Main Document

Dutch Smart Meter Requirements

By order of:	**Netbeheer Nederland**
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Change summary

Version	Change
4.0	Throughout the document the term “temperature correction” was changed to “temperature conversion”
4.0	Throughout the document all references to PLC, Data Concentrator, DC, P3.1 and P3.2 have been removed.
4.0	Throughout the document all references to “actual time” and “national standard time” were replaced with “local time”.
4.0	In section 1.8.3 removed the description about modularity
4.0	In section 2.5.1.1 the E configuration table was changed
4.0	In section 2.5.1.2 the G configuration table was changed
4.0	In section 2.6, the Identifier of the meter was removed from every entry in table 2-10
4.0	In section 2.6 a reference was made to Annex A of the P3 document in which the minimal numbers of digits used throughout the whole metering chain are shown.
4.0	In section 2.6 the note in the Interval values G was removed.
4.0	A new section 2.7 “Relation between the different time parameters” was added
4.0	In section 3.1 changed requirement DSMR-M 4.3.4
4.0	In section 3.1 changed requirement DSMR-M 4.3.8
4.0	In section 3.1 changed requirement DSMR-M 4.3.11
4.0	In section 3.1 added requirement DSMR-M 4.3.12 and DSRM-M 4.3.14
4.0	In section 3.1 requirements DSMR-M 8a, DSMR-M 8b, DSMR-M 2001, and DSMR-M 2002 were removed.
4.0	In section 3.2 added requirement DSMR-M 4.3.15
4.0	In section 3.2 changed requirement DSMR-M 4.3.16
4.0	In section 3.2 changed requirement DSMR-M 4.3.17
4.0	In section 3.2 requirement DSMR-M 4.3.18 was changed
4.0	In section 3.2 requirements DSMR-M 4.3.19 through DSMR-M 4.3.22 were added
4.0	In section 3.2 requirement DSMR-M 10a was removed
4.0	In section 3.2 requirement DSMR-M 4.3.26 was changed
4.0	In section 3.2 requirement DSMR-M 11a was removed
4.0	In section 3.2 requirement DSMR-M 13c was removed
4.0	In section 3.2 added requirement DSMR-M 4.3.29, DSMR-M 4.3.30, and DSMR-M 4.3.31
4.0	In section 3.2 changed requirement DSMR-M 4.3.35
4.0	In section 3.2 requirement DSMR-M 4.3.36 was added
4.0	In section 3.2 requirement DSMR-M 4.3.38 was changed
4.0	In section 3.2 requirement DSMR-M 4.3.42 was changed
4.0	In section 3.2 requirement DSMR-M 4.3.43 was added
4.0	In section 3.2 requirements DSMR-M 19a was removed
4.0	In section 3.3 added requirement DSMR-M 4.3.48

4.0	In section 3.3 changed requirement DSMR-M 4.3.51
4.0	In section 3.3 added requirement DSMR-M 4.3.54, DSMR-M 4.3.55, and DSMR-M 4.3.56
4.0	In section 3.3 changed requirement DSMR-M 4.3.58
4.0	In section 3.3 changed requirement DSMR-M 4.3.67
4.0	In section 3.3 changed requirement DSMR-M 4.3.68
4.0	In section 3.3 added the requirements DSMR-M 4.3.69, DSMR-M 4.3.70, DSMR-M 4.3.71, DSMR-M 4.3.72, DSMR-M 4.3.73, and DSMR-M 4.3.74
4.0	In section 3.3 requirement DSMR-M 4.3.78 has been changed
4.0	In section 3.3 requirements DSMR-M 34a was removed
4.0	Section 3.4 together with its requirements DSMR-M 35 and DSMR-M 36 was removed. As a consequence Section 3.5 was renamed section 3.4.
4.0	I In section 3.4 requirements DSMR-M 37 and DSMR-M 37a were removed
4.0	In section 3.4 changed requirement DSMR-M 4.3.80
4.0	In section 3.4 requirement DSMR-M 127 was removed
4.0	In section 3.5.2 requirement DSMR-M 4.3.86 was changed
4.0	n section 3.5.3 requirement DSMR-M 4.3.88 was changed
4.0	Section 3.6 Event logging and error reporting has been renamed section 3.5
4.0	Section 3.7 “Access and Security” has been renamed Chapter 4
4.0	Section 3.8 (Suppliers organization) including the requirements DSMR-M 2011, DSMR-M 50a, DSMR-M 50b, DSMR-M 50c, and DSMR-M 2012 were removed
4.0	Section 3.9 has been removed. Requirements DSMR-M 2013 has been moved to section 3.1 and changed
4.0	Section 3.10 “performance” and requirement DSMR-M 2014 has been removed
4.0	In section 4.2 a change was made to the security assumptions
4.0	In section 4.3 requirements DSMR-M 1002, DSMR-M 1003, DSMR-M 1008, DSMR-M 1009 and DSMR-M 1010 were removed
4.0	In section 4.3 changed requirement DSMR-M 4.4.5
4.0	In section 4.3 added requirements DSMR-M 4.4.7 and DSMR-M 4.4.8
4.0	In section 4.3 requirement DSMR-M 4.4.9 was changed
4.0	In section 4.3 requirements DSMR-M 1012, DSMR-M 1014, DSMR-M 1015 and DSMR-M 1016 were removed.
4.0	In section 4.3 requirement DSMR-M 4.4.14 was changed
4.0	In section 4.3 added requirement DSMR-M 4.4.15
4.0	In section 4.3 requirement DSMR-M 4.4.16 was changed
4.0	In section 4.3 requirement DSMR-M 37a was removed
4.0	In section 4.3 requirement DSMR-M 4.4.17 was added
4.0	In section 4.4 requirement DSMR-M 4.4.19 was changed
4.0	In section 4.4 added requirement DSMR-M 4.4.20
4.0	In section 4.5 added requirement DSMR-M 4.4.24

4.0	In section 5.1.1 changed requirement DSMR-M 4.5.2
4.0	In section 5.1.2 changed requirement DSMR-M 4.5.4
4.0	In section 5.1.2 added requirement DSMR-M 4.5.5
4.0	In section 5.1.2 changed requirement DSMR-M 4.5.6
4.0	In section 5.1.2 requirement DSMR-M 4.5.7 was added
4.0	In section 5.1.3 requirement DSMR-M 4.5.9 was changed
4.0	In section 5.2.1 requirement DSMR-M 4.5.13 removed “No decimals needed” from the fit criterion.
4.0	In section 5.3.1 requirement DSMR-M 4.5.18 was changed
4.0	In section 5.4 figure 5-4c and the pre-conditions were changed
4.0	In section 5.4.1 changed requirement DSMR-M 4.5.21
4.0	In section 5.4.1 changed requirement DSMR-M 4.5.23
4.0	In section 5.4.2 changed requirement DSMR-M 4.5.24
4.0	In section 5.5.1 changed requirement DSMR-M 4.5.28
4.0	In section 5.6.1 requirement DSMR-M 4.5.34 was changed
4.0	A new use case was added as section 5.7 “Sending power quality information to P1”
4.0	In section 5.10.1 added requirement DSMR-M 4.5.50
4.0	In section 5.10.1 added requirement DSMR-M 4.5.72
4.0	In section 5.11.1 changed requirement DSMR-M 4.5.56
4.0	In section 5.12 added figure 5-12d (moved from section 5.13).
4.0	In section 5.12.1 changed the fit criterion of DSMR-M 4.5.70
4.0	In section 5.12.1 added requirement DSMR-M 4.5.72
4.0	In section 5.13 removed figure 5-13c
4.0	In section 5.13.1 changed requirement DSMR-M 4.5.75
4.0	In section 5.13.1 removed requirement DSMR-M 4.5.76
4.0	In section 5.15.1 removed requirement DSMR-M 105a
4.0	In section 5.15.2 removed requirement DSMR-M 106
4.0	In section 5.15.2 changed requirement DSMR-M 4.5.84
4.0	In section 5.15.2 changed requirement DSMR-M 4.5.85
4.0	In section 5.16.1 changed requirement DSMR-M 4.5.87
4.0	In section 5.17 the trigger description of figure 5-17a has been changed
4.0	In section 6.1.1.2 requirements DSMR-M 2034, DSMR-M 2035, DSMR-M 2036, and DSMR-M 2040 till DSMR-M 52 were removed.
4.0	Section 6.1.2.1 “Delivery new firmware” including requirement DSMR-M 112b has been removed.
4.0	In section 6.1.2.4 requirement DSMR-M 4.6.13 was changed
4.0	In section 6.1.3.1 added requirement DSMR-M 4.6.18
4.0	In section 6.1.3.3 the Description of requirement DSMR-M 4.6.23 has been changed
4.0	Section 6.1.4.3 “Register M&S equipment” was removed
4.0	In section 6.1.5.1 requirement DSMR-M 4.6.33 was changed

4.0	In section 6.1.5.1 requirement DSMR-M 4.6.35 was changed
4.0	In section 6.1.5.1 requirement DSMR-M 4.6.38 was added
4.0	In section 6.1.5.2 requirement DSMR-M 143 was removed
4.0	In section 6.1.5.6 requirement DSMR-M 4.6.45 was changed
4.0	In section 6.1.5.6 changed requirement DSMR-M 4.6.46
4.0	In section 6.1.7.6 requirement DSMR-M 159 was removed
4.0	In section 6.1.8 requirement DSMR-M 4.6.62 was added
4.0	Section 6.1.8.4 and its requirement DSMR-M 170 and DSMR-M 171 were removed
4.0	Section 6.3 “Network Use cases” and section 6.4 “Communication Use cases” have been removed.
4.0	Chapter 7 “Functional description of the Data Concentrator” has been removed.
4.0	Annex A: Requirements DSMR 3.0 – DSMR 4.0 mapping table was added.

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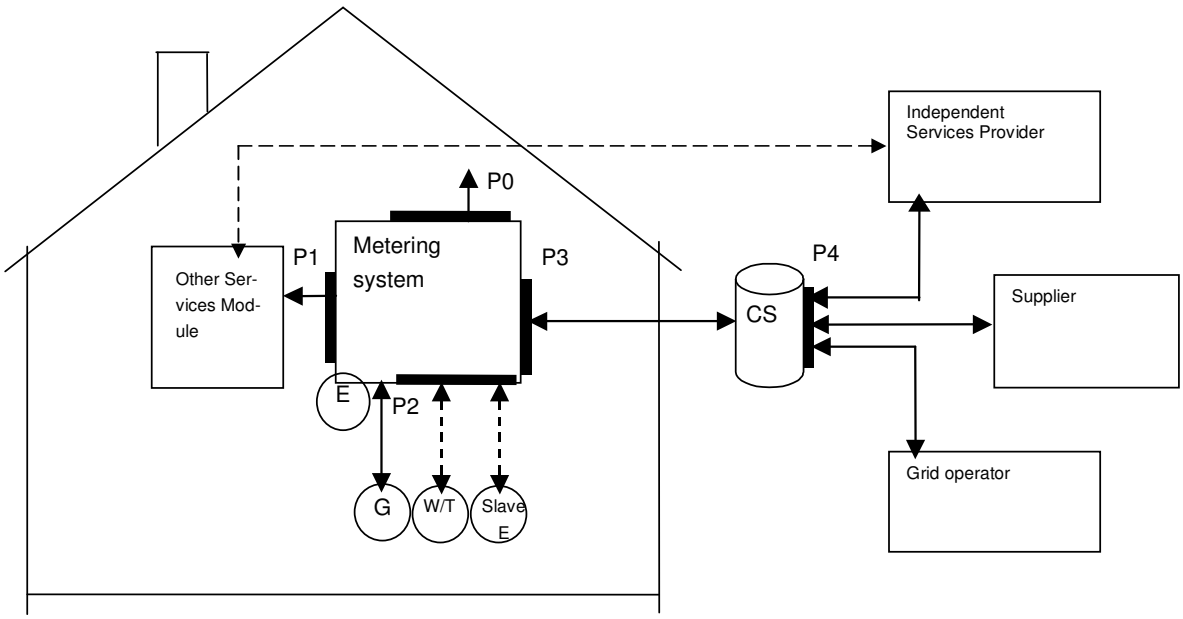
1 INTRODUCTION

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.

