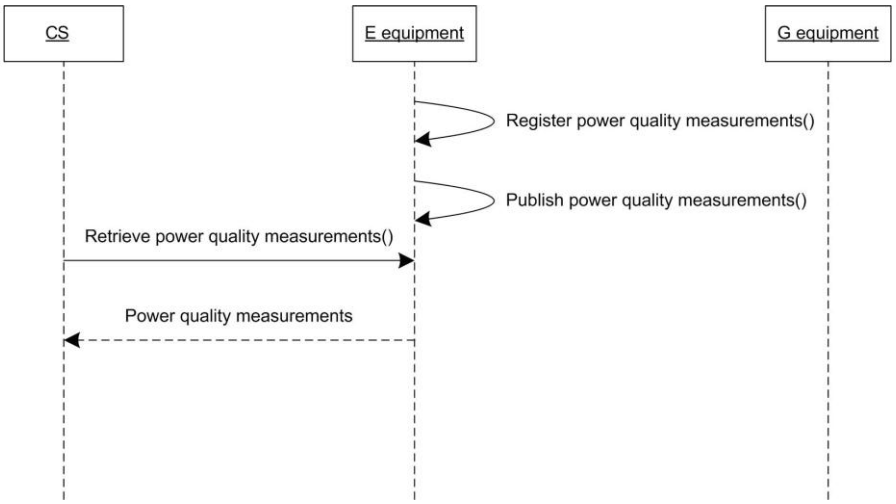


**Figure 5-6c: Provide power quality information – UML sequence diagram**

| Value | Unit |
|---|---|
| Voltage | Volt |
| Current | Ampere |
| Active Power | kW |
| Reactive power | kVAr |

**Figure 5-6d: Capturing E parameters**

*Pre-conditions*

- The grid operator wants to determine the quality of electricity supply.

*Parameters*

- Equipment identifier for the E meter;
- Period in which the power swells and sags have to be registered.

*Post-conditions*

- Power quality information is available for the designated equipment.

*Assumption*

- It is assumed that the sample population of electricity meters can be addressed in the software of the CS.
- CS needs to retrieve the power quality information regularly, in order to assign the quality measurements to specific periods.

### 5.6.1 Power quality

DSMR-M 4.5.30

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide information on the voltage swells and sags. | | | | | | |
| **Rationale** | The definition of voltage swells and power sags is specified in a local standard (NEN-EN 50160:2000). The Grid operators use the information to determine the quality of electricity supply. | | | | | | |
| **Fit criterion** | The E meter shall provide the following:<br>▪ Equipment identifier for the E meter that the information originates from;<br>▪ Number of voltage swells (configurable for duration and threshold);<br>▪ Number of voltage sags (configurable for duration and threshold);<br>In case of a polyphase meter the settings for duration and threshold are valid for all phases; the sags and swells have to be counted for every phase individually. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3.8.2) | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.31

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have the functionality to record specific E-parameters. | | | | | | |
| **Rationale** | For grid operational purposes it is necessary to be able to record E-parameters like Current and Voltages. | | | | | | |
| **Fit criterion** | The E meter shall have the functionality to record instantaneous values and average values for measuring E parameters as described in figure 5.6d. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.32

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Accuracy of measurement Voltage and Current parameters shall be at least 0.5%. | | | | | | |
| **Rationale** | For grid operational purposes it is necessary to be able to record E-parameters like Current and Voltages within the specified accuracy. | | | | | | |
| **Fit criterion** | The accuracy of the E meter for measuring the instantaneous values shall be at least 0.5% for Voltage (at 230 Volt) and Current (Imax) parameters. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.33

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The interval time for capturing values shall be adjustable. | | | | | | |
| **Rationale** | For grid operational purposes it is necessary to be able to adjust the interval period of E-parameters. | | | | | | |
| **Fit criterion** | The interval period for E-parameters shall be adjustable between N seconds and N minutes per value, where N is adjustable. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.34

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide the average value for voltage, current, active power and reactive power. | | | | | | |
| **Rationale** | Under some circumstances the average voltage is necessary (for the maintenance of the grid). The average voltage is determined for periods of N minutes. | | | | | | |
| **Fit criterion** | The E meter shall provide the average value for voltage, current, active power and reactive power.<br>The average voltage shall at least contain the following information:<br>▪ Equipment identifier for the meter from which the values originate;<br>▪ Time stamp for end of the period during which the average voltage was determined;<br>▪ Parameter name.<br>▪ Parameter value. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.35

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Constant recording of interval parameters in a circular buffer of the E meter. | | | | | | |
| **Rationale** | The E meter's interval data memory is limited; therefore the oldest data will be overwritten after at least 960 recordings. | | | | | | |
| **Fit criterion** | The Ring-buffer size of the E meter shall be at least 960 recordings per parameter. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

### 5.6.2 Performance

DSMR-M 4.5.36

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have the power quality information available on P3 soon after the request was received by the E meter. | | | | | | |
| **Rationale** | Capturing the available interval information on P3 can take some time, therefore the E meter shall publish this information as soon as possible after the request for publishing is received. | | | | | | |
| **Fit criterion** | Total handling time of retrieving power quality information and publish all information on P3 shall be less than 5 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

## 5.7 Use case 7: Sending power quality information to P1

This use case provides a description of the process of providing the power quality information to auxiliary equipment. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-7.

| Trigger | Description |
|---|---|
| Request input of RJ11 plug is high. | Equipment status is requested by auxiliary equipment. The metering installation will provide the equipment status every 10 seconds. |

**Figure 5-7a: Provide Power Quality Information to P1 – trigger description.**

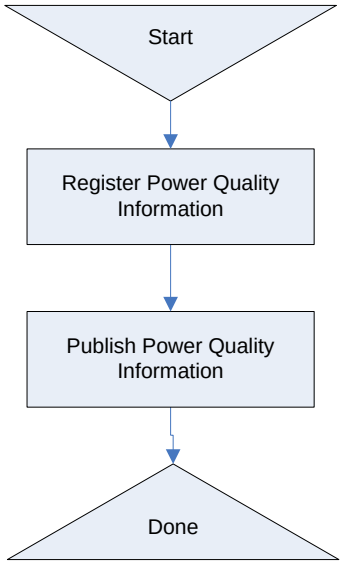


**Figure 5-7b: Provide Power Quality Information to P1 – block diagram.**

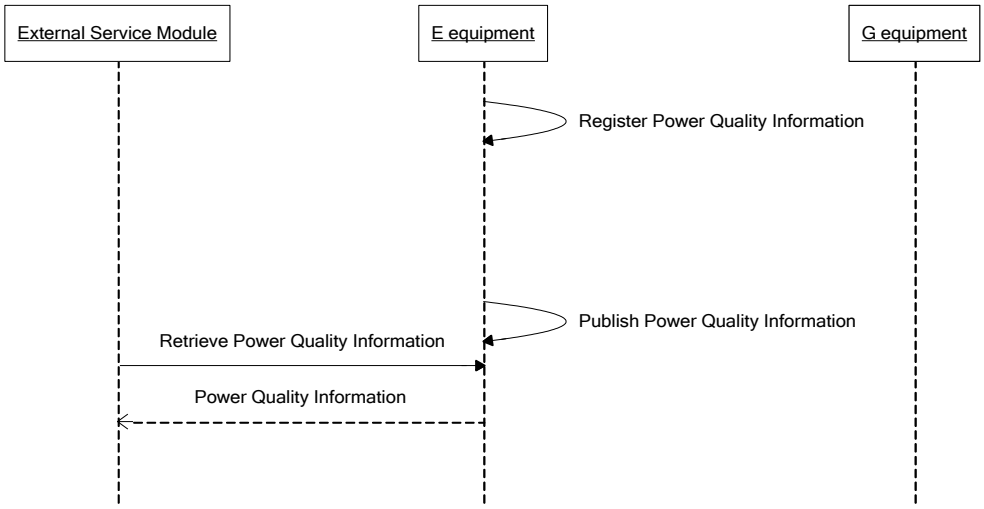


**Figure 5-7c: Provide Power Quality Information to P1 – UML sequence diagram.**

*Pre-conditions*

- Request is activated by auxiliary equipment.

*Parameters*

- None.

*Post-conditions*

- The power quality information is available to auxiliary equipment.

*Assumptions*

- None.

### 5.7.1 Requirements for electricity

DSMR-M 4.5.37

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide every 10 seconds the power quality information available in the E meter. | | | | | | |
| **Rationale** | The power quality information is to be provided to the external service module through P1. | | | | | | |
| **Fit criterion** | The power quality information which is provided:<br>▪ Number of power failures in any phases;<br>▪ Number of long power failures in any phases;<br>▪ Power Failure Event Log;<br>▪ Number of voltage sags in phase L1;<br>▪ Number of voltage sags in phase L2 (poly phase meters only)<br>▪ Number of voltage sags in phase L3 (poly phase meters only);<br>▪ Number of voltage swells in phase L1;<br>▪ Number of voltage swells in phase L2 (poly phase meters only);<br>▪ Number of voltage swells in phase L3 (poly phase meters only) | | | | | | |
| **History** | Jan. 2011 | **Origin** | TST | **Port** | P1 | **Applicable** | E Meter |

### 5.7.2 Performance

DSMR-M 4.5.38

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have the power quality information available on P1. | | | | | | |
| **Rationale** | For the benefit of the customer, the power quality information is to be provided to the auxiliary equipment through P1. This information needs to be up to date; therefore the information will be refreshed every 10 seconds. | | | | | | |
| **Fit criterion** | Total handling time of retrieving the power quality information and publishing all information on P1 shall be less than 10 seconds. | | | | | | |
| **History** | Jan. 2011 | **Origin** | TST | **Port** | P1 | **Applicable** | E meter |

## 5.8 Use case 8: Provide outage information

This section describes the use case for retrieving outage information. NEN-EN 50160:2000 is a standard for the Dutch market. In this standard the duration (T) for short and long outages has been defined as 3 minutes, to differentiate between short and long outages. In the future this definition might change. Therefore it is required that T is configurable. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-8.

| Trigger | Description |
|---|---|
| Deployment of E meter | On installation the E meters starts registering outages and on deployment this information is made available to the CS. Two types of outages exist: short and long outages. Short outages are detected for grid operating purposes while long outages can lead to retributions. In order to determine the value of the retribution, the duration of outages is used. |

**Figure 5-8a: Provide outage information – trigger description**

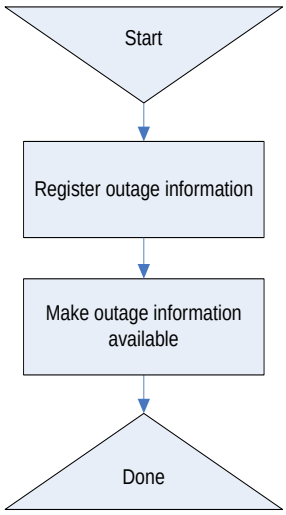


**Figure 5-8b: Provide outage information – block diagram**

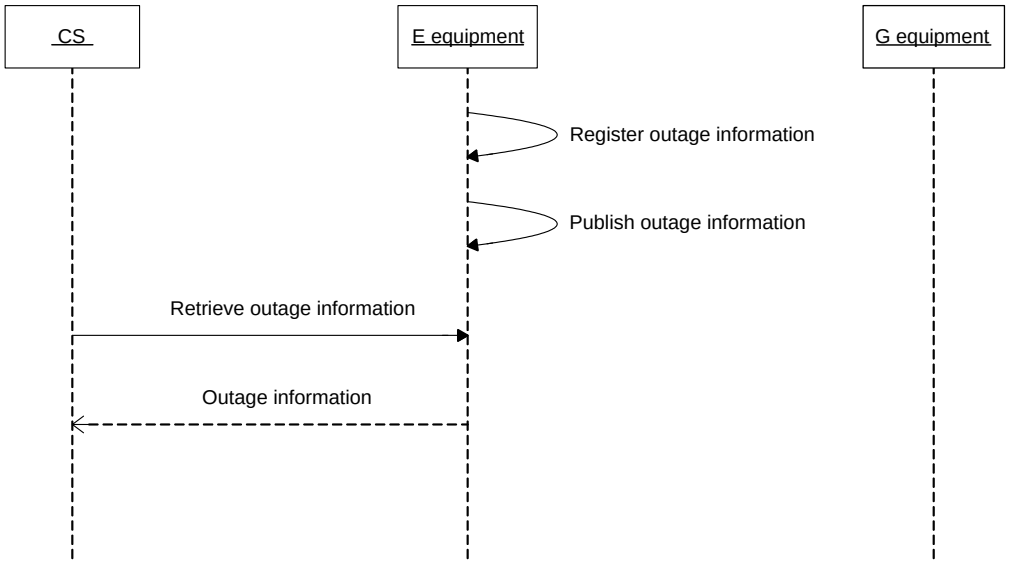


**Figure 5-8c: Provide outage information – UML sequence diagram**

*Pre-conditions*

- T is configured (set to a certain duration);
- The meter has counted short outages (<T);
- The meter has logged long outages (>T).

*Parameters*

- Equipment identifier for the E meter.

*Post-conditions*

- The GO has information on power quality available from the designated meter.

*Assumptions*

- It is assumed that the sample population of electricity meters can be addressed in the software of the CS.

- CS needs to retrieve the outage information regularly, in order to assign these measurements to specific periods.

### 5.8.1 Outage information

DSMR-M 4.5.39

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide the number of short (<T) power outages. | | | | | | |
| **Rationale** | The grid operator uses the information to determine the quality of the electricity supply. | | | | | | |
| **Fit criterion** | The E meter shall provide at least the following information:<br>▪ Equipment identifier for the meter from which the measurements originate;<br>▪ Number of short electricity outages. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.8.3) | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.40

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide information on long (>T) power outages. | | | | | | |
| **Rationale** | The grid operator uses this information to determine retributions to customers for disturbances of electricity supply. | | | | | | |
| **Fit criterion** | The electricity meter shall provide the following information on long outages:<br>▪ Equipment identifier for the meter from which the measurements originate;<br>▪ Outage duration;<br>▪ Time stamp for end of the outage. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.8.4) | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.41

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The electricity meter shall record and provide on request the 10 most recent long power outages. | | | | | | |
| **Rationale** | §5.2.8.5 of NTA 8130 requires that the electricity meter shall provide the 10 most recent long power outages. | | | | | | |
| **Fit criterion** | The electricity meter shall provide the 10 most recent long power outages. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.8.5) | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.42

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | In the case of a 3-phase metering installation, a record is also kept in case there is an outage on one or more of the phase(s). See §5.2.8.4 of NTA 8130. | | | | | | |
| **Rationale** | The grid operator uses the information to determine the quality of the electricity supply. | | | | | | |
| **Fit criterion** | The electricity meter shall provide the power outage information for each phase in the same way as this is done in the case of a 1-phase metering installation.<br>An outage on any of the phases (in the case of a 3-phase metering installation) will be handled as if it was an outage of a 1-phase metering installation. Hence, only the number of outages shall be counted (in the case of short outages) or recorded (in the case of long outages). No record need to be kept on which phase (R, S or T – or alternatively L1, L2, L3) the outage occurred. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.8.4) | **Port** | P3 | **Applicable** | E meter |

### 5.8.2 Performance

DSMR-M 4.5.43

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have the outage information available on P3 soon after the request was received by the metering installation. | | | | | | |
| **Rationale** | If the information retrieval takes too much time, this will cause delays in the data collection process. | | | | | | |
| **Fit criterion** | Total handling time of retrieving outage information and publish all information on P3 shall be less than 5 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

## 5.9 Use case 9: Provide tamper history (tamper detection)

This use case describes the activities associated with tamper. Attempts to violate (parts of) the metering installation or the removal of the meter cover must be detected and registered with a time stamp; this detection applies for both the electricity meter and the gas meter. Further, fraud attempts using magnetic fields must be registered in the metering equipment. The metering installation must be able to register at least the last 30 fraud attempts. Tamper detection (fraud and violation) is always active on all equipment (even during outages). The current process describes the retrieval of tamper detection (fraud detection). The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-9.

| Trigger | Description |
|---|---|
| Deployment of metering equipment | On installation the metering equipment starts registering tamper attempts and on deployment this information is made available to the CS. The GO will collect information on tamper attempts periodically. Attempts of fraud (tamper signals) on the electricity and gas meter are registered and provided, so the grid operator is able to take appropriate actions to stop fraud. |

**Figure 5-9a: Provide tamper history – trigger description**

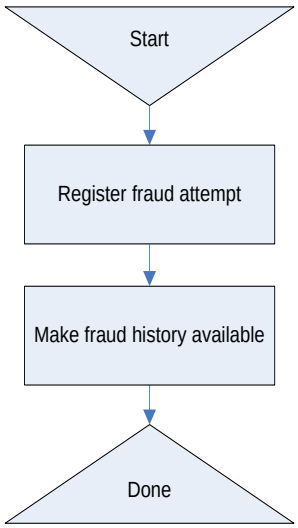


**Figure 5-9b: Provide tamper history – block diagram**

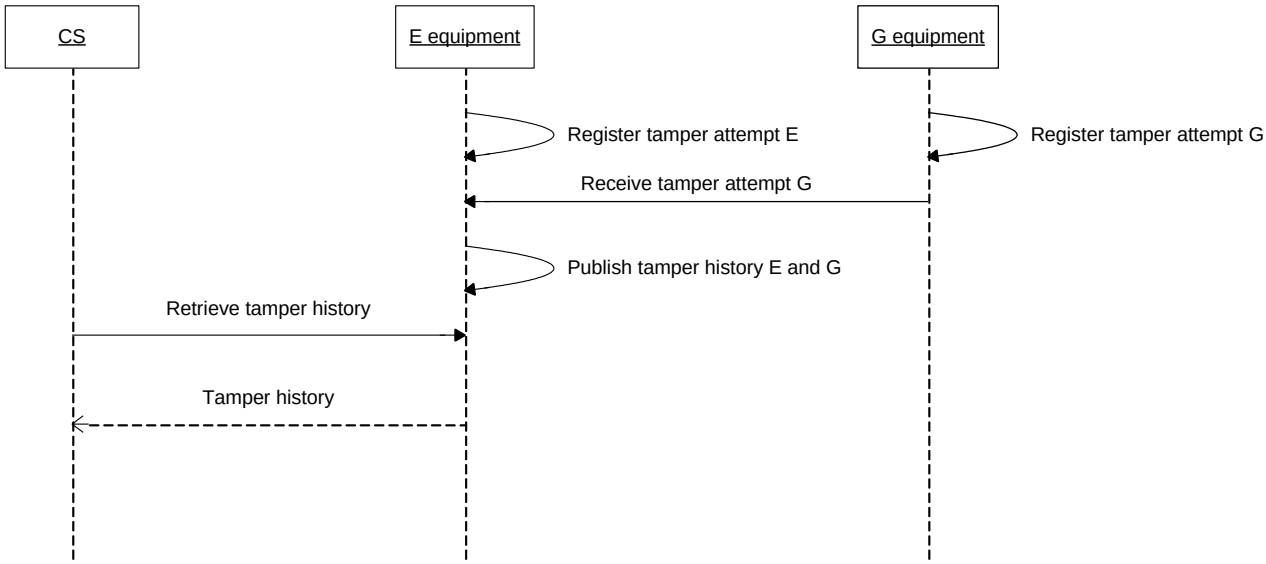


**Figure 5-9c: Provide tamper history – UML sequence diagram**

*Pre-conditions*

- The grid operator wants to retrieve tamper information from a meter.

*Parameters*

- Equipment identifier of the meter.

*Post-conditions*

- The tamper information is published.

*Assumptions*

- In general, the retrieval of an alarm byte in use case 1 (provide periodic meter reads) will be the trigger for CS to request the fraud history.

### 5.9.1 Tamper detection

DSMR-M 4.5.44

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Metering equipment shall detect physical tamper attempts. | | | | | | |
| **Rationale** | The internals of metering equipment are protected by seals in order to prevent tampering. As breaking the seals cannot be detected automatically the meter shall provide other means to detect intervention with components protected by these seals. | | | | | | |
| **Fit criterion** | Metering equipment register the following information for physical intervention:<br>▪ Equipment identifier for the meter that detected the physical intervention;<br>▪ Time stamp of the moment of the intervention if a clock is present. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.8.6) | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.5.45

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Metering equipment shall detect tamper attempts with magnetic fields if it is susceptible to these magnetic fields. | | | | | | |
| **Rationale** | Not all metering equipment is immune for magnetic fields of various strengths. The equipment shall therefore be able to detect magnetic fields that it is susceptible for. | | | | | | |
| **Fit criterion** | Metering equipment register the following information for magnetic intervention:<br>▪ Equipment identifier for the meter that detected the physical intervention;<br>▪ Time stamp of the moment of the intervention (if a clock is present in the G meter). | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.8.6) | **Port** | n.a. | **Applicable** | E meter, G meter |

### 5.9.2 Tamper history

DSMR-M 4.5.46

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide a reasonable number of detected tamper attempts. | | | | | | |
| **Rationale** | The E meter shall be able to store a number of tamper attempts that provides the GO a reasonable timeframe to collect tamper information without any information getting lost. | | | | | | |
| **Fit criterion** | The E meter shall be able to store the following numbers of tamper attempts:<br>▪ 30 most recent tamper attempts on G meter;<br>▪ 30 most recent tamper attempts on E meter.<br>▪ The registration of identical tamper events shall be limited to once per 15 minutes | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.2.8.6) | **Port** | P3 | **Applicable** | E meter |

### 5.9.3 Performance

DSMR-M 4.5.47

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have the tamper history available on P3 soon after the request was received by the metering installation. | | | | | | |
| **Rationale** | If the information retrieval takes too much time, this will cause delays in the data collection process. | | | | | | |
| **Fit criterion** | Total handling time of retrieving the tamper history and publish all information on P3 shall be less than 5 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

## 5.10 Use case 10: (Dis)connect E

This section describes the use case for connecting and disconnecting the supply of electrical power. The use case therefore has two types of triggers: one for connecting and one for disconnecting; however, for each type of trigger, there are several possibilities. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-10. Note that the list in Fig. 5-10a is *not* exhaustive; the mentioned triggers are examples.

