Main Document

Dutch Smart Meter Requirements

By order of:	**Netbeheer Nederland**
Reference:	**B101**
Date:	**March 24th, 2010**
Version:	**3.0**
Status:	**Final**

Issue list

Version	Activity

Change summary

Version	Activity
2.2	Term “Scom equipment” replaced by “Data Concentrator”.
2.2	Requirement DSMR-M9 split into separate requirements for E and G
2.2	Revision of paragraph 5.1.2.(firmware upgrade)
2.2	Delivery of new firmware moved from Tender to Main document
2.2	Requirement DSMR-M 37a moved from Tender to Main document
2.2	I&M performance requirements moved from Main to Tender document
2.2	Requirement DSMR-M 150 removed (duplicate with DSMR-M 154)
2.2	Requirement DSMR-M 187 moved to section 5.3.1.1
2.2	Revision of chapter 6, including renumbering of requirements
2.3	Changed logo to Netbeheer Nederland
2.3	Added “Applicable” field in requirements
2.3	Added temperature correction note in section 2.6
2.3	Added temperature correction requirements in section 3.3 (DSMR-M 23a, DSMR-M 23b, DSMR-M 23c)
2.3	Added requirement that poly-phase E meter shall use the Ferraris energy measurement method (DSMR-M 13a) in section 3.2
2.3	Changed name of local maintenance port on the DC from P0 to Local DC port
2.3	Added section 3.7.1: DC Security
2.3	Added requirements DSMR-M 19a, DSMR-M 34a, DSMR-M 105a, DSMR-M 147a
2.3	Adjusted definition of Hosted Equipment in section 2.5.1.1 to include the option to set the M-Bus settings of the E meter to either Master or Slave.
2.31	Added comments from Essent
3.0	In section 1.2 changed the description of the P0 port
3.0	In section 1.8.2 set the maximum delay time of the P2 interface to 2 Hours
3.0	In section 2.4 the text has been adjusted by removing the examples of “Function Locations”
3.0	Changed temperature correction note in section 2.6 to indicate that “Only one value will be indicated on the display and that value will be transmitted by the G-meter”
3.0	In section 3.1 changed the fit criterion of requirement DSMR-M 1
3.0	In section 3.1 changed the fit criterion of requirement DSMR-M 3
3.0	In section 3.1 added requirement DSMR-M 3a
3.0	In section 3.1 changed the rationale of requirement DSMR-M 4
3.0	In section 3.1 added requirement DSMR-M 5a
3.0	In section 3.1 deleted requirement DSMR-M 6
3.0	In section 3.1 changed requirement DSMR-M 2000 (previously called DSMR-T 10) to be applicable to both E and G meters.

3.0	In section 3.1 changed the description and rationale of requirement DSMR-M 7
3.0	In section 3.1 added requirement DSMR-M 7a
3.0	In section 3.1 changed the rationale and fit criterion of requirement DSMR-M 8
3.0	In section 3.1 added requirement DSMR-M 8a, and DSMR-M 8b
3.0	In section 3.2 added additional fit criterion to DSMR-M 10
3.0	In section 3.2 added requirement DSMR-M 10a
3.0	In section 3.2 changed the fit criterion of requirement DSMR-M 11
3.0	In section 3.2 added requirement DSMR-M 11a
3.0	In section 3.2 added requirement DSMR-M 11b
3.0	In section 3.2 changed to fit criterion of requirement DSMR-M 12
3.0	In section 3.2 changed the description and fit criterion of requirement DSMR-M 13
3.0	In section 3.2 changed the rationale of requirement DSMR-M 13 a
	In section 3.2 added requirements DSMR-M 13b and DSMR-M 13c
3.0	In section 3.2 changed the fit criterion of requirement DSMR-M 14
3.0	In section 3.2 added requirement DSMR-M 14a
3.0	In section 3.2 changed the fit criterion of requirement DSMR-M 2006
3.0	In section 3.2 changed the description, rationale, and fit criterion of requirement DSMR-M 17
3.0	In section 3.2 changed the fit criterion of requirement DSMR-M 19a
3.0	In section 3.3 added requirements DSMR-M 23d, DSMR-M 23e
3.0	In section 3.3 added requirement DSMR-M 27a
3.0	In section 3.3 changed the description and fit criterion of requirement DSMR-M 30
3.0	In section 3.3 requirement DSMR-M 31, changed the referred standards from NEN 1123 or NEN 3084 to NPR 7028
3.0	In section 3.3 added requirements DSMR-M 33a, DSMR-M 33b, and DSMR-M 33c
3.0	In section 3.3 changed to the fit criterion of DSMR-M 34
3.0	In section 3.3 changed the fit criterion of DSMR-M34a
3.0	In section 3.4 changed requirement DSMR-M 35. The DC for PLC communication shall service a minimum number of 1024 **devices** instead of the previously mentioned 250 connections.
	In section 3.5 changed the fit criterion of requirement DSMR-M 37.
3.0	In section 3.5 added requirement DSMR-M 37b
3.0	In section 3.5 added requirement DSMR-M 126a
3.0	Rewritten entire section 3.7 “Access and security”, added sections: 3.7.1 Threats and critical actions 3.7.2 Assumptions 3.7.3 Access and use control 3.7.4 Data Integrity 3.7.5 Data confidentiality Moved DSMR-M 16 and DSMR-M 28 to section 3.7.3 Moved DSMR-M 37a to section 3.7.3 Added requirements DSMR-M 1000 to DSMR-M 1023
3.0	In section 3.6.3 changed the description of requirement DSMR-M 45
3.0	In section 3.8 added requirements DSMR-M 50a, DSMR-M 50b, and DSMR-M 50c
3.0	In section 4.1.1 changed the fit criterion and rationale of requirement DSMR-M 52
3.0	In section 4.1.1 changed the fit criterion and rationale of requirement DSMR-M 53

3.0	In section 4.1.1 changed the fit criterion and rationale of requirement DSMR-M 55
3.0	In section 4.1.1 changed the fit criterion and rationale of requirement DSMR-M 56
3.0	In section 4.4.1 changed the fit criterion and rationale of requirement DSMR-M 67
3.0	In section 4.4.1 changed the fit criterion and rationale of requirement DSMR-M 69
3.0	In section 4.4.3 changed the Description, Rationale, and Fit Criterion of requirement DSMR-M 70.
3.0	In section 4.6 changed introduction text and added the new Figure 4-6d: Capturing power quality E
3.0	In section 4.6.1 added the new requirements DSMR-M 73a, DSMR-M 73b, DSMR-M 73c, and DSMR-M 74a.
3.0	In section 4.6.1 changed the Description, Rationale, and Fit criterion of requirement DSMR-M 74
3.0	In section 4.6.2 changed the Description, Rationale, and Fit criterion of requirement DSMR-M 2020 (Former DSMR-T 41)
3.0	In section 4.8.1 deleted requirement DSMR-M 81
3.0	In section 4.9 removed the line “in case of disconnect” from figure 4-9c (Dis)connect E – UML sequence diagram.
3.0	In section 4.9.1 changed the fit criterion of requirement DSMR-M 83
3.0	In section 4.9.2 changed the fit criterion of requirement DSMR-M 85
3.0	In section 4.9.3 DSMR-M 87 is removed
3.0	In section 4.10 changed the Assumptions
3.0	In section 4.10 added sections 4.10.2 and 4.10.3 for activation Code Red. In Section 4.10.3 three new requirements for Code Red were added.
3.0	In section 4.10.1 changed the description, rationale, and fit criterion of requirement DSMR-M 88
3.0	In section 4.11.1 changed the fit criterion of requirement DMR-M 95
3.0	In section 4.11.3 the description and rationale of requirement DSMR-M 99 were changed
3.0	In section 4.12 added Figure 4-12c: Display messages for opening or closing the gas valve – block diagram
3.0	In section 4.12.1 changed the Description, Rationale, and Fit Criterion of requirement DSMR-M 100
3.0	In section 4.12.1 added requirement DSMR-M 100a
3.0	Section 4.14.3 was added with 4 new requirements, DSMR-M 106a, and DSMR-M 106b.
3.0	In section 4.15.1 changed description, rationale, and fit criterion of requirement DSMR-M 108
3.0	In section 4.16.1 changed the rationale of requirement DSMR-M 109
3.0	In section 5.1.2.3 changed the fit criterion of requirement DSMR-M 115
3.0	In section 5.1.2.3 changed the description and fit criterion of requirement DSMR-M 122
3.0	In section 5.1.2.4 changed the rationale and fit criterion of requirement DSMR-M 114
3.0	In section 5.1.2.4 changed the fit criterion of requirement DSMR-M 120
3.0	In Section 5.1.2.5 changed the description of requirement DSMR-M 121
3.0	In section 5.1.2.6 changed the description and fit criterion of requirement DSMR-M 123
3.0	In section 5.1.3.3 changed the description and fit criterion of requirement DSMR-M 125
3.0	Moved requirements DSMR-M 126 and DSMR-M 127 to section 3.5
3.0	In section 5.2.1.1 changed the description of requirement DSMR-M 2060
3.0	In section 5.2.1.2 changed the fit criterion of requirement DSMR-M 133
3.0	In section 5.2.2.1 added requirement DSMR-M 138a and DSMR-M 138b

3.0	In section 5.2.2.2 changed the fit criterion of requirement DSMR-M 140
3.0	In section 5.2.2.2 requirement DSMR-M 142 was deleted.
3.0	In section 5.2.3.3 added requirement DSMR-M 153
3.0	Added two additional triggers in section 5.3.1
3.0	In section 5.3.1.1 changed the maximum deviation time in requirement DSMR-M 129a from 60 seconds to 30 seconds to be in line with requirement DSMR-M 180.
3.0	Integrated Tender document requirements in main document. The tender document requirement identifications (DSMR-T XX) are renamed DSMR-M 2000 to DSMR-M 2074 The original DSMR-T XX designation was retained in the Origin field.
3.0	Renamed throughout the document Central Access Server (CAS) to Central System (CS)

CONTENTS

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, gas, thermal energy (heat and cold) 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 Netherlands 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*.

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

1.2 Short description of the metering installation

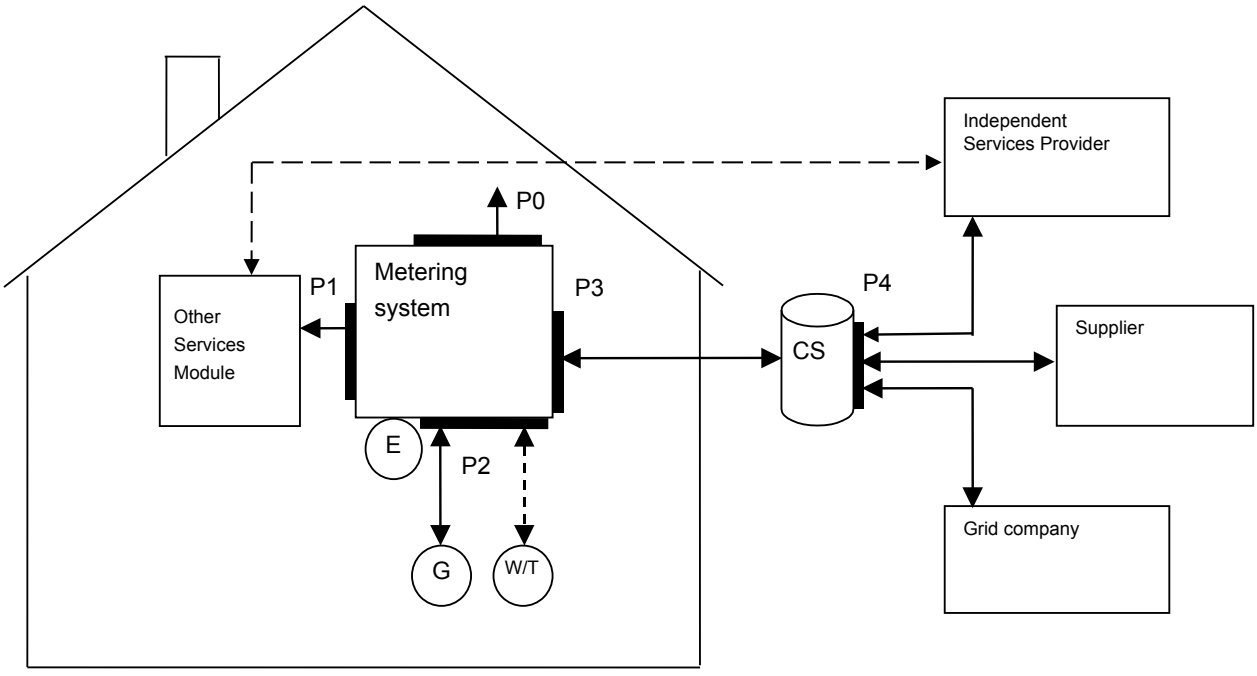


Figure 1-1 – Communication ports belonging to the metering installation

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. With P0 is also meant the service port of Gas meters, Heat meters, Water meters, and data concentrator (DC) (If a P0 port is available on these devices).
- **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 Appendix A.
- **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 Appendix B.
- **Port P3** for the communication between the metering installation and the Central System (CS).
- **Port P4** is the port on the CS with which independent service providers, suppliers and grid companies gain access to the CS. 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 skeleton on which detailed requirements are attached. Regarding these business use cases, largely two main parts can be distinguished:

- Use cases based on mandatory requirements derived from NTA 8130;
- 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) and data concentrator equipment (henceforth the term ‘DC equipment’ will be used) with respect to installation and maintenance processes.

1.4 Installation and Maintenance functionality

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

1.4.1 Installation

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 for installation need not be highly qualified. The requirements include

physical characteristics and functionality to configure equipment. The requirements shall be adjusted to the installation strategy of the grid operator (GO).

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.)
- 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 5 of the current 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. As a result a grid operator may have specified additional requirements for specific solutions on network and communication in a separate document.

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 come from the CS, are time-initiated triggers or come from the metering installation itself. 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	At deployment the E meter starts registering periodic meter readings and making these meter readings available.

1.6 Presentation of requirements

In this document all requirements originating from the NTA 8130, or additionally surveyed by a delegation of the Dutch grid companies, 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 reduce 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.]

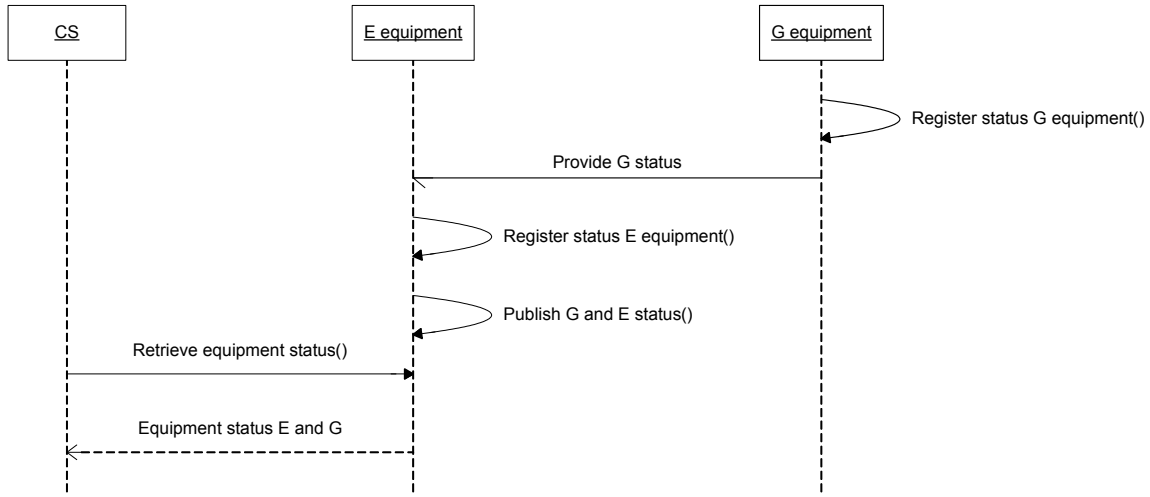
Rationale	[This attribute provides information on why the requirement is defined; it provides the background for the requirement.]						
Fit criterion	[This attribute provides insight on the criteria that will be used to verify if the requirement is met. It provides the skeleton for the logical test 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, DC etc.

Table 1-1: Presentation of requirements

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

1.7 Legend to 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 heat / cold, 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 heat / cold, water and electricity sub-meters could be specified in a similar way (i.e. comparable to gas). The general requirements (see Chapter 2) will differ for heat/cold 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 either be wired or RF. The meter readings will be collected once every hour. (Dis)connection the gas meter, however, will occur immediately, independent from the medium (maximum delay of two hours).

P3 interface

The medium for P3 as described by the grid operator, will either be PLC, GPRS or Ethernet, as described in the NTA 8130 (§5.5.3.2). Chapter 3 of the document at hand describes the communication between a central infrastructure (CS) and the metering system. The communication with a data concentrator is described in Chapter 6. The specific GPRS requirements are described in the separate DSMR GPRS requirements document. Specific IP requirements are described in the separate DSMR IP 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. In case of a modular configuration, the context should make clear whether the electricity meter or the communication module is implied.

1.8.4 Referenced documents

The current 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. Some use cases in this document require additional functionality, which is not required by or mentioned in NTA 8130. If this is the case, the origin in denoted as “NTA+”. The basis for this is the survey with additional functionality put together on behalf of the project’s Project Board.

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.
NTA+	Based on the NTA 8130 but expanded or extended by the main working group.
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 information from the privacy and security work group.

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]	P3.2	Companion standard P3.2
[6]	GPRS	Additional document describing the requirements for the GPRS infrastructure as part of the Dutch Smart Meter Specification.
[7]	IP	Additional document describing the requirements for IP via Ethernet.

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 the current 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
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.

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. In the current document all mentioned consumers are in fact domestic consumers.	
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. The supply companies are responsible for handling the consumers.	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 counter values for all tariffs in both energy directions. As E meters support two tariffs for both energy directions, each meter reading E contains four counter values with an indication for tariff and direction associated to each counter value.

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 national standard time.
Tariff	In case of a periodic meter read or an actual meter read: - Identifier for the tariff that the counter value applies to. In case of an interval meter read: - Not applicable.
Direction	Identifier for the energy direction (delivery or consumption) that the counter value applies to.
State	Meter state (regards logging information, error reports, and so on) at the time of the meter read.
Counter value	In case of a periodic meter read or an actual meter read: - The counter value is the value of the (periodic or actual) meter reading. In case of an interval meter read: - The counter value contains 96 values of the 15 minutes interval data.
Unit of measurement	The unit of measurement that applies to the counter 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 national standard time.
State	Meter state (regards logging information, error reports, and so on) at the time of the meter read.
Counter value	In case of a periodic meter read or an actual meter read: - The counter value is the value of the (periodic or actual) meter reading. In case of an interval meter read: - The counter value contains 24 values of the hourly interval data.
Unit of measurement	The unit of measurement that applies to the counter value.
Corrected	Indication if the meter reading was corrected for temperature (yes/no).

Table 2-4: Meter Readings Gas

2.4 Equipment

The current 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.

In order to identify function locations at the premises of consumers EAN-codes are used. EAN-codes are assigned to connections and are global identifiers for connections.

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 communications module.	M&S equipment
Metering instrument	Equipment with measurement functions for electricity or gas. The equipment therefore includes E meters and G meters.	
Communication equipment	All equipment installed at a network hub. Primary function is to facilitate communication with M&S equipment over the network and with central systems over the telecom network. Secondary function is to provide functionality for optimisation of data transfer. The equipment is implemented in a Data Concentrator that therefore includes a communication module and a telecom module. The communication and telecom module can be either modular components or integrated parts of the Data Concentrator.	
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.	
Data Concentrator	The implementation of Communication equipment installed at a network hub.	DC
Meter	Residential measuring device for either electricity or gas. Meters include E meter and G meter.	
E meter	Residential measuring device for registration of electricity consumption and communication. The part of the E meter that handles communication, the communication module, can be either a modular component or 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 or DC equipment).	
Central System	The ICT infrastructure, equipment and software used by the GO to handle requests from SC's and ISP's with respect to metering installations.	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 Energy Supplier 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
DC service area	All meters in the distribution area serviced by the DC through a Power Line Carrier (PLC) network.	

Table 2-5: Equipment Terminology

The current 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	This is a local port used for installation and maintenance purposes by personnel that is on-site. A typical implementation of this port is an optical connector for laptops or hand-held terminals. The local port is an integrated part of the E meter and gateway. With P0 is also meant the service port of Gas meters, Heat meters, Water meters, and DC.
P1	NTA	Port used for the communication between the metering installation and one or more other service modules. This port is a read-only port and can therefore not be used for sending data to the metering installation
P2	NTA	Port used for the communication between the E meter and other M&S equipment installed at the same connection.
P3	NTA	Port used for the communication between the metering installation and DC on the one hand and the CS on the other.

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 full 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. This means that both M&S equipment and DC equipment 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 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 operational parameters are set to values provided by the SC. The parameters for both operational parameters and configuration differ for E and G. The tables below provide the definition of the state for both E and G equipment.