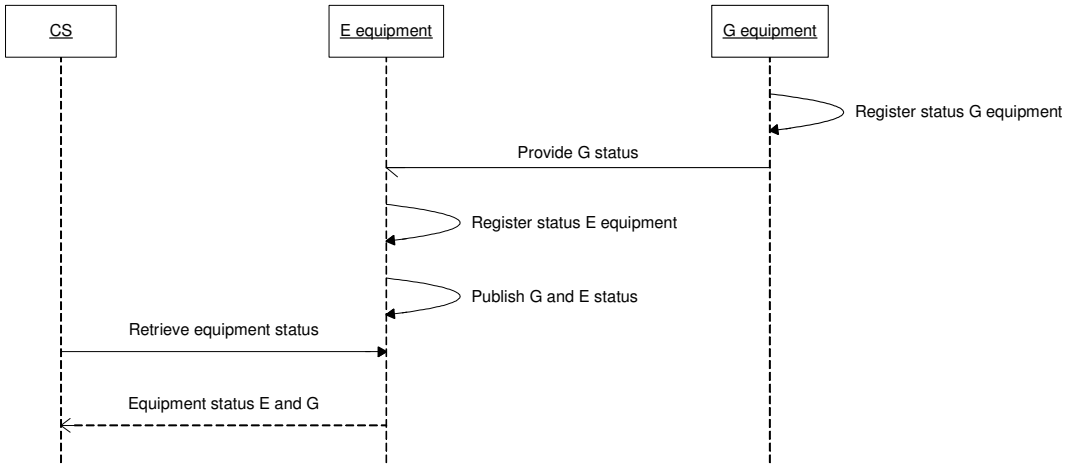
Table 1-1: Presentation of requirements

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. The table below presents terms that in the context of this document have the indicated meaning.

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. 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.

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: - Identifier for the tariff that the register value applies to. In case of an interval meter read: - 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: - The register value is the value of the (periodic or actual) meter reading. In case of an interval meter read: - The register value contains 96 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: - The register value is the value of the (periodic or actual) meter reading. In case of an interval meter read: - The register value contains 24 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. The place where equipment can be installed is indicated by a 'function location' (e.g. a consumer residence). A function location is usually populated by equipment. For example the function location G-connection is populated by a G meter and a G-valve. The population of a function location changes when equipment is installed, un-installed, replaced or removed. The notion of function location therefore facilitates the possibility to keep track of equipment history.

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

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 and/or grid operator equipments. 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.

The configuration of the M&S equipment is handled by the GO and thus encompasses all parameters that are set in the equipment on behalf of the GO. The parameters for both op-

erational 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	Yes
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	Yes
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.	Yes	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	No
Threshold for voltage swells	Definition of voltage swell in terms of threshold, cf. use case "Provide power quality information".	Yes	No
Duration of voltage sags	Definition of voltage sag in terms of duration, cf. use case "Provide power quality information".	Yes	No
Threshold for voltage sags	Definition of voltage sag in terms of threshold, cf. use case "Provide power quality in-	Yes	No

Name	Description	Initially filled by manufacturer	Changeable by GO
	formation".		
Duration short power outage	Definition of short power outage (upper bound for duration), cf. use case "Provide power information".	Yes	No
Maximum time adjustment	Definition of time adjustment allowed without raising an alarm, 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
Messages	All E-related standard messages posted on the equipment.	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	No
Administrative in/out on P3	Indicates whether the meter can 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	No
Discover on power on	Indicates whether the M-Bus discovery process is automatically started when the cover is opened	Yes	No
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	No
Send commissioning notification	Indicates whether an alarm should be raised when a new M-bus device is discovers	Yes	No
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	No
P0 enabled	Indicates whether communication via P0 is enabled or not.	Yes	No

Name	Description	Initially filled by manufacturer	Changeable by GO
HLS 3 and 4 enabled on P3	Indicates which security levels are enabled on the P3 port	Yes	No
IP message content	A configurable attribute that contains contents of the IP message send when a PDP context is established.	Yes	No
IP message target address	A configurable attribute that defines the address of the receiver of the IP message, which is send after establishing PDP context	Yes	No
GPRS operation mode	Defines the GPRS operation mode: always on, external trigger or internal trigger	Yes	No
PPP set up	Defines username and password for GPRS connectivity	Yes	No
Master key	The key used to exchange new encryption keys	Yes	No
Encryption key	The key used to encrypt / decrypt messages	No	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
Daylight savings	Indication if the clock in the meter has applied daylight savings time (DST) or standard time.	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	No	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: ▪ Time stamp of the interval value; ▪ E status ▪ Interval value specified in kWh (three decimals); ▪ Indication for energy direction (consumption or production). The interval has been chosen to be 15 minutes. 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: ▪ Time stamp of the interval values; ▪ G status ▪ Interval values specified in m^3 (two or three decimals); ▪ Indication if interval value is converted for temperature (yes/no). The interval has been chosen to be 60 minutes. 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: ▪ Number of power swells; ▪ Number of power sags; ▪ Identification of the period in which this information has been registered. See also the specifications in NEN-EN 50160:2000.
Actual Voltage information	The actual voltage information shall contain the following information: ▪ Time stamp of the actual voltage; ▪ Actual voltage specified in V (with a precision of 1 V).
Outages information	The actual voltage information shall contain the following information: ▪ The number of short power outages (<T seconds); ▪ For outages >T seconds: – Time stamp of the end of the outage. 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: ▪ Connect or disconnect; ▪ Time stamp of connect or disconnect (optional); ▪ 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: ▪ Position of the breaker after the (dis)connect has been applied; ▪ Reason, e.g. “on demand”, “exceed threshold” (in case of disconnect); ▪ Time stamp of the moment the (dis)connect has been applied.

	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 logging information	The Apply threshold (electricity) logging information shall contain the following information: ▪ New threshold value (specified in Watt); ▪ Time stamp of the moment at which the threshold was applied.

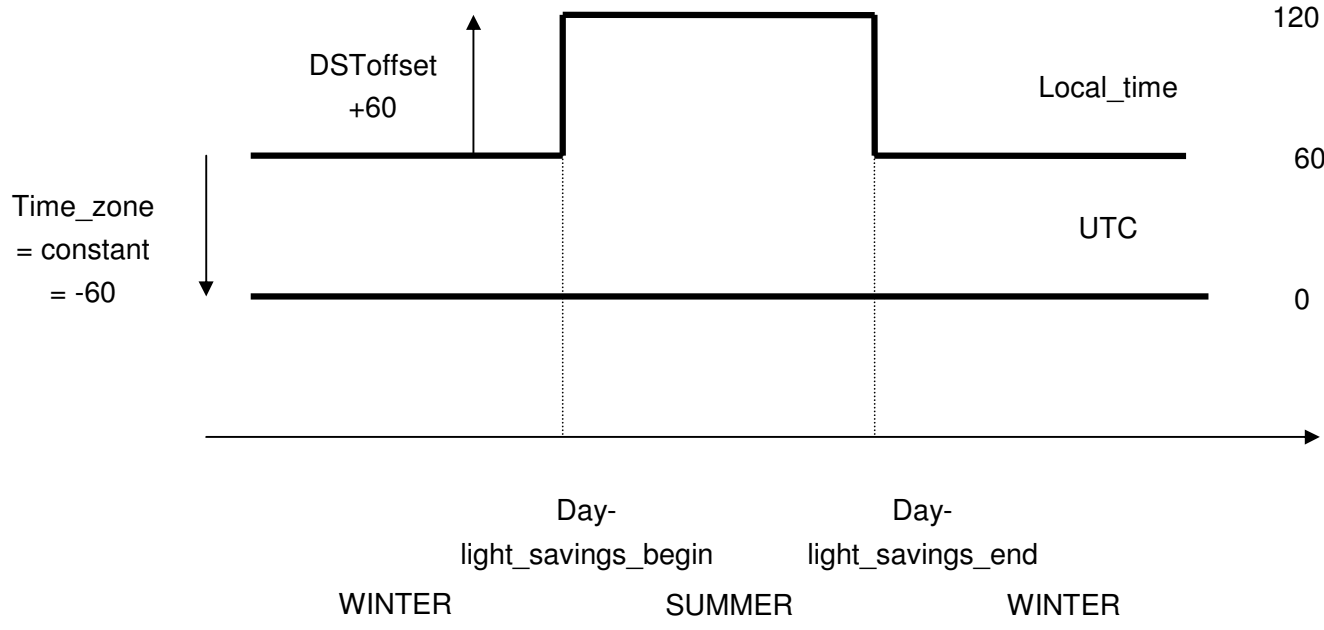
Table 2-10: Other Information Entities

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) local time = 15:00 UTC = 13:00 Deviation = -120 DST offset = +60 Time_zone = -60	WINTER TIME (DST not active) local time = 15:00 UTC = 14:00 Deviation = -60 DST offset = +60 but not active 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): ▪ Legally required information; ▪ 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); ▪ Barcode specified by the grid operator ▪ For E meters the meter code ▪ For G meters the meter code Furthermore if the grid operator requires this the type plate shall also show: ▪ A description of the communication medium (GPRS) ▪ 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. Life time expectancy of the battery of the G meter is calculated using the following conditions: ▪ Continuously visible display information.. ▪ Hourly communication between G meter and E meter ▪ Valve operation 10 times a year. ▪ Yearly update of software (if applicable) ▪ Normal operation of the meter under normal operating conditions 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. For FMEA calculations MIL-HDBK-217 (Electronic Reliability Design handbook) must be used. 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: ▪ 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) ▪ 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.						
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: ▪ Meter data; ▪ E/G configuration; ▪ 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 ℃ till 55 ℃, for G meters a range of -10℃ till 40 ℃ 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: ▪ Standard 2-core cable LiYY cross section of 0,25 mm2 ▪ Exterior diameter maximum 4.5mm ▪ 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) ▪ Color coded according DIN 47100 (White, Brown) ▪ Exterior color shall be yellow (RAL 1021) for Gas meters*. ▪ Exterior color shall be grey (RAL 7001) for Water meters ▪ Exterior color shall be red (RAL 3020) for Thermal meters ▪ Exterior color shall be blue (RAL 5015) for other M-Bus devices ▪ The cable must have cable end sleeves for the connection with the E meter ▪ 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. ▪ 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. ○ Asymmetric security algorithms ○ Key size ○ Key generation in the meter ○ Authentication on P2 ○ Firmware upgrade of M-Bus devices ○ Signed measurements ○ Up to 16 energy registers for E meters, 2 register for G meters (including storage) ○ 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**	P2, P3	**Applicable**	E meter, G meter

3.2 E equipment

DSMR-M 4.3.15

Description	The E meter shall comply with the Dutch regulation 'Meetcode Elektriciteit'.						
Rationale	The regulation 'Meetcode Elektriciteit' describes the requirements for grid operators and consumers with respect to design, implementation and maintenance of metering instruments. Furthermore it describes the information interchange on transport and consumption of electricity.						
Fit criterion	The E meter shall comply with the Dutch regulation 'Meetcode Elektriciteit'.						
History	Mar. 2011	**Origin**	TST	**Port**	n.a.	**Applicable**	E meter

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: ▪ The maximum allowed power consumption without communication and unconnected P1 device is for: - Single Phase Meters 2W / 10 VA - Poly phase Meters 4W / 20 VA

	▪ For single phase meters, average power consumption shall not exceed 4 W during communication. For poly phase meters, average power consumption shall not exceed 8 W during communication. ▪ Power consumption of the E equipment itself shall not lead to increasing register values of the E equipment. ▪ 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: ▪ Characters on the display shall have a minimal height of 8 mm; ▪ 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. For P1 output is must be possible to define a third set of items. 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: ▪ P1 output (general local port read out). ▪ Auto scroll mode (general display readout). ▪ Manual scroll mode (alternate display readout). ▪ 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: ▪ The register values for the defined tariffs in both energy directions ▪ Active instantaneous power delivered and received (resolution 1 Watt). ▪ Blinking display test. 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. Manual scroll mode is activated by pressing a button. Every time the button is pressed, a new item is shown. 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. In service mode the next information should be visible: ▪ Actual date and time ▪ The register values for all tariffs in both energy directions in Wh resolution ▪ ID's of connected M-Bus devices ▪ Version of Legally Relevant and Non Legally Relevant Software ▪ Active instantaneous power per phase for both energy directions. Every time a button is pressed, a new item is shown. When the terminal cover is installed the display changes to auto scroll mode. The values are displayed simultaneously with the relevant reduced OBIS codes (value group C,D,E i.e.1.8.1).						
History	Apr. 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: ▪ EN 50470-1 Electricity Metering Equipment (a.c.) – Part 1 General Requirements paragraph 7.4 Electromagnetic compatibility ▪ Special test levels for Immunity to damped oscillatory waves. IEC 61000-4-12, Ring wave immunity test (Chapter 5, testlevel x) Test levels for ring wave: Line to ground: 6 kV 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. The meter documentation shall clearly state that reversed phase sequence does not influence the accuracy of the energy measurement. 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 The current range will be: 0,25 - 5(*I*max) A. (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: ▪ A notified body for certifying meters will test the equipment to fulfil class A requirements; ▪ 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: - An indication if the meter is administrative on or off. Three flags for four possibilities Undefined (Factory setting) (value attribute 2 = 0); flag 1, 2 and 3 off Administrative off (value attribute 2 = 1): flag 1 on or Default (value attribute 2 = 2): flag 2 on or Administrative on (value attribute 2 = 3): flag 3 on Identification is based on OBIS code 0-1:94.31.0.255 attribute 2 - An indication if the limiter function is active or not. Limiter on: (value attribute 3 ≠ 999999): flag on Limiter off: (value attribute 3 = 999999): flag off Identification is based on OBIS code 0-0:17.0.0.255 attribute 3 - An indication if the communication module is attached to the network - An indication per phase if the voltage is present - An indication for a successful self check (Only visible in service mode) - Minimal 3 reserved flags for future use