*Disconnecting*

| Trigger | Description |
|---|---|
| Uninhabited | If the premise where the equipment is installed becomes uninhabited, the grid operator can decide to disconnect. |
| No supplier | If the grid operator determines that there is no supplier for the premise where the equipment is installed, the grid operator can decide to disconnect. |
| Non-payment | If the supplier has determined that the customer does not pay for the supplied energy, the supplier can decide to disconnect. |
| Pre-paid credit too low | If the supplier determines that the pre-paid credit for the connection is too low, the supplier can decide to disconnect. |
| Collective de-activation | In the event of (regional) power shortages, the grid operator can decide to disconnect (and reconnect) a group of customers. |

*Connecting*

| Trigger | Description |
|---|---|
| New inhabitants | If the grid operator determined that the previously uninhabited premises have new inhabitants with a supplier, the grid operator can decide to reconnect. |
| New supplier | The new supplier for a connection can issue a reconnect. |
| Bills have been paid | Customers that have paid their bills or increased their prepaid credit are being re-connected. |
| Pre-paid deposit | If the client has made a deposit for pre-payment the supplier can decide to reconnect the client. |
| Collective activation | In the event of (regional) power shortages, the grid operator can decide to disconnect (and reconnect) a group of customers. |

**Figure 5-10a: (Dis)connect E – trigger description**

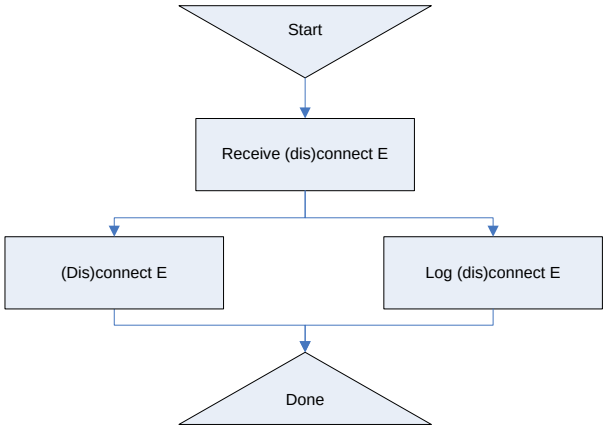


**Figure 5-10b: (Dis)connect E – block diagram**

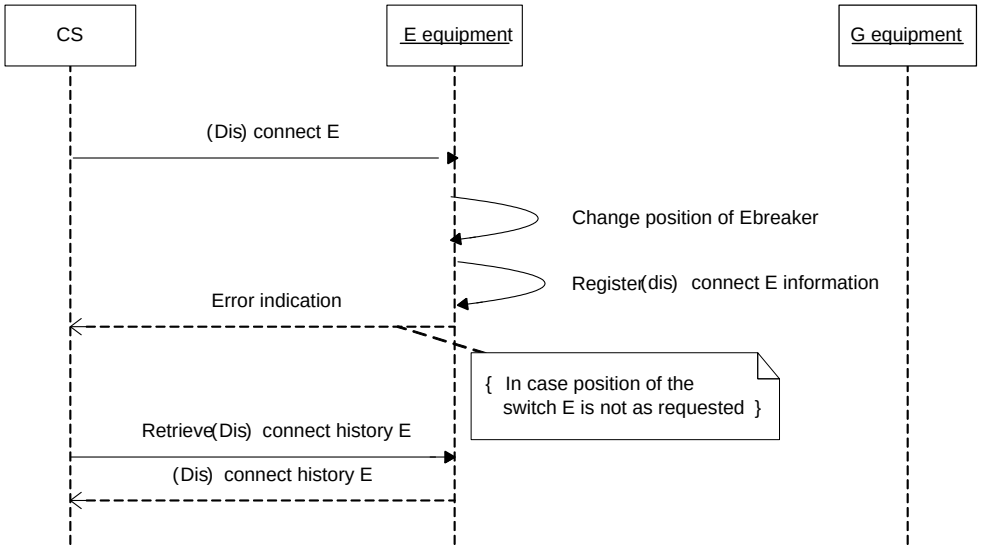


**Figure 5-10c: (Dis)connect E – UML sequence diagram**

*Pre-conditions*

- The position of the E breaker has to be changed.

*Parameters*

- Connect or disconnect;
- Date and time (timestamp) of connect or disconnect (optional);

*Post-conditions*

- The position of the E breaker has been changed;
- If the (dis)connect has failed, an error message is returned to CS (i.e. in case the position of the E breaker is not as requested).

*Assumptions*

- It is assumed that groups of meters can be addressed in the software of the CS.

### 5.10.1 (Dis)connect electricity

DSMR-M 4.5.48

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The electricity meter shall provide functionality to remotely (dis)connect the supply of electrical power on the designated date at the specified time. If a timestamp (which is an optional parameter) has not been passed as a parameter, the (dis)connect is to be performed instantly. See also DSMR-M 4.5.54. | | | | | | |
| **Rationale** | The market dynamics require a means to disconnect a customer. Market dynamics include: non-payment, change of supplier, removal, etc. | | | | | | |
| **Fit criterion** | The customer does not receive any electrical power after a disconnect. The supply of electrical power is started after a connect. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3) | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.49

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E breaker used to disconnect shall not be available for manual operation. | | | | | | |
| **Rationale** | The breaker shall not be considered as a safety precaution to de-activate the home installation manually. The breaker is therefore available for remote connecting only. | | | | | | |
| **Fit criterion** | It is not possible to use the E breaker to manually de-activate the home installation locally if remote reconnection is enabled. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3) | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.50

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Switching modes of breakers and valves must be configurable. | | | | | | |
| **Rationale** | Besides the modes described in DSMR-M 4.5.48, DSMR-M 4.5.49, DSMR-M 4.5.68, DSMR-M 4.5.69, and DSMR-M 4.5.70, the breaker/valve modes must be configurable by the P0 and P3 port. The modes are described in the DLMS Blue Book. | | | | | | |
| **Fit criterion** | Meters must be configurable according to the control modes and control states of DLMS Blue Book, clause 4.5.8. | | | | | | |
| **History** | Jan 2011 | **Origin** | TST | **Port** | P0, P3 | **Applicable** | E Meter |

DSMR-M 4.5.51

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | In case an alpha-numerical (non-mechanical) display is present the E meter shall display standardised information on the display in case of activating the switch. | | | | | | |
| **Rationale** | For customers and for the back office of grid companies and suppliers, it is useful to have the same kind of text messages on the display of the metering equipment in case of activating the switch or valve. This requirement is only applicable if the meters have an alpha-numerical (non-mechanical) display. | | | | | | |
| **Fit criterion** | In case an alpha-numerical (non-mechanical) display is present the E meter shall display standardised information on the display in case of activating the switch.<br><br>For E meters (if this functionality is used):<br>“Knop in” and the register value in case the customer needs to push a button for closing the switch (alternating or simultaneously)<br>“Geopend” and the register value in case of an open switch (alternating or simultaneously) | | | | | | |
| **History** | Oct. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

### 5.10.2 Logging information

DSMR-M 4.5.52

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall record logging information for each (dis)connect. | | | | | | |
| **Rationale** | Disconnecting a customer is a drastic measure, especially when the premises that are disconnected are inhabited. For this reason the grid operator wants to keep track of (dis)connections and therefore keeps a log of these actions. | | | | | | |
| **Fit criterion** | Besides the generic attributes for logging, at least the following information for (dis)connects shall be recorded:<br>▪ Position of the breaker after the (dis)connect was applied;<br>▪ Time stamp at which the (dis)connect has been applied. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.53

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide logging information for a reasonable amount of (dis)connects. | | | | | | |
| **Rationale** | The GO will retrieve logging information on a periodic basis. During this period the equipment shall be able to store logging information on the (dis)connects that occur. | | | | | | |
| **Fit criterion** | The E meter shall provide logging information for the 10 most recent (dis)connects. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3) | **Port** | P3 | **Applicable** | E meter |

### 5.10.3 Performance

DSMR-M 4.5.54

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall (dis)connect the supply of energy soon after the request was received by the metering system. | | | | | | |
| **Rationale** | A (dis)connect must be performed soon after the command. | | | | | | |
| **Fit criterion** | Total handling time after receiving the request shall be less than 30 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.55

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have the logging information on (dis)connection of both E and G available on P3 soon after the request was received by the metering system. | | | | | | |
| **Rationale** | If the information retrieval takes too much time, this will cause delays in the data collection process. | | | | | | |
| **Fit criterion** | Total handling time of retrieving the stored logging information on (dis)connection of both E and G and publish all information on P3 shall be less than 5 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

## 5.11 Use case 11: Apply threshold (electricity)

This section describes the use case for applying a threshold on the supply of electrical power. It must be possible to set two different threshold values simultaneously, one value for the normal contractual value of the electricity connection, and one value to be used in case a shortage of electricity is anticipated (“Code Red”). The electricity thresholds can be set remotely. The breaker de-activates if the instantaneous power import(+P) is greater than the set threshold for longer than 30 seconds. However, de-activation does not take place as long as there is a net return supply to the network. After the breaker has been switched off due to exceeding the threshold value, the breaker can manually be switched on. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-11.

| Trigger | Description |
|---|---|
| Deployment of E meter | Threshold level can be used to set the contractual level (maximum contracted power on the connection) in the meter. |
| Anticipate shortage (Code Red) | For cases where the grid operator suspects a shortage of a commodity he predefines groups for which the maximum consumption can be reduced during the shortage. |
| Pre-paid credit low | The pre-paid credit on a meter is below a level pre-defined by the supplier. The |

| | |
|---|---|
| | supplier therefore reduces the instantaneous power import(+P) allowed on the meter. |

**Figure 5-11a: Apply threshold (electricity) – trigger description**

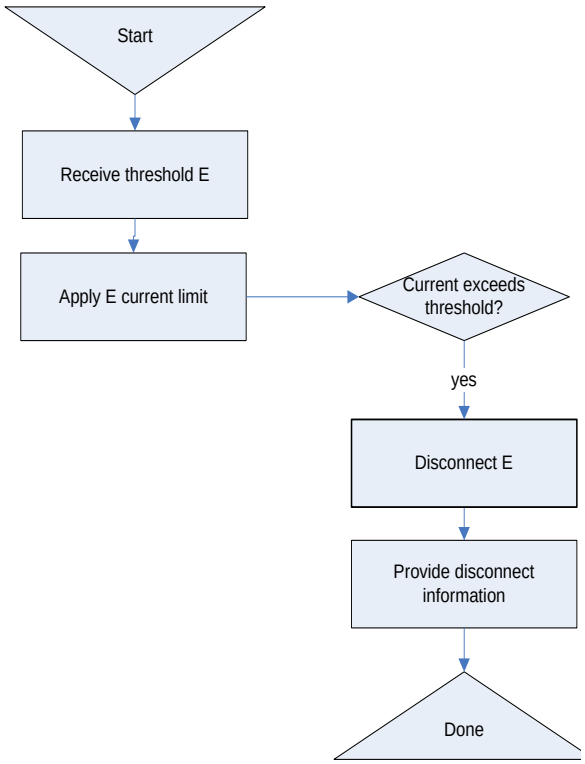


**Figure 5-11b: Apply threshold (electricity) – block diagram**

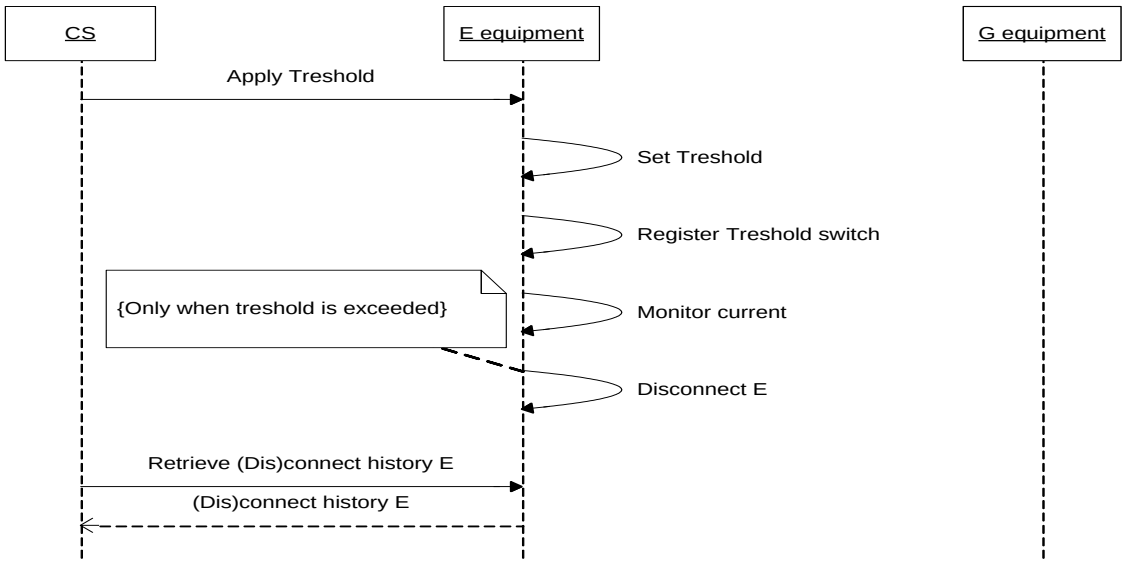


**Figure 5-11c: Apply threshold (electricity) – UML sequence diagram**

*Pre-conditions for Apply Threshold*

- No threshold or a different threshold value is applied in the E meter.

*Parameters for Apply Threshold*

- Command, indicating set or clear;
- Threshold value to be used to set the contractual level in the meter (specified in Watt);
- Threshold value to be used during “Code Red” (specified in Watt);
- Activation date and time (optional).

*Post-conditions for Apply Threshold*

- The E meter disconnects if the threshold is exceeded;
- Disconnect information is logged and an event is generated (if configured).

*Assumptions for Apply Threshold*

- Both grid operator (GO) and supply company (SC) can request a threshold value for normal operation. The CS will register these requests and pass through only the smallest value to the E meter.
- It is assumed that groups of meters can be addressed in the software of the CS

### 5.11.1 Apply threshold electricity

DSMR-M 4.5.56

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to set the values of the threshold remotely (all phases). It shall be possible to (de)activate the threshold. | | | | | | |
| **Rationale** | There are multiple reasons to reduce the active power import on a connection. A supplier can for instance reduce the active power import as the result of too little pre-paid credit.<br>Activating can be done by setting the thresholds to the given values. If no threshold is necessary the values are set to the highest possible values (meaning the breaker will never disconnect on Imax) | | | | | | |
| **Fit criterion** | In case of the set command, the E meter shall accept values for the threshold specified in Watt.<br>For a 3-phase metering installation the threshold represents the sum over all phases.<br>In case of deactivation the threshold is set to 999999. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3.1.1.3) | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.57

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The electricity meter shall log the event that a threshold is set or cleared. | | | | | | |
| **Rationale** | Setting or clearing the threshold for electricity affects the customer and possibly the supplier. For this reason it is necessary to keep track of the events of setting the threshold. See also §5.3.1.3 of the NTA 8130. | | | | | | |
| **Fit criterion** | The log item for applying a threshold shall, besides the generic attributes for logging, at least contain the following information:<br>▪ The threshold value that is set (specified in Watt). | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3.1.3) | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.58

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall automatically invoke 'Use case 10: (Dis)connect E' if the power consumption through the meter exceeds the threshold value. | | | | | | |
| **Rationale** | The threshold is used to reduce power consumption. If power consumption exceeds the threshold a disconnect is the result. | | | | | | |
| **Fit criterion** | The electricity meter shall disconnect if the power consumption exceeds the threshold.<br>▪ Disconnection is executed when the the instantaneous active power exceeds the threshold continuously during a defined period | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.59

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to let the customer reconnect manually after a disconnect that resulted from exceeding the threshold. | | | | | | |
| **Rationale** | Although the customer can be informed on the threshold, the customer shall not be able to determine under what circumstances he will exceed the threshold. If the threshold is exceeded the customer shall have the ability to reduce power consumption to a value below the threshold and then locally reconnect. | | | | | | |
| **Fit criterion** | The electricity meter has a facility that enables the customer to manually reconnect. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

### 5.11.2 Activate Code Red

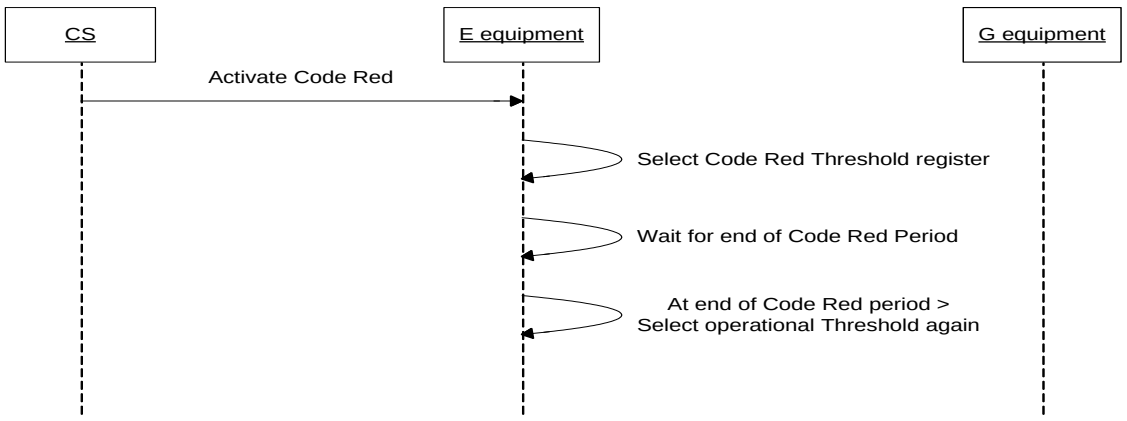


**Fig 5-11d Activate Code red – UML sequence Diagram**

*Pre-conditions for Activate Code red*

- Threshold is set by writing a value into the corresponding register.
- Code Red group name has been allocated to the E meter.

*Parameters for Activate Code red*

- Activation date and time and the date and time of the end of code red.

*Post-conditions for Activate Code red*

- The E meter uses the Code Red Threshold register in the defined time period, for monitoring the power.
- The E meter uses the normal operational Threshold register outside the defined time period, for monitoring the power.
- The E meter disconnects when the code red threshold is exceeded.
- Disconnect information is logged and an event is generated (if configured).

*Assumptions for Activate Code red*

- The CS will send a short message that will be displayed on the E meter display to indicate code red and the limit on the power supply.
- It is assumed that groups of meters can be addressed in the software of the CS

### 5.11.3 Code Red requirements

The CS has the functionality to define groups of E meters for Code Red with the following attributes:

- Unique name for the group,
- Total maximum power for all the E meters belonging to that group,
- List of all the E meter identifications belonging to that group.

When the GO anticipates a shortage of electricity, then groups of E meters are selected for which the Code red threshold will apply. The period for which the Code Red will become active will be determined by GO specific info.