2.5.1.1 E configuration

Name	Description
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.
Operational hardware	The version identifier of the hardware in the meter.
Operational firmware	The version identifier of the firmware that is operational in the meter.
Non-operational firmware	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.
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.
Function location	The function location where the equipment is installed. Typically this is an identifier for the connection which is an EAN-code in the Dutch market.
DC	General identifier for the DC that hosts the E meter. Not all type of communication networks involve DC's. PLC networks and 'meshed networks' typically use DC's. If M&S equipment uses a GPRS network however no DC is needed in which case this attribute is void.
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. As the M-bus protocol uses a master-slave relationship for connected equipment, the E meter is the master and other equipment connected are considered slaves.
Disconnectable	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.
Timestamp	Date and time of the internal clock.
Daylight savings	Indication if the clock in the meter has applied daylight savings time or standard time.
Duration of power swells	Definition of power swell in terms of duration, cf. use case "Provide power quality information".
Threshold for	Definition of power swell in terms of threshold, cf. use case "Provide power

power swells	quality information”.
Duration of power sags	Definition of power sag in terms of duration, cf. use case “Provide power quality information”.
Threshold for power sags	Definition of power sag in terms of threshold, cf. use case “Provide power quality information”.
Duration short power outage	Definition of short power outage (upper bound for duration), cf. use case “Provide power information”.
Maximum time adjustment	Definition of time adjustment allowed without raising an alarm, cf. use case “Synchronise time E-equipment”.

Table 2-7: E Configuration

2.5.1.2 E operational parameters

Name	Description	Issuer
Threshold value	The value for threshold E, specified in Amps.	GO or SC
Breaker position	The position of the breaker (on / off).	GO or SC
Tariff information	Time table indicating during which times of day the various tariffs apply.	SC
Holidays	The list of holidays that affect the tariffs.	SC
Messages	All E-related standard messages posted on the equipment.	SC

Table 2-8: E Operational Parameters

2.5.1.3 G configuration

Name	Description
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.
Operational firmware	The version identifier of the firmware that is operational in the meter.
Location information	The location information of the meter, i.e. an indication of where the meter is installed. Typical examples are GPS co-ordinates or zip code and house number.
Function location	The function location where the equipment is installed. Typically this is an identifier for the connection which is an EAN-code in the Dutch market.
Disconnectable	Indicates if the G connection can be disconnected. For some connections the GO wants to prevent the valve to be operational. Setting the value for this attribute to ‘false’ actually disables the valve.
Timestamp	Date and time of the internal clock (if present).

Table 2-9: G Configuration

2.5.1.4 G operational parameters

Name	Description	Issuer
Valve position	The position of the valve: open / closed / released (ready to be turned on).	GO or SC

Table 2-10: G Operational Parameters

2.5.2 DC equipment state

Multiple implementations of networks are foreseen but for all implementations the required functionality is the same. The functionality is provided by the DC equipment, which is described in a generic way (i.e. implementation independent way) in the current document. In order to facilitate this, a generic layout of DC equipment is presented here.

2.5.2.1 DC configuration

Name	Description
Serial number	An identifier for the DC assigned by the vendor of the meter. The serial number is not to be mistaken for the equipment identifier proposed elsewhere in the current document.
Operational hardware	The version identifier of the hardware in the DC.
Operational firmware	The version identifier of the firmware that is operational in the DC.
Non-operational firmware	The version identifier for the firmware that is uploaded in the DC for a future firmware upgrade. This version of the firmware is not operational yet.
Location information	The location information of the DC, i.e. an indication of where the meter is installed. Typical examples are GPS co-ordinates or an identifier for the mid-voltage station where the equipment is installed.
Function location	The function location where the equipment is installed. Typically this is the identifier of the mid-voltage station where the equipment is installed.
Hosted equipment	List of equipment identifiers for equipment hosted by the DC. In most common situations the equipment hosted by the DC consists of E meters.
Timestamp	Date and time of the internal clock.
Daylight savings	Indication if the clock in the DC has applied daylight savings time or standard time.

Table 2-11: DC Configuration

2.5.2.2 DC operational parameters

Name	Description
-void-	-void-

Table 2-12: DC Operational Parameters

2.6 Auxiliary reference information

Additionally, the following abbreviations will be used:

Abbreviation	Description
DC	Data Concentrator or Data Collector
DSMR	Dutch Smart Meter Requirements (Main)
E	Electricity
FMEA	Failure Mode Effect Analysis
G	Gas
MTBF	Mean Time Between Failures
PLC	Power Line Carrier or Power Line Communications
PQ	Power Quality

Table 2-13: 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: ▪ Identifier for the meter from which the interval values originate; ▪ Time stamp of the interval value; ▪ Interval value specified in kWh (three decimals); ▪ Indication for energy direction (consumption or production). The interval has been chosen to be 15 minutes.
Interval values G	The interval values (register readings) for G shall contain the following information: ▪ Identifier for the meter from which the interval values originate; ▪ Time stamp of the interval values; ▪ Interval values specified in m^3 (three decimals); ▪ Indication if interval value is corrected for temperature (yes/no). The interval has been chosen to be 60 minutes. Note: G meters with an electronic index and electronic temperature correction might contain both the temperature corrected and uncorrected interval values in m^3. Only one value will be indicated on the display and that value will be transmitted by the G-meter.
Power Quality information	Power Quality information shall contain the following information: ▪ Identifier for the meter from which the interval values originate; ▪ 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: ▪ Identifier for the meter from which the actual voltage originates; ▪ 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: ▪ Identifier for the meter from which the measurements originate; ▪ The number of short power outages (<T seconds); ▪ For outages >T seconds: – Outage duration; – 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: ▪ Identifier of the meter; ▪ Connect or disconnect; ▪ Time stamp of connect or disconnect (optional); ▪ Reason of disconnect, e.g. “on demand”, “exceed threshold” (optional).

(Dis)connect logging information	The logging information for (dis)connects shall contain the following information: ▪ Identifier of the meter; ▪ 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: ▪ Identifier of the meter; ▪ New threshold value (specified in Amps, no decimals); ▪ Time stamp of the moment at which the threshold was applied.

Table 2-14: Other Information Entities

3 GENERAL REQUIREMENTS

This section provides the requirements that apply to all M&S equipment subject to the current document. Further, it describes mandatory constraints from the point of view of installation and maintenance.

3.1 M&S equipment

DSMR-M 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**	(Future) Dutch law	**Port**	n.a.	**Applicable**	E meter, G Meter, DC

DSMR-M 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**	Dutch law, NTA Chapter 5	**Port**	n.a.	**Applicable**	E meter, G Meter, DC

DSMR-M 3

Description	Each clock that is part of the metering instrument shall be precise enough for its purpose.						
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 may 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 may deviate no more than 10 seconds per 24 hours.						
History	Nov. 2007	**Origin**	NTA+	**Port**	n.a.	**Applicable**	E meter, G Meter, DC

DSMR-M 3a

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, DC

DSMR-M 4

Description	The metrological functionality of the metering instrument shall not be affected by power outages.						
Rationale	An outage may not lead to a loss of data in any way. This means that during the outage no meter data may 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, DC

DSMR-M 5

Description	Metering instruments shall re-connect to all communication channels automatically after a power outage in case the medium is available.						
Rationale	A power outage may affect a large number of connections. It is therefore required that the equipment can re-establish communication channels without any intervention from external entities.						
Fit criterion	Metering instrument shall be re-connected 5 minutes after power was re-established after an outage.						
History	Nov. 2007	**Origin**	EN	**Port**	n.a.	**Applicable**	E meter, G Meter, DC

DSMR-M 5a

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 should be yellow (RAL 1021) for Gas meters. ▪ The cable must have cable end sleeves for the connection with the E-meter

	▪ The cable must be attached to the gas meter using a terminal block which shall be separately sealed. ▪ 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**	E meter, G meter

DSMR-M 2000

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**	DSMR-T 10	**Port**	n.a.	**Applicable**	E meter, G meter

DSMR-M 7

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. 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.						
Fit criterion	The alarm shall comply with the requirements for error handling defined in the current document.						
History	Nov. 2007	**Origin**	NTA	**Port**	n.a.	**Applicable**	E meter, G Meter, DC

DSMR-M 7a

Description	The metering instruments must be able to safely and correctly operate within the temperature range of -25 °C till 55 °C, for G meters a range of -10°C till 40 °C applies.
Rationale	When selecting metering equipment attention should 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, DC

DSMR-M 8

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/PLC/…) ▪ Ownership identification (text or logo) of grid operator						
History	Nov. 2007	**Origin**	NTA+	**Port**	n.a.	**Applicable**	E meter, G Meter, DC

DSMR-M 8a

Description	The supplier is obliged to offer assistance with regard to the execution of an integral or partial “design review” of the product to be supplied. The grid operator or an expert appointed by the grid operator will perform the “design review”.						
Rationale	With regard to the assurance of quality and durability of devices, the supplier is obliged to provide assistance with regard to the design review to be executed by the grid operator.						
Fit criterion	The supplier is obliged to offer assistance with regard to the execution of an integral or partial “design review” of the product to be supplied.						
History	Sep. 2009	**Origin**	TST	**Port**	n.a.	**Applicable**	E meter, G Meter, DC

DSMR-M 8b

Description	During the design phase of the device, the supplier will perform a design review in accordance with IEC 62059-11. The aforementioned standard includes HALT/HASS testing of the components. The grid operator will be allowed access and will be given an explanation of the results
Rationale	To assess the quality of the components, artificial ageing tests and operational tests

	must be carried out. ▪ During the design of the device, the design will need to be tested. The directive for the test is IEC 62059-11. ▪ During the design, the components will need to be subjected to what is referred to as HALT/HASS testing.						
Fit criterion	It should be proven that the design was created on the basis of the required economic life expectancy.						
History	Sep. 2009	**Origin**	TST	**Port**	n.a.	**Applicable**	E meter, G Meter, DC

DSMR-M 2001

Description	The vendor of equipment shall provide the results of a failure mode effect analysis (FMEA) for offered equipment.						
Rationale	The GO needs insight (before purchase) in the risks associated with deploying the equipment. The GO therefore requires the results of the FMEA conducted by the vendor of the equipment.						
Fit criterion	The results of the FMEA shall include a quantification of failures by means of mean time between failures (MTBF) on a component level.						
History	Nov.2007	**Origin**	DSMR-T 1	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2002

Description	The vendor of equipment shall provide all information on delivered equipment that enables the GO to perform a failure mode effect analysis (FMEA) on the delivered equipment.						
Rationale	The GO may decide to perform a FMEA on selected equipment prior to acquisition. The GO thus determines the risks and costs associated with the failures.						
Fit criterion	The vendor shall deliver the information and equipment to the GO in order to execute a FMEA.						
History	Nov. 2007	**Origin**	DSMR-T 2	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2003

Description	Interoperability between equipment of various M&S equipment suppliers must be ensured.						
Rationale	M&S equipment should have no restriction regarding interoperability with other devices, connected to the P0, P1, P2, and P3 ports (such as G meters).						
Fit criterion	• The M&S equipment supplier must produce al list of hardware from other supplier with which interoperability has been proven. • The M&S equipment supplier must be able to show a working showcase. • The M&S equipment supplier will take responsibility to resolve interoperability issues with other suppliers.						
History	Dec. 2008	**Origin**	DSMR-T 3	**Port**	n.a.	**Applicable**	E meter, G meter, DC

3.2 E equipment

DSMR-M 2004

Description	Power consumption of E equipment and communication module shall be minimised.						
Rationale	From both an environmental and economical point of view, the energy consumption should be minimized.						
Fit criterion	The average power consumed by E equipment and communication module shall meet the following criteria: ▪ Power consumption of an installation including a single phase meter shall not exceed 2.0 W (during normal operation) and shall not exceed 4.0 W (during communication); ▪ Power consumption of an installation including poly phase meter shall not exceed 4.0 W (during normal operation) and shall not exceed 8.0 W (during communication).						
History	Nov. 2007	**Origin**	DSMR-T 4	**Port**	n.a.	**Applicable**	E meter

DSMR-M 2005

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 shall be place on either the type plate of the meter or in the cover of the terminal block.						
History	Nov. 2007	**Origin**	DSMR-T 5	**Port**	n.a.	**Applicable**	E meter

DSMR-M 10

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**	NTA+	**Port**	n.a.	**Applicable**	E meter

DSMR-M 10a

Description	It must be possible to activate a test mode in the E meter during which the registers have a 2 (or 3) decimal resolution.						
Rationale	It must be possible to activate a test mode in the E meter during which the registers have a 2 (or 3) decimal resolution. The test mode can be deactivated manually but must return to normal mode automatically after 30 minutes. The activation of the test mode is done via the optical port using a supplied test program.						
Fit criterion	▪ It must be possible to activate a test mode in the E meter during which the registers have a 2 (or 3) decimal resolution. ▪ The test mode can be deactivated manually but must return to normal mode automatically after 30 minutes. ▪ The activation of the test mode is done via the optical port using a supplied test program.						
History	Sep. 2009	**Origin**	TST	**Port**	P0	**Applicable**	E meter

DSMR-M 11

Description	The E meter shall provide electromagnetic compatibility (EMC).						
Rationale	For more reliability the meter should 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 11a

Description	The PLC E-meter shall be compliant with NEN-EN-50065-1.						
Rationale	The E-meter is compliant with NEN-EN-50065-1, Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz - Part 1: General Requirements, frequency bands and electromagnetic disturbances. This standard applies to electrical equipment using signals in the frequency range 3 kHz to 148,5 kHz to transmit information on low voltage electrical systems, either on the public supply system or within installations in consumers' premises. It specifies the frequency bands allocated to the different applications, limits for the terminal output voltage in the operating band and limits for conducted.						
Fit criterion	The PLC E-meter is compliant with NEN-EN-50065-1						
History	Sep. 2009	**Origin**	TST	**Port**	n.a.	**Applicable**	E meter

DSMR-M 11b

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 12

Description	The E meter shall not be susceptible for electrostatic discharge.						
Rationale	For more reliability the meter should 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 13

Description	The poly-phase E meter shall be MID approved for right and left phase sequence

Rationale	The meter must be safely usable in a wide range of configurations and installations.						
Fit criterion	The MID approval must include an approval for both right and left phase sequence. On the display no blinking indication is allowed.						
History	Nov. 2007	**Origin**	EN	**Port**	n.a.	**Applicable**	E meter

DSMR-M 13a

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 13b

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 should 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 13c

Description	The phase sequence (being left or right) must be measured and phase sequence must be registered for retrieval via P3.						
Rationale	The network of the grid operators can have both right and left phase sequence. The meter must be able to perform phase sequence measurements and register a left phase sequence.						
Fit criterion	Phase sequence must be registered for retrieval via P3						
History	Jan 2010	**Origin**	TST	**Port**	P3	**Applicable**	E meter

DSMR-M 14

Description	The E meter shall be protective class II.						
Rationale	The meter must be safely usable in a wide range of configurations and 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 14a

Description	AC Voltage Test according to an E meter protective class II						
Rationale	The meter must be safely usable in a wide range of configurations and installations.						
Fit criterion	The test should 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 9

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 15

Description	The information displayed on the E meter shall be standardised.						
Rationale	Through standardization of the information on the display, the customer processes can be standardized.						
Fit criterion	The display shall at least contain: ▪ the current meter reading; ▪ the OBIS coding (if supported by the meter); otherwise one digit tariff indication and indication of energy direction.						
History	Nov. 2007	**Origin**	NTA+	**Port**	n.a.	**Applicable**	E meter

DSMR-M 2006

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 should be less then 3 Nm. This value should 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 should be possible to tighten and loose the screws 25 times without damage.						
History	Nov. 2007	**Origin**	DSMR-T 6	**Port**	n.a.	**Applicable**	E meter, G meter

DSMR-M 2007

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 = 80A and 100A version (or higher). Single phase meters must be delivered in an Imax=60A and 80A version (or higher).						
History	Nov. 2007	**Origin**	DSMR-T 7	**Port**	n.a.	**Applicable**	E meter

DSMR-M 2008

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**	DSMR-T 8	**Port**	n.a.	**Applicable**	E meter

DSMR-M 17

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 18

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**	NTA+	**Port**	n.a.	**Applicable**	E meter

DSMR-M 19

Description	Switching equipment shall be bi-stable.
Rationale	All switch equipment (electricity breakers and gas valves) has two positions and shall only change position as the result of a switching activity.
Fit criterion	Switching equipment will only change position as the result of a switching command.

History	Nov. 2007	**Origin**	NTA 8130	**Port**	n.a.	**Applicable**	E meter

DSMR-M 19a

Description	The vendor of the equipment must be able to provide an original of the applicable conformance certificates/documentation for the applied standards.						
Rationale	Before Product Acceptance Testing can be started there must be proof that the E meter meets all applicable standards. These standards have to be tested by a notified body.						
Fit criterion	The vendor of equipment must be able to provide an original of the following certificates/documentation: • Certificate of Notified Body • DSMR compliancy. • MBUS conformance certificate • DLMS/COSEM conformance certificate						
History	Dec. 2008	**Origin**	TST	**Port**	n.a.	**Applicable**	E meter

3.3 G equipment

DSMR-M 20

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 21

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**	NTA+	**Port**	n.a.	**Applicable**	G Meter

DSMR-M 22

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**	NTA+	**Port**	n.a.	**Applicable**	G Meter

DSMR-M 23

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**	NTA+	**Port**	n.a.	**Applicable**	G meter

DSMR-M 23a

Description	G meters that are implemented with an electronic index and temperature correction shall comply with MID (Measuring Instruments Directive), appendix MI-002, part 1, § 2.2 en part 2.						
Rationale	Multiple methods exist for temperature correction, 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 correction 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**	NTA+	**Port**	n.a.	**Applicable**	G meter

DSMR-M 23b

Description	G meters that are implemented with a mechanical index and mechanical temperature correction shall have a MID approval OR comply with EN 1359:1998 Annex-B supplemented with EN 1359:1998/A1:2006 Annex-B.						
Rationale	Multiple methods exist for temperature correction, 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 OR complies with EN 1359:1998 Annex-B supplemented with EN 1359:1998/A1:2006 Annex-B.						
History	Nov. 2007	**Origin**	NTA+	**Port**	n.a.	**Applicable**	G meter

DSMR-M 23c

Description	If the G meter is equipped with temperature correction then by default only the temperature corrected interval value will be transmitted (value indicated on the display).
Rationale	In the Netherlands there are two types of temperature corrected meters, G meters that are implemented with a mechanical temperature correction and G meters that are implemented with an electronic temperature correction. G meters with a mechanical temperature correction only have temperature corrected interval value in m^3 available while G meters with an electronic temperature correction might contain both the temperature corrected and uncorrected interval value in m^3. By default only the temperature corrected interval values will be transmitted to the CS. G Meters without temperature correction will transmit uncorrected interval values in m^3. The CS must therefore be able to distinguish uncorrected meters and apply the temperature correction for such meters itself.
Fit criterion	If the G meter is equipped with temperature correction then by default only the temperature corrected interval value will be transmitted.

History	Nov. 2007	Origin	NTA+	Port	n.a.	Applicable	G meter

DSMR-M 23d

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 23e

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 24

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 should 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 the NTA and where valve operations occur at most once every two weeks (on average).						
History	Nov. 2007	**Origin**	NTA+	**Port**	n.a.	**Applicable**	G meter

DSMR-M 25

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 may occur in a 200 mbar pressure test.						
History	Nov. 2007	**Origin**	NTA+	**Port**	n.a.	**Applicable**	G meter

DSMR-M 26

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**	NTA+	**Port**	n.a.	**Applicable**	G meter

DSMR-M 27

Description	G meters of G series 10 or higher shall be compatible with the PN-class ≥ 0.5 bar.
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	No leakage and no permanent damage may occur in a 500 mbar pressure test.

History	Nov. 2007	**Origin**	NTA+	**Port**	n.a.	**Applicable**	G meter

DSMR-M 27a

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 should handle automatically the proper M-Bus attribute (VIF)

History	Nov. 2007	**Origin**	NTA+	**Port**	n.a.	**Applicable**	G meter, E-meter

DSMR-M9a

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 29

Description	The frequency of planned in situ 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	NTA+	Port	n.a.	Applicable	G meter

DSMR-M 30

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**	NTA+	**Port**	n.a.	**Applicable**	G meter

DSMR-M 31

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**	NTA+	**Port**	n.a.	**Applicable**	G meter

DSMR-M 2009

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**	DSMR-T 9	**Port**	n.a.	**Applicable**	G meter

DSMR-M 2010

Description	The G meter shall have a G valve as an integrated part.						
Rationale	In order to reduce costs for installation the G meter shall incorporate the G valve.						
Fit criterion	The G meter and G valve shall be delivered as a single installable unit.						
History	Nov. 2007	**Origin**	DSMR-T 11	**Port**	n.a.	**Applicable**	G meter

DSMR-M 32

Description	The G valve shall provide functionality to be operated electronically.						
Rationale	The G valve should be safe and reliable, and should operate with minimum manual interaction or maintenance.						
Fit criterion	The switching equipment shall be bi-stable.						
History	Nov. 2007	**Origin**	NTA 8130	**Port**	n.a.	**Applicable**	G meter

DSMR-M 33

Description	The G valve shall perform a sufficient amount of switching operations without any maintenance.
Rationale	The G valve shall be safe and reliable, and should operate with minimum manual interaction or maintenance.
Fit criterion	The switching equipment shall be able to perform 3.000 operations during its lifetime without any maintenance.