	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: ▪ GPRS Signal Strength (4 levels). ▪ Actual energy Direction. ▪ 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. 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: ▪ Withstand minimal conditions without being damaged ▪ Withstand minimal conditions without causing damage or danger to its direct environment ▪ Endurance 1: the meter shall be capable of at least 3000 operation cycles at 80

	Ampère at PF1 ▪ 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 ▪ C5: Fault Current making capacity at UC2 level (2,5 kA) ▪ C6: Short-circuit current carrying capacity at UC2 level (2,5 kA) o Test 2 : at UC2 level (2,5 kA) o Test 1 : at UC3 level (6 kA) ▪ C8: Dielectric strength The Circuit Breaker in the E meter must meet the following endurance requirements, derived from IEC 62055-31 Annex C/C3: - 3000 operation cycles at 80 Ampère, PF1. - 2000 operation cycles at 80 Ampère, PF 0,5 inductive 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: ▪ Prospected Short-circuit current: 10 kA; U= 230VAC: PF0,5 (acc. IEC 61008-1, table 16) ▪ Meter circuit protected by an electromechanical protection relay 80 A ▪ A short circuit connection: 2 * 0,5 m; 16 mm^2 ▪ 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 4.3.44

Description	The G meter shall comply with the Dutch regulation “Meetvoorwaarden gas”.						
Rationale	The regulation ‘Meetvoorwaarden Gas’ describes the requirements for grid operators and consumers with respect to design, implementation and maintenance of metering instruments. Furthermore it describes the information interchange on transport and consumption of gas.						
Fit criterion	The G meter shall comply with the Dutch regulation “Meetvoorwaarden gas”.						
History	Nov. 2007	**Origin**	Dutch law	**Port**	n.a.	**Applicable**	G meter

DSMR-M 4.3.45

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 15°C.						
Fit criterion	The G meter will convert the uncorrected measured volume to a volume at 15°C.						
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 supplemented 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 that also convert the volume to m_n^3 shall comply with the latest release of EN 12405
Rationale	In the standards for measuring volume conversion is not included.
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 test mode and show Legally Relevant software versions.						
History	Mar. 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	Display with sleeping mode functionality: ▪ After activating the display by pushing the button, manual scroll mode is activated by pressing the button again during 10 seconds. The code for the LR software is shown in manual scroll mode in the next sequence: Index value - -> LR - -> Index value - ->…… ▪ Return to sleeping mode when no button is pressed during 30 seconds. Display without sleeping mode functionality: ▪ Manual scroll mode is activated by pressing the button during 10 seconds. The code for the LR software is shown in manual scroll mode in the next sequence: Index value - -> LR - -> Index value - -> ….. ▪ Return to normal mode when no button is pressed during 30 seconds.						
History	Mar. 2011	**Origin**	TST	**Port**	n.a.	**Applicable**	G meter

DSMR-M 4.3.56

Description	If the standard resolution is not precise enough, it must be possible to activate a test 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 test 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.
Fit criterion	It must be possible to activate a test 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.

	▪ Test mode is activated by pressing the button in manual scroll mode during 5 seconds. In test mode only index values are visible. ▪ Test mode is deactivated after 60 minutes. ▪ Testing at Qmin may not take more than 30 minutes. ▪ 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 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: ▪ G1.6 2.5 m^3/h ▪ G2.5 4.0 m^3/h ▪ G4 6.0 m^3/h ▪ G6 10.0 m^3/h ▪ G10 16.0 m^3/h ▪ G16 25.0 m^3/h ▪ 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: ▪ A notified body for certifying meters will test the equipment to fulfil class 1.5 requirements; ▪ 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 on site maintenance on the G meter shall be minimized.						
Rationale	On site 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.

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. If the accuracy of the G meter is high enough to determine the allowed flow in a shorter time period then this is allowed. In case the flow is greater than is allowed, the valve has to be shut immediately. This applies to both automatic or manual (re)connection 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. (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 inter-action.
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 in red.						
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 4.3.81

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

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: ▪ Timestamp of the logged event; ▪ Activity type of the logged event (event code);

	▪ 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: ▪ Error code for the type of error. ▪ 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 Use case: Retrieve M&S equipment state.						
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 smartcards 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 ac-

cess 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 *identification*, *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 MBus 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, either by using a unique login/password-combination or 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 Table).						
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 4.4.8

Description	The equipment shall support functionality to configure whether the P3 port is limited to HLS authentication mechanism 5, or whether the P3 port can be used with all possible HLS mechanisms.						
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	When the P3 is configured that only HLS authentication mechanism 5 is allowed then there shall be no method to use HLS mechanism 4 or lower on the P3 port.						
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 disable protocols and functionality that are not required for DSMR communications with other metering infrastructure equipment.						
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 support only the protocols and functionality required for DSMR communications with other metering infrastructure equipment.						
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 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 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 main-

	tained.						
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.						
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**	P2 P3	**Applicable**	E meter, G meter

4.5 Data Confidentiality

DSMR-M 4.4.22

Description	The system and devices 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 device and the CS is encrypted, using AES-128 as the encryption mechanism.						
History	Nov. 2007	**Origin**	P&S 1.5	**Port**	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 and passwords) shall be present in smart meters. Thus, each smart meter shall have its own unique meter master key. ○ The meter master secret keys shall be stored on meters in a secure manner which resists attempts to discover them. ○ The administrative password(s) on meters shall be stored in a secure manner which resists unauthorized attempts to access them. ○ The message encryption key and message authentication key shall be updated using the meter master key with a secure key wrapping function. ○ 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. ○ All cryptographic keys and random data involved in any cryptographic operation shall be cryptographically random. ○ 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. ○ 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. ○ 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

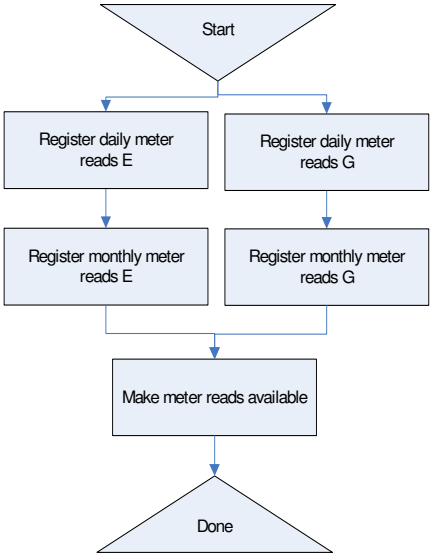


Figure 5-1b: Provide periodic meter reads – block diagram

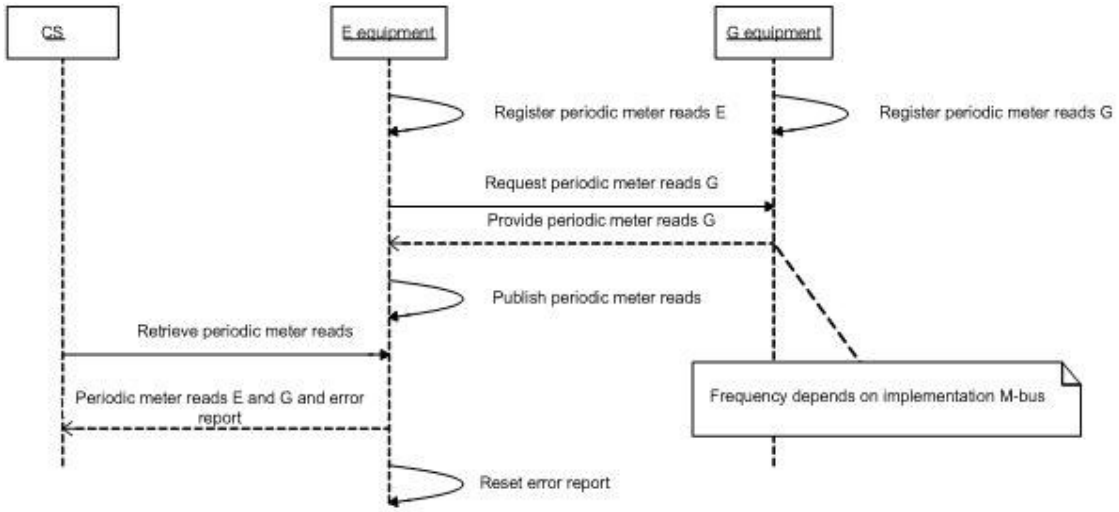


Figure 5-1c: Provide periodic meter reads – UML sequence diagram

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: ▪ Meter readings E for the designated period using kWh as the unit of measurement ▪ 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: ▪ Meter readings E for the designated period using kWh 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

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). 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 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: ▪ 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

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: ▪ 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.

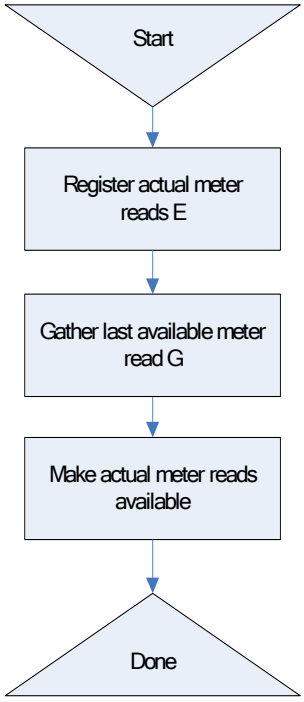


Figure 5-2b: Provide actual meter reads – block diagram.

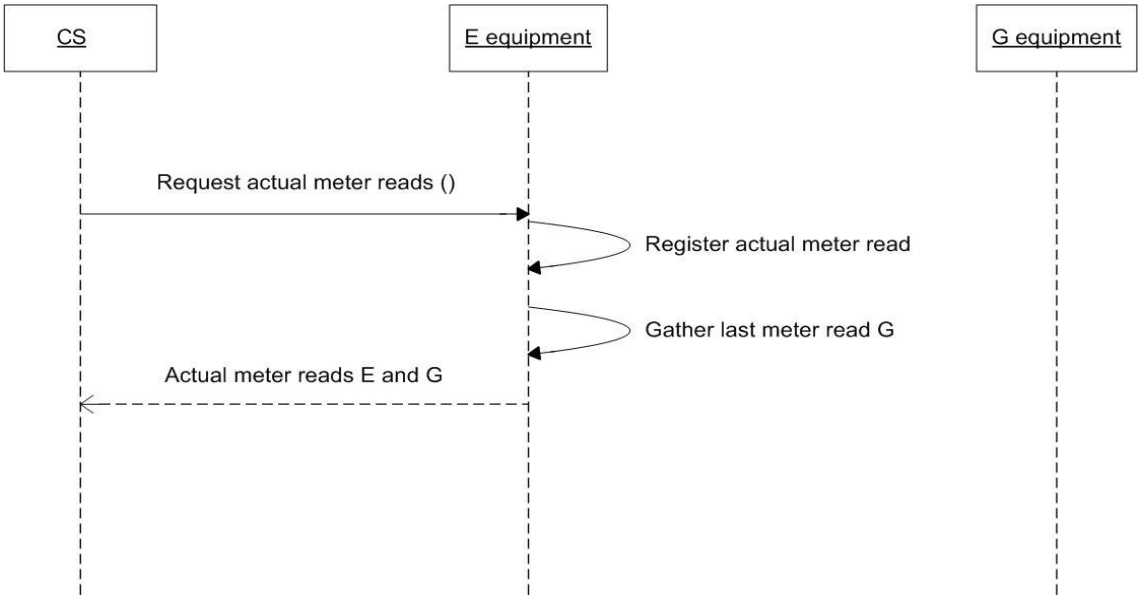


Figure 5-2c: Provide actual meter reads – UML sequence diagram.

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: ▪ Actual meter reading E using kWh as the unit of measurement; ▪ Most recent meter reading G available in the E meter (if not older than 24 hours) 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 ((§5.2.4)	**Port**	n.a.	**Applicable**	E meter, G meter

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.

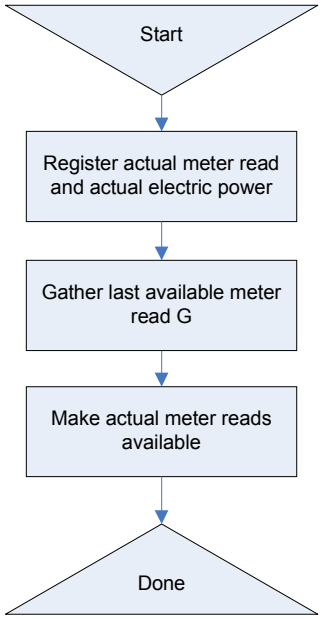


Figure 5-3b: Provide actual meter reads through P1 – block diagram.