DSMR-M 4.5.60

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to become part of a Code Red group. | | | | | | |
| **Rationale** | The CS will send Code red activation commands applicable for a certain group. Only E meters belonging to that group will activate the Code red condition. | | | | | | |
| **Fit criterion** | Functionality to become part of a Code Red group is provided. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.61

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to activate Code Red and select the code red threshold register. The command will contain an activation period and a code red group name. After that period the operational threshold register will be selected again. Only the E meters belonging to the Code red Group and with a Code Red Threshold value lower than the Operational Threshold value, will use the Code Red threshold register. | | | | | | |
| **Rationale** | The E meter has 2 threshold registers. In case of a Code Red condition, the Central System will send this Code Red condition to all or a subset of the E meters. The activation time and duration must be part of the Code Red activation command because it can not be guaranteed that an explicit “end of code red” command will be received by all E meters in reasonable time. The activation time and duration of a code red condition can be determined quite well by the SC or GO. | | | | | | |
| **Fit criterion** | The E meter shall switch between threshold registers with a tolerance of 15 seconds. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.5.62

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to explicitly deactivate Code Red with a command. The command will contain a date and time to indicate when Code Red has to be deactivated. When no date and time is provided, then the deactivation must be done instantly. After deactivate Code Red condition, the operational threshold register is used again. Only E meters belonging to the Code Red Group, will deactivate the Code red Condition. | | | | | | |
| **Rationale** | The explicit method of ending a Code Red condition is used when the CS issued a Code Red activation command that contained an irrelevant time period. Reason could be that the Code Red condition is ended earlier than estimated, or because a mistake was made by the activation. | | | | | | |
| **Fit criterion** | Functionality to explicitly deactivate Code Red with a command is provided. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

### 5.11.4 Error reporting

DSMR-M 4.5.63

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall issue a logical error in case the threshold that has to be set is beyond limits (i.e. negative or outside the range of the variable). | | | | | | |
| **Rationale** | In the function call to set the threshold, one parameter is given to set the threshold to a certain level. If this level is negative or larger than the maximum capacity a logical error will occur. | | | | | | |
| **Fit criterion** | The equipment shall issue a logical error in case the threshold that has to be set is beyond limits (i.e. negative or outside the range of the variable). The logical error issued shall at least contain the generic attributes for errors. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

### 5.11.5 Performance

DSMR-M 4.5.64

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall apply the threshold to the supply of electricity within 5 seconds after the request was received. | | | | | | |
| **Rationale** | When a threshold is set due to power shortage, it shall be set as soon as possible. | | | | | | |
| **Fit criterion** | Total handling time after receiving the request shall be less than 5 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.65

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have the logging information on applying a threshold available on P3 soon after the request was received by the metering installation. | | | | | | |
| **Rationale** | If the information retrieval takes too much time, this will cause delays in the data collection process. | | | | | | |
| **Fit criterion** | Total handling time of retrieving the stored logging information on applying a threshold and publish all information on P3 shall be less than 5 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.66

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall disconnect the supply of electricity (see use case 10) soon after the threshold is exceeded for more than 30 seconds. | | | | | | |
| **Rationale** | 30 seconds is required in NTA 8130, a small delay is needed for switching the breaker. | | | | | | |
| **Fit criterion** | Total handling time after registering the exceed shall be less than 1 s. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.67

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall reconnect the supply of electricity (see use case 10) soon after it is manually activated. | | | | | | |
| **Rationale** | The effect of pushing the button shall become clear immediately. | | | | | | |
| **Fit criterion** | Connection shall be in place within 1 s. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

## 5.12 Use case 12: (Dis)connect G

This section describes the use case for connecting and disconnecting the supply of gas. The use case therefore has two types of triggers: one for connecting and one for disconnecting; however, for each type of trigger, there are several motivations. For the gas valve there are three possible positions: on, off or released. The de-activation and release for activation of the valve is done remotely. Actual activation of the connection is done on site unless remote activation can be realized safely. For the collective activation/de-activation of gas the requirements apply as shown in §5.3.1.2.1 (of NTA 8130), where it must be possible to release or de-activate groups of connections at the same time. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-12. Note that the list of Figure 5-12a is *not* exhaustive; the mentioned triggers are examples.

*Disconnecting*

| Trigger | Description |
|---|---|
| Uninhabited | If the premises where the equipment is installed becomes uninhabited, the grid operator can decide to disconnect. |
| Non-payment | If the supplier has determined that the customer does not pay for delivery, the supplier can decide to disconnect. |
| Pre-paid credit too low | If the supplier determines that the pre-paid credit for the connection is too low, the supplier can decide to disconnect. |
| Gas outage detected | A gas outage has been detected and as a safety procedure a (group of) premise(s) is disconnected. |
| No supplier | If the grid operator determines that there is no supplier for the premises where the equipment is installed, the grid operator can decide to disconnect. |

*Connecting*

| Trigger | Description |
|---|---|
| New inhabitants | If the grid operator determined that the previously uninhabited premises have new inhabitants with a supplier, the grid operator can decide to reconnect. |
| Bills have been paid | Customers that have paid their bills or increased their prepaid credit are being re-connected. |
| Pre-paid deposit | If the client has made a deposit for pre-payment the supplier can decide to re-connect the client. |
| Gas outage resolved | After a gas outage has been resolved, a (group of) premise(s) is reconnected. |
| New supplier | The new supplier for a connection can issue a reconnect. |

**Figure 5-12a: (Dis)connect G – trigger description**

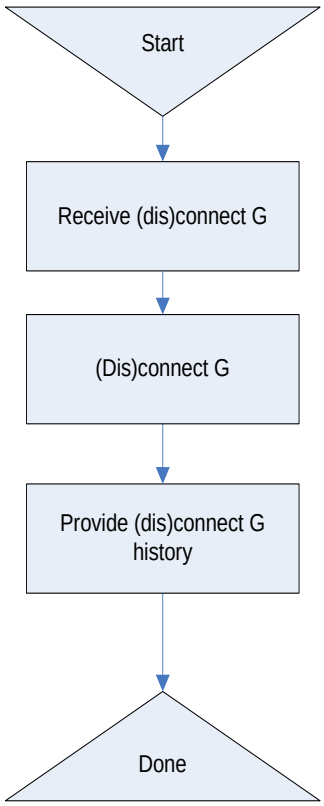


**Figure 5-12b: (Dis)connect G – block diagram**

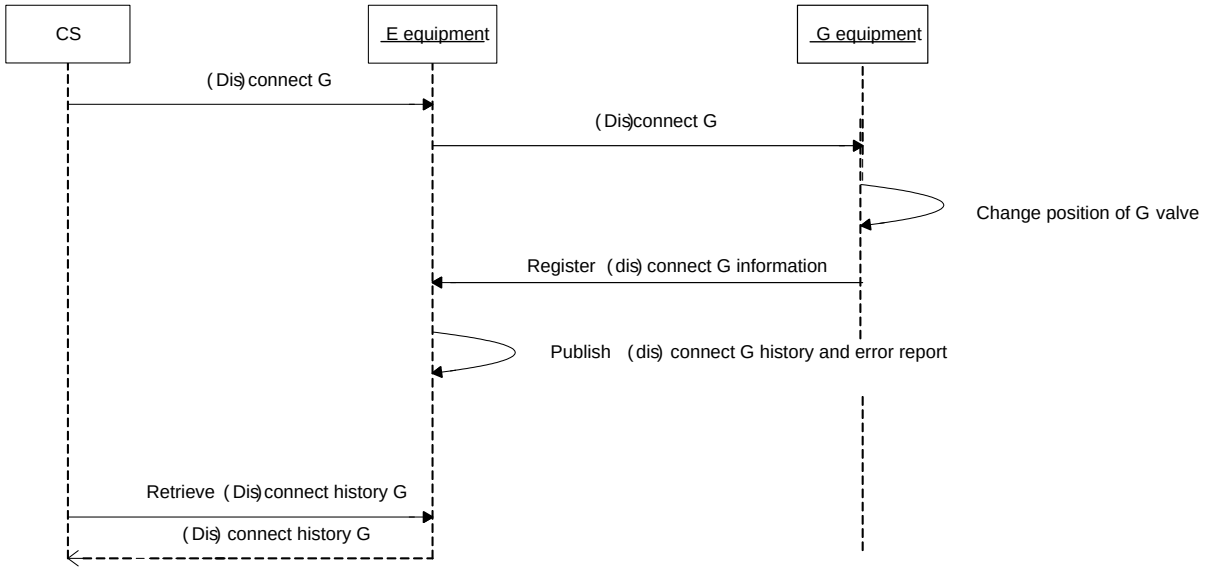


**Figure 5-12c: (Dis)connect G – UML sequence diagram**

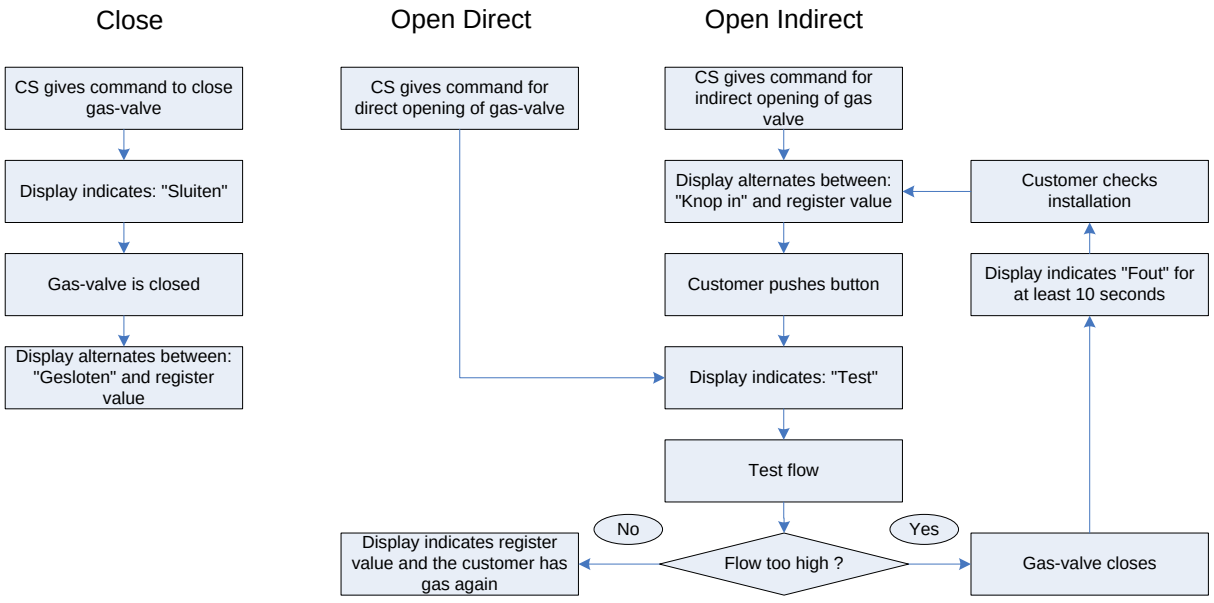


**Figure 5-12d: Display messages on G meter display for opening or closing the gas valve – block diagram**

*Pre-conditions*

- The position of the G valve has to be changed.

*Parameters*

- Connect or disconnect;
- Date and time of connect or disconnect (optional);

*Post-conditions*

- The position of the G valve has been changed;
- If the (dis)connect has failed, an error is logged in the electricity equipment (i.e. in case the position of the G valve is not as requested).

*Assumptions*

- It is assumed that groups of meters can be addressed in the software of the CS.

### 5.12.1 (Dis)connect gas

DSMR-M 4.5.68

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G equipment shall provide functionality to remotely (dis)connect the supply of gas automatically after such a command has been received. | | | | | | |
| **Rationale** | The market dynamics require a means to (dis)connect a customer. Market dynamics include: non-payment, change of supplier, removal, etc. | | | | | | |
| **Fit criterion** | The customer does not receive any gas after a disconnect. The supply of gas is started after a connect in case the connect can be handled safely. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3.1.2.1) | **Port** | P2 | **Applicable** | G meter |

DSMR-M 4.5.69

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G valve used to disconnect shall not be available for manual operation. | | | | | | |
| **Rationale** | The valve shall not be considered a safety precaution to deactivate the home installation manually. The valve is therefore available for remote disconnecting only. | | | | | | |
| **Fit criterion** | It is not possible to use the G valve to manually de-activate the home installation locally. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3) | **Port** | P2 | **Applicable** | G meter |

DSMR-M 4.5.70

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The gas meter shall provide functionality to manually connect to the gas supply if the G meter cannot connect the gas supply automatically in a safe manner. | | | | | | |
| **Rationale** | Any equipment that was turned on when the gas supply was switched off can cause leakage of gas when the gas supply is turned on again. Some G meters are prepared to handle this risk; others are not. In case the G meter cannot handle a safe connect remotely, the G meter shall provide functionality to enforce the connect manually after it is initiated remotely first. | | | | | | |
| **Fit criterion** | The G meter shall provide a facility to let the customer switch-on manually after the valve is released for activation. If a safe connection is supported, this is allowed. In this case the meter checks if there is no use of gas. The limit to be used for G4 and G6 meters is 13 liter/h. A higher flow must be detected within 5 minutes after connection and result in disconnection. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3.1.2.1) | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.5.71

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall forward a (dis)connect command to the G meter on the designated date at the specified time. If a timestamp (which is an optional parameter) has not been passed as a parameter, the (dis)connect command is to be forwarded as soon as possible. | | | | | | |
| **Rationale** | The market dynamics require a means to (dis)connect a customer. Market dynamics include: non-payment, change of supplier, removal, etc. | | | | | | |
| **Fit criterion** | The command for a (dis)connect shall be forwarded by the E meter to the G meter at the designated date at the specified time, or as soon as possible if the date has not been passed as a parameter. | | | | | | |
| **History** | Nov. 2007 | **Origin** | n.a. | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.5.72

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | In case an alpha-numerical (non-mechanical) display is present, the G meter shall display standardised information on the display in case of activating the valve. | | | | | | |
| **Rationale** | For customers and for the back office of grid companies and suppliers, it is useful to have the same kind of text messages on the display of the metering equipment in case of activating the switch or valve. This requirement is only applicable if the meters have an alpha-numerical (non-mechanical) display. | | | | | | |
| **Fit criterion** | In case an alpha-numerical (non-mechanical) display is present, the G meter shall display standardised information on the display in case of activating the valve (See figure 5-12d):<br>“Knop in” and the register value in case the customer needs to push a button for opening the valve (alternating or simultaneously)<br>“Test” - The valve is opening or testing<br>“Fout” – During testing a leakage or consumption has been detected<br>“Sluiten” – The valve is closing<br>“Gesloten” and the register value in case of a closed valve (alternating or simultaneously) | | | | | | |
| **History** | Oct. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

### 5.12.2 Error reporting

DSMR-M 4.5.73

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall issue a logical error in case the date of the requested connect or (dis)connect cannot be applied at the designated date. | | | | | | |
| **Rationale** | In the function call to connect or disconnect the meter, one parameter is given to identify the date of (dis)connect. If the equipment could not apply the (dis)connect (e.g. because the date was in the past) a logical error is issued. Note that in case of power down, the (dis)connect is applied at power up. | | | | | | |
| **Fit criterion** | The E meter shall issue a logical error in case the date of the requested connect or (dis)connect cannot be applied at the designated date. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

### 5.12.3 Performance

DSMR-M 4.5.74

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G meter shall (dis)connect the supply of energy soon after the request was received by the G meter. | | | | | | |
| **Rationale** | A (dis)connect must be performed soon after the command. | | | | | | |
| **Fit criterion** | Total handling time after receiving the request shall be less than 5 minutes. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P2, P3 | **Applicable** | G meter |

## 5.13 Use case 13: Display standard messages on meter display and P1

It must be possible for grid companies and suppliers to send standard messages concerning the supply of energy to the metering installation via port P3. These messages are displayed on the display of the metering installation and are also offered at port P1. Examples of messages concern for instance:

- Reason for (dis)connect;
- Reason for applying a threshold E;
- Impending shortage of prepaid credit.

The metering installation shall enable display of these messages. Messages concerning gas will also be displayed on the display of the electricity metering system; it must, however, be clear which messages apply to which commodity. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-13.

| Trigger | Description |
|---|---|
| The GO or supplier wants to send a message | The grid operator or supplier informs the customer of executed or pending actions. |

**Figure 5-13a: Display messages on meter display and P1 – trigger description**

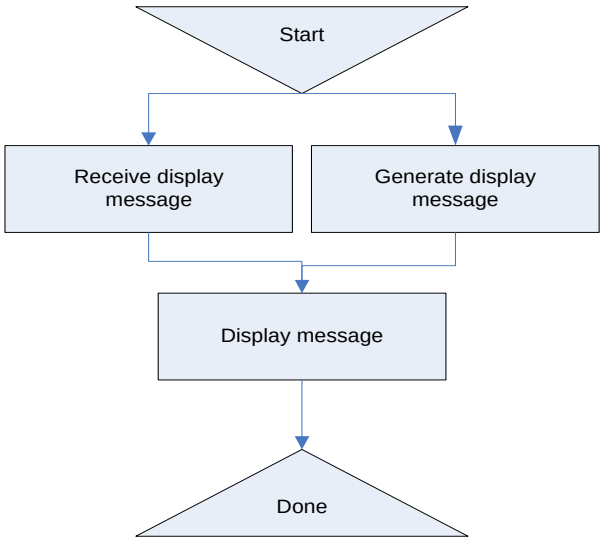


**Figure 5-13b: Display messages on meter display and P1 – block diagram**

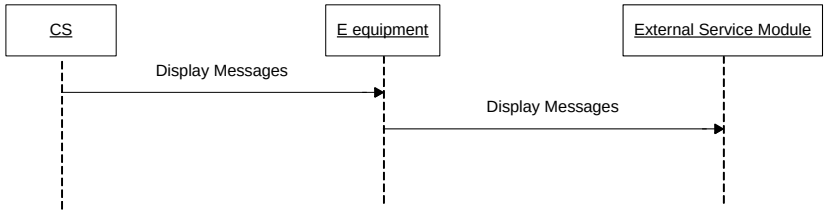


**Figure 5-13c: Display messages on meter display and port P1 – UML sequence diagram**

*Pre-conditions*

- The GO or supply company wants to inform the customer of executed or pending actions.

*Parameters, either*

- A message with syntax code NN, where NN numerical, or
- A concatenated message with syntax code NN+MM+LL…, where NN, MM, LL, and so on, are numerical (maximum 8 characters, see also P1 document), or
- An empty message.

*Post-conditions, either*

- The message is presented on P1 and on the display of the metering installation, or
- (In case of an empty message) the previous message is removed from P1 and the display of the metering installation.

*Assumptions*

- The assumption is made that the equipment that receives the information on P1 provides functionality to handle the messages in the appropriate way
- The CS shall decide which messages must be presented, when more than one needs to be presented, concatenation is handled in the CS.

### 5.13.1 Display standard messages

DSMR-M 4.5.75

| | |
|---|---|
| **Description** | The E meter shall provide functionality to display received standard messages and standard messages generated by the meter. |
| **Rationale** | Messages are used by the GO, the supplier, or by the meter in order to inform the customer. |
| **Fit criterion** | The received standard message or the generated message (added to the received standard message) is shown on the display of the metering installation and it has the following characteristics:<br>▪ It can be displayed on a numerical display;<br>▪ Horizontal scrolling will be used if the message does not fit on the display;<br>▪ A new message will override the current message on the display;<br>▪ An empty message will result in the removal of the current message on the display, and return the display to auto scroll mode;<br>▪ Maximum length is 8 characters.<br>▪ The message shall be shown continuously on the display, until the consumer |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | presses a button. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3.2.1) | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.76

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The electricity meter shall provide functionality to provide standard messages to auxiliary equipment. | | | | | | |
| **Rationale** | Auxiliary equipment is usually installed at a convenient location for the consumer to view information whereas the metering installation can be in a less convenient place. For this reason the standard messages are provided to auxiliary equipment. | | | | | | |
| **Fit criterion** | The standard message is provided to the auxiliary equipment. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3.2.1) | **Port** | P1 | **Applicable** | E meter |

### 5.13.2 Performance

DSMR-M 4.5.77

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall display a message on the meter display soon after the request was received by the metering installation. | | | | | | |
| **Rationale** | The received message has to be shown on the display on short notice. | | | | | | |
| **Fit criterion** | Total handling time after receiving the message shall be less than 5 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.78

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall send a message to P1 soon after the request was received by the metering installation. | | | | | | |
| **Rationale** | The received message has to be shown on the auxiliary device on short notice. | | | | | | |
| **Fit criterion** | Total handling time after receiving the message shall be less than 5 seconds. The E meter continues to send the message to P1 (every 10 seconds) until the next message has been received. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P1 | **Applicable** | E meter |

## 5.14 Use case 14: Sending long messages to port P1

For the market participant involved with the connection (GO, supply company and independent service provider), it is possible to send a long message to the metering installation. A long message differs from standard messages by the way the metering installation handles them. On arrival in the metering installation the long messages are directly forwarded to the auxiliary equipment. The long messages are not interpreted or displayed in the metering installation in any way. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-14.

| Trigger | Description |
|---|---|
| A market participant wants to send a message | A market participant involved wants to send a data string through P3 to the OSM on P1. |

**Figure 5-14a: Sending messages to port P1– trigger description**

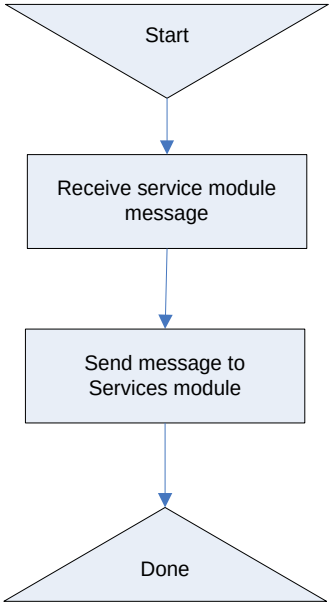


**Figure 5-14b: Sending messages to port P1– block diagram**

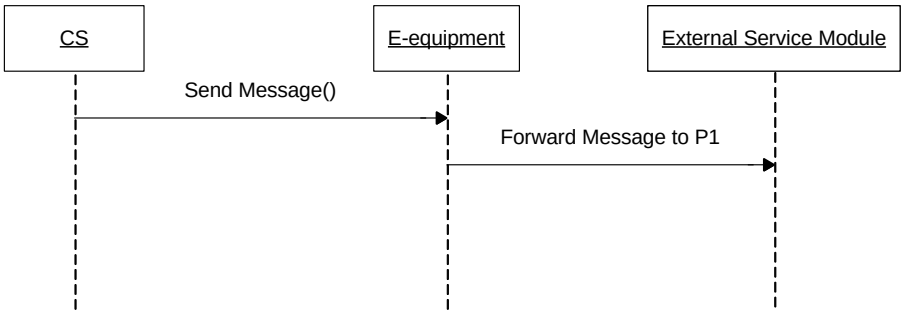


**Figure 5-14c: Sending messages to port P1– UML sequence diagram**

*Pre-conditions*

- A market participant involved with a connection wants to send a data string to the auxiliary equipment.