History	Nov. 2007	Origin	NTA 8130	Port	n.a.	Applicable	G meter

DSMR-M 33a

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

DSMR-M 33b

Description	G-Meters shall have reverse flow protection or prevent the counter 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 counter values (for gas delivery) should not change.						
Fit criterion	G-Meters shall have reverse flow protection or prevent the counter 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 33c

Description	In case a reversed flow direction is detected the G meter shall register an event.						
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 an event in case a reversed flow direction is detected.						
History	Dec. 2009	Origin	TST	Port	n.a.	Applicable	G meter

DSMR-M 34

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 should 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 decimal point and the digits after this decimal point should be clearly visible.						
History	Nov. 2007	Origin	NTA+	Port	n.a.	Applicable	G meter

DSMR-M 34a

Description	The vendor of the equipment must be able to provide an original of the applicable conformance certificates/documentation for the applied standards.
Rationale	Before Product Acceptance Testing,can be started there must be proof that the G meter meets all applicable standards. These standards have to be tested by a notified body.
Fit criterion	The vendor of equipment must be able to provide an original of the following certificates/documentation: • Notified Body certificate (MID approval) • MBUS conformance certificate

History	Dec. 2008	Origin	TST	Port	n.a.	Applicable	G meter

3.4 DC equipment

DSMR-M 35

Description	The DC equipment for PLC communication shall handle a sufficient number of slaves in order to make application of PLC economically feasible.						
Rationale	In case the DC for PLC communication can handle insufficient slaves, it will restrict the situations in which PLC can be applied to such an extent that usage of PLC becomes economically not feasible.						
Fit criterion	The DC for PLC communication shall service a minimum number of 1024 slaves.						
History	Nov. 2007	Origin	Q&P	Port	n.a.	Applicable	DC

DSMR-M 36

Description	Communication equipment that makes use of IP addresses shall support dynamic assignment of IP addresses.						
Rationale	A network with a large number of nodes that use IP addresses is very hard to manage and maintain in situations where dynamic address assignment is not possible.						
Fit criterion	The communication equipment shall only accept IP addresses that are dynamically assigned.						
History	Nov. 2007	Origin	Q&P	Port	n.a.	Applicable	DC

3.5 Communication channels

DSMR-M 37

Description	The reach of PLC equipment shall be sufficient to enable PLC to be applied in an economic way.						
Rationale	In case the reach of PLC equipment for communication is too small, it will restrict the situations in which PLC can be applied to such extend that usage of PLC becomes economically not feasible.						
Fit criterion	The reach of PLC equipment (without repeater functionality) shall be 250 meters under the given condition of max. 80 dbm noise level.						
History	Nov. 2007	Origin	Q&P	Port	n.a.	Applicable	E meter, DC

DSMR-M 37b

Description	The communication unit shall provide for a number of PLC communication settings to be remotely changeable.						
Rationale	The communication unit shall provide for the possibility to remotely change a number of PLC communication settings such as: ▪ List of managed meters ▪ PLC transmission level in steps of maximum 6dB (range 0-24 dB).						
Fit criterion	The communication unit shall provide for a number of PLC communication settings to be remotely changeable such as the list of managed meters and PLC transmission level in steps of maximum 6dB.						
History	29 Jan 2010	Origin	TST	Port	P3	Applicable	DC, Comm. Unit

DSMR-M 126

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 126a

Description	The G meter and the DC can 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	If applicable, 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**	G Meter, DC

DSMR-M 127

Description	The protocol to be used on the P0 interface shall be standardized.						
Rationale	The maintenance personnel want to access all meters in a similar fashion.						
Fit criterion	The protocol on the P0 interface shall be IEC 62056-21, mode E.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0	**Applicable**	E Meter, G Meters, DC

DSMR-M 38

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, as defined in appendix A.						
History	Nov. 2007	**Origin**	NTA+	**Port**	P1	**Applicable**	E meter

DSMR-M 39

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, as defined in appendix B.						
History	Nov. 2007	**Origin**	NTA+	**Port**	P2	**Applicable**	E Meter, G meter

DSMR-M 40

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, as defined in appendix C (to be included). The P3 CS is based on the DLMS/Cosem protocol.						
History	Nov. 2007	**Origin**	NTA+	**Port**	P3	**Applicable**	E Meter, DC

3.6 Event logging and error reporting

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

3.6.1 Logging

DSMR-M 41

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**	NTA+	**Port**	n.a	**Applicable**	E Meter, G meter, DC

DSMR-M 42

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, G meter, DC

3.6.2 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 43

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: ▪ Equipment identifier for the equipment that raised the error; ▪ 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, DC

DSMR-M 44

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.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a	**Applicable**	E Meter, G meter, DC

3.6.3 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 45

Description	The equipment shall include an event report with external parties 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. The event report returns a list of events occurred within a time frame specified by the CS. 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	The event report provided to external entities shall include at least the following information: ▪ Equipment identifier for the equipment that raised the events; ▪ List of events that occurred in the time frame as requested by the CS.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3	**Applicable**	E Meter, DC

3.6.4 Software errors

DSMR-M 47

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 becomes active, 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, DC

3.7 Access and security

Cyber-security is a well known issue in classical IT systems. For some years, there has been a growing interest in 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 concerned by this focus. Security is everywhere in the metering process, from the meter and the data concentrator 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 work together for awareness-raising and securing the metering systems.

3.7.1 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, data concentrator, 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 Euro in damages (for equipment and responsibility).

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

3.7.2 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 finance or web services IT communication systems. 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 references and security mechanisms.
The concept of “defense in depth” should 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 3 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 meter or data concentrator happens, the compromising of one device should not permit compromising all of the system.
- Sensitive information and commands will have to be protected.
- All communication at application level between the device and the CS is encrypted, using an encryption mechanism at least as strong as AES-128. Usage of trusted equipments, such as cryptographic processor embedded in smart-cards should be considered because they are tamper resistant.
- Since security standards are available for IT systems and Industrial Automation and Control Systems, they should be applied, from the very conception of the systems to the deployment of devices and system.

The metering infrastructure should 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
- Respecting standards and Common Criteria

3.7.3 Access, Use Control and Authenticity

Only the grid operator is allowed to have access to P3, P3.1, and P3.2. In case there is a separate grid operator for electricity and for gas, only the electricity grid operator may have direct access to the metering installation via P3, P3.1, and P3.2. 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 (in some situations via a DC) and vice versa. The manufacturer of equipment must ensure the correct implementation of the *identification*, *authentication* and *authorization* concerning the metering installation and DC, and *confidentiality* of the data communication from the metering installation to the central system (in some situations via a DC) and between the metering installation and the connected G / W / T meter (P2 port), regardless of the communication medium used.

DSMR-M 1000

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, G meter, DC

DSMR-M 1001

Description	The system must be capable of automatically generating alarms 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 alarms when the

	terminal-cover is opened.						
Fit criterion	Alarms for opening the terminal cover will be generated.						
History	July. 2009	**Origin**	Open Meter, OM-GR12	**Port**	n.a.	**Applicable**	E Meter, G meter, DC

DSMR-M 1002

Description	The E meter shall display a warning message cover open						
Rationale	In the NTA is stated that an alarm has to be sent to the CS when the terminal block cover is removed (tamper alarm). It is preferred that the display of the E meter would display a message that the removal of the cover has been detected and that the grid operator will be notified.						
Fit criterion	The E meter shall display a message that the removal of the cover has been detected and that the grid operator will be notified. The message on the display will be “cover open alarm is gemeld aan netbeheerder”.						
History	Aug. 2009	**Origin**	TST	**Port**	n.a.	**Applicable**	E meter

DSMR-M 16

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 should 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**	NTA+	**Port**	n.a.	**Applicable**	E meter

DSMR-M 28

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 should 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, should be locked behind sealable covers.						
History	Nov. 2007	**Origin**	NTA+	**Port**	n.a.	**Applicable**	G meter

DSMR-M 1003

Description	The construction of the DC shall prevent intruding into the DC and tampering with the DC.						
Rationale	Intrusion and tamper attempts should be visible on visual inspection.						
Fit criterion	The DC is protected by separate seals in order to prevent intruding into the DC and tampering with the DC.						
History	Sep. 2009	**Origin**	TST	**Port**	n.a.	**Applicable**	DC

DSMR-M 1004

Description	The P2 (M-Bus) connection with the E-meter must be accessible without breaking the seal of the E-meter and be separately sealable (or any other way that safety is guaranteed).
Rationale	It must be possible to connect an M-bus cable to the E-meter without the engineer having to come in contact with other terminals and the E-meter seal (an electrical

	engineer needs an approval to install meters, the so called BEI instruction). This allows the G engineer to install a G-meter without BEI instruction.						
Fit criterion	The P2 (M-Bus) connection with the E-meter must be accessible without breaking the seal of the E-meter (with this is not meant the seal of the terminal cover). The P2 (M-Bus) connection with the E-meter must be separately sealable from the other terminals (or any other way that safety is guaranteed).						
History	Sep. 2009	**Origin**	TST	**Port**	P2	**Applicable**	E meter

DSMR-M 48

Description	The equipment shall provide functionality for authentication on the communication ports P0, P2 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.(For example the second mechanism of ISO 9797-2:2002 with SHA-1 as the hash function and a 128 bit unique key)						
History	Nov. 2007	**Origin**	NTA+	**Port**	P0, P2 P3	**Applicable**	E Meter, G meter, DC

DSMR-M 1005

Description	The equipment must be capable of managing access rights for any of its components, with an adequate granularity.						
Rationale	Users should be authenticated and authorized to access only the components of the equipment for which they have the appropriate rights. For instance, strong authentication is necessary for critical commands (such as the disconnect command).						
Fit criterion	Access control will be offered for any of its components, with an adequate granularity.						
History	July. 2009	**Origin**	Open Meter, OM-GR3	**Port**	P0, P3	**Applicable**	E Meter, DC

DSMR-M 1006

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**	Open Meter, OM-TR20	**Port**	P0, P3	**Applicable**	E Meter, DC

DSMR-M 1007

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**	Open Meter, OM-TR21	**Port**	P0, P2 P3	**Applicable**	E Meter, G meter, DC

DSMR-M 1008

Description	It shall not be possible to command or control the DC via the P3.1 interface.						
Rationale	From a security perspective it should not be possible to command and control a DC via the P3.1 interface. Since the communication from DC to the meter is master-slave communication this should normally not be possible.						
Fit criterion	The DC shall not respond to attempts to control the DC via the P3.1 interface.						
History	Sep. 2009	**Origin**	P&S	**Port**	P3.1	**Applicable**	DC

DSMR-M 1009

Description	The supplier of the M&S equipment shall provide an overview all accessible services, ports, interfaces and protocols.						
Rationale	It is important that the grid operator has an overview of which services, ports, interfaces and protocols are potentially accessible by outsiders.						
Fit criterion	The supplier of the M&S equipment shall provide an overview all accessible services, ports, interfaces and protocols, and guarantees that no additional services, ports, interfaces and protocols are accessible than mentioned in that overview.						
History	July. 2009	**Origin**	TST, OM-TR21a	**Port**	All	**Applicable**	E Meter, G meter, DC

DSMR-M 1010

Description	The supplier of the M&S equipment shall provide an official statement stating that their equipment, systems, software, and networks do not contain any “backdoors” offering unauthorized access.						
Rationale	A backdoor in a computer system is a method of bypassing normal authentication, securing remote access to a computer, while attempting to remain undetected. The backdoor may take the form of an installed program (e.g., Back Orifice), or could be a modification to an existing program or hardware device. It is important that the suppliers of M&S equipment issues some sort of guarantee that their equipment do not contain any backdoors potentially offering access to unauthorized persons.						
Fit criterion	An official statement is provided by the suppliers of the M&S equipment stating that their equipment, systems, software, and networks do not contain any “backdoors”.						
History	Sep. 2009	**Origin**	TST	**Port**	All	**Applicable**	E Meter, G meter, DC

DSMR-M 1011

Description	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.
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 do 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**	Open Meter, OM-TR22	**Port**	P0, P2 P3	**Applicable**	E Meter, G meter, DC

DSMR-M 1012

Description	The equipment shall provide functionality to ensure that only authorised and authenticated registrations and de-registrations of devices can occur.						
Rationale	After the equipment is prepared for installation but before it is actually installed, it has to be registered. It is important that any device registrations and de-registrations are authorised and authenticated, to prevent the malicious registration or de-registration, and the registration of unauthorised devices in place of authorised ones.						
Fit criterion	Only authorised and authenticated registrations and de-registrations of devices can occur.						
History	July. 2009	**Origin**	Open Meter, OM-TR24	**Port**	n.a.	**Applicable**	E Meter, G meter, DC

DSMR-M 1013

Description	Unused physical interfaces (NTA and Non-NTA) will be disabled by default, including the programming/installation mode of the meter. The local maintenance Interface (P0) must be used for enabling the unused NTA physical interfaces.						
Rationale	For security reasons it is important that management of physical interfaces should 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 NTA interfaces. Only 1 local maintenance interface P0 will be present per device.						
History	July. 2009	**Origin**	Open Meter, OM-GR13	**Port**	P0, P2, P3	**Applicable**	E Meter, G meter, DC

DSMR-M 1014

Description	Only services which are necessary during the life cycle of the M&S equipment are active.						
Rationale	Services could be present in the M&S equipment which is not necessary during the life cycle of the equipment. This poses unwanted security risks.						
Fit criterion	During the life cycle of the M&S equipment only the services which are necessary are active.						
History	Oct. 2009	**Origin**	P&S I10	**Port**	P0, P2, P3	**Applicable**	E Meter, G meter, DC

DSMR-M 1015

Description	Passwords and security keys are unique per device at the moment they leave the factory.						
Rationale	All passwords, the Master and Default Encryption Key, and the currently in use encryption key are expected to be unique for every individual meter at the moment they leave the factory.						
Fit criterion	Passwords and security keys are unique per device at the moment they leave the factory.						
History	Oct. 2009	**Origin**	P&S I19	**Port**	P0, P2,	**Applicable**	E Meter, G

					P3		meter, DC

DSMR-M 1016

Description	The equipment must handle a password of at least 10 characters long. If a device is password protected then the password for access to the Interfaces must be at least 10 alphanumerical characters long.						
Rationale	Usage of 10 alphanumerical characters, in any random order of capital letters, non-capital letters and numbers provides for a reasonably strong password.						
Fit criterion	Passwords for access to the Interfaces must be at least 10 alphanumerical characters long.						
History	July. 2009	**Origin**	Open Meter, OM-TR28	**Port**	P0, P3	**Applicable**	E Meter, G meter, DC

DSMR-1017

Description	All keys (except the master key), login names and passwords 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 passwords. This ensures that compromised passwords (files) do not lead to uncontrollable exposure of a (large group of) meter(s). A compromised master 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 key), login names and passwords via either the local maintenance port P0 or remotely via P3						
History	July. 2009	**Origin**	Open Meter, OM-TR29	**Port**	P0, P2, P3	**Applicable**	E Meter, G meter, DC

DSMR-M 1018

Description	When username/passwords are used then more than 3 attempts to access password protected ports and components with an incorrect username/password combination, must result in locking the port or component for at least 1 hour and a message in a log file.						
Rationale	For security reasons it is important that if more than 3 attempts are made to access port or components with an incorrect username/password combination (when username/passwords are used), the port or component is locked for at least 1 hour before another 3 attempts can be made. Also this event must be logged in a log file.						
Fit criterion	The port or component must be locked for at least 1 hour if more than 3 access attempts are made with an incorrect username/password combination (when username/passwords are used). Also this event must be logged in a log file.						
History	July. 2009	**Origin**	Open Meter, OM-GR14	**Port**	P0, P2, P3	**Applicable**	E Meter, G meter, DC

DSMR-M 37a

Description	Broadcast communication shall take place in a secure manner.						
Rationale	The nature of broadcast communication restricts the security measures that can be applied on the information exchange. For this reason broadcasts represent a severe security threat. With provision of COSEM Security broadcast communication can be both authenticated and encrypted, providing a solution for the stated security threat.						
Fit criterion	The communication equipment shall not respond to broadcast messages at any time, unless COSEM security is applied.						
History	Nov. 2007	**Origin**	Q&P	**Port**	n.a.	**Applicable**	E Meter, DC

3.7.4 Data Integrity

DSMR-M 1019

Description	The equipment shall provide functionality to preserve the integrity of data storage, including integrity of equipment firmware.						
Rationale	It is important that the integrity of data and firmware stored in the equipment is maintained.						
Fit criterion	Security mechanisms shall be implemented to ensure the protection of data and encryption keys stored on the equipment. For example, keys shall be located in a dedicated place of the system and access should be restricted to avoid alteration. Data or programs should only be accessible by the application in a secure manner.						
History	July 2009	**Origin**	Open meter, OM-GR6	**Port**	n.a.	**Applicable**	E Meter, G meter, DC

DSMR-M 1020

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 should 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.						
History	July. 2009	**Origin**	Open Meter, OM-TR23	**Port**	n.a.	**Applicable**	E Meter, G meter, DC

DSMR-M 1021

Description	The equipment will be capable of implementing an 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**	Open Meter, OM-GR8	**Port**	P2 P3	**Applicable**	E Meter, G meter, DC

3.7.5 Data Confidentiality

DSMR-M 50

Description	The system and devices should 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 an encryption mechanism at least as strong as AES-128.						
History	Nov. 2007	**Origin**	NTA+	**Port**	P2, P3	**Applicable**	E Meter, G meter, DC

DSMR-M 1023

Description	The device provides functionality for management of login names, passwords and security keys, including at least, safe storage and change.						
Rationale	Encryption keys and passwords must be managed such that they can be exchanged, stored, used and replaced, all in a secure manner.						
Fit criterion	Functionality for management of login names, passwords and security keys is provided.						
History	July. 2009	**Origin**	Open Meter, OM-GR11	**Port**	P2, P3	**Applicable**	E Meter, G meter, DC

3.8 Supplier's organisation

The following requirements are related to the manufacturer's organisation and commercial processes. These requirements are not related to any specific technical requirement and may be overruled during any commercial negotiation.

DSMR-M 2011

Description	The vendor shall guarantee maintainability of the equipment throughout the expected lifecycle of the equipment.						
Rationale	The GO's expect to buy large numbers of equipment and plan to keep these operational for a considerable period. In order to keep the equipment operational, the equipment shall be serviceable and maintainable.						
Fit criterion	In order for the equipment to remain maintainable the following services shall be provided: ▪ Supply of spare parts for the equipment; ▪ Supply of software for the equipment; ▪ Support for software in the equipment ▪ Service for the maintenance of the equipment.						
History	Nov. 2007	**Origin**	DSMR-T 12	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 50a

Description	The vendor shall have Problem Management procedures in place.						
Rationale	During the meter life cycle problems can occur in the metering equipment. The supplier must be able to keep track of all reported problems and provide the GO with updates about all reported problems.						
Fit criterion	The supplier will have a proper problem management system in place in order to provide the GO with Status updates en keep track of all reported problems and solutions.						
History	Oct. 2009	**Origin**	TST	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 50b

Description	The vendor shall have Change management procedures in place.
Rationale	During the meter life cycle functionality might need changes or improvements.
Fit criterion	The supplier of equipment shall present any planned change to functionality of existing meters or new meters to the GO prior to the time when the change is

	executed and will only implement these changes after approval of the GO.						
History	Oct. 2009	**Origin**	TST	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 50c

Description	The vendor shall have Configuration Management procedures in place.						
Rationale	During the meter life cycle changes to hard en software might occur, resulting in a different configuration.						
Fit criterion	The supplier shall provide traceability and configuration information on delivered goods and allow the GO access to the suppliers Configuration Management System during the complete lifetime of the meter. The traceability information provided by the supplier to the GO shall contain besides the items listed in DSMR-M 2045, at least the following delivered information: • Hardware version • Software version • Release dates						
History	Oct. 2009	**Origin**	TST	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2012

Description	The vendor of equipment shall provide a written statement stating that the GO is allowed to perform an audit on the quality system of the vendor.						
Rationale	The supplier of equipment shall comply with a quality management system for production of the equipment. The Go requires that an audit may be performed by or on behalf of the GO.						
Fit criterion	In order to verify compliance with the quality system the GO requires the following: ▪ To be allowed to perform a QA audit of the supplier's production process, either by his own QA department or by an independent qualified agency; ▪ Insight in the quality manual of the production process.						
History	Nov. 2007	**Origin**	DSMR-T 13	**Port**	n.a.	**Applicable**	E meter, G meter, DC

3.9 Technical life expectancy

For each component a minimum life expectancy and maximum dropout percentages are specified. Dropout percentages are specified per year and for the complete lifecycle of the equipment. The table below presents the information for replaceable components, i.e. the components that can be individually replaced are presented in the list.

Component	**Annual dropout rates**	**Lifetime dropout rates**	**Min. technical life expectancy (years)**
E meter (with integrated breaker and facilities for a modular communications module, but without the communications module)	0.2%	2.0%	20
E communication module (if modular)	0.2%	2.0%	20

E meter (with integrated breaker and communication module)	0.2%	2.0%	20
G meter (with integrated valve and facilities for a modular communications module but without the communications module)	0.3%	3.0%	20
G communication module (if modular)	0.3%	3.0%	20
G meter (with integrated valve and communication module)	0.3%	3.0%	20
Data concentrator	0.1%	1.0%	10

Table 3-1: Technical Life Expectancy

Suppliers should clearly show, based on FMEA and MTBF analysis, the expected life time of their products. These calculations shall be clearly documented and available for independent parties for reviews.

DSMR-M 2013

Description	The vendor of equipment has to meet the requirements for life expectancy as stated in this section.						
Rationale	For each component a minimum life expectancy and maximum dropout percentages are specified. Dropout percentages are specified per year and for the complete lifecycle of the equipment.						
Fit criterion	Suppliers should clearly show, based on FMEA and MTBF analysis, the expected life time of their products, which must meet the percentages specified in this section. These calculations shall be clearly documented and available for independent parties for reviews.						
History	Dec. 2008	**Origin**	DSMR-T 13a	**Port**	n.a.	**Applicable**	E meter, G meter, DC

3.10 Performance

Performance requirements are defined per use case. For all performance requirements the following general requirement applies.