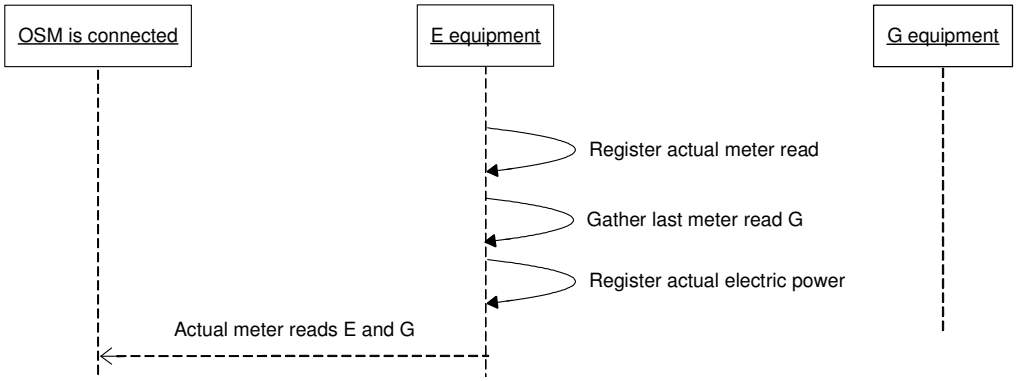


Figure 5-3c: Provide actual meter reads through P1 – UML sequence diagram.

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: ▪ Equipment identifier(s); ▪ Actual meter reading E using kWh (three decimals) as the unit of measurement; ▪ Actual electrical power (delivery and consumption) specified with a resolution of 1 W; ▪ 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). 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

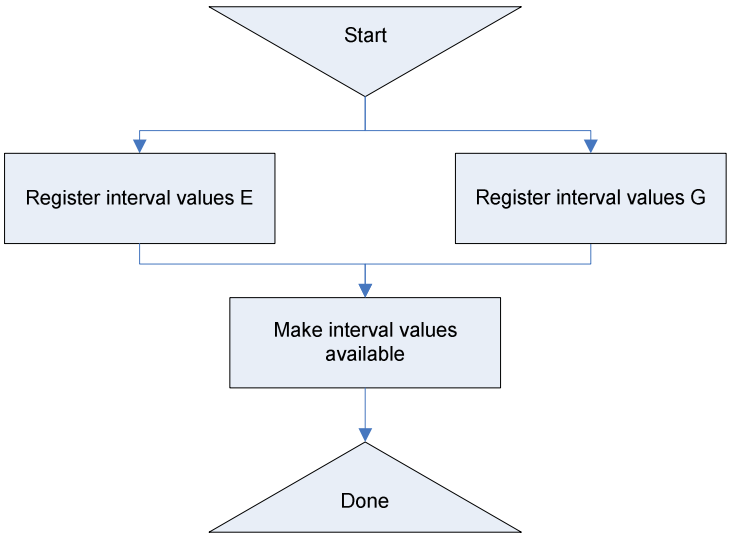


Figure 5-4b: Provide interval values – block diagram

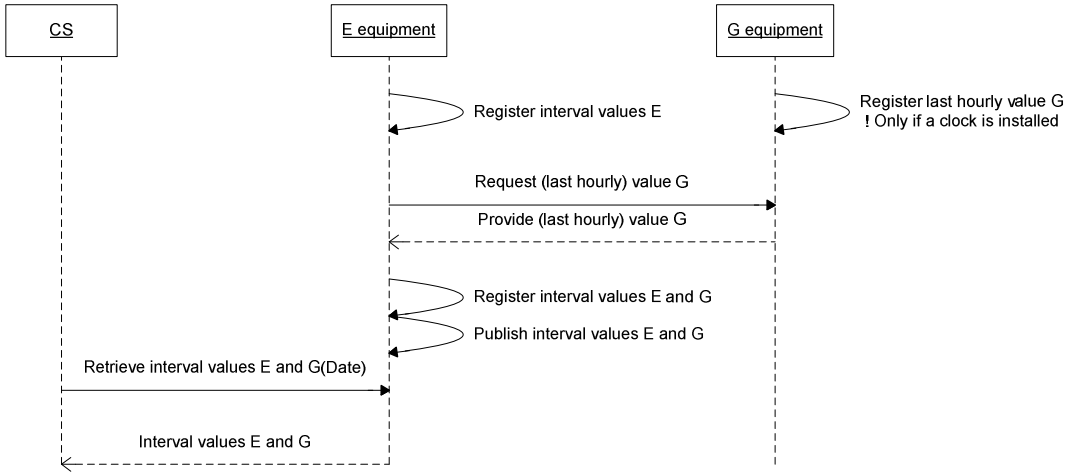


Figure 5-4c: Provide interval values - UML sequence diagram

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: ▪ Meter readings E with a measurement period of 15 minutes using kWh (3 decimals) as the unit of measurement; ▪ 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. 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 with a clock 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) when the G meter has an internal clock. For clock-less G meters the E meter is responsible to register the G meter reading at the 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.

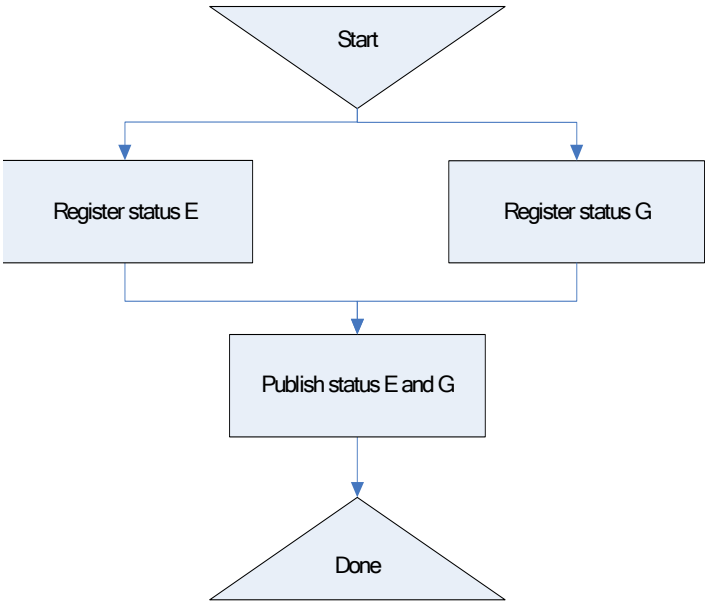


Figure 5-5b: Provide equipment status to P1 – block diagram.

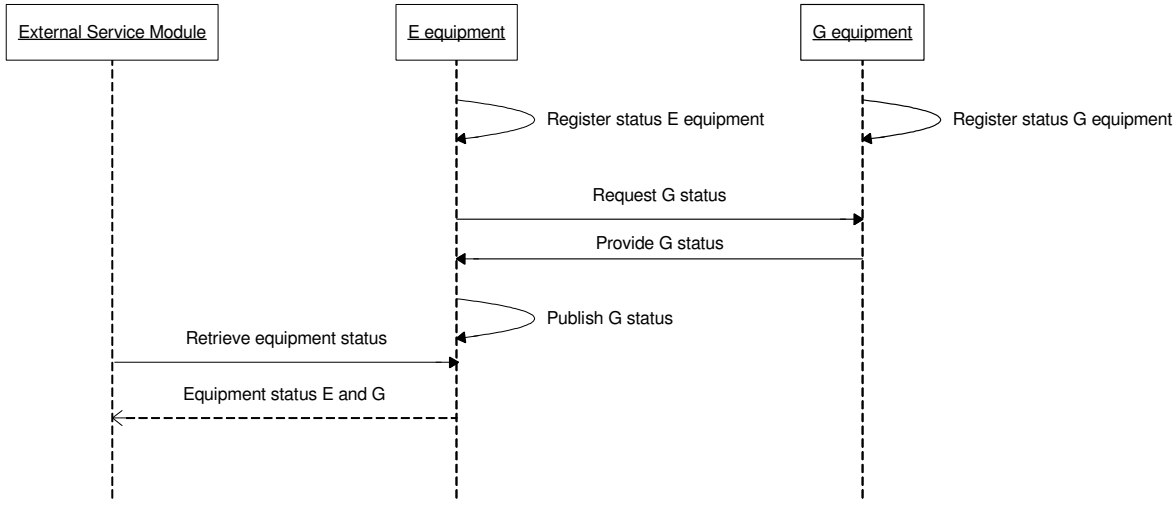


Figure 5-5c: Provide equipment status to P1 – UML sequence diagram.

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: ▪ Equipment identifier for the E meter; ▪ Equipment identifier for the G meter; ▪ Actual tariff E; ▪ Actual switch position E breaker (on/off/released); ▪ Actual threshold E; ▪ 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

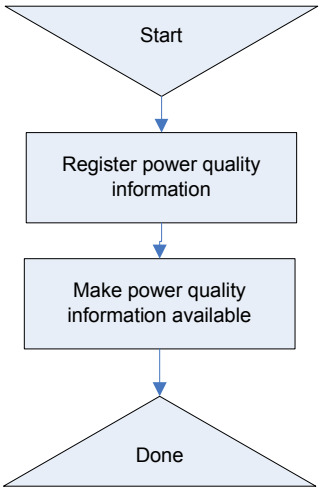


Figure 5-6b: Provide power quality information – block diagram

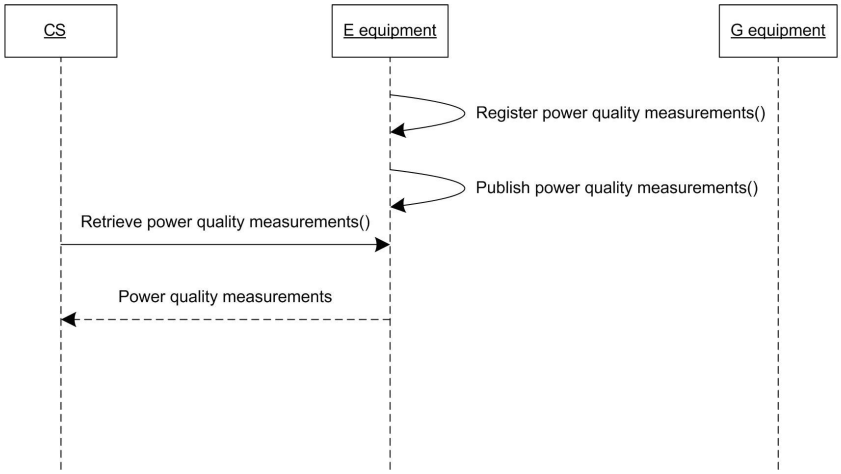


Figure 5-6c: Provide power quality information – UML sequence diagram

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 power swells and sags.						
Rationale	The definition of power 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: ▪ Equipment identifier for the E meter that the information originates from; ▪ Number of power swells (configurable for duration and threshold); ▪ Number of power sags (configurable for duration and threshold); 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 actual 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. The average voltage shall at least contain the following information: ▪ Equipment identifier for the meter from which the values originate; ▪ Time stamp for end of the period during which the average voltage was determined; ▪ Parameter name. ▪ 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.

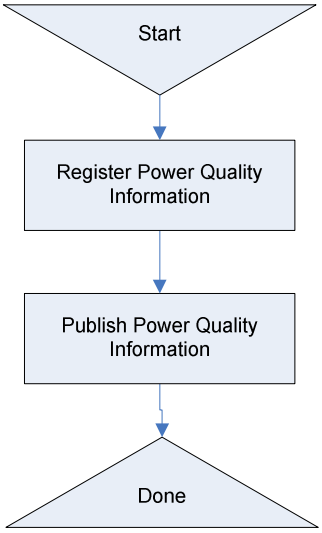


Figure 5-7b: Provide Power Quality Information to P1 – block diagram.

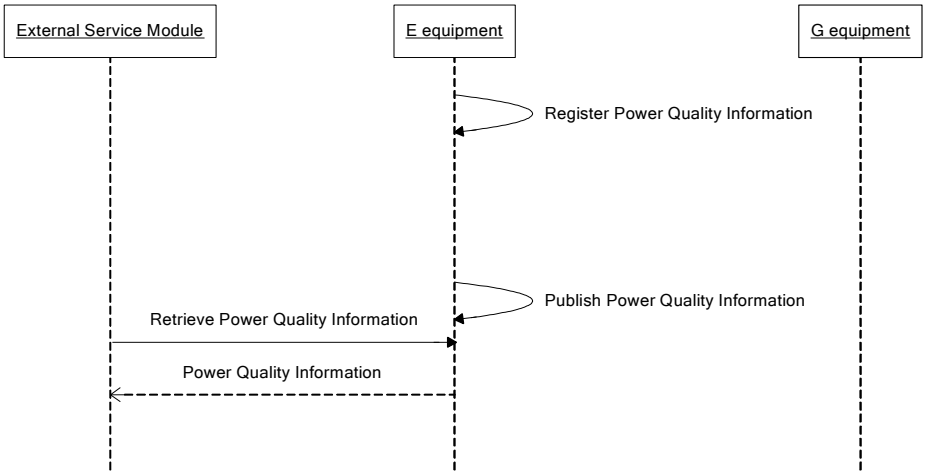


Figure 5-7c: Provide Power Quality Information to P1 – UML sequence diagram.