*Parameters*

- A long message (maximum 1024 characters).

*Post-conditions*

- The long message is provided to the auxiliary equipment. The central system assures at least 1 hour availability of the long message at the end customer device. In case another message is offered for processing, the new message is hold back by the CS in case the previous message was processed less than 1 hour ago"

### 5.14.1 Long messages

DSMR-M 4.5.79

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to receive long messages. | | | | | | |
| **Rationale** | Market participants can provide specific information to consumers through the auxiliary equipment. Note the difference with standard messages. The standard messages are provided to auxiliary equipment too, but are also displayed by the E meter itself.. | | | | | | |
| **Fit criterion** | The E meter shall accept long messages with a maximum of 1024 characters for distribution to the auxiliary equipment. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3.2.2) | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.5.80

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to forward long messages to the auxiliary equipment. | | | | | | |
| **Rationale** | The contents of long messages are no concern for the metering installation. The contents are therefore forwarded to the auxiliary equipment directly. The E meter continues to send the message to the auxiliary equipment until the next message has been received. | | | | | | |
| **Fit criterion** | The displayed message is available to the auxiliary equipment until the next message has been received. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.3.2.2) | **Port** | P1 | **Applicable** | E meter |

### 5.14.2 Error reporting

DSMR-M 4.5.81

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall issue a logical error in case it cannot handle the received long message due to its size. | | | | | | |
| **Rationale** | Messages can be modified during transport (e.g. differing character sets). This could lead to situations where a message is longer than the size that can be handled by the equipment. | | | | | | |
| **Fit criterion** | The equipment shall issue a logical error in case it cannot handle the received long message due to its size. The logical error issued shall at least contain the generic attributes for errors. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

### 5.14.3 Performance

DSMR-M 4.5.82

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall publish the message on the P1 port soon after the request was received by the metering installation. | | | | | | |
| **Rationale** | The message shall become available for the external service module on short notice. | | | | | | |
| **Fit criterion** | Total handling time after receiving the message shall be less than 5 seconds. The E meter continues to send the message to the auxiliary equipment until the next message has been received. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P1 | **Applicable** | E meter |

## 5.15 Use case 15: Shift tariff times electricity

The supply company can deliver electricity for a flat rate (single tariff) or two tariffs. In the latter case, a calendar day is divided in two parts. The times during the day where a shift from one tariff to another takes place are denoted tariff shift times. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-15.

| Trigger | Description |
|---|---|
| Change of tariff times | The supply company requests a change in the tariff switch times. |

**Figure 5-15a: Shift tariff times electricity – trigger description**

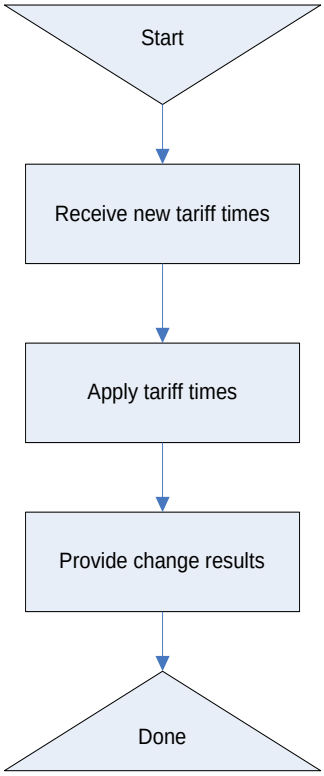


**Figure 5-15b: Shift tariff times electricity – block diagram**

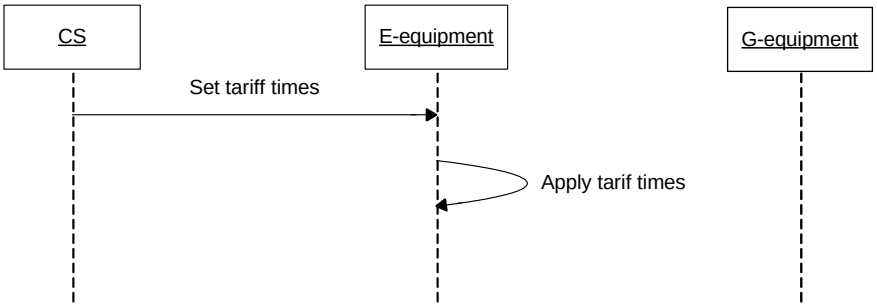


**Figure 5-15c: Shift tariff times electricity – UML sequence diagram**

*Pre-conditions*

- A shift of the tariff period is required

*Parameters*

- date at which the new shift times have to applied (activation date);
- tariff shift time to 'on-peak' tariff;
- tariff shift time to 'off-peak' tariff.

*Post-conditions*

- The tariff shift times have been set at the activation date;
- If setting of the tariff shift time has failed, an error is issued. The current active shift times must be not affected by this failure and must stay active.

*Assumptions*

- None.

### 5.15.1 Set tariff times

DSMR-M 4.5.83

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The electricity meter shall provide functionality to set two tariff shift times at a designated date. | | | | | | |
| **Rationale** | A supplier may want to differentiate tariffs e.g. to satisfy customers with a specific consumption pattern. For this purpose the supplier can set tariff shift times per connection. Tariff shift times are applied at 00:00h in order to let the change coincide with a periodic meter read. | | | | | | |
| **Fit criterion** | After 00:00h on the designated date the tariff shift times are applied and consumption is assigned to the correct tariff according to the tariff shift times. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 ((§5.4.1) | **Port** | P3 | **Applicable** | E meter |

### 5.15.2 Logging and events

DSMR-M 4.5.85

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall log info when the new Tariff Shift Time is applied. | | | | | | |
| **Rationale** | It is important to have the means to verify when and which tariff is used and what the meter register values were. | | | | | | |
| **Fit criterion** | The E meter shall log info when the new Tariff Shift Time is applied. The following info is logged:<br>▪ Activation date and time<br>▪ Event 9 and/or 19 will be used | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

## 5.16 Use case 16: Synchronise time E-equipment

The general requirement DSMR-M 4.3.5 states the required accuracy of the time of the meter. To be able to verify that the internal clock of the metering equipment is operating and set cor-

rectly, the CS has to be able to synchronise the time of the metering equipment. This use case only applies to meters that use the CS for clock synchronisation, other methods are allowed as long as general requirement DSMR-M 4.3.5 is met. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-16.

| Trigger | Description |
|---|---|
| Synchronise request from CS | A synchronise request is received from CS specifying the local time. |

**Figure 5-16a: Synchronise time E-equipment – trigger description**

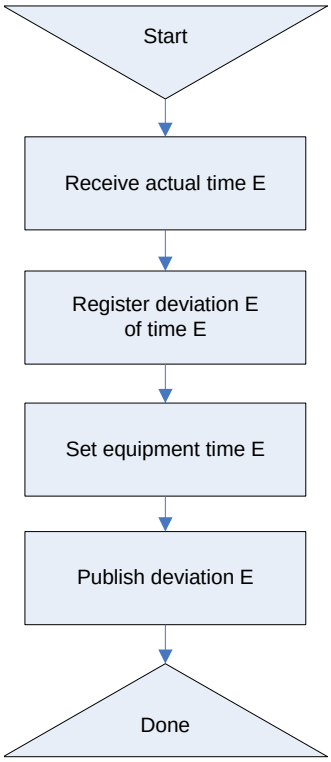


**Figure 5-16b: Synchronise time E-equipment – block diagram**

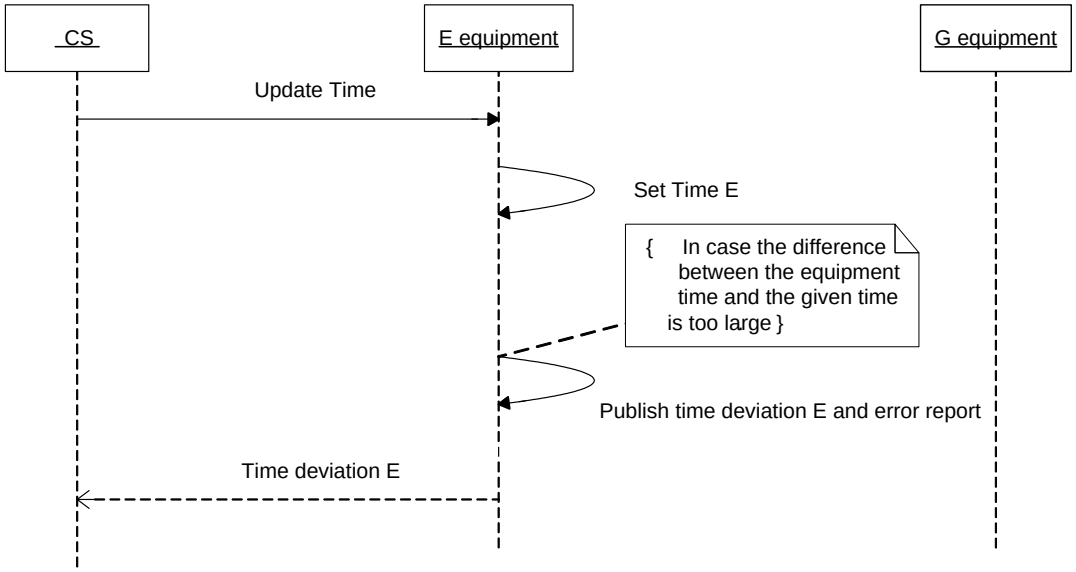


**Figure 5-16c: Synchronise time E-equipment – UML sequence diagram**

*Pre-conditions*

- The internal clock of the E meter can deviate from the local time.

*Parameters*

- Local time (possibly with the time needed for communication accounted for).

*Post-conditions*

- The internal clock of the metering equipment is within the limits of accuracy.
- If the clock is adjusted more than a predefined amount of time, this is logged as an error.

*Assumptions*

- The time it takes to send the local time from the CS to the meter can be neglected.
- After retrieval of the alarm byte concerning the time shift (in use case *Provide periodic meter reads*) and retrieval of the error logging including the applied time shift (use case *Provide error history*), it is the responsibility of CS to ascertain the quality of the periodic meter reads and interval values.

### 5.16.1 Synchronise time

DSMR-M 4.5.86

| | |
|---|---|
| **Description** | The E meter shall provide functionality to synchronise its internal clock, and to adjust the maximal deviation that is accepted compared to the local time from the CS. |
| **Rationale** | It is required that the accuracy of the time of the meter is within limits. As it is not reasonable to equip meters with clocks that meet the accuracy during their lifetime, the meter shall provide functionality to synchronise its clock to external entities. |
| **Fit criterion** | ▪ The E meter shall provide functionality to synchronise its internal clock.<br>▪ The deviation of the clock shall be within the limits of accuracy.<br>▪ The maximum deviation in seconds can be adjusted in the E meter (typically 60 seconds). |

| History | Nov. 2007 | Origin | TST | Port | P3 | Applicable | E meter |
|---|---|---|---|---|---|---|---|

DSMR-M 4.5.87

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall issue an event if the time adjustment is larger than the maximum deviation time. | | | | | | |
| **Rationale** | In order for meter readings to be accurate, the time of registration has to be accurate too. Therefore the equipment shall provide information on large time adjustments. | | | | | | |
| **Fit criterion** | If the time adjustment is more than the maximum deviation time in Seconds, two events are issued. The corresponding log entry contains the event Clock adjusted (old date/time) and the event Clock adjusted (new date/time). | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

### 5.16.2 Performance

DSMR-M 4.5.88

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall have the logging information on large time shifts available for both E and G on P3 soon after the request was received by the metering installation. | | | | | | |
| **Rationale** | If the information retrieval takes too much time, this will cause delays in the data collection process. | | | | | | |
| **Fit criterion** | The retrieval of the stored information and publication on P3 shall take no more than 5 seconds. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3 | **Applicable** | E meter |

## 5.17 Use case 17: Synchronise time G-equipment

The general requirement DSMR-M 4.3.5 states the required precision of the time of the meter. To be able to verify that the metering equipment is operating accordingly and correct the time when necessary the E-equipment has to be able to synchronise the time of the G-equipment. The trigger description, block diagram and UML sequence diagram are depicted in Figure 5-17.

| Trigger | Description |
|---|---|
| Deployment of gas equipment | At deployment the time of the metering equipment is probably not correct, so it has to be synchronized. If the P2 device has an internal clock, it shall be synchronised by the E meter via an M-Bus time set action after the first encrypted response is received.<br>Note that time synchronisation is always initiated by the E meter. In wireless (RF) configurations the G meter allows the E meter to send commands once every hour. |
| Time change | Synchronisation is done at every time change of the bus master (including daylight savings time related changes) |
| Communication restart | Synchronisation is done at every restart of the communication (after communication breakdown, after M-Bus master breakdown, and after M-Bus slave breakdown). |
| Periodically | Synchronisation is done every 24 hours, to ensure a maximum deviation below 60 seconds. |

**Figure 5-17a: Synchronise time G-equipment – trigger description**

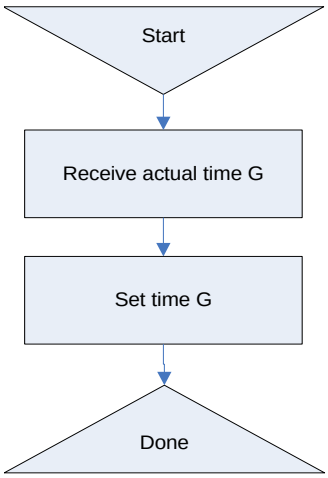


**Figure 5-17b: Synchronise time G-equipment – block diagram**

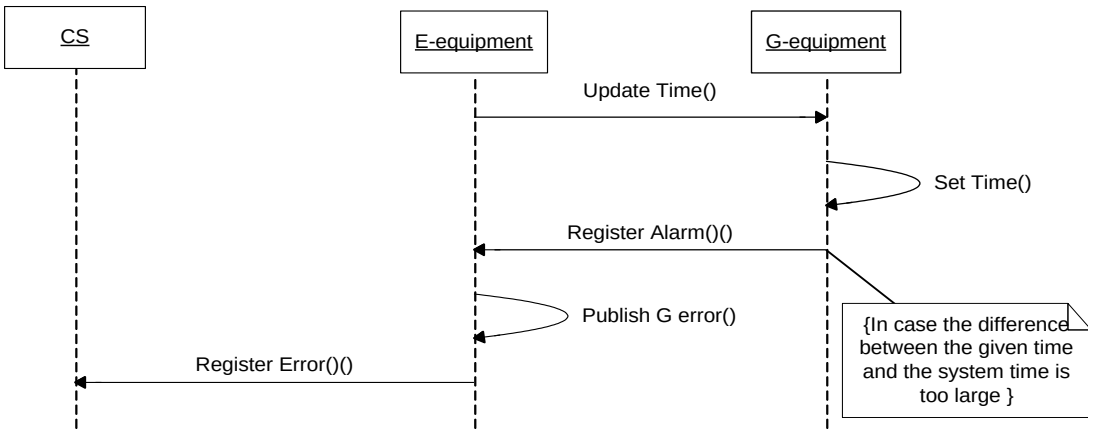


**Figure 5-17c: Synchronise time G-equipment – UML sequence diagram**

*Pre-conditions*

- The internal clock of the G equipment can deviate from the E meter time.

*Parameters*

- Local time.

*Post-conditions*

- The time of the G-equipment is within the limits of accuracy.
- If the clock is adjusted more than a predefined amount of time, this is logged as an error.

*Assumptions*

- The time to send the local time from the E meter to the G meter can be neglected.

### 5.17.1 Synchronise time

DSMR-M 4.5.89

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to synchronise the time of the G-equipment. | | | | | | |
| **Rationale** | It is required that the accuracy of the time of the meter is within limits. As it is not reasonable to equip meters with clocks that meet the accuracy during their lifetime, the E meter shall provide functionality to synchronise the clock of the G meter. Synchronisation is done:<br>▪ At every time change of the bus master (including daylight savings time related changes).<br>▪ At every restart of the communication (after communication breakdown, after M-Bus master breakdown, and after M-Bus slave breakdown).<br>▪ Every 24 hours, to ensure a maximum deviation below 60 seconds.<br>▪ The E meters shall automatically perform a M-Bus time set action after installation of a G meter. | | | | | | |
| **Fit criterion** | The G meter can be synchronized. Deviation of the clock shall be within the limits of accuracy. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 | **Port** | P2 | **Applicable** | E meter, G meter |

DSMR-M 4.5.90

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G meter shall provide functionality to synchronise its clock. | | | | | | |
| **Rationale** | It is required that the accuracy of the time of the meter is within limits. As it is not reasonable to equip meters with clocks that meet the accuracy during their lifetime, the meter shall provide functionality to synchronise its clock to external entities. | | | | | | |
| **Fit criterion** | The G meter can be synchronized | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 | **Port** | P2 | **Applicable** | G meter |

DSMR-M 4.5.91

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G-equipment shall provide functionality to publish large time shifts. | | | | | | |
| **Rationale** | Time shifts shall be known in the CS in order to determine the quality of certain interval values. | | | | | | |
| **Fit criterion** | Upon synchronisation, if the clock deviates more than 60 seconds, an alarm is raised. Upon first communication, the alarm is reported to the E meter. | | | | | | |
| **History** | 16-07-07 | **Origin** | NTA 8130 | **Port** | P2 | **Applicable** | G meter |

### 5.17.2 Error reporting

DSMR-M 4.5.92

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E-equipment shall issue a normal error for large time adjustments that occur in the G meter. | | | | | | |
| **Rationale** | In order for meter readings to be accurate, the time of registration has to be accurate too. Therefore the equipment shall provide information on large time adjustments. | | | | | | |
| **Fit criterion** | If the time adjustment is more than S (typically 1 minute), an error is issued that contains the generic attributes for normal errors. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA 8130 | **Port** | P2 | **Applicable** | E meter |

# 6 BUSINESS USE CASES FOR INSTALLATION AND MAINTENANCE

In this chapter the requirements are provided in a framework of use cases. The use cases represent the building block for business processes for installation and maintenance in which the equipment participates. The entity that executes the use cases is external to the equipment. The actual type of the external entity (system, user or other) is irrelevant for the requirements in this section. What is however important, is to have a clear division between the activities internal to the equipment and the external entity. Where gas meters are mentioned this could also be replaced with thermal, water, or slave E meters.

## 6.1 M&S equipment use cases

This section provides the use cases that apply to all equipment.

### 6.1.1 Use case: Receive equipment

This use case provides descriptions of the activities that start after the equipment is produced and are completed at the moment the equipment is ready to be installed.

| Trigger | Description |
|---|---|
| The GO has ordered equipment | The GO has ordered equipment from a vendor. |

Reception of equipment is handled per batch, i.e. the GO considers each delivery of equipment as a single batch of equipment.

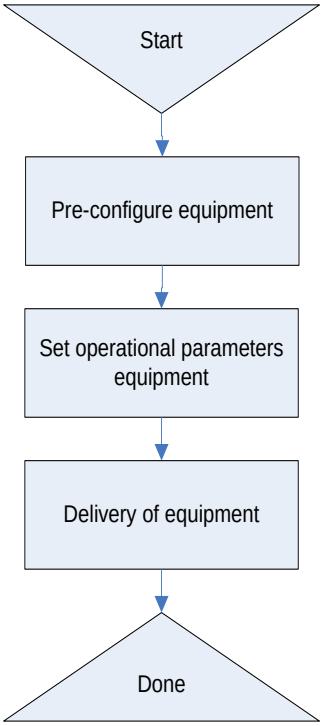


**Figure 6-1: Receive equipment**

Pre-conditions

- The equipment is in the initial state as produced.

Parameters

- Default configuration information;
- Default values for operational parameters.

Post-conditions

- The equipment is ready to be installed in the production environment

Assumptions

- -none-

#### 6.1.1.1 Pre-configure equipment

The vendor handles pre-configuring the equipment. It involves setting values for the configuration and the operational parameters for the equipment. Refer to section 2.5 of the main document for a description of the configuration attributes for various types of equipment.

The GO will deliver a complete set of values for pre-configuring the equipment that is part of a batch of equipment, i.e. for each batch a new set of configuration values is provided.

The pre-configuration information for M&S as provided by the GO consists of the following categories of information for each of the values in section 2.5.1:

| Value | Description |
|---|---|
| Name | The name of the configuration item. |
| Value | The actual value to be pre-configured. |
| Displayable | Indicates if the name and value of the configuration item shall be displayable on the metering installation or not. |

The activity of pre-configuring equipment is based on the assumption that it is more efficient and less error prone to do this separately from the physical installation. Another advantage of pre-configuring is that configuration information does not need to be distributed.

As the vendor performs the activity of pre-configuring the equipment, there are no requirements associated with this activity.

#### 6.1.1.2 Set operational parameters equipment

The vendor will set the operational parameters for equipment prior to delivery. For this purpose the GO provides a complete set of values for the operational parameters. Refer to section 2.5.1.1 for a description of the operational parameters for E equipment and to section 2.5.1.2 for a description of operational parameters for G equipment.

As the vendor performs the activity of setting the operational parameters for the equipment there are no requirements associated with this activity.

#### 6.1.1.3 Delivery of equipment

The current section describes the requirements for delivery of equipment. All equipment is pre-configured by the vendor. After the vendor has preconfigured the equipment and set the operational parameters, the equipment is shipped to the GO.