DSMR-M 2014

Description	The performance criteria stated shall include the processing time needed for Identification, authentication, authorization and encryption.						
Rationale	When stating performance requirements, the complete functionality is addressed.						
Fit criterion	All identification, authentication, authorization and encryption are supposed to be embedded in all performance requirements stated in other requirements.						
History	Nov. 2007	**Origin**	DSMR-T 0	**Port**	n.a.	**Applicable**	E meter, G meter, DC

The functionality of the uses cases can be divided in three groups:

1. Publishing information (on an interface) on request (data requests)
2. Request for status changes (e.g. apply threshold, (dis) connect, configuration changes)

3. Internal processing (e.g. storing information)

No performance requirements will be set on internal processing. The performance requirements set on data requests will exclude the time needed for communication, as follows:

P1 communication
The P1 interface sends all data as far as collected. The data collection process for data to be sent over P1 is not time-critical. However to avoid losing data (i.e. data that is overwritten by a next data set before it can be sent on the P1 port) a time limit of 1.5 seconds is set to the data collection process. This limit applies to the interval between receiving a request on the P3 / P2 port, and sending the data on the P1 port (i.e. excluding communication time on P1/P2/P3).

P2 communication
P2 communication can be either wired or wireless. The wired interface can contact connected meters and gather required data immediately. The wireless interface typically exchanges data every hour.

P3 communication
Any request for data on the P3 interface should be handled within 5 seconds. This limit applies to the interval between receiving a request on the P3 port, and sending the requested data on the P1/P2/P3 port (i.e. excluding communication time on P1/P2/P3)

4 REQUIREMENTS DERIVED FROM NTA 8130

This chapter provides the business use cases for metering and switching equipment installed at the premises of domestic customers.

4.1 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 deployment of the E meter.

The current 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 the current use case shall comply with these definitions. The trigger description, block diagram and UML sequence diagram are depicted in Figure 4-1.

Trigger	Description
Deploy E meter	At deployment the E meter starts registering periodic meter reads (also for G, and, if desired, for W and T) and providing these meter reads to the CS.

Figure 4-1a: Provide periodic meter reads – trigger description

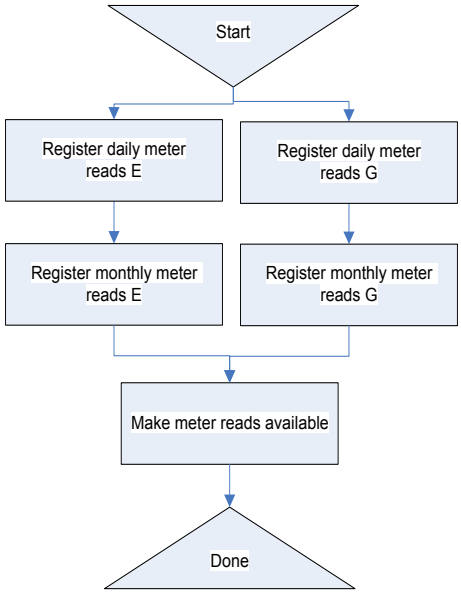


Figure 4-1b: Provide periodic meter reads – block diagram

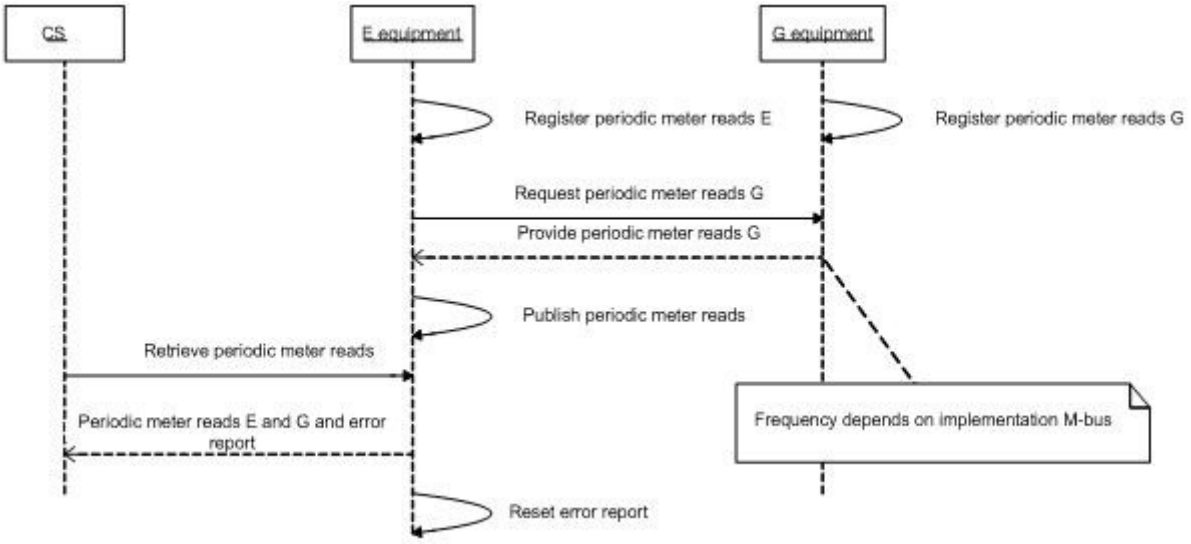


Figure 4-1c: Provide periodic meter reads – UML sequence diagram

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.

4.1.1 Requirements for electricity

DSMR-M 51

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 52

Description	The E meter shall provide the *10* most recent daily meter readings for E.
Rationale	The period of ten days guarantees that no meter readings will be lost within a period ten 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 10 days.						
Fit criterion	The E meter shall have available meter readings E for the 10 most recent days in the past. The minimum and maximum retaining period for daily meter readings for E in the meter is 10 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 (no decimals needed); ▪ Event report for the designated period.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.1)	**Port**	n.a.	**Applicable**	E Meter

DSMR-M 53

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 (no decimals needed); ▪ Event report for the designated period.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.1)	**Port**	P3	**Applicable**	E Meter

4.1.2 Requirements for gas

DSMR-M 54

Description	The G meter shall register meter readings for G 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 G 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**	G Meter

DSMR-M 55

Description	The E meter shall provide the *10* most recent daily meter readings for G.
Rationale	The period of ten days guarantees that no meter readings will be lost within a period ten 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 10 days.
Fit criterion	The E meter shall have available meter readings G for the 10 most recent days in the past. The minimum and maximum retaining period for daily meter readings for G in the meter is 10 days. The information provided as periodic meter readings shall at least

	contain the following information: ▪ Meter readings G for the designated period using m^3 (no decimals needed) 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 56

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 (no decimals needed) 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

4.1.3 Error reporting

DSMR-M 57

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 alarm information the CS will be informed that the metering installation registered an error.						
Fit criterion	The meter shall provide information indicating an error or fraud attempt. The error information fields shall be reset after receiving a reset command.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.8.5)	**Port**	P3	**Applicable**	E Meter

DSMR-M 58

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 should 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**	NTA+	**Port**	n.a.	**Applicable**	E Meter, G Meter

4.1.4 Performance

DSMR-M 2015

Description	The E meter shall have periodic meter reads 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 to retrieve all requested information from the meter and publish it through P3 shall be less than 5 seconds.						
History	Nov. 2007	**Origin**	DSMR-T 36	**Port**	P3	**Applicable**	E meter

4.2 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 4-2. Definitions for meter readings for E and G are provided in Chapter 2. All meter readings mentioned in the current use case shall comply with these definitions.

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

Figure 4-2a: Provide actual meter reads – trigger description.

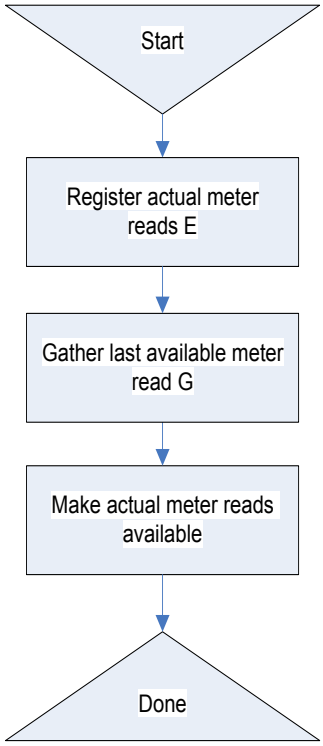


Figure 4-2b: Provide actual meter reads – block diagram.

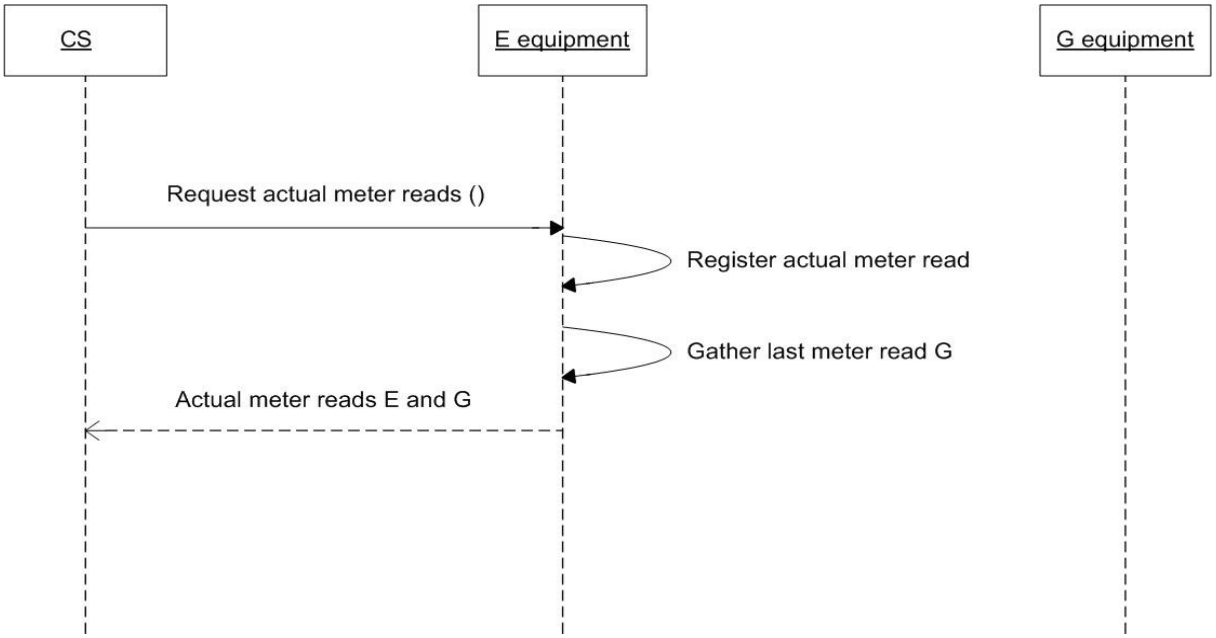


Figure 4-2c: Provide actual meter reads – UML sequence diagram.

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.

4.2.1 Requirements for electricity and gas

DSMR-M 59

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 60

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 (no decimals needed) as the unit of measurement; ▪ Most recent meter reading G available in the E meter (if not older than 24 hours) using m^3 (no decimals needed) as the unit of measurement; ▪ Event report.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.4)	**Port**	P3	**Applicable**	E Meter

4.2.2 Error reporting

DSMR-M 61

Description	The E meter shall issue an error if it has no meter reading G available that was registered within the last 24 hours.						
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 meter reading G is older than 24 hours an error is generated.						
Fit criterion	The error shall at least contain the generic attributes for errors.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.4)	**Port**	n.a.	**Applicable**	E Meter, G Meter

4.2.3 Performance

DSMR-M 2016

Description	The E meter shall have actual meter reads available on P3 immediately after the request was received by the metering installation.						
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**	DSMR-T 37	**Port**	P3	**Applicable**	E meter

4.3 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 4-3.

Trigger	Description
Auxiliary equipment is connected to P1.	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 4-3a: Provide actual meter reads through P1 – trigger description.

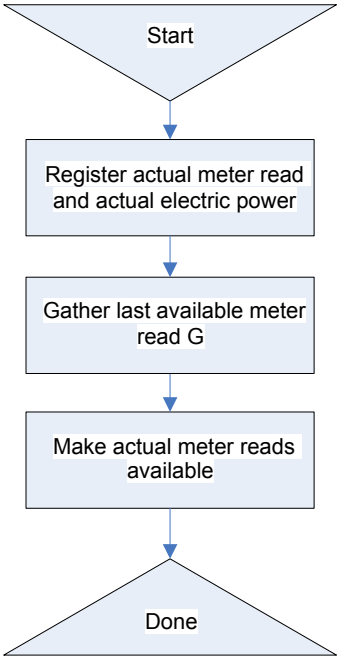


Figure 4-3b: Provide actual meter reads through P1 – block diagram.

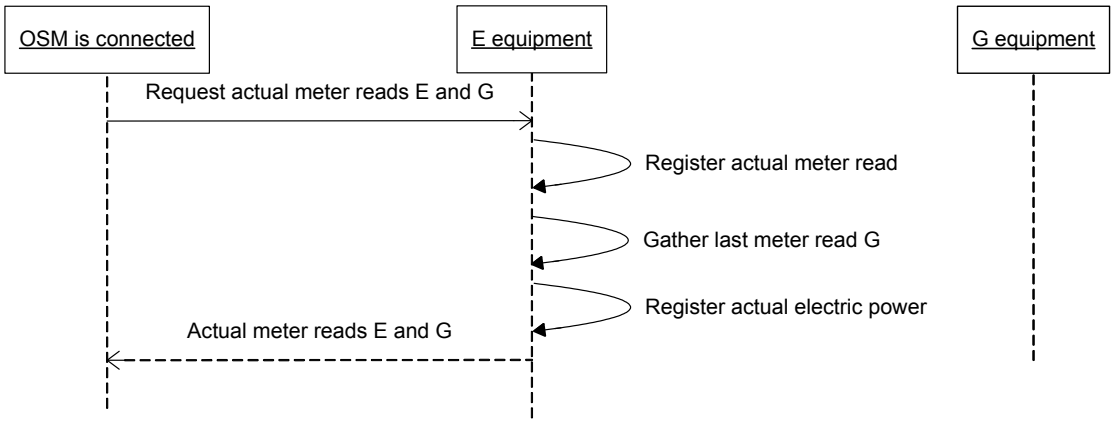


Figure 4-3c: Provide actual meter reads through P1 – UML sequence diagram.

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.

4.3.1 Requirements for electricity and gas

DSMR-M 62

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 63

Description	On connecting an 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 for every 10 second interval.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.5)	**Port**	n.a.	**Applicable**	E Meter

DSMR-M 64

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 specified with a resolution of 10 W; ▪ Most recent hourly meter reading G available in the metering equipment using m^3 (three decimals) as the unit of measurement. 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 may be temporarily interrupted.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.5)	**Port**	P1	**Applicable**	E Meter

4.3.2 Performance

DSMR-M 2017

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**	DSMR-T 38	**Port**	P1	**Applicable**	E meter

4.4 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 4-4.

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 the current 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 deployment the E meter starts registering interval meter reads and making these meter reads available to the CS.

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

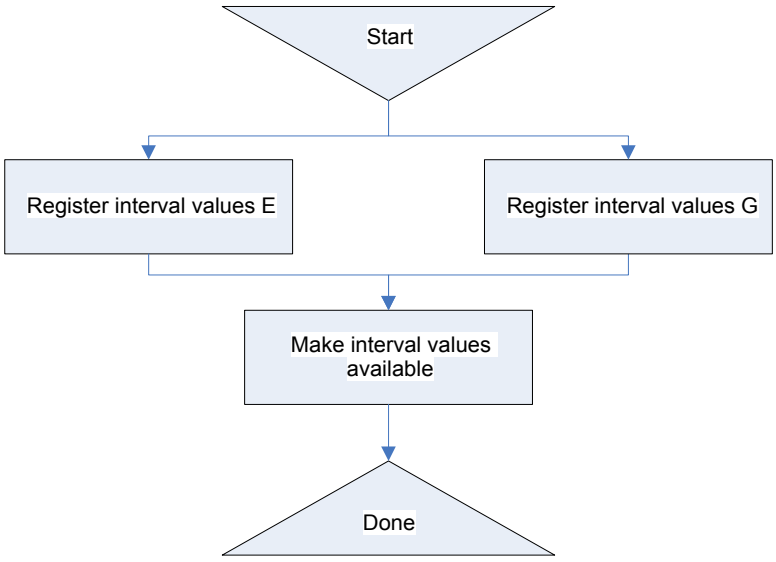


Figure 4-4b: Provide interval values – block diagram

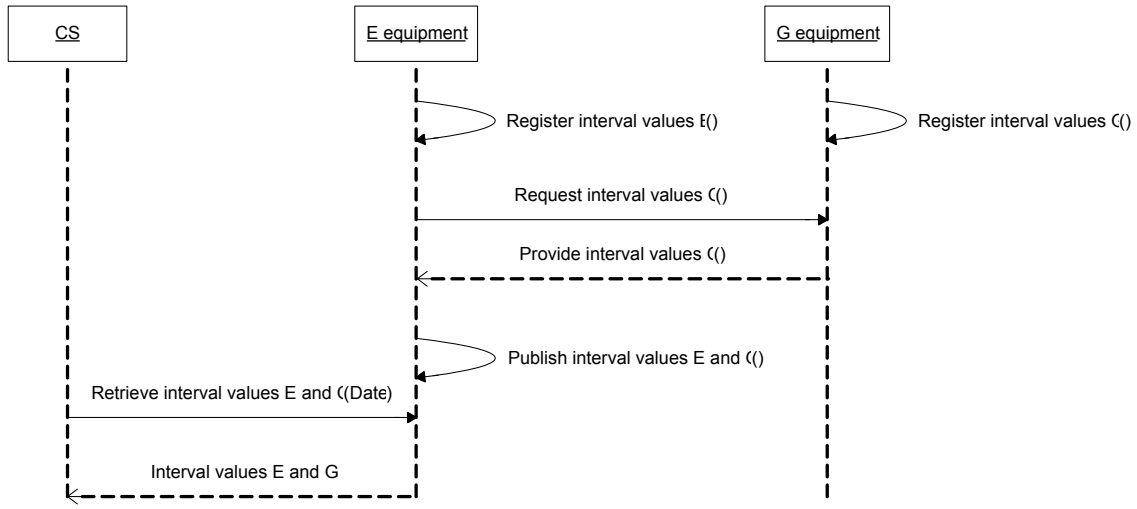


Figure 4-4c: Provide interval values - UML sequence diagram

Pre-conditions

- Interval values E and G have been registered.

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

- The current process description is based on the assumption that the metering equipment shall not provide interval values for periods longer than 15 minutes for electricity and 60 minutes for gas. If interval values for longer periods are required these are provided by the CS.

4.4.1 Requirements for electricity

DSMR-M 65

Description	The E meter shall register meter readings E (from the total consumption counter) 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 66

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) as the unit of measurement.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.6)	**Port**	P3	**Applicable**	E Meter

DSMR-M 67

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

4.4.2 Requirements for gas

DSMR-M 68

Description	The G meter shall register meter readings G for 60 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 advises to customers or for analysis of consumption patterns.						
Fit criterion	The G meter shall register a meter reading G as defined in Chapter 2 every 60 minutes.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.6)	**Port**	n.a.	**Applicable**	G Meter

DSMR-M 69

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

4.4.3 Error reporting

DSMR-M 70

Description	The E meter shall issue a logical error in case the begin or the end date of the requested period are beyond the period that the E meter has interval data available for.						
Rationale	The E meter has interval data available for a period of at least (and at maximum) 10 days. If the request specifies a period for which the E meter cannot provide interval data anymore (i.e. data was overwritten) this is considered a logical error in the CS. The CS should be notified why there is no interval data available and may issue a request with another time period.						
Fit criterion	The logical error issued shall contain at least the generic attributes for errors.						
History	Nov. 2007	**Origin**	NTA +	**Port**	n.a.	**Applicable**	E Meter

DSMR-M 71

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 logical error issued shall at least contain the generic attributes for logical errors.						
History	Nov. 2007	**Origin**	NTA+	**Port**	n.a.	**Applicable**	E Meter, G Meter

4.4.4 Performance

DSMR-M 2018

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**	DSMR-T 39	**Port**	P3	**Applicable**	E meter, G meter

4.5 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 4-5.

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 4-5a: Provide equipment status to P1 – trigger description.

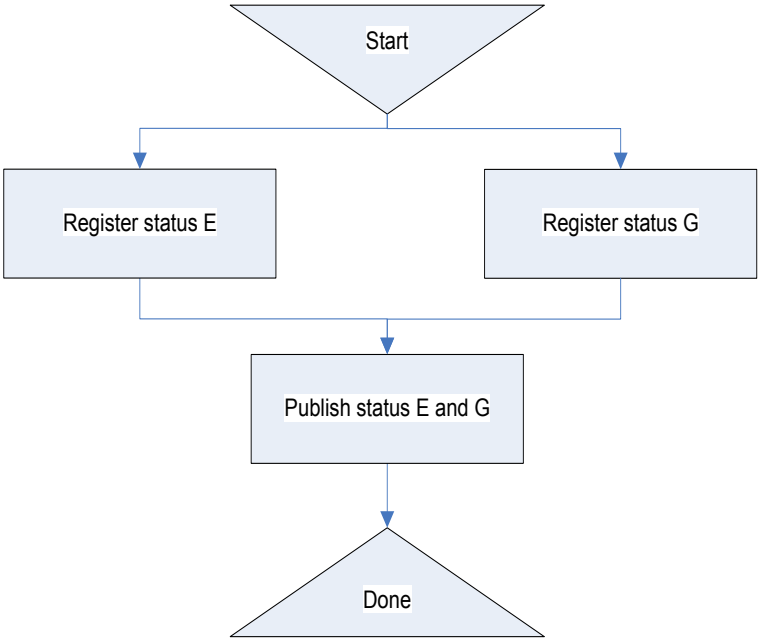


Figure 4-5b: Provide equipment status to P1 – block diagram.