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: ▪ Number of power failures in any phases; ▪ Number of long power failures in any phases; ▪ Power Failure Event Log; ▪ Number of voltage sags in phase L1; ▪ Number of voltage sags in phase L2 (poly phase meters only) ▪ Number of voltage sags in phase L3 (poly phase meters only); ▪ Number of voltage swells in phase L1; ▪ Number of voltage swells in phase L2 (poly phase meters only); ▪ 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

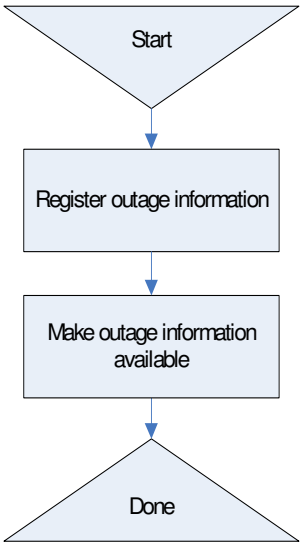


Figure 5-8b: Provide outage information – block diagram

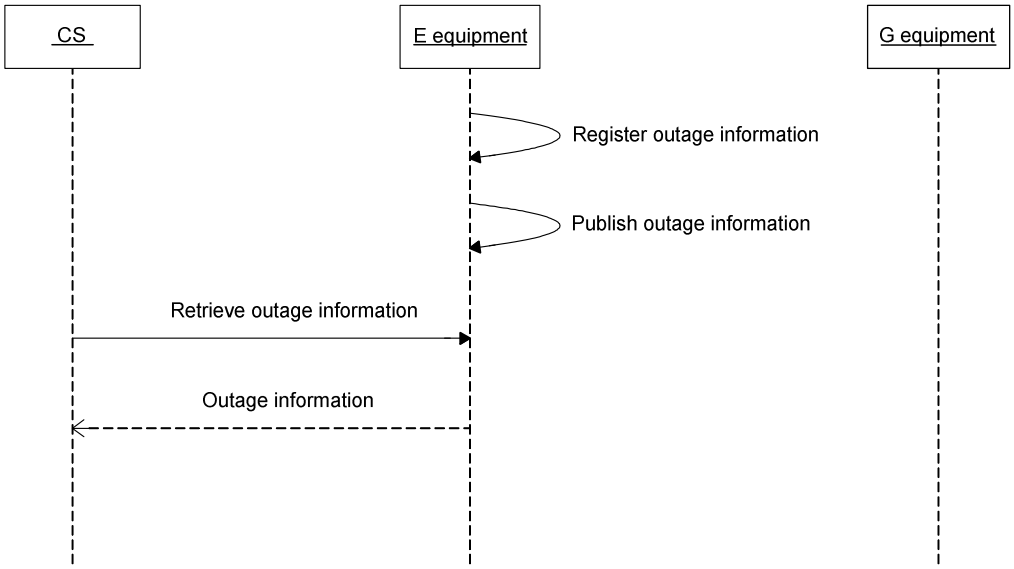


Figure 5-8c: Provide outage information – UML sequence diagram

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: ▪ Equipment identifier for the meter from which the measurements originate; ▪ 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: ▪ Equipment identifier for the meter from which the measurements originate; ▪ Outage duration; ▪ 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. 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 10 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

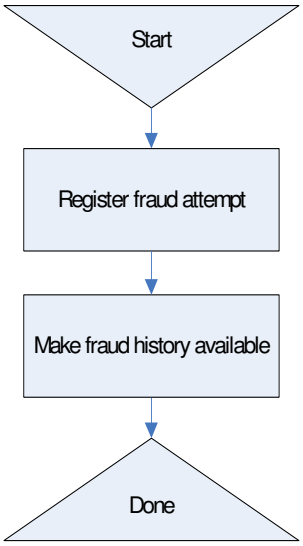


Figure 5-9b: Provide tamper history – block diagram

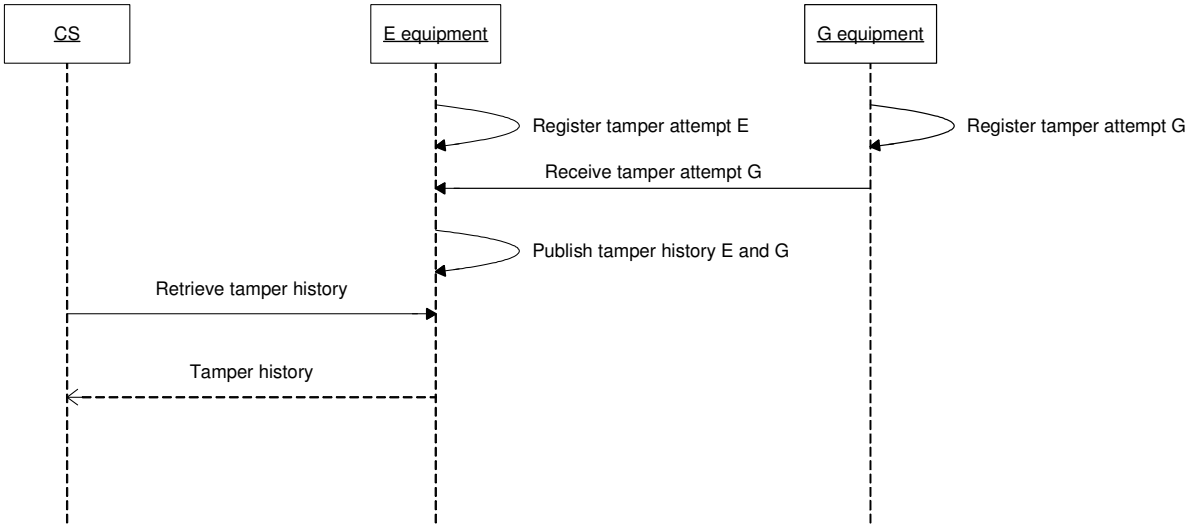


Figure 5-9c: Provide tamper history – UML sequence diagram

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: ▪ Equipment identifier for the meter that detected the physical intervention; ▪ 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: ▪ Equipment identifier for the meter that detected the physical intervention; ▪ 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: ▪ 30 most recent tamper attempts on G meter; ▪ 30 most recent tamper attempts on E meter. ▪ 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

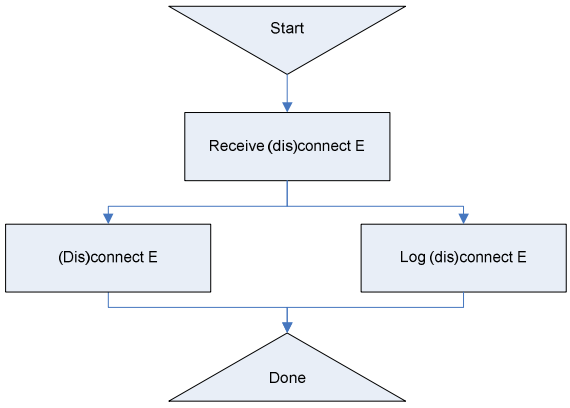


Figure 5-10b: (Dis)connect E – block diagram

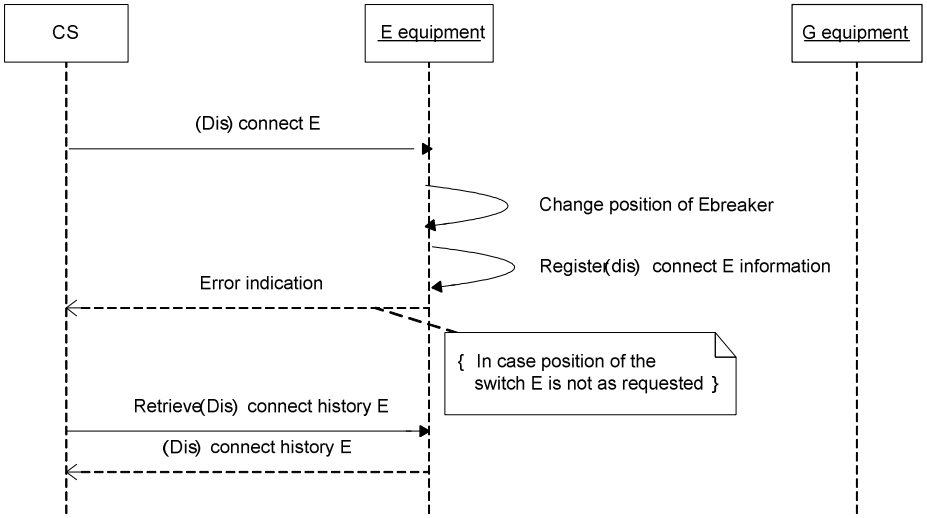


Figure 5-10c: (Dis)connect E – UML sequence diagram

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. For E meters (if this functionality is used): “Knop in” and the register value in case the customer needs to push a button for closing the switch (alternating or simultaneously) “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: ▪ Position of the breaker after the (dis)connect was applied; ▪ Time stamp at which the (dis)connect has been applied.						
History	Nov. 2007	**Origin**	NTA 8130	**Port**	n.a.	**Applicable**	E meter

			((§5.3)				

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

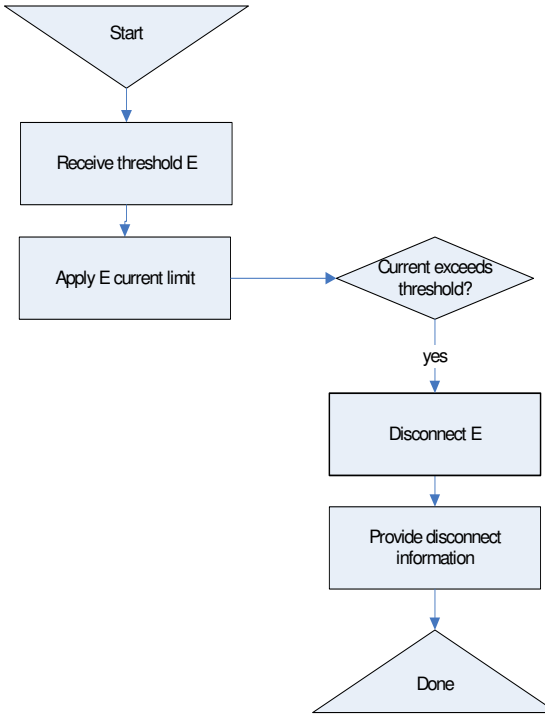


Figure 5-11b: Apply threshold (electricity) – block diagram

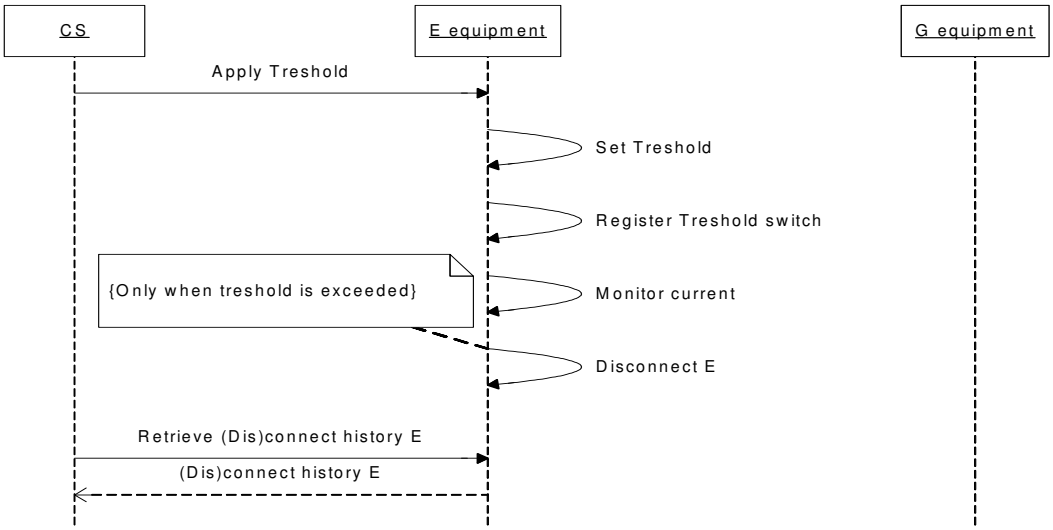


Figure 5-11c: Apply threshold (electricity) – UML sequence diagram

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 alarm is raised (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. The command will be performed at the designated date and at the specified time. If the activation date (which is an optional parameter) has not been passed as a parameter, the command is to be performed instantly.						
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. The grid operator can reduce the active power import as the result of a power shortage ("Code Red"). 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. For a 3-phase metering installation the threshold represents the sum over all phases. 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: ▪ 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 net power consumption (consumption minus production) exceeds the threshold. ▪ Disconnection can take place at exceeding a certain power level, this is calculated with U = 230 V, cos(φ) = 1 ▪ The threshold is compared with the average net power consumption over a period of 30 seconds.						
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