The GO can verify that all requirements in this section are met through random samples determined before or after arrival of the equipment.

DSMR-M 4.6.1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | During the packaging of each E meter a mounting clip shall be included. | | | | | | |
| **Rationale** | Sometimes it is necessary for installation purposes to use a mounting clip to fit the E meter on the meter board. | | | | | | |
| **Fit criterion** | During the packaging of each E meter a mounting clip shall be included. | | | | | | |
| **History** | Dec. 2008 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.6.2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | M&S equipment shall have an equipment identifier according to the U.S.S code 128 bar code system. | | | | | | |
| **Rationale** | GO's need an identifier for the meter that is used throughout its lifetime: the equipment identifier. The identifier for E and G meters contains the meter code. The meter code implicitly indicates that the meter is certified to be used in the Dutch market. The equipment identifier also includes the serial number for the equipment. The serial number is assigned by the vendor. Finally the equipment identifier contains the last 2 digits of the year of manufacturing (i.e. year of century). However, these last two digits can't be used to make the equipment ID unique. | | | | | | |
| **Fit criterion** | The equipment identifier shall be compiled of three parts:<br>▪ Meter code, 5 character code (with leading spaces if is code is shorter than 5 characters);<br>▪ Serial number, 10 characters, assigned by the vendor, with leading zeroes if the number is shorter than 10 characters<br>▪ Year of manufacturing, 2 characters, assigned by the vendor as year of century. However, these last two digits can't be used to make the equipment ID unique. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.6.3

| | |
|---|---|
| **Description** | The equipment identifier shall be printed in a form that is readable for both humans and machines. |
| **Rationale** | The equipment identifier shall be provided in both machine readable and human readable form as this facilitates installation and maintenance processes. In order to improve readability the background colour of the bar code shall preferably be white. |
| **Fit criterion** | The printed representation of the equipment identifier shall meet the following criteria:<br>▪ The bar code must comply with Code 128 bar code (also known as ANSI/AIM 128 or USS code 128) specifications;<br>▪ The width of the thinnest line or space in the bar code, also known as the 'significant dimensional parameter X' must be at least 0.3 mm;<br>▪ The blank zones preceding and following the bar code, also known as the 'quiet |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | zone' must be a minimum of 6 mm;<br>▪ The height of the bar code must be a minimum of 7 mm;<br>▪ A written out representation of the contents of the bar code must be printed directly underneath the bar code with a minimum character height of 3 mm;<br>▪ The size of the label shall not exceed a height of 30 mm and a length of 75 mm;<br>▪ The label shall remain legible throughout the lifetime of the meter. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

### 6.1.2 Use case: Firmware upgrade

This use case provides a description of the requirements to equipment with respect to firmware upgrades.

Please note that NTA 8130 states that firmware upgrades for the metering installation are required. In this document this is interpreted as firmware upgrades for only E meters (no G meters).

| Trigger | Description |
|---|---|
| Add functionality | The GO wants to add new functionality on existing hardware and therefore installs new firmware. |
| Add optimisations | The GO wants to deploy optimised version of the firmware. |
| Fix software defects | The current version of the software contains flaws (bugs, incompatibilities etc) and is therefore replaced with a new version. |

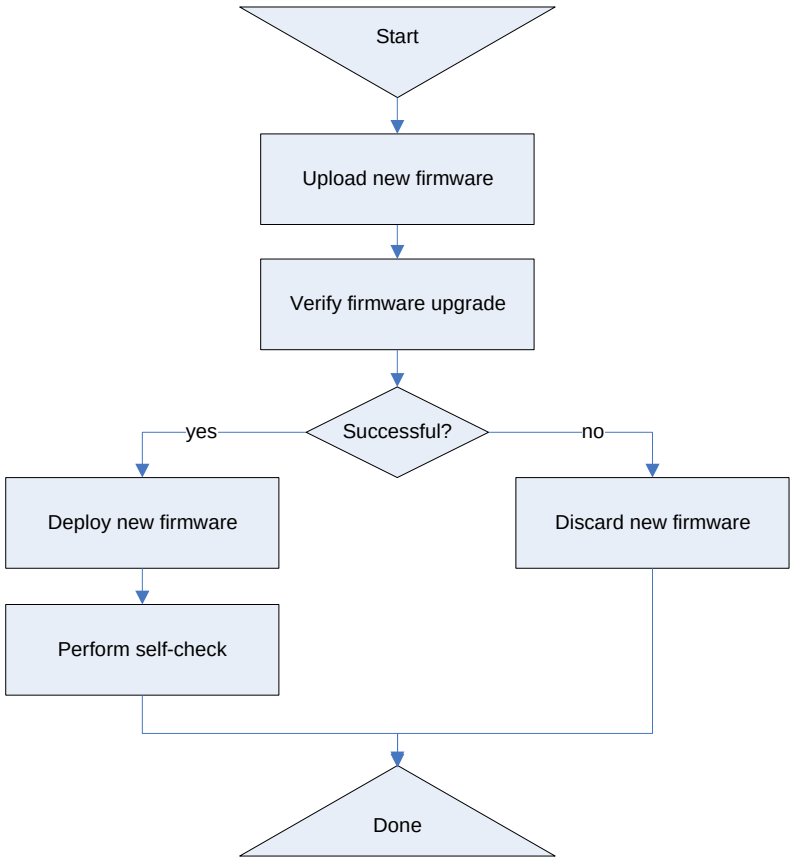


**Figure 6-2: Firmware upgrade**

Pre-conditions

- The current version of the firmware is incomplete, incorrect or outdated.

Parameters

- Date to deploy the new version of the firmware;
- New version of the firmware.

Post-conditions

- The new version of the firmware is deployed successfully or discarded;
- Verification of the new firmware is logged;
- The change of firmware is logged.

Assumptions

- The meter data in the metering instrument are not affected in any way by the firmware update;
- The state of the equipment (operational parameters and configuration) is not affected in any way by the firmware update;
- The metrological functions of metering instruments shall not be affected by a firmware upgrade.

#### 6.1.2.1 Upload new firmware

DSMR-M 4.6.4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall provide functionality to upload new firmware to equipment. | | | | | | |
| **Rationale** | It is expected that the firmware will be upgraded multiple times during the lifecycle of the equipment. Multiple reasons exist for upgrading firmware: new functionality added to firmware, optimisations in firmware, defects in firmware etc. For economic reasons it may not be feasible to upgrade firmware on-site, therefore both remote and local uploads of firmware are required. | | | | | | |
| **Fit criterion** | The new version of the firmware shall be stored by the equipment. The fact that a new version of firmware is available can be verified through the state of the equipment. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA | **Port** | P3, P0 | **Applicable** | E meter |

#### 6.1.2.2 Verify firmware upgrade

DSMR-M 4.6.7

| | |
|---|---|
| **Description** | The equipment shall issue a logical error in case the new firmware is incomplete, inconsistent or incompatible with the equipment-type. |
| **Rationale** | A firmware upgrade is preceded by thorough testing and it is therefore not expected that firmware is not compatible. Incompatible firmware of a single piece of equipment usually implies that the upgrade will fail for other equipment too. As a firmware upgrade is a time-consuming activity users have to be informed of incompatible firmware immediately. |
| **Fit criterion** | The logical error issued for incomplete, inconsistent (invalid identification or signing) or incompatible with the equipment-type firmware shall at least contain the generic attrib- |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | utes for logical errors. The new firmware shall not be deployed. | | | | | | |
| **History** | Nov 2007 | **Origin** | I&M | **Port** | P3 | **Applicable** | E meter |

DSMR-M 4.6.8

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall log the event of successful verification of a new version of the firmware. | | | | | | |
| **Rationale** | For maintenance reasons it is important to verify if new firmware was received by the equipment and at what time and date it was verified. | | | | | | |
| **Fit criterion** | The log information for the event shall at least contain the following information:<br>• Time stamp at which the new version of the firmware was verified<br>• | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter |

### 6.1.2.3 Deploy new firmware

DSMR-M 4.6.9

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The metering equipment shall deploy the new version immediately. | | | | | | |
| **Rationale** | The metering equipment shall deploy the new version immediately. | | | | | | |
| **Fit criterion** | The new version of the firmware is the operational version of the firmware in the equipment.<br>If the deployment date coincides with a power outage, the upgrade shall be deployed after power on. In this case no error shall be raised. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.6.10

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Deployment of new firmware shall not result in modification or deletion of any meter data, configuration parameters or operational parameters in the equipment. | | | | | | |
| **Rationale** | The deployment of new firmware shall not have any additional activities as a result in order to have the equipment function correctly. This means that the firmware is supplied as 'plug-n-play' software. | | | | | | |
| **Fit criterion** | No operational changes in the functioning of the meter shall occur after deployment of new firmware other than the documented changes for the new firmware. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.6.11

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | A firmware upgrade for metering instruments shall not affect the metrological part of the instruments in any way. | | | | | | |
| **Rationale** | According to European law and legislation it is not allowed to change the metrological characteristics or functionality in metering instruments. A firmware upgrade shall therefore not affect it. By following Welmec 7.2 Issue 4 (Software Guide – measuring Instruments Directive 2004/22/EC –) a compliancy with the software-related requirements contained in the MID (e.g. Annex 1, 7.6, 8.3, 8.4) can be assumed. | | | | | | |
| **Fit criterion** | The equipment shall comply with Welmec 7.2 Issue 4 (Software Guide – measuring Instruments Directive 2004/22/EC –) | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.6.12

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall log the event of deploying a new version of the firmware. | | | | | | |
| **Rationale** | For maintenance reasons it is important to know at which time and date the firmware was deployed or discarded. | | | | | | |
| **Fit criterion** | The log information for the event shall contain the following information:<br>• Time stamp at which the new version of the firmware was deployed. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter |

### 6.1.2.4 Perform self-check

DSMR-M 4.6.13

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Immediately after the new firmware is deployed, a self-check is executed by the equipment. The results consist of the outcome of 'Use case: Perform self-check M&S equipment.' | | | | | | |
| **Rationale** | A self-check is executed to establish the correct running of the newly installed software. This can be considered as the final check performed during the process of a firmware upgrade. | | | | | | |
| **Fit criterion** | The self-check that is executed as part of the firmware upgrade shall be performed within 10 seconds after the completion of the firmware update process,. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P3 | **Applicable** | E meter |

### 6.1.2.5 Discard new firmware

In case the verification of correct operation failed the new firmware shall not be deployed.

DSMR-M 4.6.14

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall discard the new version of the firmware in case it is incomplete, inconsistent or incompatible with the equipment-type. | | | | | | |
| **Rationale** | Equipment is able to store two versions of firmware: the version deployed and the version to be deployed. If the verification for correct delivery of the new version of the firmware fails, that version of the firmware shall not be deployed. | | | | | | |
| **Fit criterion** | In case the firmware is incomplete, inconsistent or incompatible with the equipment-type, the new version of the firmware is prevented from activation by the equipment. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter |

### 6.1.2.6 Performance

DSMR-M 4.6.15

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall complete a firmware upgrade within a limited period of time. | | | | | | |
| **Rationale** | A remote firmware upgrade of firmware (P3) is not an online activity whereas a local firmware upgrade (P0) is considered an online activity (as on-site personnel may be waiting for it to complete). | | | | | | |
| **Fit criterion** | The completion rates and times for execution of the use case for the respective ports are:<br>P3 P0<br>80 %: 24 hours void<br>95 %: 48 hours void<br>99 %: 120 hours 5 minutes | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P0, P3 | **Applicable** | E meter |

### 6.1.3 Use case: Planned on-site maintenance

This section describes the use case for periodical on-site maintenance. This use case applies to M&S equipment The equipment shall be implemented is such a way that planned on-site maintenance is kept to a minimum.

| Trigger | Description |
|---|---|
| The battery of equipment is low | The GO has determined that the battery of the equipment needs to be replaced. |
| New communication | The GO want to change the communication technology for the equipment and therefore replaces the communications module. |

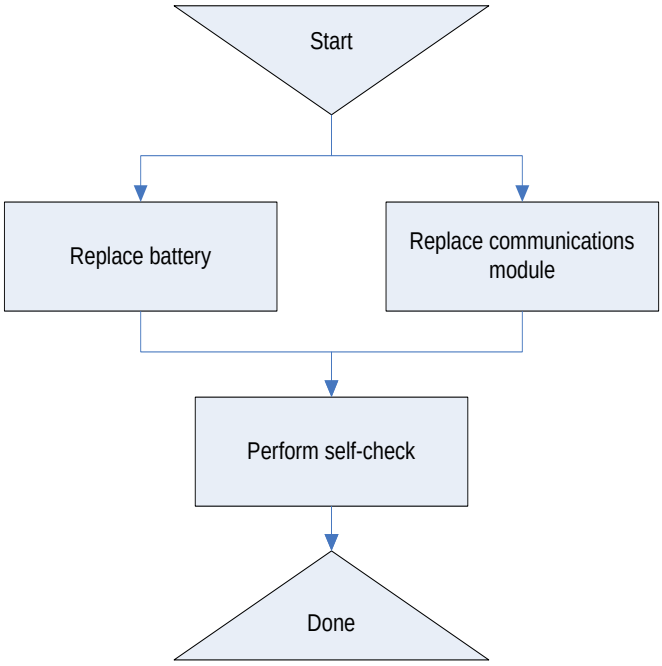


**Figure 6-3: Planned on-site maintenance**

Pre-conditions

- The equipment needs on-site maintenance.

Parameters

- -none-

Post-conditions

- The maintenance on the equipment was completed and the equipment functions correctly.

Assumptions

- -none-

#### 6.1.3.1 Replace battery

The lifetime of the battery is required to be at least as long as the technical lifetime of the equipment. However, it is anticipated that a battery in individual meters can have a shorter lifetime than the meter itself. For this purpose the possibility of replacing the battery is necessary.

DSMR-M 4.6.16

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Equipment that contains a battery shall be constructed in such a way that replacement of the battery can be performed safely without disconnecting the equipment from the grid. | | | | | | |
| **Rationale** | Lifetime of a battery can under some circumstances be shorter than the lifetime of the equipment. | | | | | | |
| **Fit criterion** | Replacement of the battery module shall not lead to modification or loss of data in the equipment. The configuration and operational parameters of equipment will not be affected and need not to be changed as the result of replacing a battery. For metering instruments the meter data will not be affected by the replacement of the battery. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.6.17

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Equipment that contains a battery shall be constructed in such a way that replacement of the battery can be performed without breaking the metrological seal. | | | | | | |
| **Rationale** | In case the metrological seal is broken, the equipment has to be recalibrated in order to be used. Replacing the battery shall not lead to mandatory recalibration as this is too time-consuming. | | | | | | |
| **Fit criterion** | The battery can be replaced without breaking the metrological seal | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.6.18

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The battery lifetime counter must reset itself to the default value after changing the battery also the “battery low” bit must be reset | | | | | | |
| **Rationale** | It must be possible to reset the battery lifetime counter without tools. | | | | | | |
| **Fit criterion** | The battery lifetime counter and the battery low bit must be reset after a battery change by detecting the power down – power up sequence when exchanging the battery for a new one. | | | | | | |
| **History** | Jan. 2011 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.6.19

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The activity of replacing the battery in equipment that contains a battery shall be completed in a limited period of time. | | | | | | |
| **Rationale** | The design of equipment shall enable fast replacement of the battery. The battery is located behind the non-metrological seal. The performance criterion presented here is based on the assumption that trained personnel replace the battery. | | | | | | |
| **Fit criterion** | The battery is located behind the non-metrological seal. The completion rates and times for replacing the battery need to be 99 % in 5 minutes. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | G meter |

#### 6.1.3.2 Replace communications module

The state-of-the-art in communications technology changes quickly. It is therefore expected that the communications module that is part of the equipment may need replacement earlier than the equipment itself.
There are two concepts for the communication module: modular and integrated. If there is a separate (modular) communication module than the requirements in this paragraph apply. The communication module is located in the meter and can contain application and communication functionality.

DSMR-M 4.6.20

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall be constructed in such a way that replacement of the communication module can be performed safely without disconnecting the equipment from the grid. | | | | | | |
| **Rationale** | If the communications technology provides better means to communicate or a more cost-effective solution for communication, the GO may want to replace the communications module in the equipment with a new one that uses the better or more cost-effective means of communication. | | | | | | |
| **Fit criterion** | Replacement of the communications module shall not lead to loss of data in the equipment. The configuration and operational parameters will not be affected and need not to be changed as the result of replacing a communications module. The meter data for metering instruments will not be lost or modified as the result of replacing the communications module. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.6.21

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The meter shall be constructed in such a way that replacement of the communications module can be performed without breaking the metrological seal. | | | | | | |
| **Rationale** | In case the metrological seal is broken, the equipment has to be recalibrated in order to be used. Replacing the communications module shall not lead to mandatory recalibration as this is too time-consuming. | | | | | | |
| **Fit criterion** | The communications module can be replaced without mandatory recalibration of the equipment. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.6.22

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The activity of replacing the communications module in equipment shall be completed in a limited period of time. | | | | | | |
| **Rationale** | The design of equipment shall enable fast replacement of the communications module. The performance criterion presented here is based on the assumption that trained personnel replace the communications module. | | | | | | |
| **Fit criterion** | The completion rates and times for replacing the communications module need to be 99 % in 5 minutes. | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter, G meter |

#### 6.1.3.3 Perform self-check

DSMR-M 4.6.23

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall provide functionality to present the results of a self-check and retrieve the results from the local port during installation. The results consist of the outcome of 'Use case: Perform self-check M&S equipment.' | | | | | | |
| **Rationale** | The maintenance personnel want to verify that the equipment functions correctly after the maintenance work is completed. | | | | | | |
| **Fit criterion** | The self-check process shall comply with the description of the respective self-checks for the different types of equipment. The self-check process shall be completed within 10 seconds after initiation. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0 | **Applicable** | E meter |

### 6.1.4 Use case: Adjust equipment before installation

This use case handles the process of adjusting the equipment to the installation location. Adjustment of the equipment can be executed in two occasions during the installation process. The first occasion is prior to physical installation. Adjustment is then performed on attributes that are not depending on the location where the equipment is installed. The second occasion to adjust the equipment can take place after the equipment is physically installed. This will involve attributes that depend on the location where the equipment is installed.

It is important to note that the GO strives to minimize the number of adjustments to the equipment, hence the pre-configuration of the equipment by the vendor. The vendor shall thus handle the majority of the work during the activity of pre-configuring the equipment.

| Trigger | Description |
|---|---|
| M&S equipment is not configured correctly | The equipment is installed in a location where the default configuration or parameters applied during pre-configuration are not correct. |
| M&S equipment is not configured completely | The equipment is installed in a location where the additional configuration values or parameters are required. |
| Install M&S equipment | During installation of the equipment the configuration and operational parameters of the equipment may need to be modified. |

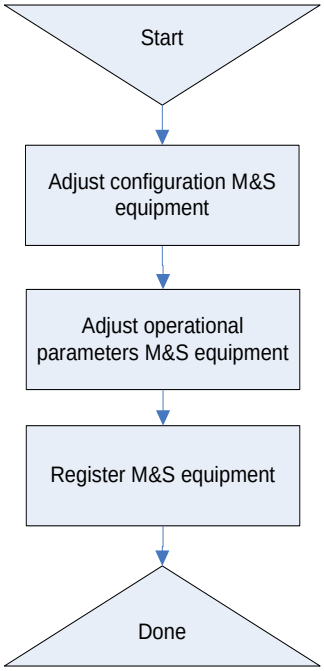


**Figure 6-4: Adjust equipment**

Pre-conditions

- The equipment is not configured correctly for the location where it is to be installed.

Parameters

- Configuration for the equipment
- Operational parameters for the equipment.

Post-conditions

- The equipment is configured correctly for the location where it is to be installed

Assumptions

- None.

#### 6.1.4.1 Adjust configuration M&S equipment

Although the vendor has pre-configured the equipment before shipping it, the GO may need to modify the configuration. There are multiple reasons to do this, consider the examples below:

- The default values for configuration provided by the GO have changed since the values were provided to the vendor;
- A sub-set of the equipment needs specific values (different from the default values) for configuration.

The GO thus needs facilities to adjust the configuration of the equipment. It should be noted that the adjustment of the configuration shall be kept to a minimum. It is the responsibility of the GO to minimize the amount of adjustment of equipment.

DSMR-M 4.6.24

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The vendor of the M&S equipment shall deliver an integrated software package that supports adjusting the pre-configuration of the M&S equipment **and** setting the operational parameters for all the M&S equipment. | | | | | | |
| **Rationale** | Although the vendor will pre-configure the meters according to the specifications of the GO, the GO needs a facility to modify the pre-configuration. The configuration process by the GO does not apply to the communication facilities used during the operational phase of the equipment (i.e. P3), but utilizes a local tool and port (i.e. P0). | | | | | | |
| **Fit criterion** | The tool provided by the M&S equipment vendor shall support the adjustment of pre-configuration functionality and setting operational parameters for all M&S equipment as described in 'Use case: Adjust equipment' | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P0 | **Applicable** | E meter |

DSMR-M 4.6.25

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The meter shall provide functionality to set the internal clock to local time after the meter is physically installed. | | | | | | |
| **Rationale** | The clock in the meter will not be adjusted to local time on delivery. Before the meter is deployed however, it needs to have the time set correctly in order to measure consumption correctly. | | | | | | |
| **Fit criterion** | The meter shall provide functionality to set the internal clock to local time after the meter is physically installed. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

DSMR-M 4.6.26

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to automatically adjust to daylight savings time and back. | | | | | | |
| **Rationale** | Local time includes two shifts of an hour every year: switch to daylight savings time and back. The meter shall automatically perform these shifts according to the rules for applying daylight savings time. | | | | | | |
| **Fit criterion** | The time and date of the internal clock will deviate less than 60 seconds from local time at any time. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter |

### 6.1.4.2 Adjust operational parameters M&S equipment

During the activity of setting operational parameters the GO sets all parameters on behalf of external parties like SC's. After this activity is concluded, the meter is prepared to function according to the wishes of external parties.