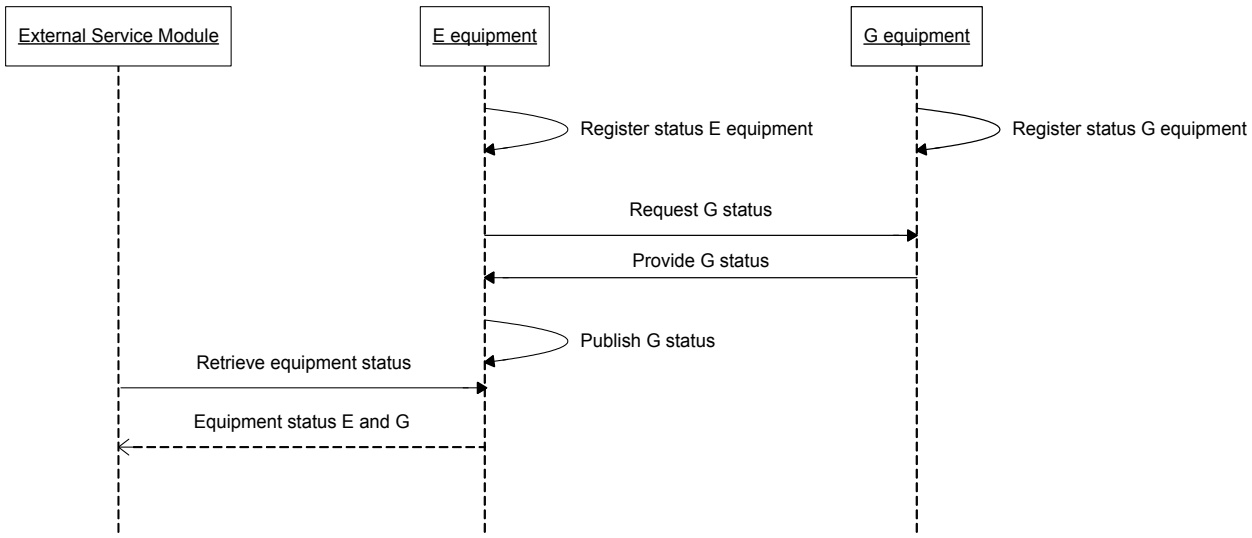


Figure 4-5c: Provide equipment status to P1 – UML sequence diagram.

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.

4.5.1 Requirements for electricity and gas

DSMR-M 72

Description	The E meter shall provide 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 P1.						
Fit criterion	The current status of the equipment is provided, viz.: ▪ Equipment identifier for the E Meter; ▪ Equipment identifier for the G meter; ▪ Actual tariff E; ▪ Actual switch position E breaker; ▪ Actual threshold E; ▪ Actual switch position gas valve (on/off/released).						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.7.2, §5.5.1.1 and Appendix B)	**Port**	P1	**Applicable**	E Meter

4.5.2 Performance

DSMR-M 2019

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**	DSMR-T 40	**Port**	P1	**Applicable**	E meter

4.6 Use case 6: Provide power quality information

This use case describes the process of gathering power quality measurements. Figure 4-6d 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 4-6.

Trigger	Description
Deployment of electricity meter	On deployment the E meter starts providing information on power quality. The Grid operator uses the power quality information for monitoring the grid for distribution of electricity.

Figure 4-6a: Provide power quality information – trigger description

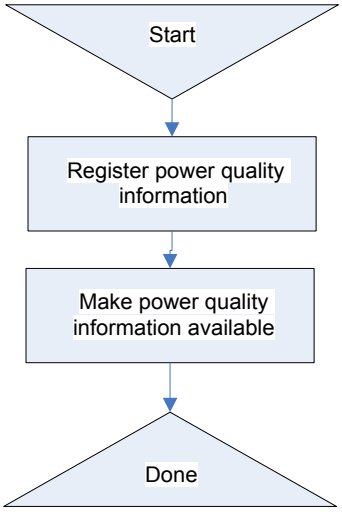


Figure 4-6b: Provide power quality information – block diagram

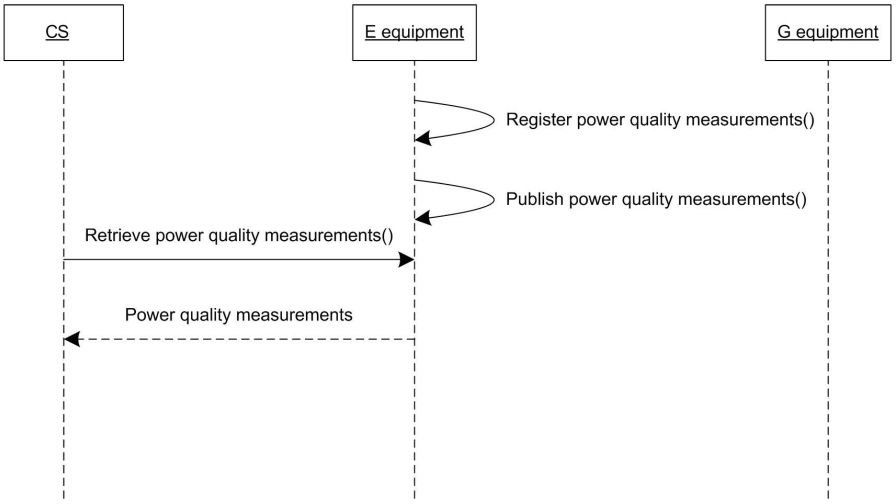


Figure 4-6c: Provide power quality information – UML sequence diagram

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

Figure 4-6d: 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.

4.6.1 Power quality

DSMR-M 73

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 national standard (NEN-EN 50160:2000). The Grid operator uses 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 73a

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 4.6d.						
History	Sep. 2009	**Origin**	TST	**Port**	P3	**Applicable**	E Meter

DSMR-M 73b

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 73c

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 74

Description	The E meter shall provide the average value for voltage, current 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 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**	NTA +	**Port**	P3	**Applicable**	E Meter

DSMR-M 74a

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

4.6.2 Performance

DSMR-M 2020

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**	DSMR-T 41	**Port**	P3	**Applicable**	E meter

4.7 Use case 7: 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 4-7.

Trigger	Description
Deployment of electricity meter	On deployment the E meters starts registering outages. Two types of outages exist: short and long outages. Short outages are detected for grid operating purposes while long outages may lead to retributions. In order to determine the value of the retribution, the duration of outages is used.

Figure 4-7a: Provide outage information – trigger description

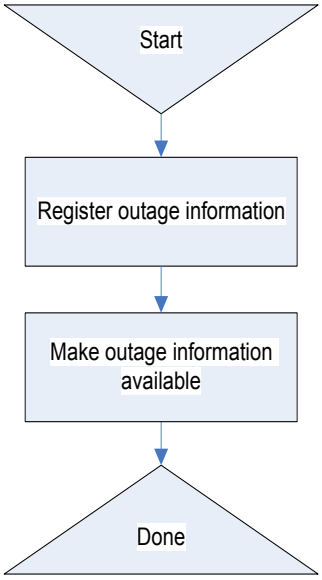


Figure 4-7b: Provide outage information – block diagram

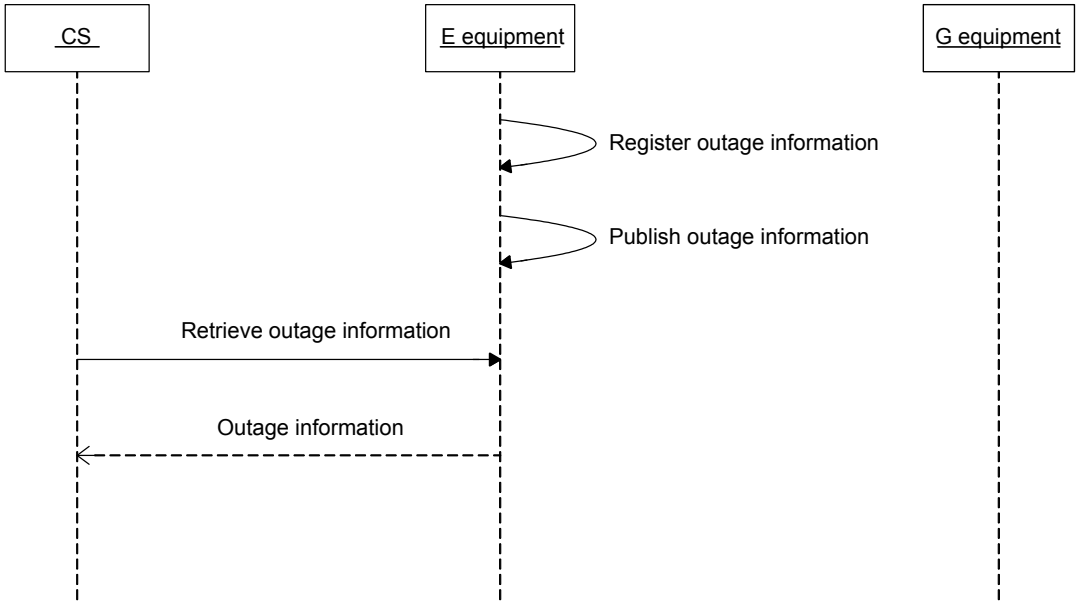


Figure 4-7c: Provide outage information – UML sequence diagram

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.

4.7.1 Outage information

DSMR-M 75

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 76

Description	The E-meter shall provide the 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 77

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 78

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 of 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

4.7.2 Performance

DSMR-M 2021

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**	DSMR-T 42	**Port**	P3	**Applicable**	E meter

4.8 Use case 8: 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 4-8.

Trigger	Description
Deployment of metering equipment	The registration of tamper attempts starts on deployment of the equipment. 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 4-8a: Provide tamper history – trigger description

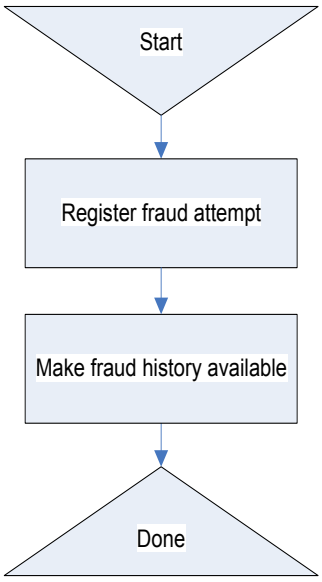


Figure 4-8b: Provide tamper history – block diagram

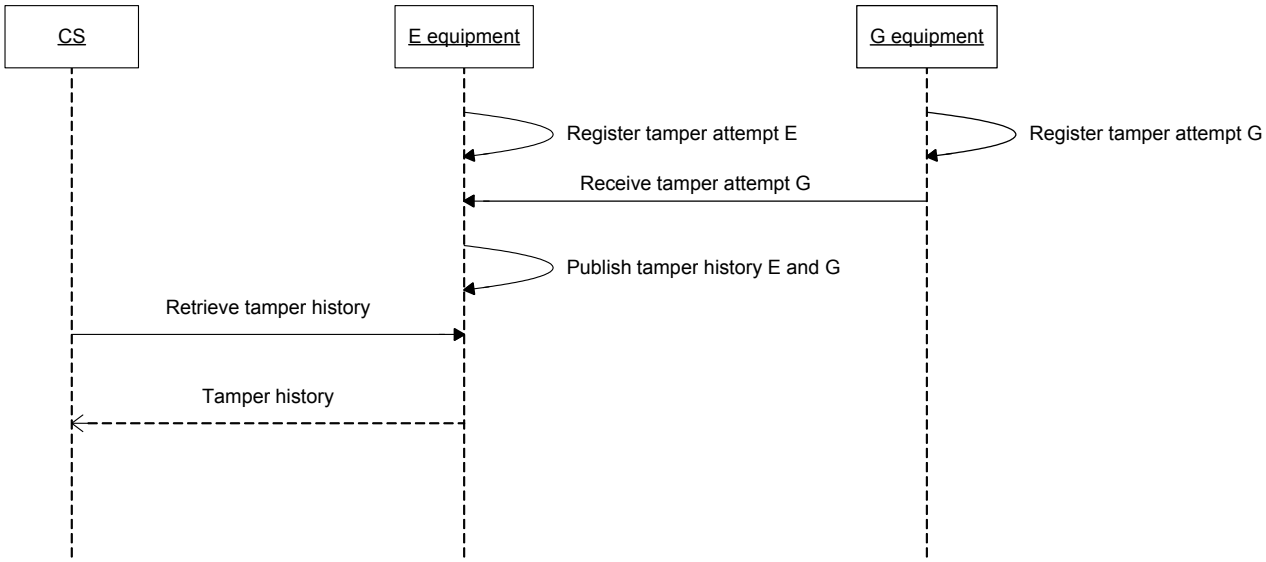


Figure 4-8c: Provide tamper history – UML sequence diagram

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.

4.8.1 Tamper detection

DSMR-M 79

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.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.8.6)	**Port**	n.a.	**Applicable**	E Meter, G Meter

DSMR-M 80

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.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.2.8.6)	**Port**	n.a.	**Applicable**	E Meter, G Meter

4.8.2 Tamper history

DSMR-M 82

Description	Metering equipment shall provide a reasonable number of detected tamper attempts.						
Rationale	The equipment 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 metering equipment 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, G Meter

4.8.3 Performance

DSMR-M2022

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**	DSMR-T 43	**Port**	P3	**Applicable**	E meter

4.9 Use case 9: (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 4-9. Note that the list in Fig. 4-9a 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 may 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 may decide to disconnect.
Non-payment	If the supplier has determined that the customer does not pay for the supplied energy, the supplier may 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 may decide to disconnect.
Collective de-activation	In the event of (regional) power shortages, the grid operator may 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 may decide to reconnect.
New supplier	The new supplier for a connection may 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 may decide to reconnect the client.
Collective activation	In the event of (regional) power shortages, the grid operator may decide to disconnect (and reconnect) a group of customers.

Figure 4-9a: (Dis)connect E – trigger description

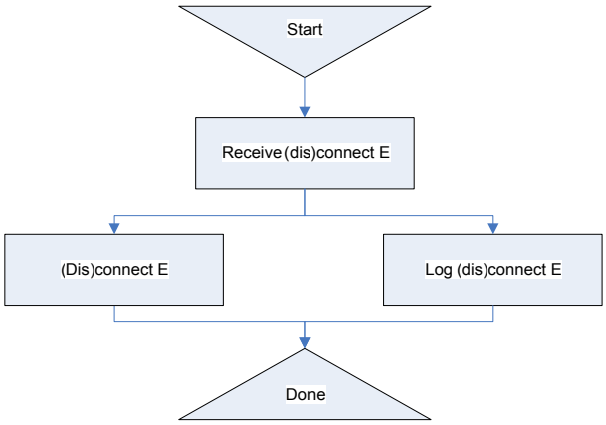


Figure 4-9b: (Dis)connect E – block diagram

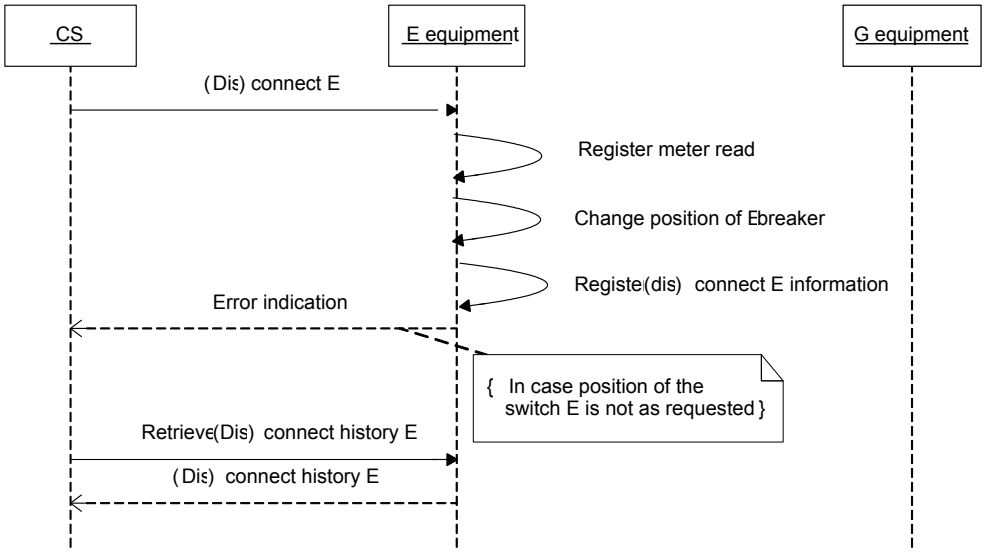


Figure 4-9c: (Dis)connect E – UML sequence diagram

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.

4.9.1 (Dis)connect electricity

DSMR-M 83

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 2023.						
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. A (dis)connect is always preceded by a meter read.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.3)	**Port**	P3	**Applicable**	E Meter

DSMR-M 84

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

4.9.2 Logging information

DSMR-M 85

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. ▪ Meter reading Electricity						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.3)	**Port**	n.a.	**Applicable**	E Meter

DSMR-M 86

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

4.9.3 Performance

DSMR-M 2023

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 should be less than 30 seconds.						
History	Nov. 2007	**Origin**	DSMR-T 44	**Port**	P3	**Applicable**	E meter

DSMR-M 2024

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**	DSMR-T 45	**Port**	P3	**Applicable**	E meter

4.10 Use case 10: 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 electric current 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 4-10.

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 current allowed on the meter.

Figure 4-10a: Apply threshold (electricity) – trigger description

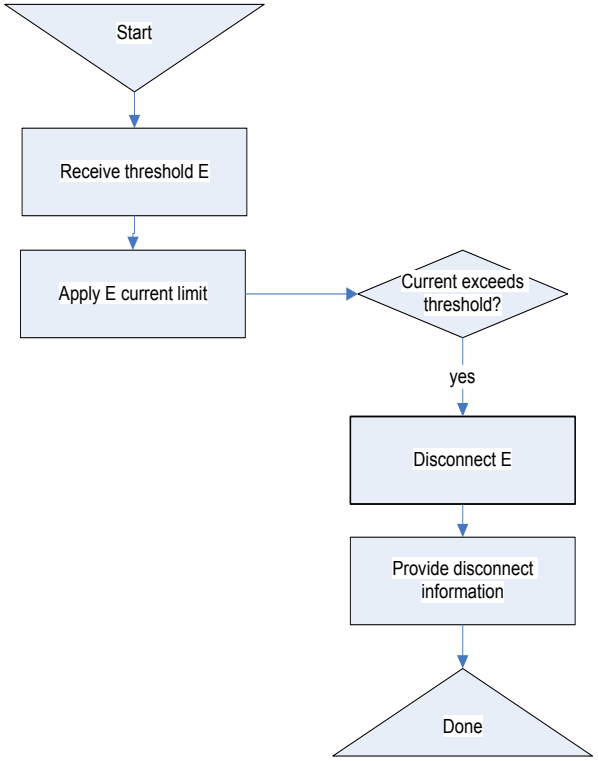


Figure 4-10b: Apply threshold (electricity) – block diagram

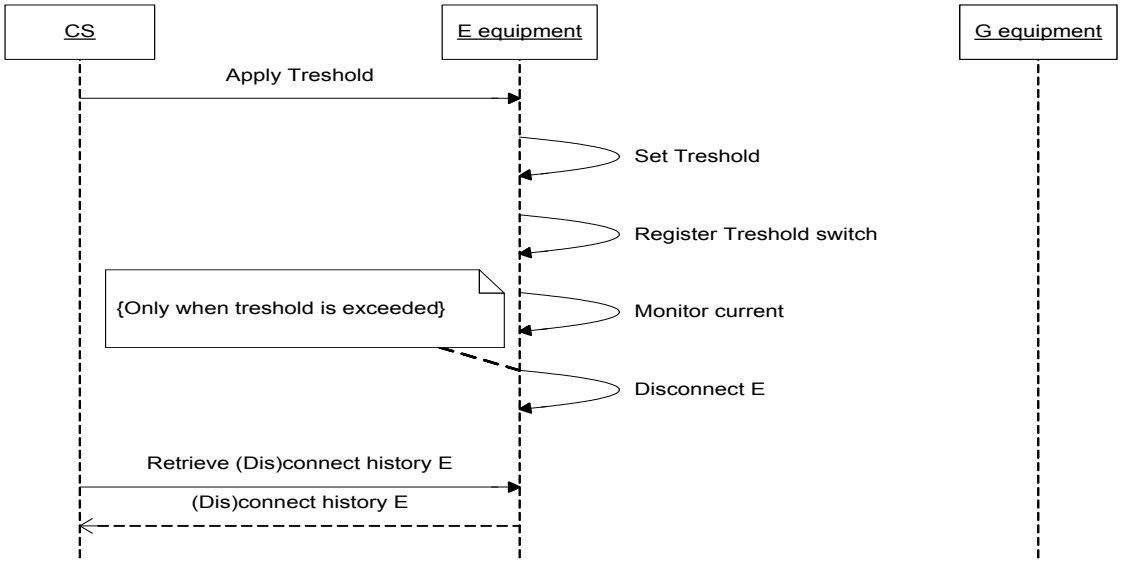


Figure 4-10c: Apply threshold (electricity) – UML sequence diagram

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 Amperes – no decimals needed);
- Threshold value to be used during “Code Red” (specified in Amperes - no decimals needed);
- 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