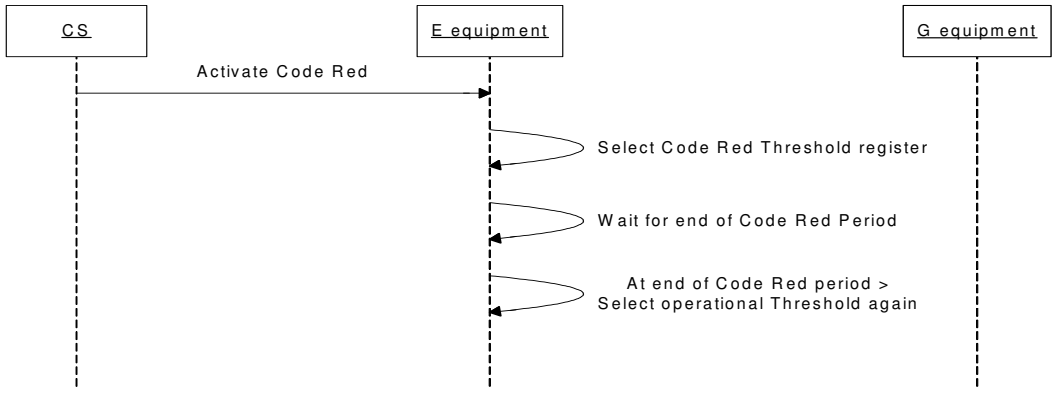


Fig 5-11d Activate Code red – UML sequence Diagram

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 alarm is raised (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	A gas outage has been detected and as a safety procedure a (group of) premise(s)

detected	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 reconnect 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

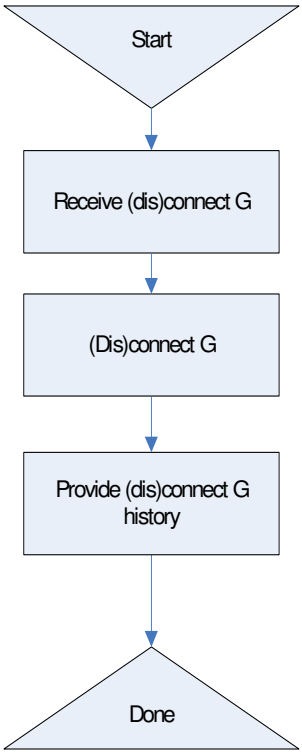


Figure 5-12b: (Dis)connect G – block diagram

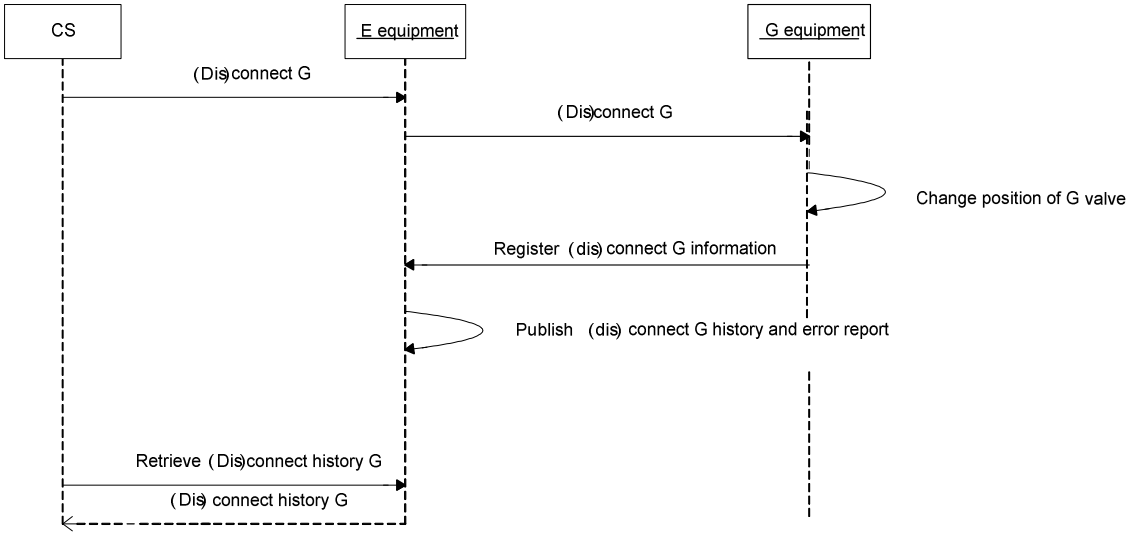


Figure 5-12c: (Dis)connect G – UML sequence diagram

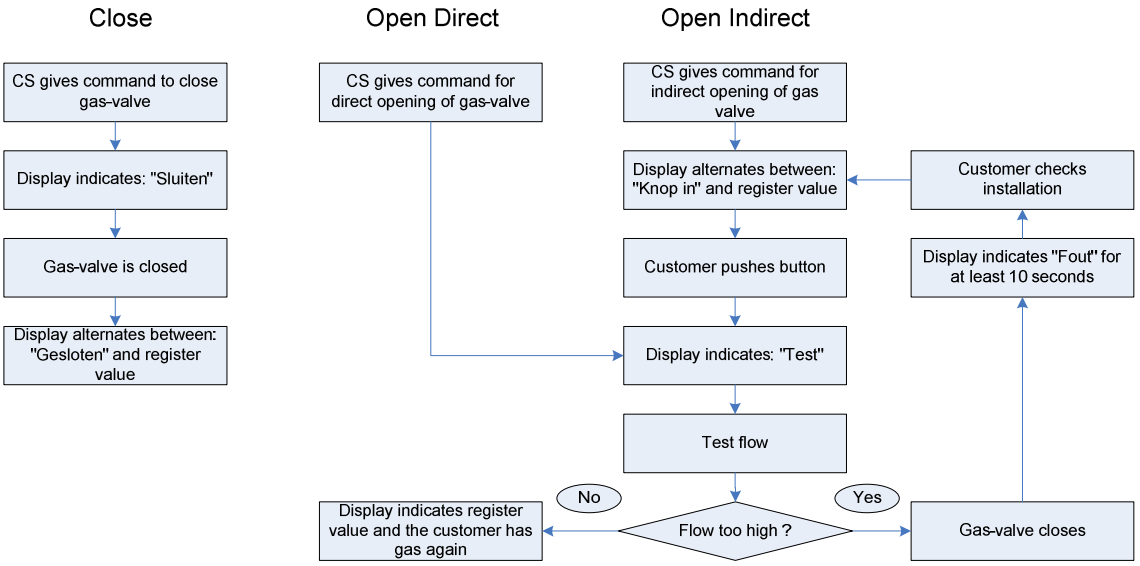


Figure 5-12d: Display messages on G meter display for opening or closing the gas valve – block diagram

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. A disconnect is always preceded by a meter read from the CS.						
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 can not 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 can not 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**	P3	**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): "Knop in" and the register value in case the customer needs to push a button for opening the valve (alternating or simultaneously) "Test" - The valve is opening or testing "Fout" – During testing a leakage or consumption has been detected "Sluiten" – The valve is closing "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, or the timestamp is more then 24 hours in the past.						
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, or the command was given more then 24 hours 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, or the timestamp is more then 24 hours in the past..						
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

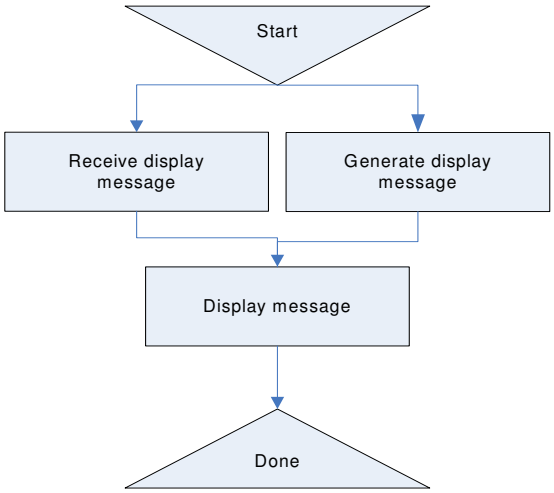


Figure 5-13b: Display messages on meter display and P1 – block diagram

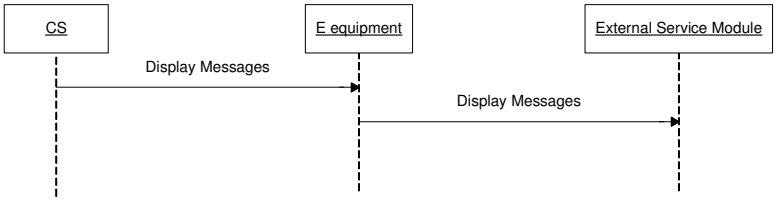


Figure 5-13c: Display messages on meter display and port P1 – UML sequence diagram

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: ▪ It can be displayed on a numerical display; ▪ Horizontal scrolling will be used if the message does not fit on the display; ▪ A new message will override the current message on the display; ▪ An empty message will result in the removal of the current message on the display, and return the display to auto scroll mode; ▪ Maximum length is 8 characters. ▪ 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

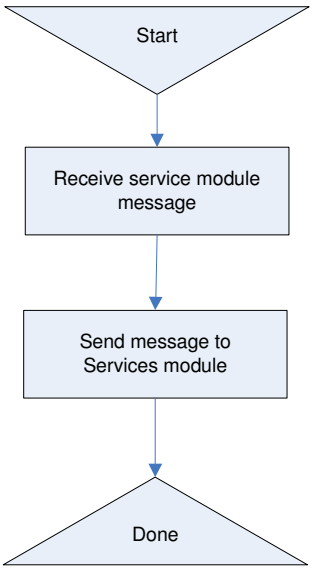


Figure 5-14b: Sending messages to port P1– block diagram

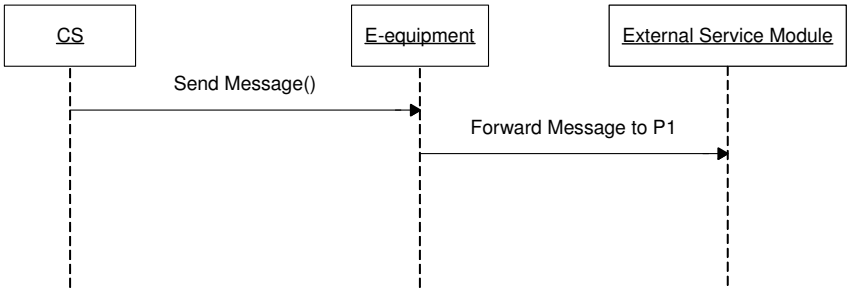


Figure 5-14c: Sending messages to port P1– UML sequence diagram

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

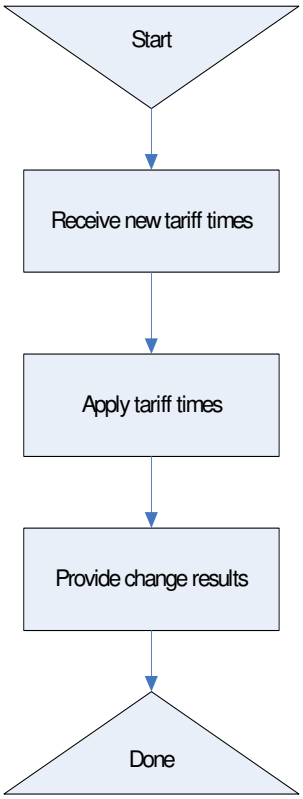


Figure 5-15b: Shift tariff times electricity – block diagram

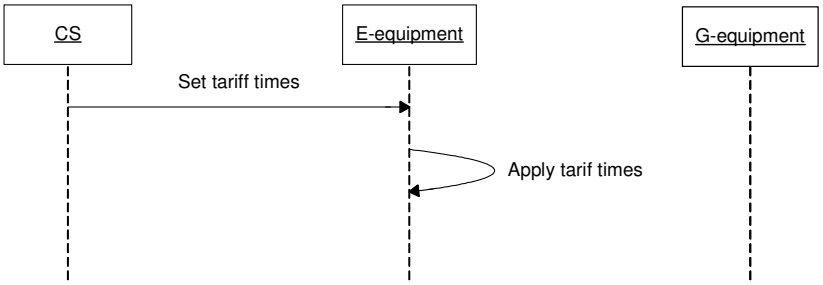


Figure 5-15c: Shift tariff times electricity – UML sequence diagram

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 4.5.84

Description	The E meter shall log all Set Tariff Shift Time requests.						
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 if a change of Tariff Shift Times has occurred.						
History	Sep. 2009	**Origin**	TST	**Port**	P3	**Applicable**	E meter

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: ▪ Activation date and time						
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 correctly, 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