DSMR-M 4.6.27

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to set the threshold E before and after the meter is physically installed. | | | | | | |
| **Rationale** | The threshold can be set to a value on behalf of the GO or to a value provided by the SC responsible for the connection that the meter will be installed. | | | | | | |
| **Fit criterion** | The adjusted threshold value will be applied at the time the E meter is deployed. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

DSMR-M 4.6.28

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to set the breaker and/or valve position before and after it is physically installed. | | | | | | |
| **Rationale** | The GO needs to set breaker or valve position according to the wishes of the SC. Under some circumstances the GO can modify the position according to its own preferences. Note that it shall be possible to set the valve position for gas in the E meter. | | | | | | |
| **Fit criterion** | The adjusted breaker and/or valve position will be applied at the time the E meter is deployed. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P2, P3 | **Applicable** | E meter |

DSMR-M 4.6.29

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to set the periods for different tariffs for electricity before and after the meter is physically installed. | | | | | | |
| **Rationale** | The periods for different tariffs will differ per SC and possibly per connection. In order to register consumption correctly for the different tariffs, the periods for the tariffs are configured before the E meter is installed. | | | | | | |
| **Fit criterion** | The adjusted tariff periods will be applied at the time the E meter is deployed. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0,P3 | **Applicable** | E meter |

DSMR-M 4.6.30

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to set the table for special days before and after the E meter is physically installed. | | | | | | |
| **Rationale** | Currently the Dutch market uses a flat rate for electricity on special days like Easter, Christmas etc. This means that no differentiated tariffs are applied on these special days. The system shall therefore provide functionality to specify the special days. | | | | | | |
| **Fit criterion** | The table for special days shall contain at least 30 positions to store the dates of special days. The special days can be set a year at a time or multiple years at once. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

DSMR-M 4.6.31

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to set the standard messages in the meter before and after it is physically installed. | | | | | | |
| **Rationale** | The meter uses standard messages. The contents of these messages are fixed for the Dutch market. | | | | | | |
| **Fit criterion** | The adjusted standard messages will be applied at the time the meter is deployed. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

#### 6.1.4.3 Performance

DSMR-M 4.6.32

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The activities for the process of adjusting M&S equipment (excluding registering the equipment) shall be completed in a limited period of time. | | | | | | |
| **Rationale** | This process is typically executed after the meter is physically installed. The process does not support relaying a command and shall therefore be completed within a limited amount of time. | | | | | | |
| **Fit criterion** | The completion rates and times to be met are:<br>P3 P0<br>99 %: 2 minutes 1 minute | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P0, P3 | **Applicable** | E meter |

### 6.1.5 Use case: Install M&S equipment

This use case provides a description of the installation process of M&S equipment and the requirements on the equipment needed to support the process. Most activities in the process are executed by personnel on-site. The activities are therefore required to complete swiftly in order to reduce the amount of time personnel spends waiting.

| Trigger | Description |
|---|---|
| M&S equipment does not meet regulatory standards | The GO replaces old M&S equipment that does not meet regulatory standards or does not meet the requirement in the policy of the GO. |
| Malfunctioning equipment | The GO replaces the equipment as a result of malfunctioning of the meter. |
| End of lifecycle | The GO replaces the M&S equipment at the end of the lifecycle of the equipment. |

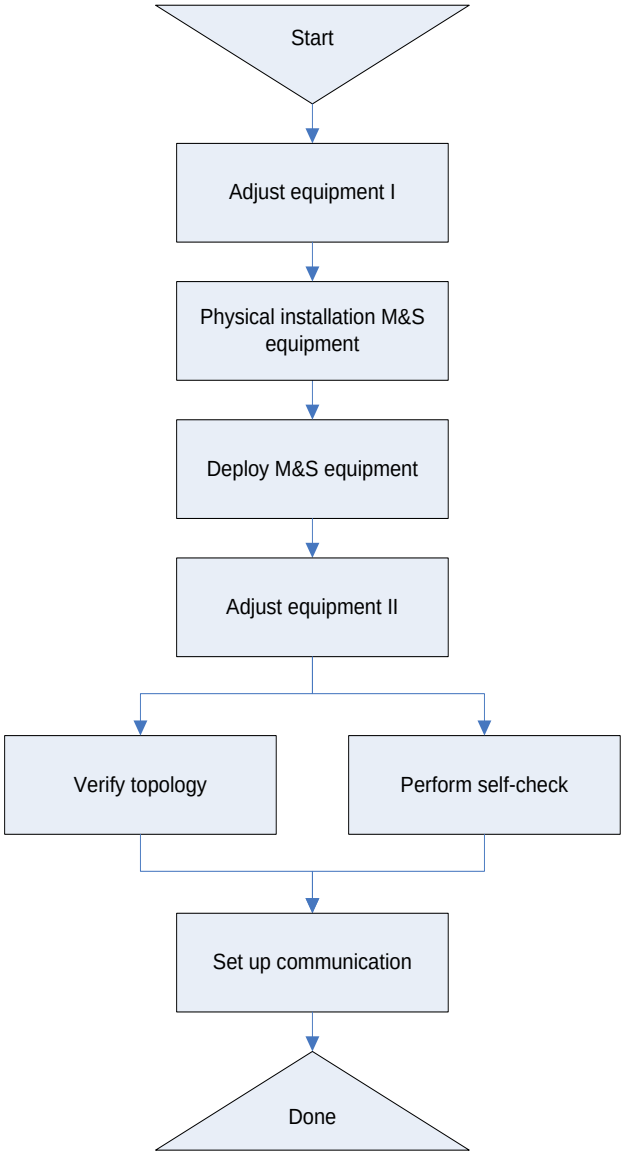


**Figure 6-5: Install M&S equipment**

Pre-conditions

- The M&S equipment is in the initial state as produced.

Parameters

- -none-

Post-conditions

- The M&S equipment is ready to be deployed in the production environment

Assumptions

- It is assumed that the E meter functions as the local host to all M&S equipment for installation purposes.

#### 6.1.5.1 Physical installation M&S equipment

During this activity the equipment is installed at the premises of the consumer. In order to minimize the costs of physical installation this section provides requirements that reduce the installation time.

DSMR-M 4.6.33

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall fit on meter boards (installed base). | | | | | | |
| **Rationale** | In order to reduce the costs for installation, the meter (including mounting hooks) shall fit on meter boards available in most households to reduce the time spent during installation. In existing installations, meter boards can be very small. In this case installation might only be possible if a short terminal cover is used. | | | | | | |
| **Fit criterion** | The distance between the holes for mounting the meter on a meter board shall comply with DIN 43857.<br>The external housing for single phase meter (including mounting hooks) shall not exceed the next dimensions: Height = 225 mm, width = 135 mm, depth = 140 mm.<br>The external housing for polyphase meter (including mounting hooks) shall not exceed the next dimensions: Height = 330 mm, width = 180 mm, depth = 150 mm.<br><br>The length of the meter cover shall guarantee that:<br>- The cut-out for the installation wires in the meter board are covered up completely.<br>- There is sufficient space between terminals and the bottom of the terminal cover for easy mounting of the wires. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.6.34

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The terminal block of E meter shall be constructed in a standard way. | | | | | | |
| **Rationale** | The installation of metering equipment requires a substantial investment. For this reason the E meter shall be constructed in a way that facilitates installation and reduces the investments needed. | | | | | | |
| **Fit criterion** | The construction of the terminal block shall comply with DIN 43856. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.6.35

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The terminal block of E meter shall facilitate a secure connection to the grid. | | | | | | |
| **Rationale** | One of the major concerns of GO is to provide a safe and secure means for distribution of electricity. Therefore the E meter shall be connected to the grid using robust wiring. | | | | | | |
| **Fit criterion** | The construction of the terminal block shall contain connectors suitable for wiring ranging from 4 $mm^2$ to 25 $mm^2$ for single phase meters, and from 4 mm2 to 35 mm2 for poly phase meters. The type of wires (that must be secured in a safe way) can be solid cores, composite cores or stranded wires. The terminal block must be suitable for cable sleeves. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.6.36

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | It shall not be possible to come in contact with the terminal block of the meter. | | | | | | |
| **Rationale** | The terminal block is protected by the terminal cover. It shall not be possible to come in contact with the screws of the terminal block. | | | | | | |
| **Fit criterion** | The cover of the terminal block of the meter shall meet the criteria in IEC 60529 IP31 when installed. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.6.36a

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | Removal of the terminal cover will not lead to instability of the meter cover. | | | | | | |
| **Rationale** | When the terminal cover is removed, it must be possible to fix a clamp-on optical head that counts the impulses per kWh of the impulse led, for accuracy testing purposes. The meter cover must be stable to use a clamp-on optical head. | | | | | | |
| **Fit criterion** | The meter cover will stay fixed in place, whenever the terminal cover is removed. | | | | | | |
| **History** | May 2011 | **Origin** | ET Metrology | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.6.37

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | It must be possible to install an external antenna without the need to come in contact with the terminal block or circuit board (PCB) of the meter. | | | | | | |
| **Rationale** | Low GPRS signal can necessitate the use for an external antenna. For safety reasons it must be possible to install such an antenna without having to come in contact with the terminal block or circuit board (PCB) of the meter. | | | | | | |
| **Fit criterion** | An external antenna can be installed without having to come in contact with the terminal block or PCB. | | | | | | |
| **History** | Sep. 2009 | **Origin** | TST | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.6.38

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | Terminal blocks of equipment must be designed in a proper way. | | | | | | |
| Rationale | Unintended penetration of the meter by connection wires via the terminal block must be prevented. It must not be possible to bypass a switch or to damage internal circuit boards (PCB). | | | | | | |
| Fit criterion | The terminal block shall be constructed in such a way that wires cannot enter the housing of the meter. | | | | | | |
| History | Nov. 2011 | Origin | TST | Port | n.a. | Applicable | E meter, G meter |

DSMR-M 4.6.39

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The activity of physically installing M&S equipment shall be completed in a limited period of time. | | | | | | |
| **Rationale** | The physical installation is a time-consuming activity and therefore expensive activity. For this reason the meter shall be constructed in such a way that physical installation is a relatively quick process. | | | | | | |
| **Fit criterion** | The completion rates and times to be met are:<br>E equipment G equipment<br>80 %: 10 min 25 min | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter, G meter |

#### 6.1.5.2 Deploy M&S equipment

At this point in the process the M&S equipment is physically installed at the premises of the consumer. At this time the equipment is registering consumption according to the operational parameters provided by the market participants. Some activities required before the equipment is deployed are described here.

DSMR-M 4.6.40

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to set location information in the meter after the meter is physically installed but before the meter is deployed. | | | | | | |
| **Rationale** | GO's will set location information in the meter for maintenance reasons. The location information typically consists of zip code and house number or geographical co-ordinates. | | | | | | |
| **Fit criterion** | The E meter shall provide functionality to set location information in the meter. The register size for the location information is set to 48 ASCII characters. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

#### 6.1.5.3 Adjust equipment after installation

During this activity the configuration and operational parameters of the equipment are adjusted after physical installation of the equipment. For this activity 'Use case: Adjust equipment' is invoked over port P3 or P0.

DSMR-M 4.6.42

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to invoke 'Use case: Adjust equipment' remotely. | | | | | | |
| **Rationale** | After the M&S equipment is installed it may need adjustment of configuration or operational parameters. The GO can decide to handle adjustment remotely. | | | | | | |
| **Fit criterion** | Adjustment of the M&S equipment shall comply with the description of use case 'Use case: Adjust equipment'. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P3 | **Applicable** | E meter |

#### 6.1.5.4 Perform self-check

DSMR-M 4.6.43

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to invoke 'Use case: Perform self-check M&S equipment' and retrieve the results locally (P0 or display). | | | | | | |
| **Rationale** | The GO wants to verify that the metering installation functions correctly before the installation is completed. Typically personnel that installed the equipment shall invoke a self-check as one of the last steps of the installation process. | | | | | | |
| **Fit criterion** | The result of the self-check that is executed as part of the installation process shall comply with the description of 'Use case: Perform self-check M&S equipment'. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

### 6.1.5.5 Set up communication

DSMR-M 4.6.45

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | After the M&S equipment is physically installed, a network attach shall be established automatically so that the meter can be contacted. | | | | | | |
| **Rationale** | The final step of installation of M&S equipment is to set up communication. At this point in the process a network attach shall be set up automatically. | | | | | | |
| **Fit criterion** | The meter shall provide functionality to automatically attach to the network. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

DSMR-M 4.6.46

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall indicate on the display that installation of an M-Bus device was successful. | | | | | | |
| **Rationale** | During installation it is important to have confirmation of a working connection between E meter and G meter | | | | | | |
| **Fit criterion** | In manual scroll mode the E meter shall indicate on the display the serial number of the successfully installed M-Bus device(s). | | | | | | |
| **History** | Dec. 2008 | **Origin** | I&M | **Port** | P2 | **Applicable** | E meter; G meter |

DSMR-M 4.6.47

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The activities for the process of installing M&S equipment (excluding physical installation) shall be completed in a limited period of time. | | | | | | |
| **Rationale** | The time between the actual connection to the grid and the moment the installation is completed shall be limited as during this period the meter may not be configured correctly. For this reason the period shall be limited. | | | | | | |
| **Fit criterion** | The completion rates and times to be met are:<br>P3 P0<br>99 %: 5 minutes 1 minute | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3, P2 and P0 | **Applicable** | E meter, G meter |

### 6.1.6 Use case: Un-install M&S equipment

This use case provides a description of the process of un-installing M&S equipment and the requirements on the equipment needed to support the process. It is emphasized that the un-install process described here applies to smart metering equipment.

Various triggers exist for un-installing M&S equipment as indicated in the table below.

| Trigger | Description |
|---|---|
| Modification to function location | A change in the connection can lead to un-installation of equipment. Consider, for example, a situation where an E connection changes from single phase to poly-phase. This means the un-installation of a single phase E meter (and a subsequent installation of a poly phase meter). |
| Malfunctioning equipment | In case the GO experiences malfunctioning of equipment he can decide to replace the equipment. |
| End of life cycle | In case the life cycle of equipment is complete, it is un-installed. |

Un-installing M&S equipment does not address removing equipment temporarily for (re-) calibration.

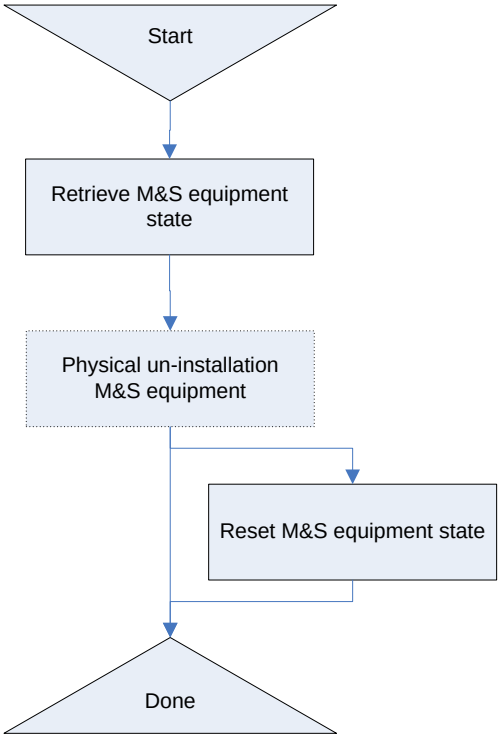


**Figure 6-6: Un-install M&S equipment**

Pre-conditions

- M&S equipment or a part of the M&S equipment has to be uninstalled.

Parameters

- Equipment identifiers for the equipment that has to be uninstalled.

Post-conditions

- The state of the equipment is retrieved and the equipment has been un-installed.

Assumptions

- The assumption is made that meter data stored in the metering instruments is retrieved prior to the process of un-installing the instrument. Therefore only the actual meter readings are retrieved as part of the un-installation process.

#### 6.1.6.1 Retrieve M&S equipment state

The first step in un-installing equipment shall be to retrieve the state of the equipment.

DSMR-M 4.6.48

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to invoke ‘<br><br>Use case: Retrieve M&S equipment state<br>’. | | | | | | |
| **Rationale** | The GO wants to retrieve all configuration information and operational parameters from the equipment at the time the equipment is un-installed. The personnel performing the un-installation therefore need to retrieve the equipment state just before the equipment is disconnected. | | | | | | |
| **Fit criterion** | Retrieval of the state of the equipment that is executed as part of the un-installation process shall comply with the description of ‘<br><br>Use case: Retrieve M&S equipment state<br>’. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

#### 6.1.6.2 Removed

#### 6.1.6.3 Reset M&S equipment state

DSMR-M 4.6.50

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The M&S equipment shall provide functionality to reset its state after the equipment is physically un-installed. A reset of M&S equipment shall not affect the metrological part of the instruments in any way. | | | | | | |
| **Rationale** | The GO can decide that equipment shall be re-used after it is un-installed. For this purpose the equipment shall provide functionality to reset the state to the default settings used for pre-configuring the equipment. | | | | | | |
| **Fit criterion** | The E meter shall provide functionality to reset its state. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.6.51

| | |
|---|---|
| **Description** | The M&S equipment shall provide functionality to overwrite user meter data (only the data that is allowed according to the MID), keys and personal details (including interval |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | values) with zero's (0) after the equipment is physically un-installed. Overwriting this data shall not affect the metrological part of the instruments in any way. Keys should be reset to their original values (as listed in the original shipmentfile | | | | | | |
| **Rationale** | The GO can decide that equipment shall be re-used after it is un-installed. For this purpose the equipment shall provide functionality to overwrite user meter data (only the data that is allowed according to the MID), keys and personal details (including interval values) with zero's (0). According to European law and legislation it is not allowed to change the metrological characteristics or functionality in metering instruments. By following Welmec 7.2 Issue 4 (Software Guide – measuring Instruments Directive 2004/22/EC –) a compliancy with the software-related requirements contained in the MID can be assumed. | | | | | | |
| **Fit criterion** | Functionality to overwrite user meter data (only the data that is allowed according to the MID), keys and personal details (including interval values) with zero's (0) is provided using the defined security mechanism. Keys should be reset to their original value (as listed in the original shipmentfile). | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter, G meter |

#### 6.1.6.4 Performance

DSMR-M 4.6.52

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The activity of un-installing M&S equipment shall be completed in a limited period of time. | | | | | | |
| **Rationale** | Un-installing equipment requires retrieving the state and the actual meter readings from the equipment. After this 'virtual' un-install the physical un-install is executed (the physical un-install is not included in the times for un-installation). | | | | | | |
| **Fit criterion** | The completion rates and times to be met are:<br>P3 P0<br>80 %: 2 minutes 2 minutes | | | | | | |
| **story** | Nov. 2007 | **Origin** | TST | **Port** | P3, P2 and P0 | **Applicable** | E meter, G meter |

### 6.1.7 Use case: Retrieve M&S equipment state

This use case provides a description of the process of retrieving the complete state of the M&S equipment as defined in section 2.5.1.

Retrieval of M&S equipment states is utilized for multiple purposes as indicated by the described triggers:

| Trigger | Description |
|---|---|
| Un-install M&S equipment | Before equipment is physically uninstalled the GO will need the current state of the equipment. |
| Inconsistencies in state reported | In case an inconsistency in the state of the equipment is suspected or experienced the GO will retrieve the state of the equipment to verify the inconsistency. |
| Unplanned on-site maintenance | Retrieval of the equipment state is performed as part of the process of unplanned on-site maintenance. |

Pre-conditions

- The state of the M&S equipment is unknown or unavailable to the GO.

Parameters

- The interval for which to retrieve logging and interaction history (optional)

Post-conditions

- The state of the M&S equipment is available for the GO.