4.10.1 Apply threshold electricity

DSMR-M 88

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 maximum current on a connection. A supplier can for instance reduce the current as the result of too little pre-paid credit. The grid operator can reduce the maximum current 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 Amperes (no decimals needed); For a 3-phase metering installation the threshold represents the sum over all phases. In case of deactivation the threshold is set to the maximum value (at least 2x Imax for the sum of all phases).						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.3.1.1.3)	**Port**	P3	**Applicable**	E Meter

DSMR-M 89

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 Amps, no decimals).						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.3.1.3)	**Port**	n.a.	**Applicable**	E Meter

DSMR-M 90

Description	The E meter shall automatically invoke 'Use case 9: (Dis)connect E' if the current 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 91

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 may be informed on the threshold, the customer may not be able to determine under what circumstances he will exceed the threshold. If the threshold is exceeded the customer should 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**	NTA +	**Port**	n.a.	**Applicable**	E Meter

4.10.2 Activate Code Red

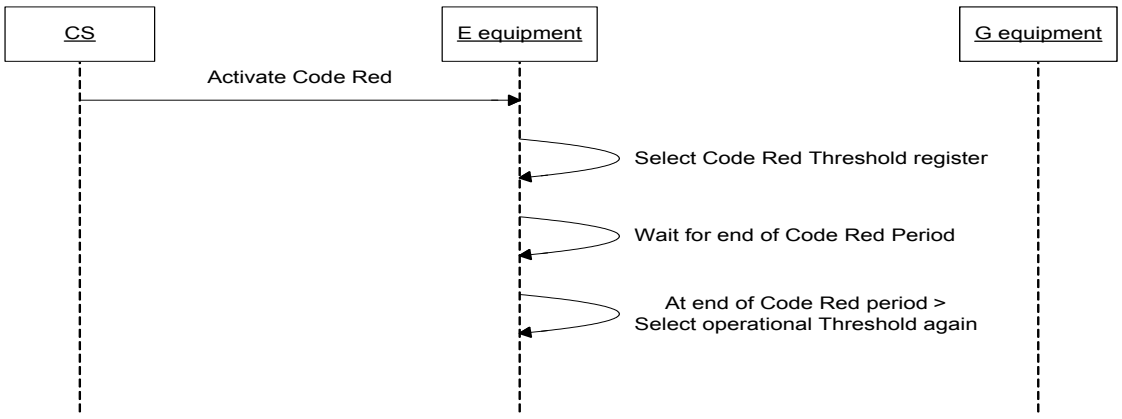


Fig 4-10d Activate Code red – UML sequence Diagram

Pre-conditions for Activate Code red

- Threshold registers are set with “Apply Threshold” message.
- 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 de defined time period, for monitoring the current.
- The E meter uses the normal operational Threshold register outside the defined time period, for monitoring the current.
- 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 Display message to indicate the code red and the limit on the supply power.
- It is assumed that groups of meters can be addressed in the software of the CS

4.10.3 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 current 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 91a

Description	The E meter shall provide functionality to become part of a Code Red group.						
Rationale	The CS will broadcast 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, DC

DSMR-M 91b

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. The code red command is broadcasted; only 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 broadcast this Code Red condition to all or a subset of the E-Meters. The end date and time 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 begin and end time 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, DC

DSMR-M 91c

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. The code red command is broadcasted; 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 with a not useful 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, DC

4.10.4 Error reporting

DSMR-M 92

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 logical error issued shall at least contain the generic attributes for errors.						
History	Nov. 2007	**Origin**	NTA +	**Port**	n.a.	**Applicable**	E Meter, G Meter

4.10.5 Performance

DSMR-M 2025

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 should be set as soon as possible.						
Fit criterion	Total handling time after receiving the request should be less than 5 seconds.						
History	Nov. 2007	**Origin**	DSMR-T 46	**Port**	P3	**Applicable**	E meter

DSMR-M 2026

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**	DSMR-T 47	**Port**	P3	**Applicable**	E meter

DSMR-M 2027

Description	The E meter shall disconnect the supply of electricity (see use case 11) 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 should be less than 1 s.						
History	Nov. 2007	**Origin**	DSMR-T 48	**Port**	P3	**Applicable**	E meter

DSMR-M 2028

Description	The E meter shall reconnect the supply of electricity (see use case 11) soon after it is manually activated.						
Rationale	The effect of pushing the button should become clear immediately.						
Fit criterion	Connection shall be in place within 1 s.						
History	Nov. 2007	**Origin**	DSMR-T 49	**Port**	P3	**Applicable**	E meter

4.11 Use case 11: (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 4-11. Note that the list of Figure 4-11a 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 may decide to disconnect.
Non-payment	If the supplier has determined that the customer does not pay for delivery, the supplier may 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 may decide to disconnect.
Gas outage detected	A gas outage has been detected and as a safety procedure a (group of) premise(s) is disconnected.
No supplier	If the grid operator determines that there is no supplier for the premises where the equipment is installed, the grid operator may 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 may 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 may 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 may issue a reconnect.

Figure 4-11a: (Dis)connect G – trigger description

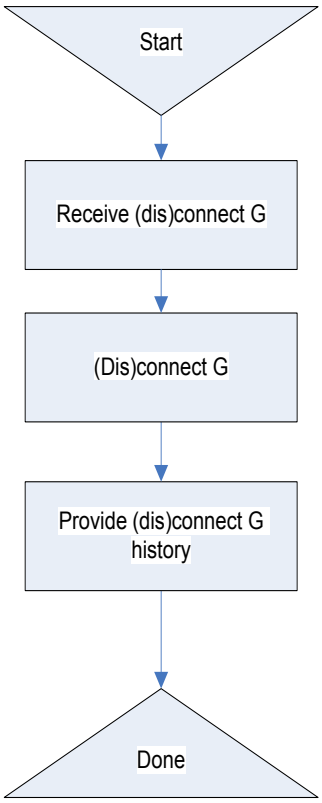


Figure 4-11b: (Dis)connect G – block diagram

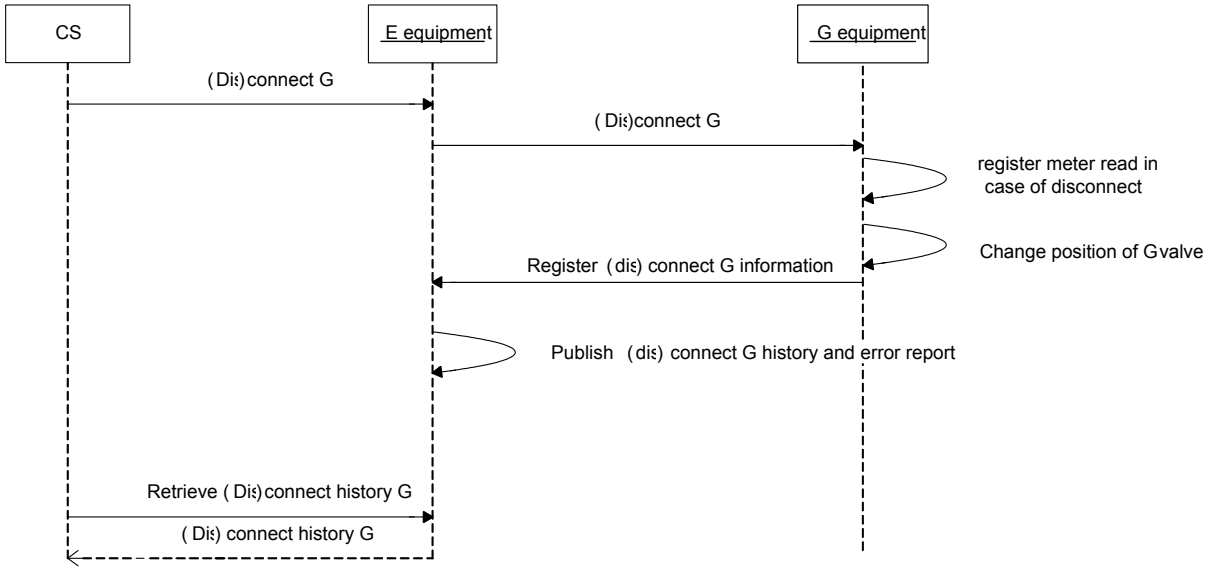


Figure 4-11c: (Dis)connect G – UML sequence diagram

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.

4.11.1 (Dis)connect gas

DSMR-M 93

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.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.3.1.2.1)	**Port**	P2	**Applicable**	G Meter

DSMR-M 94

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 95

Description	The gas meter shall provide functionality to manually perform a connect to the gas supply if the installation 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 may cause leakage of gas when the gas supply is turned on again. Some installations are prepared to handle this risk; others are not. In case the installation can not handle a safe connect remotely, the installation 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 at 35 mbar, for G10 – G26 meters 30 liter/h, and for G25 meters 60 liter/h. A higher flow must be detected within one minute after connection and result in disconnection.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.3.1.2.1)	**Port**	P3	**Applicable**	G Meter

DSMR-M 96

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 instantly.						
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 has been forwarded by the E meter to the G meter at the designated date at the specified time or instantly (if the date has not been passed as a parameter).						
History	Nov. 2007	**Origin**	n.a.	**Port**	n.a.	**Applicable**	E Meter, G Meter

4.11.2 Logging information

DSMR-M 97

Description	The E meter shall log information for each (dis)connect of gas.
Rationale	(Dis)connecting 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	The logging information for (dis)connects shall contain, besides the generic attributes for logging, at least the position of the valve after the (dis)connect was applied.

History	Nov. 2007	**Origin**	NTA 8130 ((§5.3.1.3)	**Port**	n.a.	**Applicable**	E Meter

DSMR-M 98

Description	The E meter shall provide logging information for a reasonable amount of gas (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 metering installation shall provide logging information for the 10 most recent gas (dis)connects.						
History	Nov. 2007	**Origin**	NTA 8130 ((§5.3)	**Port**	P3	**Applicable**	E Meter

4.11.3 Error reporting

DSMR-M 99

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 logical error issued shall at least contain the generic attributes for logical errors.						
History	Nov. 2007	**Origin**	NTA +	**Port**	n.a.	**Applicable**	E Meter

4.11.4 Performance

DSMR-M 2029

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 should be less than 5 minutes.						
History	Nov. 2007	**Origin**	DSMR-T 50	**Port**	P2, P3	**Applicable**	G meter

4.12 Use case 12: 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 4-12.

Trigger	Description
Deployment of electricity meter	The grid operator or supplier informs the customer of executed or pending actions.

Figure 4-12a: Display messages on meter display and P1 – trigger description

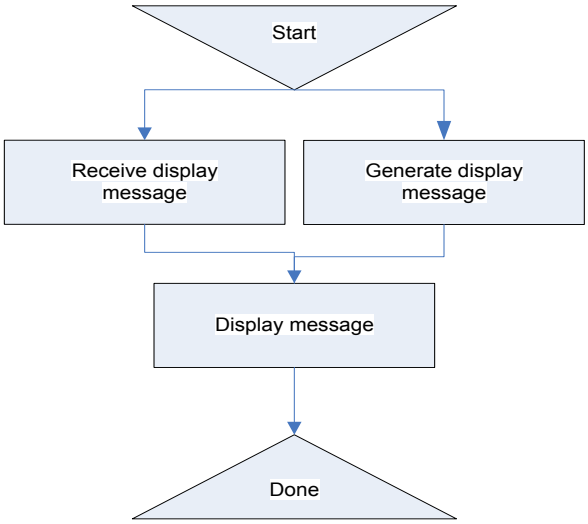


Figure 4-12b: Display messages on meter display and P1 – block diagram

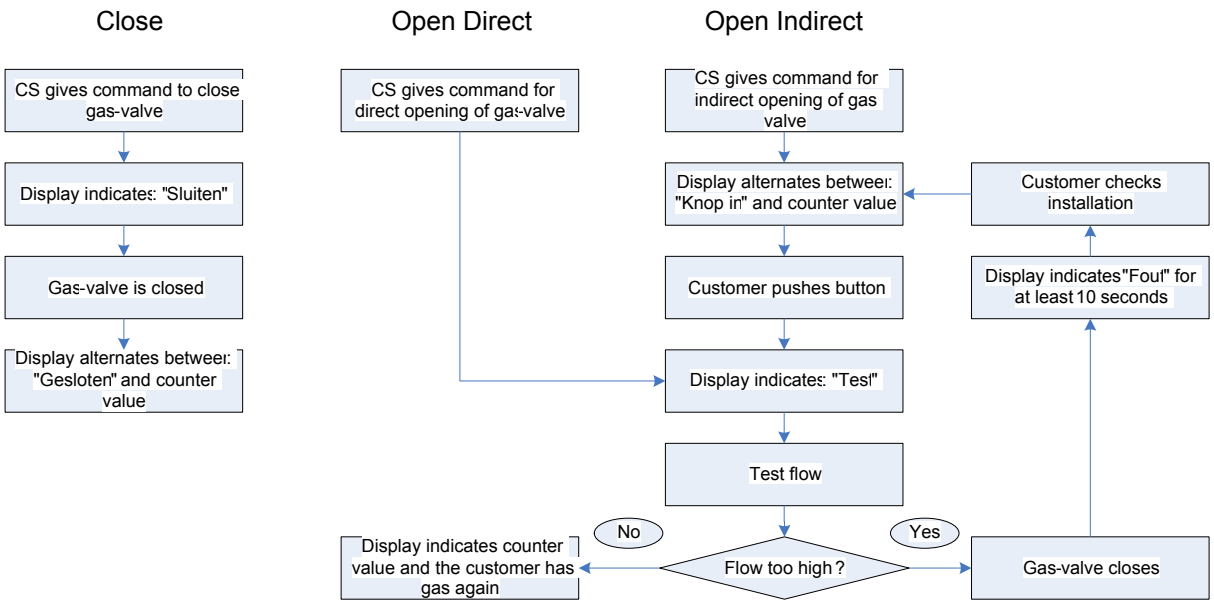


Figure 4-12c: Display messages for opening or closing the gas valve – block diagram

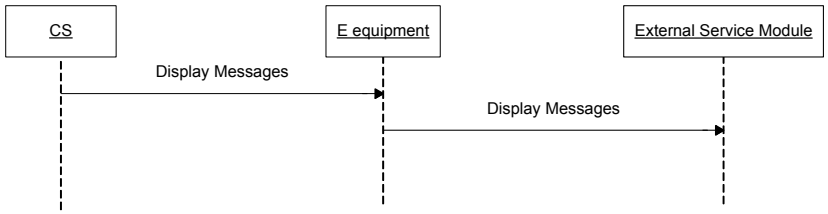


Figure 4-12d: Display messages on meter display and P1 – UML sequence diagram

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), 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 should decide which messages must be presented, when more than one needs to be presented, concatenation is handled in the CS.

4.12.1 Display standard messages

DSMR-M 100

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; ▪ an empty message will result in the removal of the current message on the display; ▪ a new message will override the current message on the display; ▪ 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 100a

Description	In case an alpha-numerical (non mechanical) display is present, both E meter and G meter shall display standardised information on the display in case of activating the switch or 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	For G meters (See figure 4-12c): Alternating “Knop in” and the index value in case the customer needs to push a button for opening the valve “Test” - The valve is opening or testing “Fout” – During testing a leakage or consumption has been detected “Sluiten” – The valve is closing Alternating “Gesloten” and the index value in case of a closed valve For E meters (if this functionality is used): Alternating “Knop in” and the index value in case the customer needs to push a button for closing the switch Alternating “Geopend” and the index value in case of an open switch						
History	Oct. 2009	**Origin**	TST	**Port**	n.a.	**Applicable**	E meter, G Meter

DSMR-M 101

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 may 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

4.12.2 Performance

DSMR-M 2030

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**	DSMR-T 51	**Port**	P3	**Applicable**	E meter

DSMR-M 2031

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**	DSMR-T 52	**Port**	P1	**Applicable**	E meter

4.13 Use case 13: 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 4-13.

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

Figure 4-13a: Sending messages to port P1– trigger description

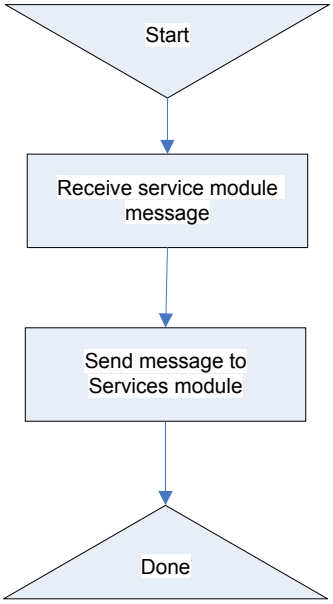


Figure 4-13b: Sending messages to port P1– block diagram

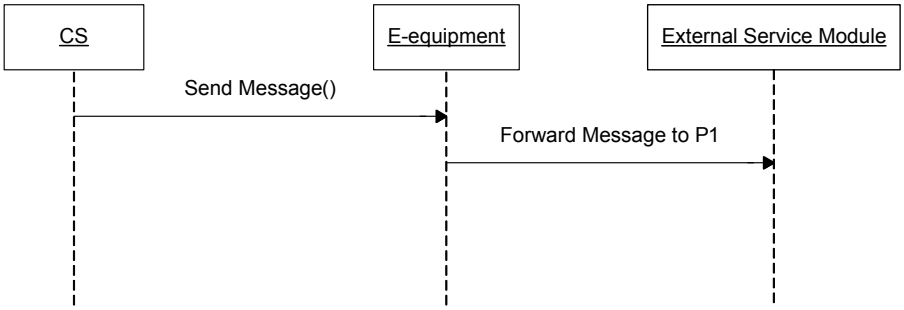


Figure 4-13c: Sending messages to port P1– UML sequence diagram

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 in case the previous message was processed less than 1 hour ago"

4.13.1 Long messages

DSMR-M 102

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 handled by the E meter itself as well.						
Fit criterion	The E meter shall accept long message 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 103

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

4.13.2 Error reporting

DSMR-M 104

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 logical error issued shall at least contain the generic attributes for errors.						
History	Nov. 2007	**Origin**	NTA +	**Port**	n.a.	**Applicable**	E Meter, G Meter

4.13.3 Performance

DSMR-M 2032

Description	The E meter shall publish the message on P1 soon after the request was received by the metering installation.						
Rationale	The message should 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**	DSMR-T 53	**Port**	P1	**Applicable**	E meter

4.14 Use case 14: 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 4-14.

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

Figure 4-14a: Shift tariff times electricity – trigger description

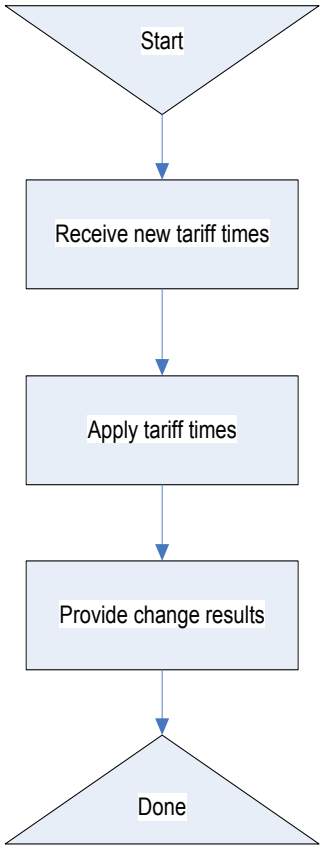


Figure 4-14b: Shift tariff times electricity – block diagram

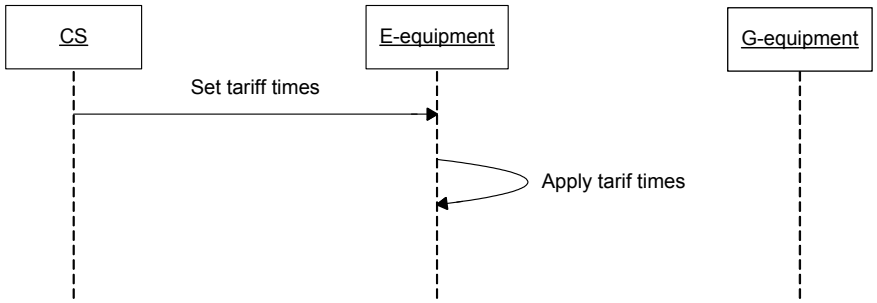


Figure 4-14c: Shift tariff times electricity – UML sequence diagram

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.

Assumptions

- None.

4.14.1 Set tariff times

DSMR-M 105

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

DSMR-M 105a

Description	E meter should stay on low tariff (T1) until the E meter is synchronised by the CS or PDA						
Rationale	Due to network conditions it can take a long time before an E meter is synchronised by the central system. Therefore there is a chance that customers are billed for the normal tariff during the low tariff period. This should be avoided.						
Fit criterion	E meter should stay on low tariff (T1) until the E meter is synchronised by the CS or PDA						
History	Dec. 2008	**Origin**	TST	**Port**	P3	**Applicable**	E Meter

4.14.2 Error reporting

DSMR-M 106

Description	The equipment shall issue a logical error in case the activation date is in the past.
Rationale	In the function call to set the shift times, a parameter is used to identify the activation date. If the activation date is in the past, a logical error will occur.

Fit criterion	The logical error issued shall at least contain the generic attributes for logical errors.						
History	Nov. 2007	**Origin**	NTA +	**Port**	n.a.	**Applicable**	E Meter, G Meter

4.14.3 Logging and events

DSMR-M 106a

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 logging info shall contain the requested activation date, the date of receipt of the request, the type of day and the time shift values.						
History	Sep. 2009	**Origin**	TST	**Port**	P3	**Applicable**	E Meter

DSMR-M 106b

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 ▪ The actual meter reading at the moment of Tariff Shift Time activation.						
History	Sep. 2009	**Origin**	TST	**Port**	P3	**Applicable**	E Meter

4.15 Use case 15: Synchronise time E-equipment

The general requirement DSMR-M 3 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 3 is met. The trigger description, block diagram and UML sequence diagram are depicted in Figure 4-15.