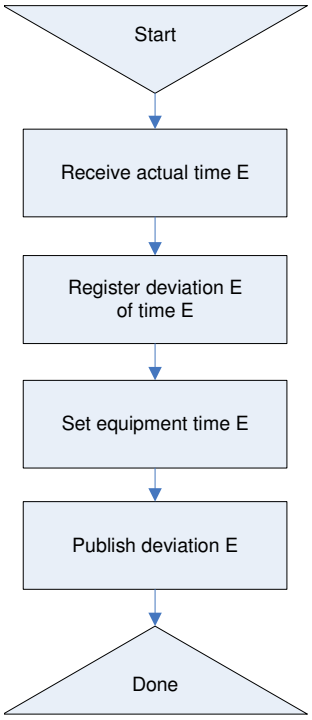


Figure 5-16b: Synchronise time E-equipment – block diagram

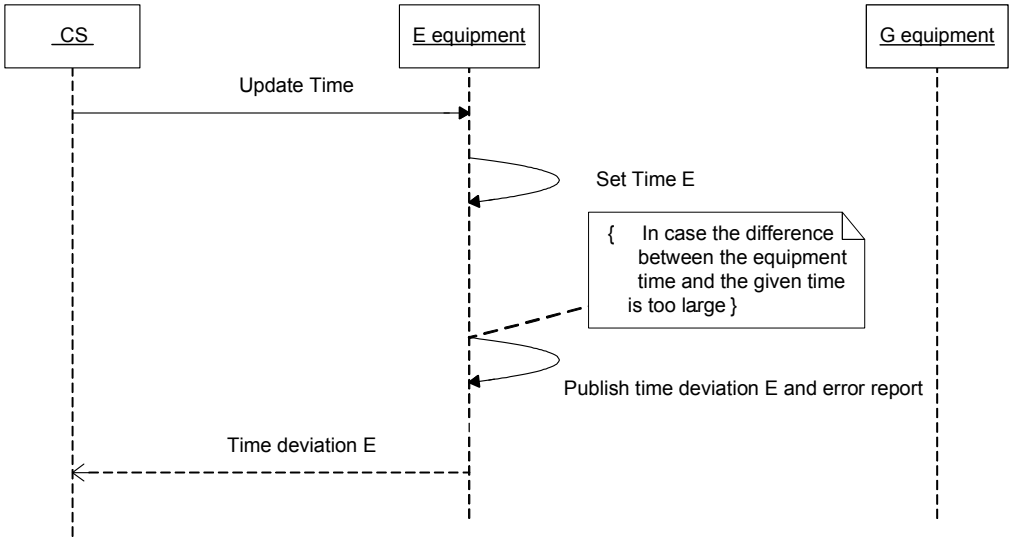


Figure 5-16c: Synchronise time E-equipment – UML sequence diagram

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. ▪ The deviation of the clock shall be within the limits of accuracy. ▪ 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. 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

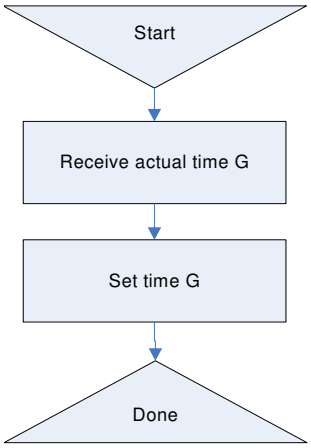


Figure 5-17b: Synchronise time G-equipment – block diagram

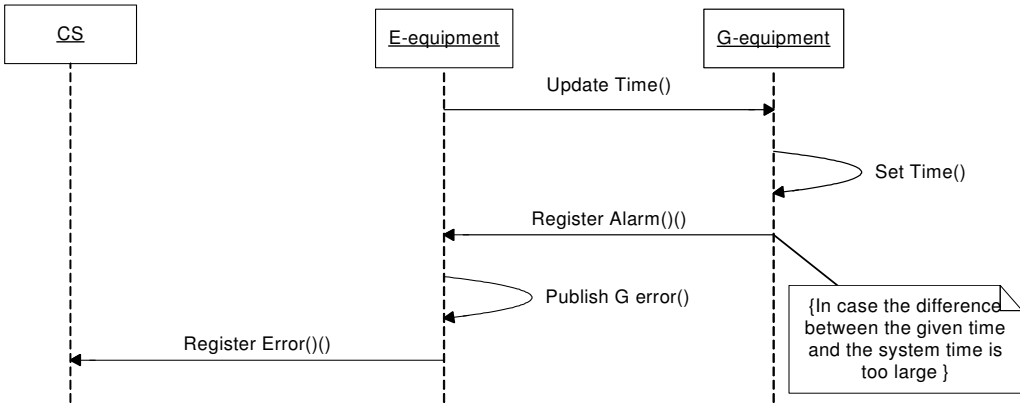


Figure 5-17c: Synchronise time G-equipment – UML sequence diagram

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: ▪ At every time change of the bus master (including daylight savings time related changes). ▪ At every restart of the communication (after communication breakdown, after M-Bus master breakdown, and after M-Bus slave breakdown). ▪ Every 24 hours, to ensure a maximum deviation below 60 seconds. ▪ 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 a pre-configured amount of time, an alarm is raised. Upon first communication, the alarm is reported to the E meter. The pre-configured threshold is a factory parameter, to be specified by the grid operator.						
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.

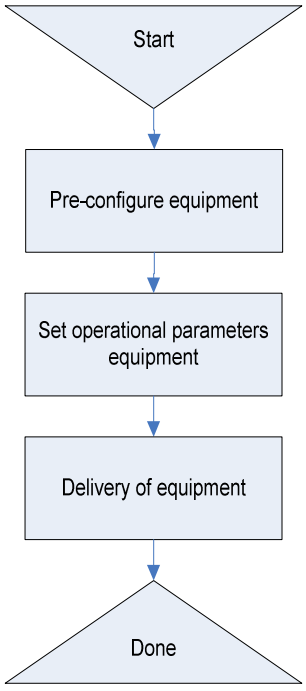


Figure 6-2: Receive equipment

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: ▪ Meter code, 5 character code (with leading spaces if is code is shorter than 5 characters); ▪ Serial number, 10 characters, assigned by the vendor, with leading zeroes if the number is shorter than 10 characters ▪ 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: ▪ The bar code must comply with Code 128 bar code (also known as ANSI/AIM 128 or USS code 128) specifications;

	▪ 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; ▪ The blank zones preceding and following the bar code, also known as the 'quiet zone' must be a minimum of 6 mm; ▪ The height of the bar code must be a minimum of 7 mm; ▪ 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; ▪ The size of the label shall not exceed a height of 30 mm and a length of 75 mm; ▪ 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.

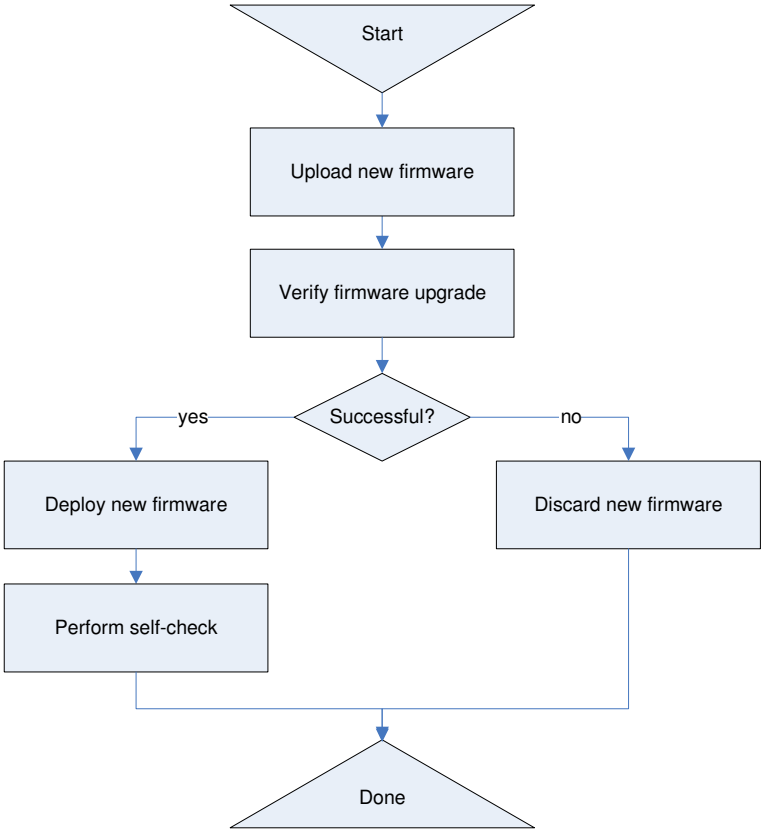


Figure 6-3: Firmware upgrade

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

DSMR-M 4.6.5

Description	The equipment shall relay the firmware upgrade if the designated date for deployment of the new firmware is in the future.						
Rationale	Upgrading firmware is usually executed for large numbers of equipment. Due to limitations in bandwidth uploading firmware is usually done some time before the firmware shall be deployed.						
Fit criterion	The equipment shall relay the firmware upgrade until the designated date and time and then deploy it.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	E meter

DSMR-M 4.6.6

Description	The equipment shall issue a logical error in case the deployment date for the new firmware is in the past.						
Rationale	A deployment date for firmware is provided in order to guarantee that equipment deploys the firmware on the designated date. If the new firmware cannot be deployed at the designated date this can lead to complications and may lead to unanticipated situations. For this reason users must be informed on this type of situations.						
Fit criterion	The logical error issued for late reception of firmware shall at least contain the generic attributes for logical errors.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3	**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 up-

	grade 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 attributes 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: • Time stamp at which the new version of the firmware was verified • Version number of the verified firmware.						
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 either immediate or time based (at a designated date and time).						
Rationale	The metering equipment shall deploy the new version either immediate or at a designated date and time.						
Fit criterion	The new version of the firmware is the operational version of the firmware in the equipment. 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 In-

	struments 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: • 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 in cases where no delay is programmed.

Rationale	Firmware upgrades can be pre-programmed (delayed) and can therefore be prepared long before the upgrade shall be deployed. 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: P3 P0 80 %: 24 hours void 95 %: 48 hours void 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.

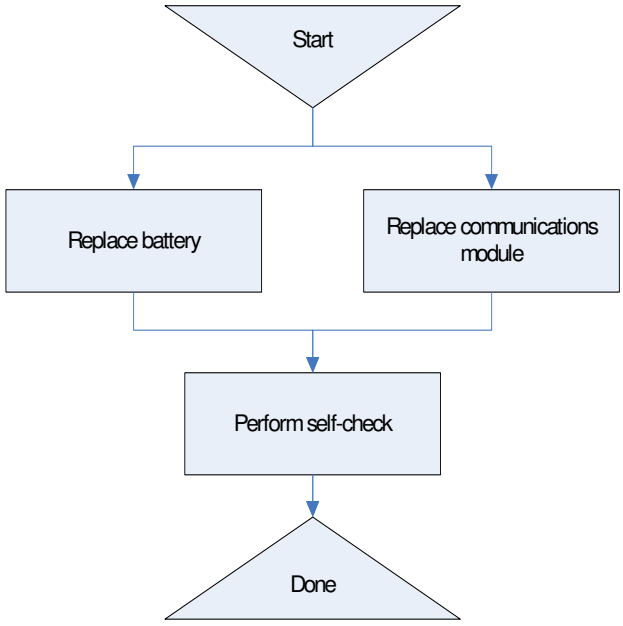


Figure 6-4: Planned on-site maintenance

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 calibration seal.						
Rationale	In case the calibration 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 mandatory recalibration of the equipment.						
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.
Rationale	It must be possible to reset the battery lifetime counter without tools.
Fit criterion	Battery lifetime counter is 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 calibration seal.						
Rationale	In case the calibration 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.

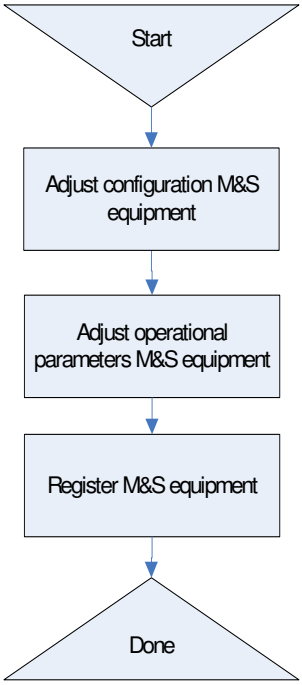


Figure 6-5: Adjust equipment

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, G 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: P3 P0 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.