Assumptions

- -none-

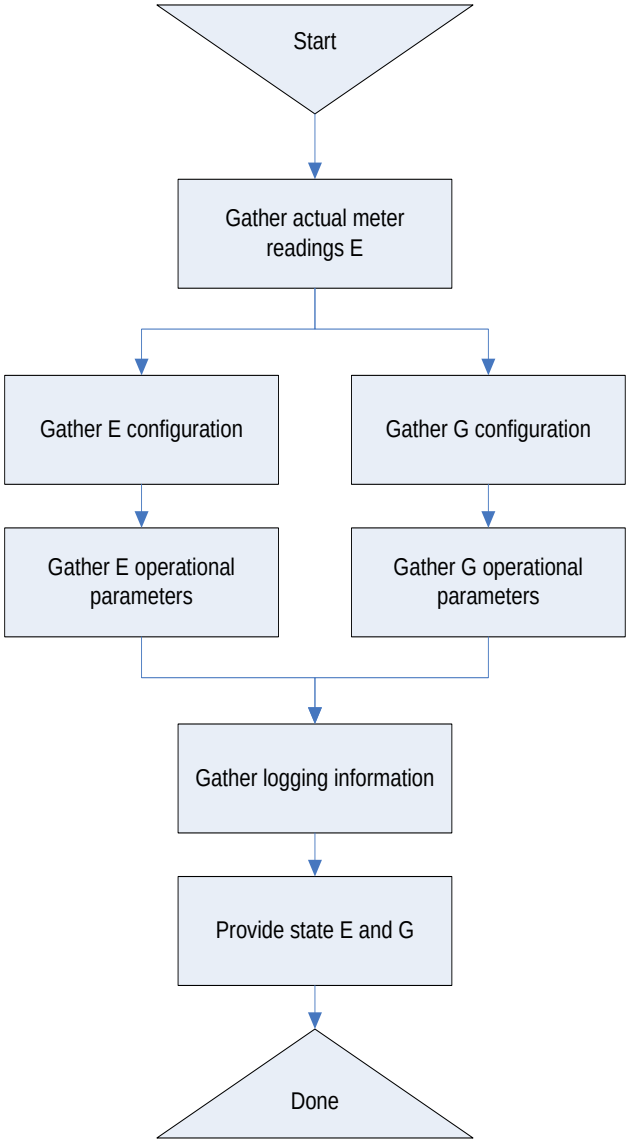


**Figure 6-7: M&S Equipment state**

#### 6.1.7.1 Gather actual meter readings E

DSMR-M 4.6.53

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall automatically invoke use case *Provide actual meter reads* as part of retrieving the state. | | | | | | |
| **Rationale** | In order to interpret the configuration and operational parameters the actual meter readings at the time the configuration and parameters were retrieved can be helpful. | | | | | | |
| **Fit criterion** | The actual meter readings gathered shall be in accordance with the description of use case 'Provide actual meter reads'. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P2, P3 | **Applicable** | E, Meter |

#### 6.1.7.2 Gather E configuration

The E configuration consists of information in the E equipment that was inserted by the GO or the vendor of the meter (refer to section 2.5.1.1 for a complete description of the configuration E).

DSMR-M 4.6.54

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to retrieve the E configuration. | | | | | | |
| **Rationale** | Information on the configuration is used for maintenance purposes and for trouble-shooting the equipment. | | | | | | |
| **Fit criterion** | The information retrieved as the E configuration shall at least contain the information specified in section '2.5.1.1'. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

#### 6.1.7.3 Gather E operational parameters

The operational parameters for E include all parameters that are set on E equipment on behalf of SC's (refer to section 2.5.1.1 for a complete description of the operational parameters E).

DSMR-M 4.6.55

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to retrieve the E operational parameters. | | | | | | |
| **Rationale** | Information on the operational parameters is used for maintenance purposes and for troubleshooting the equipment. | | | | | | |
| **Fit criterion** | The operational parameters retrieved for the E equipment shall at least contain the information specified in section '2.5.1.1'. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

#### 6.1.7.4 Gather G configuration

The configuration consists of information in the G equipment that was inserted by the GO or the vendor of the meter (refer to section 2.5.1.2 for a complete description of the configuration G).

DSMR-M 4.6.56

| | |
|---|---|
| **Description** | The E meter shall provide functionality to retrieve the G configuration. |
| **Rationale** | Information on the G configuration is used for maintenance purposes and for trouble-shooting the equipment. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Fit criterion** | The information retrieved as the G configuration shall at least contain the information specified in section '2.5.1.2'. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P2, P3 | **Applicable** | E, Meter |

### 6.1.7.5 Gather G operational parameters

The operational parameters G include all parameters that are set in the G equipment on behalf of SC's (refer to section 2.5.1.2 for a complete description of the operational parameters G).

DSMR-M 4.6.57

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to retrieve the G operational parameters. | | | | | | |
| **Rationale** | Information on the G operational parameters is used for maintenance purposes and for troubleshooting the equipment. | | | | | | |
| **Fit criterion** | The operational parameters retrieved for the G equipment shall at least contain the information specified in section '2.5.1.2'. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P2, P3 | **Applicable** | E meter |

### 6.1.7.6 Gather logging information

The metering equipment is required to store logging information. This activity is concerned with retrieving the logging information from the equipment.

Besides logging activities the equipment issues logical errors as well. The errors are provided to external parties as part of the logging information.

DSMR-M 4.6.58

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide logging information and errors from both the E equipment and the G equipment. | | | | | | |
| **Rationale** | The E meter provides logging information to external entities. Logging information is used to verify the state of equipment and for diagnosis purposes in case of malfunctioning. The use case has an optional parameter for the period for which to retrieve the logging information. In case a value for this parameter is provided, the provided information shall be logged within the designated period. | | | | | | |
| **Fit criterion** | The E meter shall provide on request of an external entity the log items for the designated interval. | | | | | | |
| **History** | Nov. 2007 | **Origin** | NTA (§5.3.1.3) | **Port** | P0, P3 | **Applicable** | E meter |

#### 6.1.7.7 Provide state E and G

DSMR-M 4.6.59

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide the actual meter readings for E and G, complete state and logging information. | | | | | | |
| **Rationale** | For interpretation of the logging the most recent meter reads can be helpful and are therefore included in the state of the equipment. The logging information is used to derive how the equipment came in the state it is in. | | | | | | |
| **Fit criterion** | The state and auxiliary information shall at least contain the following information:<br>• Complete configuration and operational parameters for E and G equipment;<br>• The actual meter readings for E;<br>• Last known meter readings for G available in the E meter;<br>• Complete logging information for the requested interval; | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

#### 6.1.7.8 Performance

DSMR-M 4.6.60

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The activity of remotely retrieving the state of M&S equipment shall be completed in a limited period of time. | | | | | | |
| **Rationale** | The state of equipment is retrieved for problem solving. Solving problems when performed remotely is not an 'online' activity: maintenance personnel are in other words not waiting for the state to be retrieved. | | | | | | |
| **Fit criterion** | The completion rates and times to be met are:<br>P3 P0<br>99 %: 1 hour 1 minute | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | P3, P0 | **Applicable** | E meter, G meter |

### 6.1.8 Use case: Perform self-check M&S equipment

The purpose of this use case is to provide the GO insight in the functioning of the M&S equipment. For this reason the equipment shall be able to perform a self-check and report on the outcome.

| Trigger | Description |
|---|---|
| Internal event | Internal event in the equipment can trigger this use case. Examples of events that invoke the use case are: firmware upgrade, power up and installation. |
| Install M&S equipment | The self-check is usually performed as part of the process of installing M&S equipment. |
| Unplanned on-site maintenance | A self-check is performed as part of the process of unplanned on-site maintenance |
| Periodically | A self-check is periodically performed. |

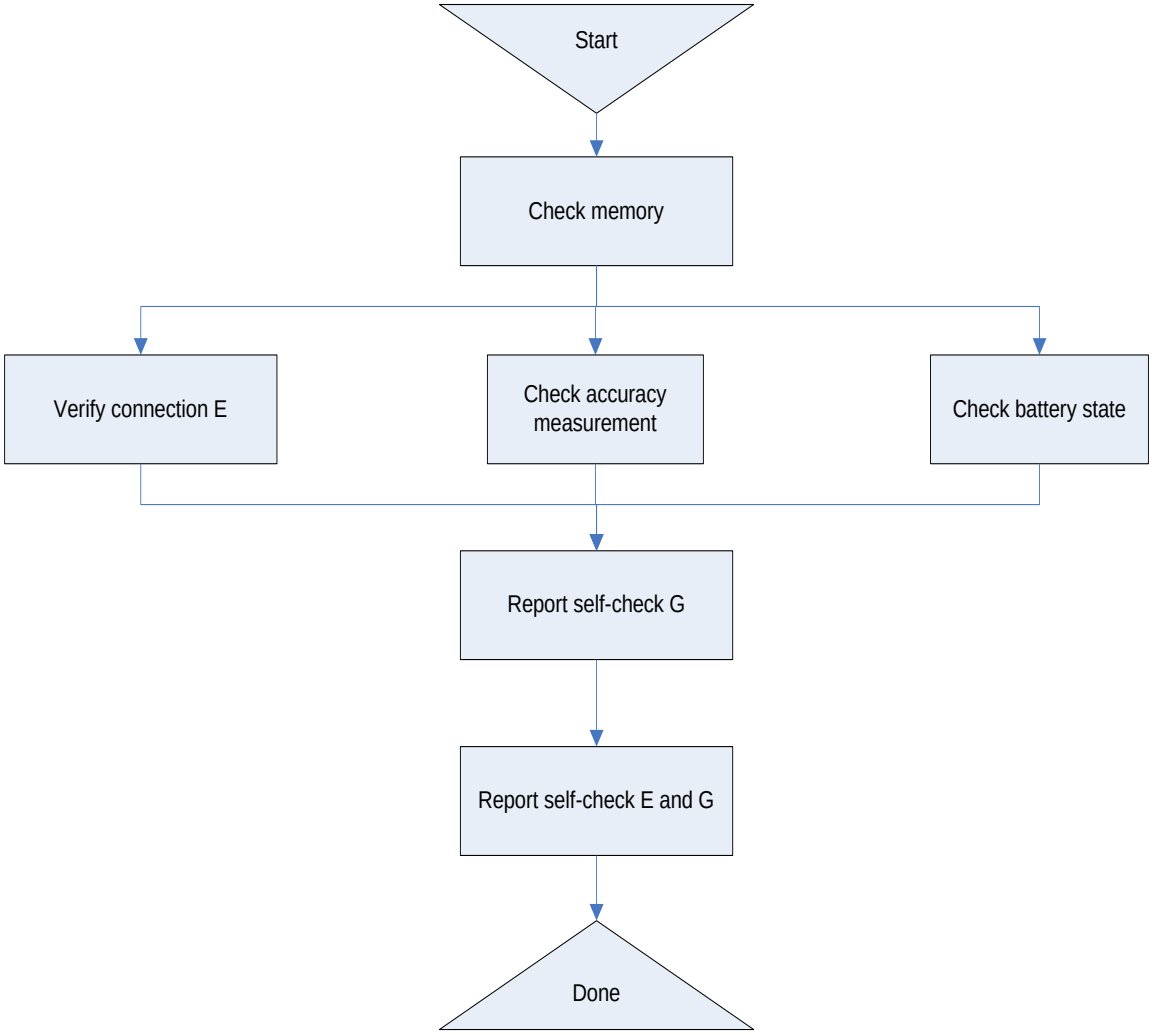


**Figure 6-8: Perform self-check**

Pre-conditions

- The overall condition of the M&S equipment is unknown to the GO.

Parameters

- -none-

Post-conditions

- The overall condition of the M&S equipment is known to the GO.

Assumptions

- -none-

DSMR-M 4.6.61

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The M&S equipment shall automatically execute a self-check each time power re-occurs on the E meter. | | | | | | |
| **Rationale** | During a period in which there is no power on the E meter, the meter cannot detect any malfunctioning and cannot report on any event. It is therefore important to determine that the equipment functions correctly each time it becomes able to report any malfunctioning. | | | | | | |
| **Fit criterion** | The M&S equipment shall verify that it functions correctly after each outage and each time it is connected to the grid. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter |

DSMR-M 4.6.62

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall provide functionality to log the results of a self-check after a firmware update. | | | | | | |
| **Rationale** | Immediately after the new firmware is deployed, a self-check is executed by the equipment. This can be considered as the final check performed during the process of a firmware upgrade. | | | | | | |
| **Fit criterion** | The self-check that is executed as part of the firmware upgrade shall be performed within 10 seconds after the completion of the firmware update process and shall comply with the description of the respective self-checks for the different types of equipment. The result of this self check will be logged in the event log (also in case of a good result). | | | | | | |
| **History** | Jan. 2011 | **Origin** | TST | **Port** | P3 | **Applicable** | E Meter |

### 6.1.8.1 Check memory

DSMR-M 4.6.63

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The M&S equipment shall be able to perform a consistency check on the memory in the equipment. | | | | | | |
| **Rationale** | It is assumed that errors in software lead to inconsistencies in memory. Errors can be caused by communication failure, intrusion, software defects, hardware defects etc. For maintenance reasons the result of a consistency check on the memory gives an overall indication of the condition of the equipment. | | | | | | |
| **Fit criterion** | The equipment shall verify that the memory of the equipment is consistent. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter, G meter |

DSMR-M 4.6.64

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall issue a normal error if it detects an inconsistent state of the memory. | | | | | | |
| **Rationale** | Inconsistencies in memory can lead to incorrect information being exchanged or to problems with communication. The inconsistent state shall therefore be reported as quickly as possible. | | | | | | |
| **Fit criterion** | The error for inconsistent memory shall contain the generic attributes for errors. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P3 | **Applicable** | E meter, G meter |

#### 6.1.8.2 Check accuracy measurement

Checking of accuracy of equipment can, to certain extend, be performed by the equipment itself. The ability to determine accuracy and the way this is performed differs per vendor. The vendor is therefore required to deliver as part of the documentation of the metering instruments a description of how accuracy drift is determined and what the reliability of the results is.

DSMR-M 4.6.65

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The metrological part of the metering instrument shall not be susceptible for accuracy drifts during the lifetime of the equipment. | | | | | | |
| **Rationale** | Accuracy drifts cannot be easily determined, therefore they shall be avoided. | | | | | | |
| **Fit criterion** | The stability of the measurement system shall be guaranteed, i.e. the accuracy of measurements shall not exceed the pre-defined level for measurement accuracy during the lifetime of the equipment. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter, G meter |

#### 6.1.8.3 Check battery state

Under some circumstances the application of a battery is essential (e.g. in G meters). However, in all situations where usage of a battery is not essential, equipment without a battery is preferred albeit that the equipment still has to meet all requirements.

DSMR-M 4.6.66

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The M&S equipment using a battery shall be able to determine the remaining lifetime of the battery. | | | | | | |
| **Rationale** | In case of a dead battery the G meter is not able to store data and to transmit it using an RF connection. For the G meter the battery is essential in case of an outage. The implementation of the algorithm for determining the remaining lifetime shall take actual usage of the battery and other aspects that influence the lifetime of the battery into account. | | | | | | |
| **Fit criterion** | The method used to determine the remaining use time shall be specified and its accuracy shall be shown through test reports. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.6.67

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | At the meter factory the moment that the end-of-use time alarm shall be raised shall be configurable. | | | | | | |
| **Rationale** | The moment the alarm has to be raised in based on three parameters:<br>▪ Expected life time of the battery<br>▪ Required length of period between the alarm raise and the end-of-use time<br>▪ Usage of battery | | | | | | |
| **Fit criterion** | The time between the alarm and the end-of-use time of the battery given the expected lifetime of the battery shall be configurable within the limits of the MID MI-002, according to a method specified by the meter vendor. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | G meter |

DSMR-M 4.6.68

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The M&S equipment using a battery shall issue a normal error if the remaining lifetime of the battery meets a predefined threshold. | | | | | | |
| **Rationale** | GO's wants to be informed on the lifetime of batteries in order to plan and execute replacement. The remaining lifetime is predefined and can be used to determine if replacement of the battery can be combined with other on-site maintenance. | | | | | | |
| **Fit criterion** | The error for battery lifetime shall contain the generic attributes for errors. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P3 | **Applicable** | G meter |

### 6.1.8.4 Check meter display

DSMR-M 4.6.69

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The equipment shall provide functionality to verify that the complete character and symbol set of the display is displayable in a readable way. | | | | | | |
| **Rationale** | Displays are the means to communicate with consumers: meters are required to display meter readings correctly. If the display does not function correctly (e.g. because it is broken), consumers will question the reliability of the equipment as a whole. | | | | | | |
| **Fit criterion** | If any of the character or symbols cannot be displayed correctly the test of the display fails. This is a visible test. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | E meter, G meter |

### 6.1.8.5 Report self-check G

DSMR-M 4.6.70

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The G equipment shall provide errors that resulted from the self-check to the E meter. | | | | | | |
| **Rationale** | The E meter handles the logging information (including alarms) for all M&S equipment. External systems can access the alarms through the E meter. The G equipment shall therefore provide the alarms to the E meter. | | | | | | |
| **Fit criterion** | All errors resulting from the self-check performed by G equipment are available from the E meter (via standard event log) after each update of meter reads from the G meter to the E meter. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P2 | **Applicable** | G meter |

DSMR-M 4.6.71

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | If the G equipment has a display, it shall provide the result of the self-check G on the display of the G meter if the self check fails. | | | | | | |
| **Rationale** | A self-check can be invoked locally (as part of the installation process). Therefore the meter shall also provide the result of the self-check locally, i.e. on the display. | | | | | | |
| **Fit criterion** | Each time the self-check is executed, the G meter shall update the display to provide the result of the last self-check, if the self check fails. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | n.a. | **Applicable** | G meter |

#### 6.1.8.6 Report self-check E and G

DSMR-M 4.6.72

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall indicate if the self-check for E and G failed. | | | | | | |
| **Rationale** | The E meter gathers the results of the self-check for E and receives the results of the self-check in the G equipment. | | | | | | |
| **Fit criterion** | If any of the verifications of the self-check failed, the self-check shall fail. If all verifications pass, the self-check passes. The result of the self-check shall at least contain the following information:<br>▪ Type of failure G;<br>▪ Timestamp for the execution of the self-check G;<br>▪ Type of failure E;<br>▪ Timestamp for the execution of the self-check E; | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter, G meter |

#### 6.1.8.7 Performance

DSMR-M 4.6.73

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The activity of executing a self-check on M&S equipment shall be completed in a limited period of time. | | | | | | |
| **Rationale** | A self-check is performed automatically and in multiple situations, either on power-up or at regular intervals. In some situations however, a self-check is considered to be an 'online' activity (i.e. someone is waiting for the result). | | | | | | |
| **Fit criterion** | The completion rates and times to be met are:<br>Display<br>99 %: 1 minute after power up | | | | | | |
| **History** | Nov. 2007 | **Origin** | TST | **Port** | Display | **Applicable** | E meter, G meter |

### 6.1.9 Use case: Unplanned on-site maintenance

Under some circumstances on-site maintenance is necessary. Consider a situation where communication with the equipment is impossible (for a long period of time) or when part of the functionality of the equipment has become unavailable. It is however important to note that on-site maintenance is reduced to a minimum under all circumstances.

| Trigger | Description |
|---|---|
| Malfunctioning equipment | The GO has determined that equipment is not functioning correctly. After the GO has determined that the problem cannot be solved remotely, the maintenance has to be performed on-site. |

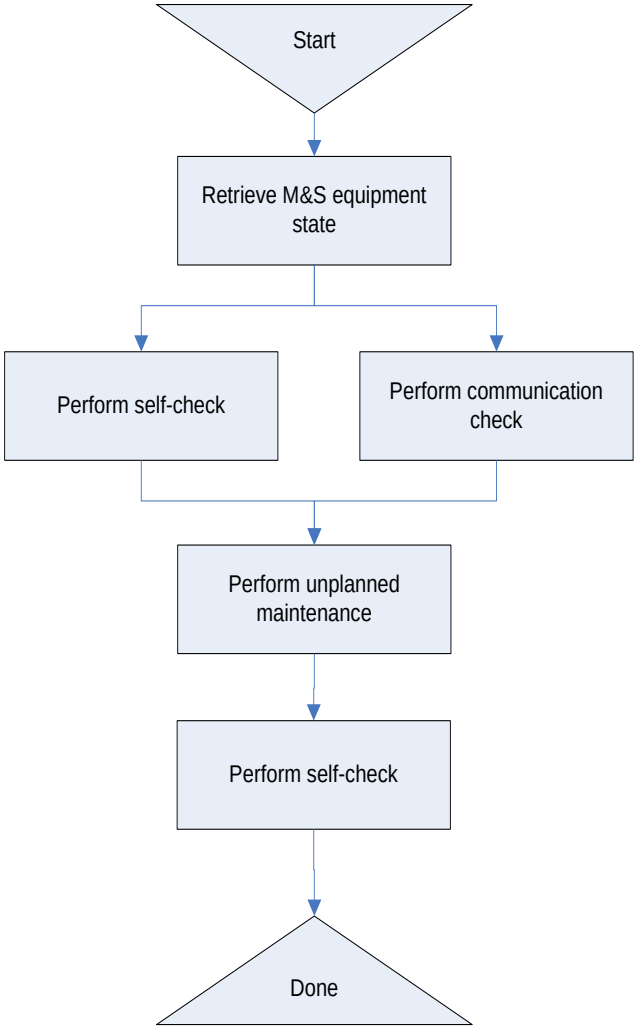


**Figure 6-9: Unplanned maintenance on-site**

Pre-conditions

- The equipment needs unplanned on-site maintenance.

Parameters

- -none-

Post-conditions

- The maintenance on the equipment was completed and the equipment functions correctly.

Assumptions

- -none-

#### 6.1.9.1 Retrieve M&S equipment state

DSMR-M 4.6.74

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to invoke ‘<br><br>Use case: Retrieve M&S equipment state<br>’ and present the results on the display and the local O&M device. | | | | | | |
| **Rationale** | The GO wants to retrieve all configuration information and operational parameters from the equipment before actual maintenance on the equipment starts. | | | | | | |
| **Fit criterion** | Retrieval of the state of the equipment that is executed as part of the maintenance process shall comply with the description of ‘<br><br>Use case: Retrieve M&S equipment state<br>’. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

#### 6.1.9.2 Perform self-check

The self-check verifies that the meter functions correctly and, if not, reports the problems. Note that the self-check can be executed before and/or after the actual maintenance work takes place.