Trigger	Description
Synchronise request from CS	A synchronise request is received from CS specifying the actual time.

Figure 4-15a: Synchronise time E-equipment – trigger description

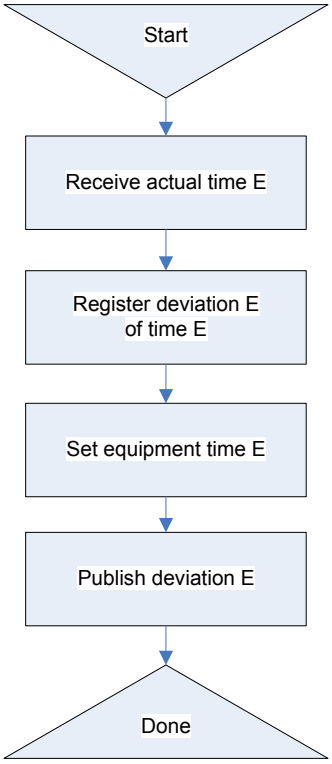


Figure 4-15b: Synchronise time E-equipment – block diagram

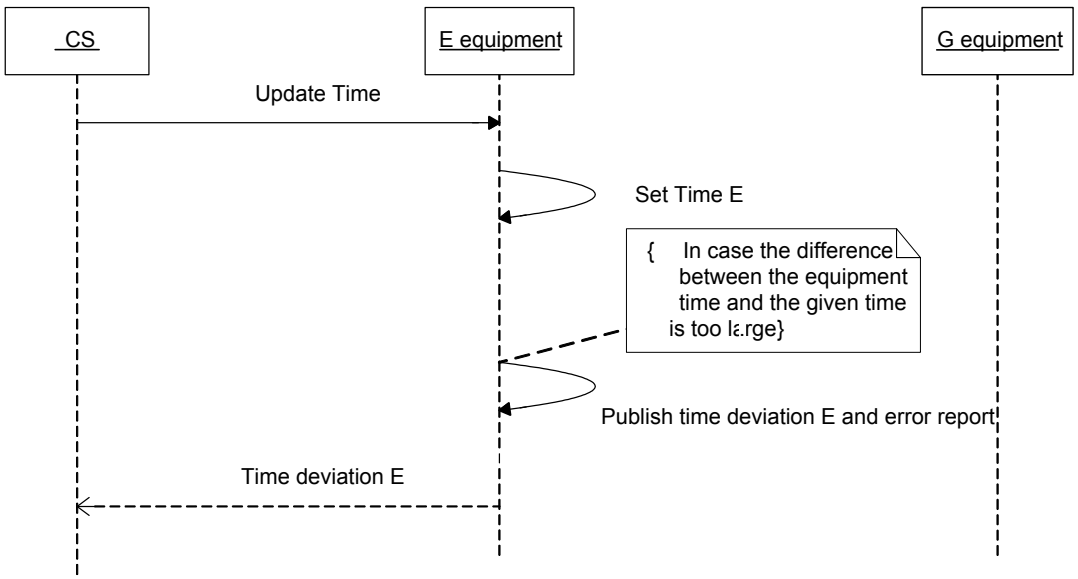


Figure 4-15c: Synchronise time E-equipment – UML sequence diagram

Pre-conditions

- The internal clock of the E meter may deviate from the national standard time.

Parameters

- Actual 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 actual time from the CS to the meter can be neglected, or should be accounted for by the CS.
- 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.

4.15.1 Synchronise time

DSMR-M 107

Description	The E meter shall provide functionality to synchronise its internal clock, and to adjust the maximal deviation that is accepted compared to the actual 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 deviation of the clock shall be within the limits of accuracy. The maximum deviation (S) can be adjusted in the E meter (typically 1 minute).						
History	Nov. 2007	**Origin**	NTA +	**Port**	P3	**Applicable**	E Meter

DSMR-M 108

Description	The E meter shall issue a logical error if the time adjustments 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 S, a logical error is issued containing the generic attributes for errors. The corresponding log entry contains at least the value of time adjustment in seconds.						
History	Nov. 2007	**Origin**	NTA +	**Port**	P3	**Applicable**	E Meter

4.15.2 Performance

DSMR-M 2033

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**	DSMR-T 54	**Port**	P3	**Applicable**	E meter

4.16 Use case 16: Synchronise time G-equipment

The general requirement DSMR-M 3 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 4-16.

Trigger	Description
Deployment of gas equipment	If the P2 device has an internal clock, it should be synchronised by the master system. At deployment the time of the metering equipment is probably not correct, so it has to be synchronized. Further on in time, it should stay synchronized. 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 an M-bus time set action after installation of a G-meter after the first encrypted response is received from that G-meter 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 every hour.

Figure 4-16a: Synchronise time G-equipment – trigger description

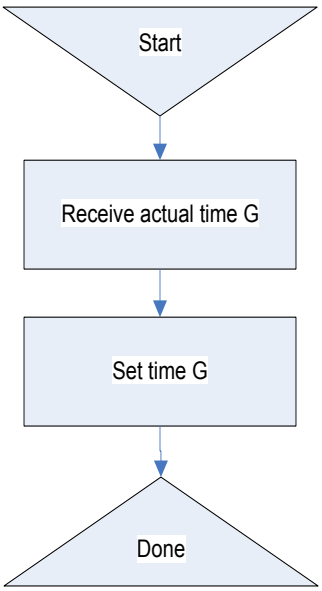


Figure 4-16b: Synchronise time G-equipment – block diagram

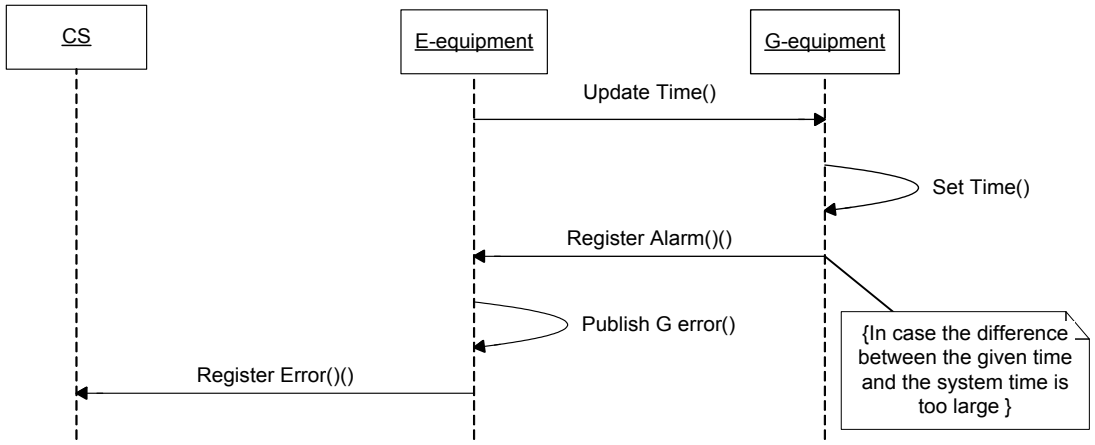


Figure 4-16c: Synchronise time G-equipment – UML sequence diagram

Pre-conditions

- The internal clock of the G equipment may deviate from the national standard time.

Parameters

- Actual 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 actual time from the E meter to the G meter can be neglected.

4.16.1 Synchronise time

DSMR-M 109

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 after the first encrypted response is received from that 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 110

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 111

Description	The G-equipment shall provide functionality to publish large time shifts.						
Rationale	Time shifts should 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

4.16.2 Error reporting

DSMR-M 112

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

5 BUSINESS USE CASES FOR INSTALLATION AND MAINTENANCE

In this chapter, the interfaces P3.1 and P3.2 are introduced because a Data Concentrator (DC) can be placed between the CS and the meter(s). With this, the DC divides P3 into two parts, P3.1 and P3.2. However since P3 and P3.1 are functionally the same these terms are interchangeable. Where P3 is mentioned this can also be read as P3.1 (when a DC is involved). Where gas meters are mentioned this could also be replaced with thermal and water meters.

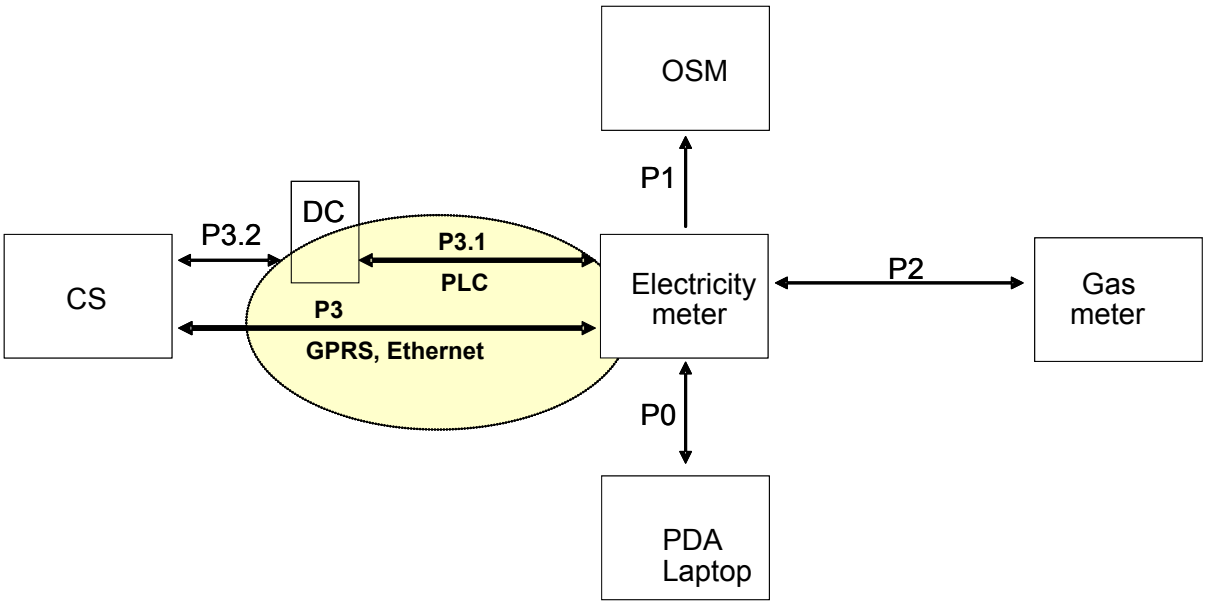


Figure 5-1: Overview P3.1 and P3.2 interfaces

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.

5.1 Equipment use cases

This section provides the use cases that apply to all equipment (both M&S and DC equipment). Subsequent sections provide use cases that specifically apply to M&S equipment or DC equipment.

5.1.1 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.

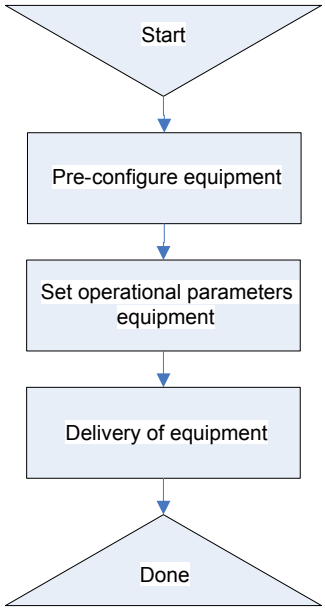


Figure 5-2: Receive equipment

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-

5.1.1.1 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 should be displayable on the metering installation or not.

The pre-configuration information for DC as provided by the GO consists of the following categories of information for each of the values in section 2.5.2:

Value	Description
Name	The name of the configuration item.
Value	The actual value to be pre-configured.

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.

5.1.1.2 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 2.5.1.2 for a description of the operational parameters for E equipment and to section 2.5.1.4 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.

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

DSMR-M 2034

Description	The vendor of equipment shall allow the GO to perform an acceptance test on a random sample of the delivery before the equipments are delivered.						
Rationale	In cases of large shipments it is not practical to perform the acceptance test after the goods are delivered (if the test fails it may result in shipping back the complete delivery). The GO therefore wants the opportunity to perform the acceptance test at the premises of the vendor. The GO will perform an additional (site) acceptance test after delivery of the equipment.						
Fit criterion	The vendor shall provide a written statement that allows the GO to perform acceptance test on goods before delivery.						
History	Nov. 2007	**Origin**	DSMR-T 14	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2035

Description	The register values in the metering instrument shall be within a range close to zero at the time of delivery.						
Rationale	Administrative processes are easier to set up and verify with meters that have register values close to zero. Furthermore this requirement states implicitly that the GO will not accept equipment that is used for testing purposes by other parties prior to delivery to the GO.						
Fit criterion	On delivery all register values of the metering instruments will have a value in the range from 0 to 5 kWh / m^3.						
History	Nov. 2007	**Origin**	DSMR-T 15	**Port**	n.a.	**Applicable**	E meter, G meter

DSMR-M 2036

Description	The equipment shall be packaged in an environmentally friendly manner.						
Rationale	The GO pursues sustainable entrepreneurship. For this reason the packaging of the equipment has to be environmentally friendly.						
Fit criterion	All packing materials shall be recyclable.						
History	Nov. 2007	**Origin**	DSMR-T 16	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2037

Description	During the packaging of each E meter a mounting clip should 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 should be included.						
History	Dec. 2008	**Origin**	DSMR-T 16a	**Port**	n.a.	**Applicable**	E meter

DSMR-M 2038

Description	M&S and DC 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 meters contains the meter code that is assigned by KEMA. The meter codes for G meters are assigned by KIWA-Gastec.

	The equipment code for DC equipment is assigned by the GO. 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 assigned by KEMA (for E meters) or KIWA-Gastec (for G meters) or GO (for DC equipment) 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**	DSMR-T 17	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2039

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 may 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**	DSMR-T 18	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2040

Description	The packing of the individual parts of equipment enables identification of the contents by its equipment identifier without opening the packing.
Rationale	Handling of equipment prior to installation is handled most efficiently when the packing of the equipment is closed and in its original state. Note that this requirement applies to pallets, multipart packing and packing of individual parts of equipment.
Fit criterion	The packing of the equipment shall carry the equipment identifier (preferably on a self-adhesive label) for the equipment

History	Nov. 2007	**Origin**	DSMR-T 19	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2041

Description	Equipment shall be delivered with 2 self adhesive labels, one of which is attached to the equipment, the other is supplied separately.						
Rationale	The personnel involved in installing the equipment need two labels. The separate label is used on the 'meter change form' which is used in administrative processes. The label on the equipment is used to verify that the correct equipment is installed and registered.						
Fit criterion	Each piece of equipment is delivered with one label attached to the meter and a separate label (not attached) that can be attached on the 'meter change form'.						
History	Nov. 2007	**Origin**	DSMR-T 20	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2042

Description	Each delivery of equipment shall contain documentation for the delivered goods.						
Rationale	In order to handle installation and maintenance in a controlled manner each batch of equipment is delivered with documentation explicitly for that batch. The documentation shall therefore explicitly state to which batch of equipment it applies through the batch identifier. Any changes to equipment have to be approved by the GO prior to the delivery of the equipment.						
Fit criterion	The documentation delivered with the goods shall be stated in the Dutch language and shall a least contain the following information: ▪ The batch identifier for the current batch; ▪ The list of serial numbers for the equipment; ▪ Installation manuals and schemes; ▪ Technical manuals; ▪ Admittance documentation as provided by a notified body; ▪ Batch identifier for the previous delivered batch; ▪ List of approved changes to the equipment since the previous delivered batch (hardware en software). ▪ Dutch instructions for the equipment						
History	Nov. 2007	**Origin**	DSMR-T 21	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2043

Description	All documentation shall preferably be in Dutch, otherwise it shall be in the English Language.						
Rationale	Whenever there is mention of documentation in the NTA or DSMR, it should be fit for purpose and readable for a Dutch audience.						
Fit criterion	All documentation shall preferably be in Dutch, otherwise it shall be in the English Language.						
History	Dec. 2008	**Origin**	DSMR-T 21a	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2044

Description	The vendor of equipment shall present any planned change to the delivered goods to the GO prior to the time when the change is executed.
Rationale	For the GO it is important to know exactly how the delivered goods are implemented.

	For economic reasons it is important which equipment is susceptible for maintenance. Therefore the GO requires information on any changes and as can be read in other requirements in the current document, the GO shall approve the planned change before it is implemented on the equipment to be delivered to him.						
Fit criterion	The vendor shall present the following information for planned changes: ▪ Product for which a change is planned; ▪ Detailed description of the planned change; ▪ Motivation for the planned change; ▪ Date on which the planned change will be executed.						
History	Nov. 2007	**Origin**	DSMR-T 22	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2045

Description	The vendor of equipment shall provide traceability information on delivered goods and allow the GO access to the vendor's traceability system for the complete lifetime of the delivered goods.						
Rationale	Traceability of equipment is important for the GO. For this reason the vendor shall provide with each delivered batch information on hardware and software changes to the GO.						
Fit criterion	The traceability information provided by the vendor to the GO shall at least contain the following information: ▪ Description of the change; ▪ First serial number that the change is applied to; ▪ Date of production of the first equipment that the change was applied to; ▪ Other information necessary to utilize the traceability system efficiently.						
History	Nov. 2007	**Origin**	DSMR-T 23	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2046

Description	The vendor shall provide access to the GO to the calibration certificates of all delivered M&S equipment during the complete lifecycle of the equipment.						
Rationale	The GO does not need physical calibration certificates of delivered equipment. For this reason the GO does not want the certificates to be delivered but may need to access certificates at some time. For this reason the GO requires access to the archive of certificates for all delivered equipment.						
Fit criterion	The GO shall verify for a random sample of delivered equipment if the calibration certificates are available.						
History	Nov. 2007	**Origin**	DSMR-T 24	**Port**	n.a.	**Applicable**	E meter, G meter

DSMR-M 2047

Description	The vendor of the equipment shall provide as part of each delivery the test results of the equipment delivered.						
Rationale	The GO needs to ensure that the delivered equipment was sufficiently tested before it is handled any further by the GO. The testing activities shall reflect the application of the equipment by the GO, i.e. the tests shall be adjusted to the needs of the GO.						
Fit criterion	The GO shall provide to the vendor the test criteria that shall be addressed during testing by the vendor. The test results shall include a detailed description of how these criteria were met during testing.						
History	Nov. 2007	**Origin**	DSMR-T 25	**Port**	n.a.	**Applicable**	E meter, G

							meter, DC

DSMR-M 2048

Description	The equipment delivered as part of a single delivery shall have consecutive numeric serial numbers.						
Rationale	Consecutive serial numbers facilitate the process of keeping track of equipment before and during installation. Consecutive serial numbers for instance facilitate checking if all equipment that was delivered is indeed installed.						
Fit criterion	For each delivery the serial numbers provided as part of the documentation for the batch will be verified on consecutiveness and correctness using random samples.						
History	Nov. 2007	**Origin**	DSMR-T 26	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2049

Description	The equipment in multipart packages (pallets and boxes) shall have consecutive serial numbers.						
Rationale	Consecutive serial numbers facilitate the process of keeping track of equipment before and during installation. Consecutive serial numbers for instance facilitate checking if all equipment that was delivered is indeed installed.						
Fit criterion	For each packing that contains multiple parts the serial numbers of the parts shall be consecutive.						
History	Nov. 2007	**Origin**	DSMR-T 27	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2050

Description	The vendor of equipment shall provide a bill of materials.						
Rationale	For Quality Systems it is important to have a good description of the major components of the equipment (E Meter, G Meter, DC).						
Fit criterion	The vendor of equipment shall present a list of major components consisting of amongst others: • Supplier • Type of equipment • Hardware version • Specifications All other information necessary for configuration management						
History	Dec. 2008	**Origin**	DSMR-T 28	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2051

Description	The vendor of equipment shall provide a software overview.						
Rationale	When the total solution consists of two or more software components it is important to understand the relation between these components.						
Fit criterion	The vendor of equipment shall provide an overview of the building blocks of the software.						
History	Dec. 2008	**Origin**	DSMR-T 28a	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2052

Description	The vendor of equipment shall provide a delivery file.						
Rationale	The GO needs certain information for Central System and other information systems. This information needs to be accurate and sent over before actual delivery.						
Fit criterion	The vendor of equipment shall provide an automatically generated delivery file containing at least the following fields: • Meter_ID / DC_ID • Factory_number • Kema code • Year of_manufactory • Description • Communication_method • Operational_firmware_version • Operational_hardware_version • Switch • Meter_identification / DC_identification • Meter unit / DC unit • Default encryption key • Batchnumber • IMSI_NR						
History	Dec. 2008	**Origin**	DSMR-T 28b	**Port**	n.a.	**Applicable**	E meter, G meter, DC

5.1.2 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 the current document this is interpreted as firmware upgrades for only E meters (no G meters). Furthermore the current document requires that firmware updates for DC equipment are supported by the equipment.

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.