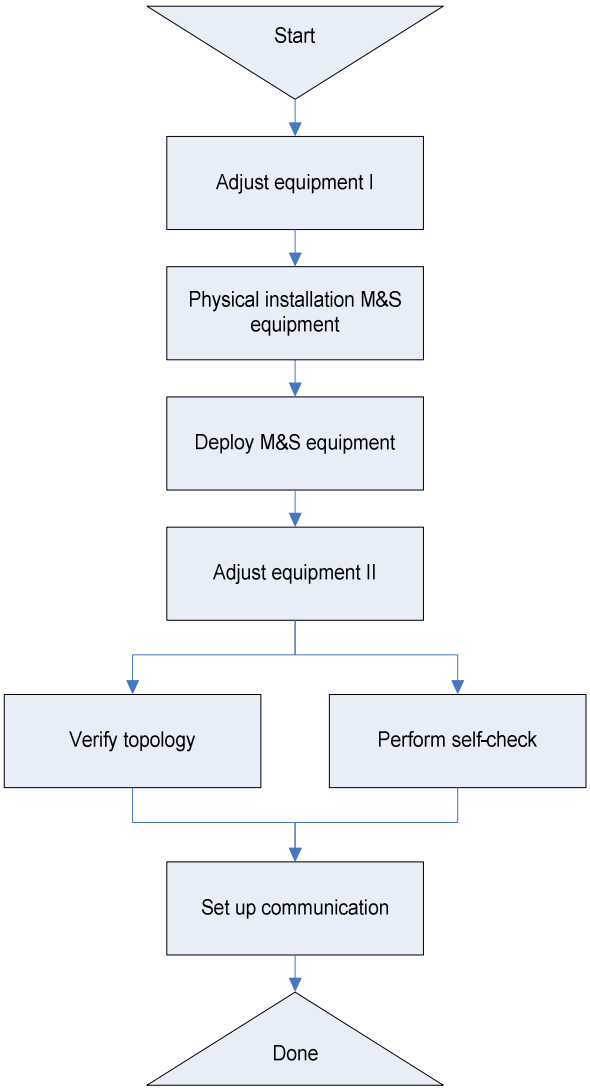


Figure 6-6: Install M&S equipment

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. 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. The external housing for polyphase meter (including mounting hooks) shall not exceed the next dimensions: Height = 330 mm, width = 180 mm, depth = 150 mm. The length of the meter cover shall guarantee that: - The cut-out for the installation wires in the meter board are covered up completely. - 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 4.6.37

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: E equipment G equipment 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

DSMR-M 4.6.41

Description	A metering instrument shall provide functionality to set the 'function location' using a correct EAN code before the instrument is deployed.						
Rationale	GO's will specify the function location by means of the EAN code of the connection. The EAN code shall comply with the rules for EAN codes.						
Fit criterion	The meter will provide facilities to record a correct 18 digit EAN code.						
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 Verify topology

DSMR-M 4.6.44

Description	The E meter shall provide functionality to invoke 'Use case: Verify topology' and retrieve the results from the local port.						
Rationale	The GO wants to verify that the devices that are to be hosted by the meter function correctly before the equipment is actually deployed.						
Fit criterion	The topology use case that is executed as part of the installation process shall comply with the description of 'Use case: Verify topology'.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0, P3	**Applicable**	E meter

6.1.5.6 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: P3 P0 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.

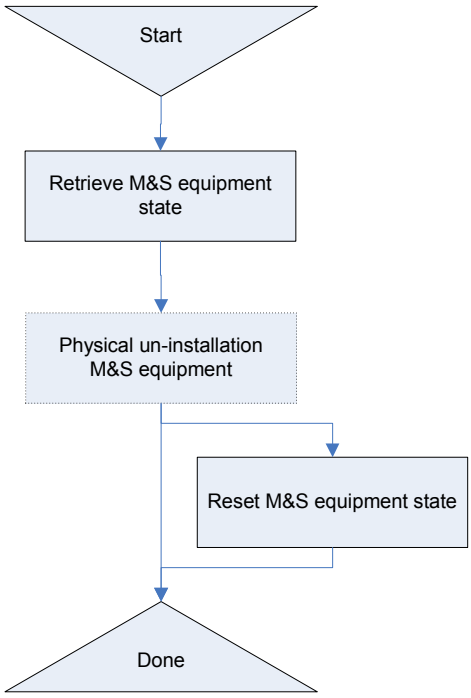


Figure 6-7: Un-install M&S equipment

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 'Use case: Retrieve M&S equipment state'.						
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 'Use case: Retrieve M&S equipment state'.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0, P3	**Applicable**	E meter

6.1.6.2 Physical un-install M&S equipment

DSMR-M 4.6.49

Description	Communication with equipment other than the metering installation from which equipment is un-installed, shall be maintained despite the removal of the M&S equipment.						
Rationale	M&S equipment in a metering installation is not supposed to serve as an essential communication component for equipment that is not part of the metering installation.						
Fit criterion	Communication with M&S equipment in other metering installations than the one from which equipment is un-installed, shall be maintained.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0, P3	**Applicable**	E meter, G meter

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, passwords 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.						
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, passwords 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, passwords and personal details (including interval values) with zero's (0) is provided.						
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: P3 P0 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	Retrieval of the equipment state is performed as part of the process of un-

maintenance	planned 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-

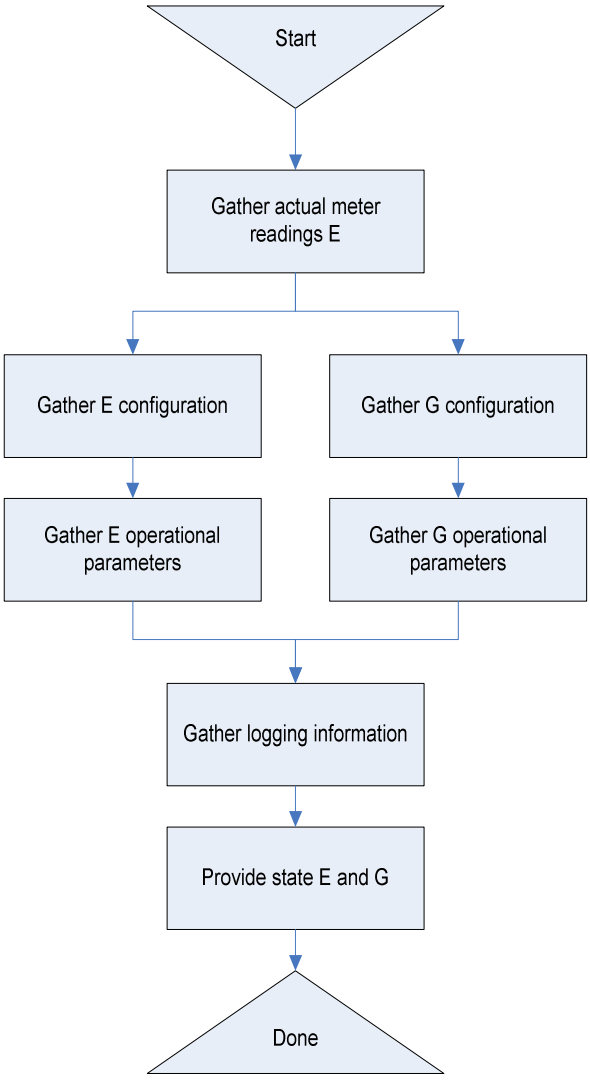


Figure 6-8: M&S Equipment state

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: • Complete configuration and operational parameters for E and G equipment; • The actual meter readings for E; • Last known meter readings for G available in the E meter; • 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: P3 P0 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.

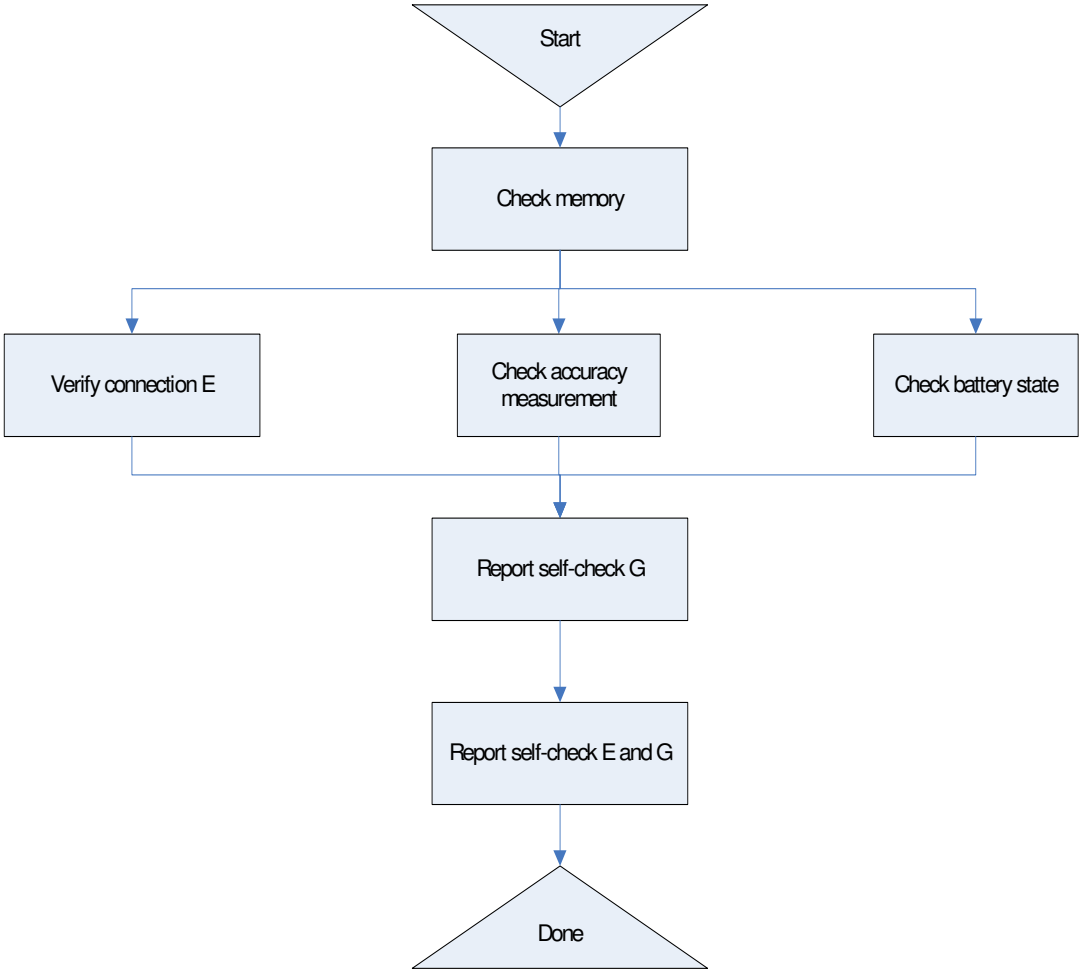


Figure 6-9: Perform self-check

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: ▪ Expected life time of the battery ▪ Required length of period between the alarm raise and the end-of-use time ▪ 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, 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: ▪ Type of failure G; ▪ Timestamp for the execution of the self-check G; ▪ Type of failure E; ▪ 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: Display 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.

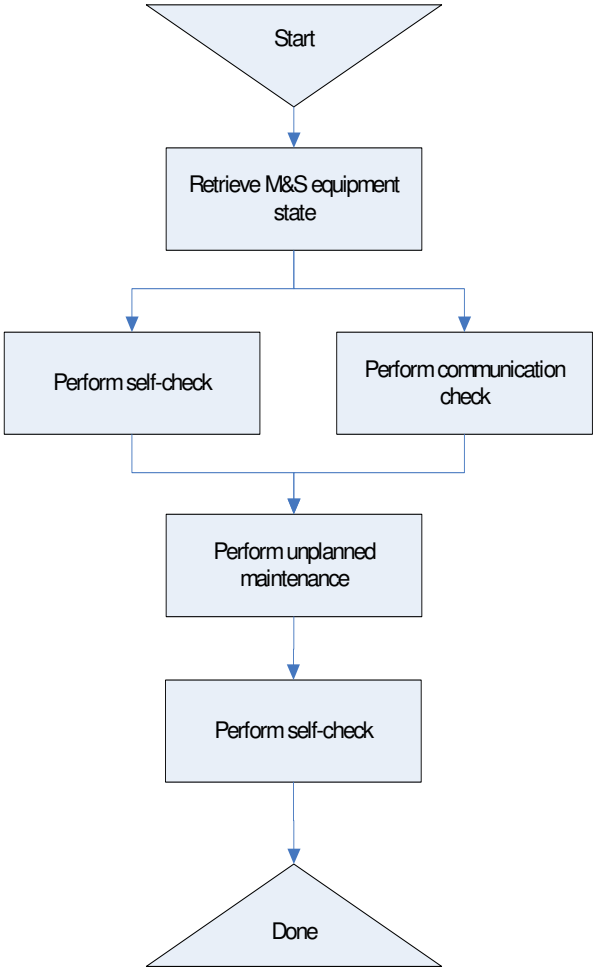


Figure 6-10: Unplanned maintenance on-site

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 'Use case: Retrieve M&S equipment state' 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 'Use case: Retrieve M&S equipment state'.						
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 MAPPING TABLE

NR:	DSMR 3.0 Req.	DSMR 4.0 Req.	NR:	DSMR 3.0 Req.	DSMR 4.0 Req.	NR:	DSMR 3.0 Req.	DSMR 4.0 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 Req.	NR:	DSMR 3.0 Req.	DSMR 4.0 Req.	NR:	DSMR 3.0 Req.	DSMR 4.0 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 Req.	NR:	DSMR 3.0 Req.	DSMR 4.0 Req.	NR:	DSMR 3.0 Req.	DSMR 4.0 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			