DSMR-M 4.6.75

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | The E meter shall provide functionality to invoke ‘Use case: Perform self-check M&S equipment’ and sent the results to the local O&M device. | | | | | | |
| **Rationale** | The GO wants to verify that the meter functions correctly before the equipment is actually deployed. Performing the self-check shall be possibly remotely and locally. | | | | | | |
| **Fit criterion** | The result of the self-check that is executed as part of the maintenance process shall comply with the description of ‘Use case: Perform self-check M&S equipment’. | | | | | | |
| **History** | Nov. 2007 | **Origin** | I&M | **Port** | P0, P3 | **Applicable** | E meter |

#### 6.1.9.3 Perform communication check

The communication check verifies that the meter communicates correctly and, if not, reports the problems. Note that executing the communication check can be executed before and/or after the actual maintenance work takes place.

#### 6.1.9.4 Perform unplanned maintenance

There are no requirements for performing unplanned maintenance on equipment.

# ANNEX A: REQUIREMENTS DSMR 3.0 – DSMR 4.0.6 MAPPING TABLE

| NR: | DSMR 3.0 Req. | DSMR 4.0.6 Req. | NR: | DSMR 3.0 Req. | DSMR 4.0.6 Req. | NR: | DSMR 3.0 Req. | DSMR 4.0.6 Req. |
|---|---|---|---|---|---|---|---|---|
| 1 | DSMR-M 1 | DSMR-M 4.3.1 | 36 | - | DSMR-M 4.3.36 | 71 | - | DSMR-M 4.3.71 |
| 2 | DSMR-M 2 | DSMR-M 4.3.2 | 37 | DSMR-M 2006 | DSMR-M 4.3.37 | 72 | - | DSMR-M 4.3.72 |
| 3 | DSMR-M 8 | DSMR-M 4.3.3 | 38 | DSMR-M 2007 | DSMR-M 4.3.38 | 73 | - | DSMR-M 4.3.73 |
| 4 | DSMR-M 2013 | DSMR-M 4.3.4 | 39 | DSMR-M 2008 | DSMR-M 4.3.39 | 74 | - | DSMR-M 4.3.74 |
| 5 | DSMR-M 3 | DSMR-M 4.3.5 | 40 | DSMR-M 17 | DSMR-M 4.3.40 | 75 | DSMR-M 33 | DSMR-M 4.3.75 |
| 6 | DSMR-M 3a | DSMR-M 4.3.6 | 41 | DSMR-M 18 | DSMR-M 4.3.41 | 76 | DSMR-M 33a | DSMR-M 4.3.76 |
| 7 | DSMR-M 4 | DSMR-M 4.3.7 | 42 | DSMR-M 19 | DSMR-M 4.3.42 | 77 | DSMR-M 33b | DSMR-M 4.3.77 |
| 8 | DSMR-M 5 | DSMR-M 4.3.8 | 43 | - | DSMR-M 4.3.43 | 78 | DSMR-M 33c | DSMR-M 4.3.78 |
| 9 | DSMR-M 7 | DSMR-M 4.3.9 | 44 | DSMR-M 20 | DSMR-M 4.3.44 | 79 | DSMR-M 34 | DSMR-M 4.3.79 |
| 10 | DSMR-M 7a | DSMR-M 4.3.10 | 45 | DSMR-M 21 | DSMR-M 4.3.45 | 80 | DSMR-M 126 | DSMR-M 4.3.80 |
| 11 | DSMR-M 5a | DSMR-M 4.3.11 | 46 | DSMR-M 22 | DSMR-M 4.3.46 | 81 | DSMR-M 38 | DSMR-M 4.3.81 |
| 12 | - | DSMR-M 4.3.12 | 47 | DSMR-M 23 | DSMR-M 4.3.47 | 82 | DSMR-M 39 | DSMR-M 4.3.82 |
| 13 | DSMR-M 2000 | DSMR-M 4.3.13 | 48 | - | DSMR-M 4.3.48 | 83 | DSMR-M 40 | DSMR-M 4.3.83 |
| 14 | - | DSMR-M 4.3.14 | 49 | DSMR-M 23a | DSMR-M 4.3.49 | 84 | DSMR-M 41 | DSMR-M 4.3.84 |
| 15 | - | DSMR-M 4.3.15 | 50 | DSMR-M 23b | DSMR-M 4.3.50 | 85 | DSMR-M 42 | DSMR-M 4.3.85 |
| 16 | DSMR-M 2004 | DSMR-M 4.3.16 | 51 | DSMR-M 23c | DSMR-M 4.3.51 | 86 | DSMR-M 43 | DSMR-M 4.3.86 |
| 17 | DSMR-M 2005 | DSMR-M 4.3.17 | 52 | DSMR-M 23d | DSMR-M 4.3.52 | 87 | DSMR-M 44 | DSMR-M 4.3.87 |
| 18 | DSMR-M 10 | DSMR-M 4.3.18 | 53 | DSMR-M 23e | DSMR-M 4.3.53 | 88 | DSMR-M 45 | DSMR-M 4.3.88 |
| 19 | - | DSMR-M 4.3.19 | 54 | - | DSMR-M 4.3.54 | 89 | DSMR-M 47 | DSMR-M 4.3.89 |
| 20 | - | DSMR-M 4.3.20 | 55 | - | DSMR-M 4.3.55 | 90 | DSMR-M 1000 | DSMR-M 4.4.1 |
| 21 | - | DSMR-M 4.3.21 | 56 | - | DSMR-M 4.3.56 | 91 | DSMR-M 1001 | DSMR-M 4.4.2 |
| 22 | - | DSMR-M 4.3.22 | 57 | DSMR-M 24 | DSMR-M 4.3.57 | 92 | DSMR-M 16 | DSMR-M 4.4.3 |
| 23 | DSMR-M 11 | DSMR-M 4.3.23 | 58 | DSMR-M 25 | DSMR-M 4.3.58 | 93 | DSMR-M 28 | DSMR-M 4.4.4 |
| 24 | DSMR-M 11b | DSMR-M 4.3.24 | 59 | DSMR-M 26 | DSMR-M 4.3.59 | 94 | DSMR-M 1004 | DSMR-M 4.4.5 |
| 25 | DSMR-M 12 | DSMR-M 4.3.25 | 60 | DSMR-M 27 | DSMR-M 4.3.60 | 95 | DSMR-M 48 | DSMR-M 4.4.6 |
| 26 | DSMR-M 13 | DSMR-M 4.3.26 | 61 | DSMR-M 27a | DSMR-M 4.3.61 | 96 | - | DSMR-M 4.4.7 |
| 27 | DSMR-M 13a | DSMR-M 4.3.27 | 62 | DSMR-M9a | DSMR-M 4.3.62 | 97 | - | DSMR-M 4.4.8 |
| 28 | DSMR-M 13b | DSMR-M 4.3.28 | 63 | DSMR-M 29 | DSMR-M 4.3.63 | 98 | DSMR-M 1005 | DSMR-M 4.4.9 |
| 29 | - | DSMR-M 4.3.29 | 64 | DSMR-M 30 | DSMR-M 4.3.64 | 99 | DSMR-M 1006 | DSMR-M 4.4.10 |
| 30 | - | DSMR-M 4.3.30 | 65 | DSMR-M 31 | DSMR-M 4.3.65 | 100 | DSMR-M 1007 | DSMR-M 4.4.11 |
| 31 | - | DSMR-M 4.3.31 | 66 | DSMR-M 2009 | DSMR-M 4.3.66 | 101 | DSMR-M 1011 | DSMR-M 4.4.12 |
| 32 | DSMR-M 14 | DSMR-M 4.3.32 | 67 | DSMR-M 2010 | DSMR-M 4.3.67 | 102 | DSMR-M 1013 | DSMR-M 4.4.13 |
| 33 | DSMR-M 14a | DSMR-M 4.3.33 | 68 | DSMR-M 32 | DSMR-M 4.3.68 | 103 | DSMR-M 1017 | DSMR-M 4.4.14 |
| 34 | DSMR-M 9 | DSMR-M 4.3.34 | 69 | - | DSMR-M 4.3.69 | 104 | - | DSMR-M 4.4.15 |
| 35 | DSMR-M 15 | DSMR-M 4.3.35 | 70 | - | DSMR-M 4.3.70 | 105 | DSMR-M 1018 | DSMR-M 4.4.16 |

| NR: | DSMR 3.0 Req. | DSMR 4.0.6 Req. | NR: | DSMR 3.0 Req. | DSMR 4.0.6 Req. | NR: | DSMR 3.0 Req. | DSMR 4.0.6 Req. |
|---|---|---|---|---|---|---|---|---|
| 106 | - | DSMR-M 4.4.17 | 141 | DSMR-M 72 | DSMR-M 4.5.28 | 176 | DSMR-M 92 | DSMR-M 4.5.63 |
| 107 | DSMR-M 1019 | DSMR-M 4.4.18 | 142 | DSMR-M 2019 | DSMR-M 4.5.29 | 177 | DSMR-M 2025 | DSMR-M 4.5.64 |
| 108 | DSMR-M 1020 | DSMR-M 4.4.19 | 143 | DSMR-M 73 | DSMR-M 4.5.30 | 178 | DSMR-M 2026 | DSMR-M 4.5.65 |
| 109 | - | DSMR-M 4.4.20 | 144 | DSMR-M 73a | DSMR-M 4.5.31 | 179 | DSMR-M 2027 | DSMR-M 4.5.66 |
| 110 | DSMR-M 1021 | DSMR-M 4.4.21 | 145 | DSMR-M 73b | DSMR-M 4.5.32 | 180 | DSMR-M 2028 | DSMR-M 4.5.67 |
| 111 | DSMR-M 50 | DSMR-M 4.4.22 | 146 | DSMR-M 73c | DSMR-M 4.5.33 | 181 | DSMR-M 93 | DSMR-M 4.5.68 |
| 112 | DSMR-M 1023 | DSMR-M 4.4.23 | 147 | DSMR-M 74 | DSMR-M 4.5.34 | 182 | DSMR-M 94 | DSMR-M 4.5.69 |
| 113 | - | DSMR-M 4.4.24 | 148 | DSMR-M 74a | DSMR-M 4.5.35 | 183 | DSMR-M 95 | DSMR-M 4.5.70 |
| 114 | DSMR-M 51 | DSMR-M 4.5.1 | 149 | DSMR-M 2020 | DSMR-M 4.5.36 | 184 | DSMR-M 96 | DSMR-M 4.5.71 |
| 115 | DSMR-M 52 | DSMR-M 4.5.2 | 150 | - | DSMR-M 4.5.37 | 185 | DSMR-M 100a | DSMR-M 4.5.72 |
| 116 | DSMR-M 53 | DSMR-M 4.5.3 | 151 | - | DSMR-M 4.5.38 | 186 | DSMR-M 99 | DSMR-M 4.5.73 |
| 117 | DSMR-M 54 | DSMR-M 4.5.4 | 152 | DSMR-M 75 | DSMR-M 4.5.39 | 187 | DSMR-M 2029 | DSMR-M 4.5.74 |
| 118 | - | DSMR-M 4.5.5 | 153 | DSMR-M 76 | DSMR-M 4.5.40 | 188 | DSMR-M 100 | DSMR-M 4.5.75 |
| 119 | DSMR-M 55 | DSMR-M 4.5.6 | 154 | DSMR-M 77 | DSMR-M 4.5.41 | 189 | DSMR-M 101 | DSMR-M 4.5.76 |
| 120 | - | DSMR-M 4.5.7 | 155 | DSMR-M 78 | DSMR-M 4.5.42 | 190 | DSMR-M 2030 | DSMR-M 4.5.77 |
| 121 | DSMR-M 56 | DSMR-M 4.5.8 | 156 | DSMR-M 2021 | DSMR-M 4.5.43 | 191 | DSMR-M 2031 | DSMR-M 4.5.78 |
| 122 | DSMR-M 57 | DSMR-M 4.5.9 | 157 | DSMR-M 79 | DSMR-M 4.5.44 | 192 | DSMR-M 102 | DSMR-M 4.5.79 |
| 123 | DSMR-M 58 | DSMR-M 4.5.10 | 158 | DSMR-M 80 | DSMR-M 4.5.45 | 193 | DSMR-M 103 | DSMR-M 4.5.80 |
| 124 | DSMR-M 2015 | DSMR-M 4.5.11 | 159 | DSMR-M 82 | DSMR-M 4.5.46 | 194 | DSMR-M 104 | DSMR-M 4.5.81 |
| 125 | DSMR-M 59 | DSMR-M 4.5.12 | 160 | DSMR-M2022 | DSMR-M 4.5.47 | 195 | DSMR-M 2032 | DSMR-M 4.5.82 |
| 126 | DSMR-M 60 | DSMR-M 4.5.13 | 161 | DSMR-M 83 | DSMR-M 4.5.48 | 196 | DSMR-M 105 | DSMR-M 4.5.83 |
| 127 | DSMR-M 61 | DSMR-M 4.5.14 | 162 | DSMR-M 84 | DSMR-M 4.5.49 | 197 | DSMR-M 106a | DSMR-M 4.5.84 |
| 128 | DSMR-M 2016 | DSMR-M 4.5.15 | 163 | - | DSMR-M 4.5.50 | 198 | DSMR-M 106b | DSMR-M 4.5.85 |
| 129 | DSMR-M 62 | DSMR-M 4.5.16 | 164 | - | DSMR-M 4.5.51 | 199 | DSMR-M 107 | DSMR-M 4.5.86 |
| 130 | DSMR-M 63 | DSMR-M 4.5.17 | 165 | DSMR-M 85 | DSMR-M 4.5.52 | 200 | DSMR-M 108 | DSMR-M 4.5.87 |
| 131 | DSMR-M 64 | DSMR-M 4.5.18 | 166 | DSMR-M 86 | DSMR-M 4.5.53 | 201 | DSMR-M 2033 | DSMR-M 4.5.88 |
| 132 | DSMR-M 2017 | DSMR-M 4.5.19 | 167 | DSMR-M 2023 | DSMR-M 4.5.54 | 202 | DSMR-M 109 | DSMR-M 4.5.89 |
| 133 | DSMR-M 65 | DSMR-M 4.5.20 | 168 | DSMR-M 2024 | DSMR-M 4.5.55 | 203 | DSMR-M 110 | DSMR-M 4.5.90 |
| 134 | DSMR-M 66 | DSMR-M 4.5.21 | 169 | DSMR-M 88 | DSMR-M 4.5.56 | 204 | DSMR-M 111 | DSMR-M 4.5.91 |
| 135 | DSMR-M 67 | DSMR-M 4.5.22 | 170 | DSMR-M 89 | DSMR-M 4.5.57 | 205 | DSMR-M 112 | DSMR-M 4.5.92 |
| 136 | DSMR-M 70 | DSMR-M 4.5.23 | 171 | DSMR-M 90 | DSMR-M 4.5.58 | 206 | DSMR-M 2037 | DSMR-M 4.6.1 |
| 137 | DSMR-M 68 | DSMR-M 4.5.24 | 172 | DSMR-M 91 | DSMR-M 4.5.59 | 207 | DSMR-M 2038 | DSMR-M 4.6.2 |
| 138 | DSMR-M 69 | DSMR-M 4.5.25 | 173 | DSMR-M 91a | DSMR-M 4.5.60 | 208 | DSMR-M 2039 | DSMR-M 4.6.3 |
| 139 | DSMR-M 71 | DSMR-M 4.5.26 | 174 | DSMR-M 91b | DSMR-M 4.5.61 | 209 | DSMR-M 113 | DSMR-M 4.6.4 |
| 140 | DSMR-M 2018 | DSMR-M 4.5.27 | 175 | DSMR-M 91c | DSMR-M 4.5.62 | 210 | DSMR-M 117 | DSMR-M 4.6.5 |

| NR: | DSMR 3.0 Req. | DSMR 4.0.6 Req. | NR: | DSMR 3.0 Req. | DSMR 4.0.6 Req. | NR: | DSMR 3.0 Req. | DSMR 4.0.6 Req. |
|---|---|---|---|---|---|---|---|---|
| 211 | DSMR-M 116 | DSMR-M 4.6.6 | 246 | DSMR-M 141 | DSMR-M 4.6.41 | | | |
| 212 | DSMR-M 122 | DSMR-M 4.6.7 | 247 | DSMR-M 144 | DSMR-M 4.6.42 | | | |
| 213 | DSMR-M 115 | DSMR-M 4.6.8 | 248 | DSMR-M 145 | DSMR-M 4.6.43 | | | |
| 214 | DSMR-M 118 | DSMR-M 4.6.9 | 249 | DSMR-M 146 | DSMR-M 4.6.44 | | | |
| 215 | DSMR-M 119 | DSMR-M 4.6.10 | 250 | DSMR-M 147 | DSMR-M 4.6.45 | | | |
| 216 | DSMR-M 114 | DSMR-M 4.6.11 | 251 | DSMR-M 147a | DSMR-M 4.6.46 | | | |
| 217 | DSMR-M 120 | DSMR-M 4.6.12 | 252 | DSMR-M 2062 | DSMR-M 4.6.47 | | | |
| 218 | DSMR-M 121 | DSMR-M 4.6.13 | 253 | DSMR-M 149 | DSMR-M 4.6.48 | | | |
| 219 | DSMR-M 123 | DSMR-M 4.6.14 | 254 | DSMR-M 151 | DSMR-M 4.6.49 | | | |
| 220 | DSMR-M 2053 | DSMR-M 4.6.15 | 255 | DSMR-M 152 | DSMR-M 4.6.50 | | | |
| 221 | DSMR-M 2054 | DSMR-M 4.6.16 | 256 | DSMR-M 153 | DSMR-M 4.6.51 | | | |
| 222 | DSMR-M 2055 | DSMR-M 4.6.17 | 257 | DSMR-M 2063 | DSMR-M 4.6.52 | | | |
| 223 | - | DSMR-M 4.6.18 | 258 | DSMR-M 154 | DSMR-M 4.6.53 | | | |
| 224 | DSMR-M 2056 | DSMR-M 4.6.19 | 259 | DSMR-M 155 | DSMR-M 4.6.54 | | | |
| 225 | DSMR-M 2057 | DSMR-M 4.6.20 | 260 | DSMR-M 156 | DSMR-M 4.6.55 | | | |
| 226 | DSMR-M 2058 | DSMR-M 4.6.21 | 261 | DSMR-M 157 | DSMR-M 4.6.56 | | | |
| 227 | DSMR-M 2059 | DSMR-M 4.6.22 | 262 | DSMR-M 158 | DSMR-M 4.6.57 | | | |
| 228 | DSMR-M 125 | DSMR-M 4.6.23 | 263 | DSMR-M 160 | DSMR-M 4.6.58 | | | |
| 229 | DSMR-M 2060 | DSMR-M 4.6.24 | 264 | DSMR-M 161 | DSMR-M 4.6.59 | | | |
| 230 | DSMR-M 128 | DSMR-M 4.6.25 | 265 | DSMR-M 2064 | DSMR-M 4.6.60 | | | |
| 231 | DSMR-M 129 | DSMR-M 4.6.26 | 266 | DSMR-M 163 | DSMR-M 4.6.61 | | | |
| 232 | DSMR-M 130 | DSMR-M 4.6.27 | 267 | - | DSMR-M 4.6.62 | | | |
| 233 | DSMR-M 131 | DSMR-M 4.6.28 | 268 | DSMR-M 164 | DSMR-M 4.6.63 | | | |
| 234 | DSMR-M 132 | DSMR-M 4.6.29 | 269 | DSMR-M 165 | DSMR-M 4.6.64 | | | |
| 235 | DSMR-M 133 | DSMR-M 4.6.30 | 270 | DSMR-M 166 | DSMR-M 4.6.65 | | | |
| 236 | DSMR-M 134 | DSMR-M 4.6.31 | 271 | DSMR-M 167 | DSMR-M 4.6.66 | | | |
| 237 | DSMR-M 2061 | DSMR-M 4.6.32 | 272 | DSMR-M 168 | DSMR-M 4.6.67 | | | |
| 238 | DSMR-M 136 | DSMR-M 4.6.33 | 273 | DSMR-M 169 | DSMR-M 4.6.68 | | | |
| 239 | DSMR-M 137 | DSMR-M 4.6.34 | 274 | DSMR-M 172 | DSMR-M 4.6.69 | | | |
| 240 | DSMR-M 138 | DSMR-M 4.6.35 | 275 | DSMR-M 173 | DSMR-M 4.6.70 | | | |
| 241 | DSMR-M 138a | DSMR-M 4.6.36 | 276 | DSMR-M 174 | DSMR-M 4.6.71 | | | |
| 242 | DSMR-M 138b | DSMR-M 4.6.37 | 277 | DSMR-M 175 | DSMR-M 4.6.72 | | | |
| 243 | - | DSMR-M 4.6.38 | 278 | DSMR-M 2065 | DSMR-M 4.6.73 | | | |
| 244 | DSMR-M 139 | DSMR-M 4.6.39 | 279 | DSMR-M 177 | DSMR-M 4.6.74 | | | |
| 245 | DSMR-M 140 | DSMR-M 4.6.40 | 280 | DSMR-M 178 | DSMR-M 4.6.75 | | | |