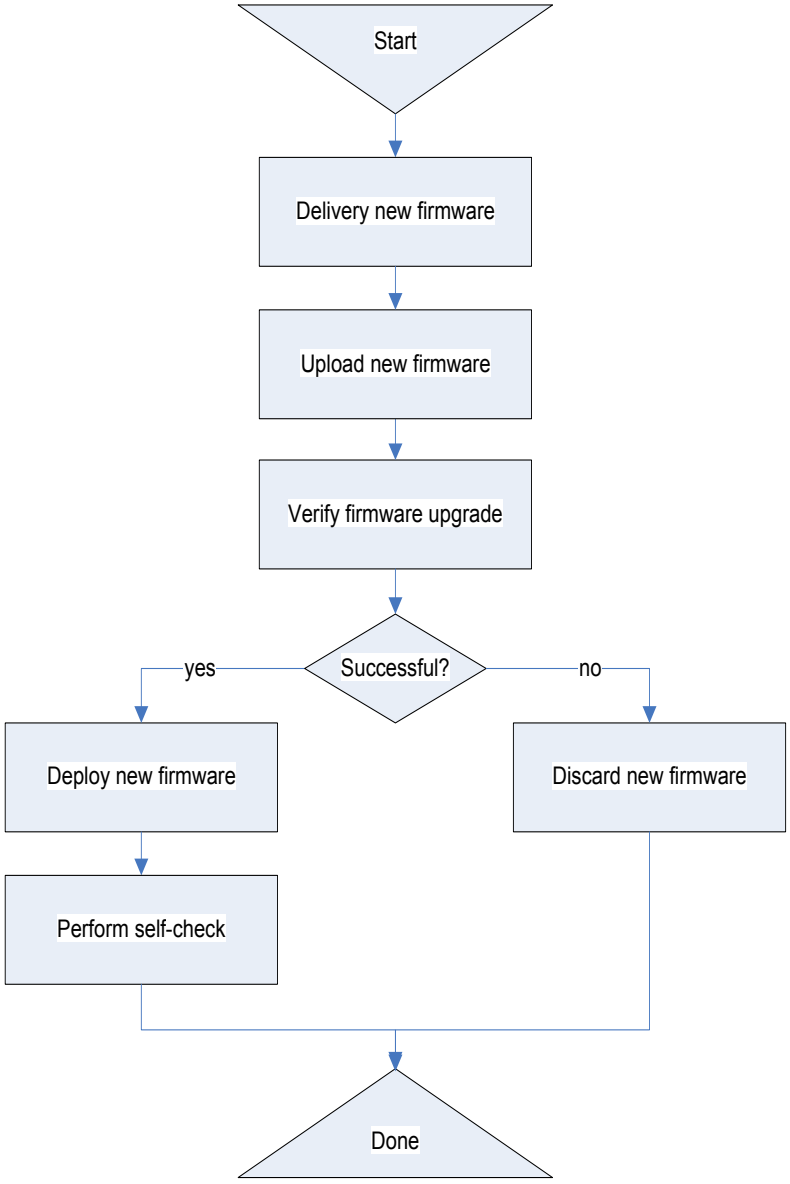


Figure 5-3: Firmware upgrade

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.

5.1.2.1 Delivery new firmware

DSMR-M 112b

Description	The supplier of firmware shall provide documentation with each version of delivered firmware.						
Rationale	Upgrading of firmware is a delicate process. On the one hand it is as a result of the potentially large number of equipment affected. On the other because faults in the firmware have a large impact. For this reason the GO wants to be sure that the firmware functions correctly and needs to know in advance on which hardware the firmware can be applied.						
Fit criterion	The documentation (release notes) that is delivered with a new version of the firmware shall at least contain the following information: ▪ A list of changes with respect to the previous version of the firmware (new features and solution of problems); ▪ List of equipment that is compatible with the new firmware.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	E Meter, G Meter, DC

5.1.2.2 Upload new firmware

DSMR-M 113

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/P3.2, P0	**Applicable**	E Meter, G Meter, DC

DSMR-M 117

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 should 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, G Meter, DC

DSMR-M 116

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/P3.2	**Applicable**	E Meter, G Meter, DC

5.1.2.3 Verify firmware upgrade

DSMR-M 122

Description	The equipment shall issue a logical error in case the new firmware is incomplete, inconsistent or incompatible with the equipment-type.						
Rationale	A firmware upgrade is preceded by thorough testing and it is therefore not expected that firmware is not compatible. Incompatible firmware of a single piece of equipment usually implies that the upgrade will fail for other equipment too. As a firmware upgrade is a time-consuming activity users have to be informed of incompatible firmware immediately.						
Fit criterion	The logical error issued for incomplete, inconsistent (invalid identification or signing) or incompatible with the equipment-type firmware shall at least contain the generic attributes for logical errors. The new firmware shall not be deployed.						
History	Nov 2007	**Origin**	I&M	**Port**	P3/P3.2	**Applicable**	E Meter, G Meter, DC

DSMR-M 115

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, G Meter, DC

5.1.2.4 Deploy new firmware

DSMR-M 118

Description	The metering equipment shall deploy the new version either immediate or time based (at a designated date and time).
Rationale	Firmware is preferably deployed at midnight on the indicated date.
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, G Meter, DC

DSMR-M 119

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, G Meter, DC

DSMR-M 114

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

DSMR-M 120

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 a version of the firmware was deployed or discarded.						
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 deployed. • Version number of the deployed firmware						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	E Meter, G Meter, DC

5.1.2.5 Perform self-check

DSMR-M 121

Description	The equipment shall provide functionality to present the results of a permanently run self-check and retrieve the results remotely (via standard event log).
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.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3/P3.2	**Applicable**	E Meter, G Meter, DC

5.1.2.6 Discard new firmware

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

DSMR-M 123

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, G Meter, DC

5.1.2.7 Performance

DSMR-M 2053

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 should 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**	DSMR-T 55	**Port**	P0, P3	**Applicable**	E meter, DC

5.1.3 Use case: Planned on-site maintenance

This section describes the use case for periodical on-site maintenance. This use case applies to both M&S equipment and DC 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.

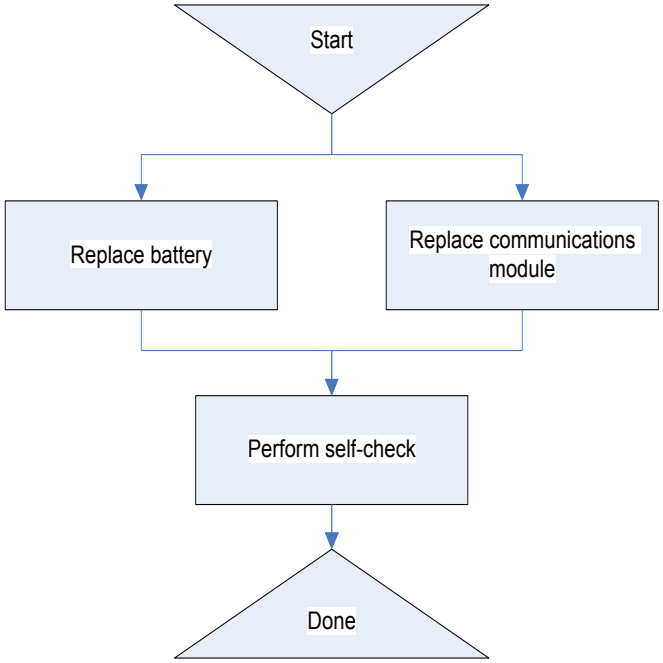


Figure 5-4: Planned on-site maintenance

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-

5.1.3.1 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 may have a shorter lifetime than the meter itself. For this purpose the possibility of replacing the battery is necessary.

DSMR-M 2054

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**	DSMR-T 30	**Port**	n.a.	**Applicable**	G meter

DSMR-M 2055

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 may 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**	DSMR-T 31	**Port**	n.a.	**Applicable**	G meter

DSMR-M 2056

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 performance criterion presented here is based on the assumption that trained personnel replace the battery.						
Fit criterion	The completion rates and times to be met are: 99 %: 5 minutes						
History	Nov. 2007	**Origin**	DSMR-T 32	**Port**	n.a.	**Applicable**	G meter

5.1.3.2 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.

DSMR-M 2057

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**	DSMR-T 33	**Port**	n.a.	**Applicable**	E meter, G meter, DC

DSMR-M 2058

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 may 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**	DSMR-T 34	**Port**	n.a.	**Applicable**	E meter, G meter

DSMR-M 2059

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 to be met are: 99 % 5 minutes						
History	Nov. 2007	**Origin**	DSMR-T 35	**Port**	n.a.	**Applicable**	E meter, G meter, DC

5.1.3.3 Perform self-check

DSMR-M 125

Description	The equipment shall provide functionality to present the results of a permanently run self-check and retrieve the results from the local port during installation.						
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

5.2 M&S use cases

The current section provides a description of the use cases that are specific for M&S equipment whereas the previous section provided a description of use cases that apply for both M&S and DC equipment.

5.2.1 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 (refer to sections 'Pre-configure equipment' ([2], chapter 3.1) and 'Set operational parameters equipment' ([2], chapter 3.2).

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.

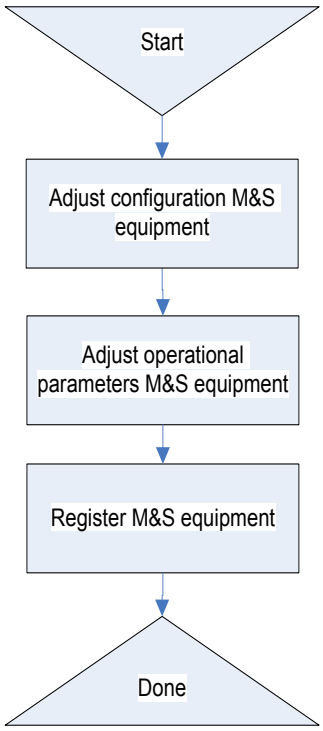


Figure 5-5: Adjust equipment

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.

5.2.1.1 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 2060

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' ([1], chapter 5.2.1).						
History	Nov. 2007	**Origin**	DSMR-T 29	**Port**	P0	**Applicable**	E meter, G meter, DC

DSMR-M 128

Description	The meter shall provide functionality to set the internal clock to national standard time before and after the meter is physically installed.

Rationale	The clock in the meter will not be adjusted to national standard 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	By the time the meter is deployed the time and date of the internal clock will deviate less than 60 seconds from national standard time.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0,P3, P3.2	**Applicable**	E Meter, G Meter

DSMR-M 129

Description	The E meter shall provide functionality to automatically adjust to daylight savings time and back.						
Rationale	National standard 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 national standard time at any time.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	E Meter, G Meter

5.2.1.2 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 130

Description	The E meter shall provide functionality to set the threshold E before and after the meter is physically installed.						
Rationale	The threshold may 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, P3.2	**Applicable**	E Meter

DSMR-M 131

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 may 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, P3.2	**Applicable**	E Meter

DSMR-M 132

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, P3.2	**Applicable**	E Meter

DSMR-M 133

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, P3.2	**Applicable**	E Meter

DSMR-M 134

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, P3.2	**Applicable**	E Meter

5.2.1.3 Register M&S equipment

After the equipment is prepared for installation but before it is actually installed, it has to be registered in a meter management system. The equipment does not provide any particular functionality for this activity.

5.2.1.4 Performance

DSMR-M 2061

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 should 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**	DSMR-T 56	**Port**	P0, P3	**Applicable**	E meter

5.2.2 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.

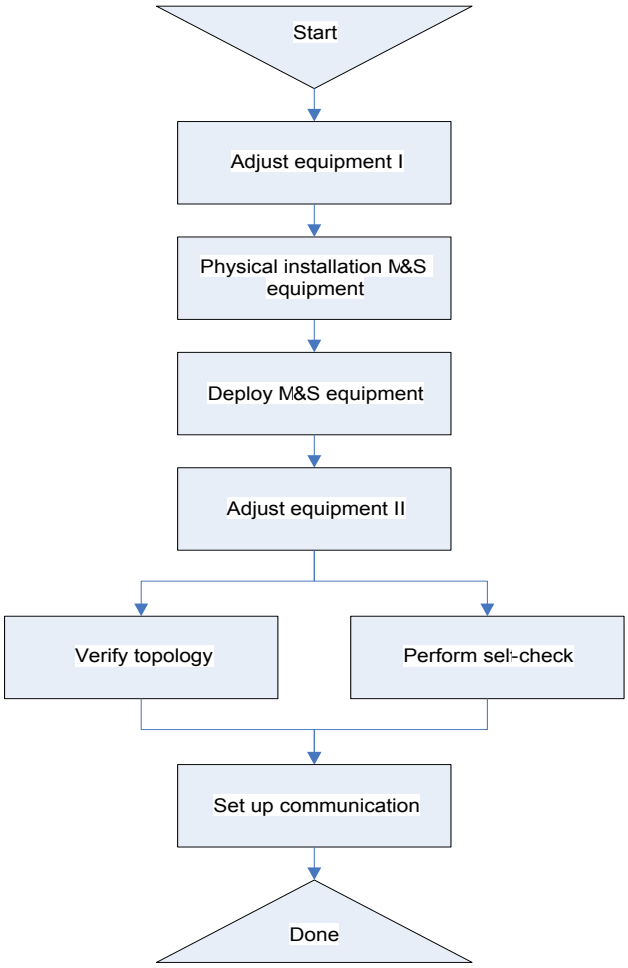


Figure 5-6: Install M&S equipment

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;
- The current process description is based on the assumption that DC equipment is already installed by the time the M&S equipment is installed.

5.2.2.1 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 136

Description	The E meter shall fit on standard meter boards.						
Rationale	In order to reduce costs for installation the meter shall fit on meter boards available in most houses to reduce the time spent during installation. Note that this requirement does not state that standard meter boards are always available.						
Fit criterion	The external housing of the meter shall comply with DIN 43857						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	E Meter

DSMR-M 137

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 138

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 6 mm^2 to 16 mm^2.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	E Meter

DSMR-M 138a

Description	It should 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 should 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 138b

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 139

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

5.2.2.2 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 140

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, P3.2	**Applicable**	E Meter

DSMR-M 141

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, P3.2	**Applicable**	E Meter

DSMR-M 143

Description	The meter shall provide functionality to set the disconnectable flag before and after the meter is physically installed.						
Rationale	The disconnectable flag will not be adjusted on delivery. Before the meter is deployed however, it needs to have the flag set correctly in order to have the configuration adapted to the place it is installed.						
Fit criterion	By the time the meter is deployed the disconnectable flag is set to the correct value.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0,P3, P3.2	**Applicable**	E Meter

5.2.2.3 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 144

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 may 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, P3.2	**Applicable**	E Meter

5.2.2.4 Perform self-check

DSMR-M 145

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, P3.2	**Applicable**	E Meter

5.2.2.5 Verify topology

DSMR-M 146

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, P3.2	**Applicable**	E Meter

5.2.2.6 Set up communication

DSMR-M 147

Description	After the M&S equipment is physically installed and functions correctly, communication shall be established automatically.						
Rationale	The final step of installation of M&S equipment is to set up communication. At this point in the process the equipment functions correctly and communication shall be set up automatically.						
Fit criterion	The meter shall provide functionality to automatically invoke 'Use case: Set up communication'.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0, P3, P3.2	**Applicable**	E Meter

DSMR-M 147a

Description	The E meter shall indicate on the display that installation of an MBUS device was successful.						
Rationale	During installation it is important to have confirmation of a working connection between E meter and G meter						
Fit criterion	The E meter shall indicate on the display that installation of an MBUS device was successful.						
History	Dec. 2008	**Origin**	I&M	**Port**	P2	**Applicable**	E Meter; G Meter

DSMR-M 2062

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**	DSMR-T 57	**Port**	P3, P2 and P0	**Applicable**	E meter, G meter

5.2.3 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 equipment that is described in the current document. Un-installation of 'traditional' i.e. old equipment is handled in a different way.

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 may lead to un-installation of equipment. Consider, for example, a situation where an E connection changes from single phase to poly-phase. This may lead to 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.

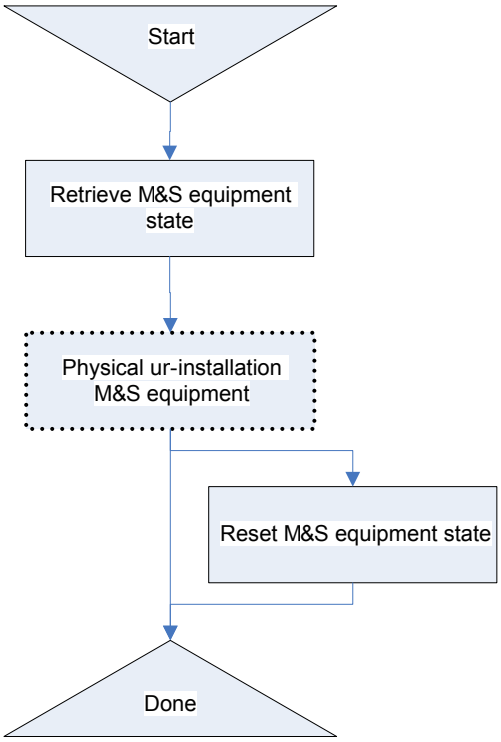


Figure 5-7: Un-install M&S equipment

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.

5.2.3.1 Retrieve M&S equipment state

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

DSMR-M 149

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, P3.2	**Applicable**	E Meter

5.2.3.2 Physical un-install M&S equipment

DSMR-M 151

Description	Communication with other equipment than the metering installation from which equipment is un-installed, shall not be effected in anyway by 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 not be effected by the un-installation.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0, P3, P3.2	**Applicable**	E Meter, G Meter

5.2.3.3 Reset M&S equipment state

DSMR-M 152

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 meterological part of the instruments in any way.
Rationale	The GO may 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**	P0	**Applicable**	E Meter, G Meter

DSMR-M 153

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 meterological part of the instruments in any way.						
Rationale	The GO may 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**	P0	**Applicable**	E Meter, G Meter, DC

5.2.3.4 Performance

DSMR-M 2063

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						
History	Nov. 2007	**Origin**	DSMR-T 58	**Port**	P3, P2 and P0	**Applicable**	E meter, G meter

5.2.4 Use case: Retrieve M&S equipment state

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

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

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

Pre-conditions

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

Parameters

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

Post-conditions

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

Assumptions

- -none-

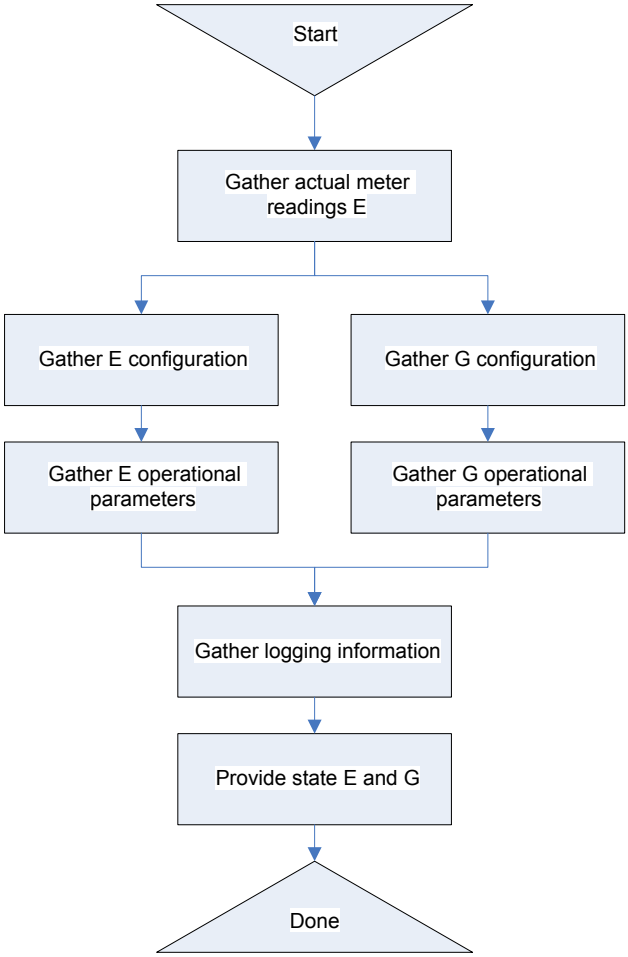


Figure 5-8: M&S Equipment state

5.2.4.1 Gather actual meter readings E

DSMR-M 154

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, P3.2	**Applicable**	E, Meter

5.2.4.2 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 155

Description	The E meter shall provide functionality to retrieve the E configuration.						
Rationale	Information on the configuration is used for maintenance purposes and for troubleshooting 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, P3.2	**Applicable**	E Meter

5.2.4.3 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 2.5.1.2 for a complete description of the operational parameters E).

DSMR-M 156

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 '2.5.1.2'.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0, P3, P3.2	**Applicable**	E Meter

5.2.4.4 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 2.5.1.3 for a complete description of the configuration G).

DSMR-M 157

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 troubleshooting the equipment.						
Fit criterion	The information retrieved as the G configuration shall at least contain the information specified in section '2.5.1.3'.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0, P2, P3, P3.2	**Applicable**	E, Meter

5.2.4.5 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 2.5.1.4 for a complete description of the operational parameters G).

DSMR-M 158

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 '2.5.1.4'.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0, P2, P3, P3.2	**Applicable**	E Meter

5.2.4.6 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 159

Description	The G meter shall provide error and event information to the E meter.						
Rationale	The E meter provides logging information to external entities. The G meter therefore provides error and event information to the E meter.						
Fit criterion	The G meter shall provide on request of the E meter the recent error and event items. The E meter shall log the events and errors, supplied by the Gas meter.						
History	Nov. 2007	**Origin**	NTA+ (§5.3.1.3)	**Port**	P2	**Applicable**	G Meter

DSMR-M 160

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, P3.2	**Applicable**	E Meter

5.2.4.7 Provide state E and G

DSMR-M 161

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, P3.2	**Applicable**	E Meter

5.2.4.8 Performance

DSMR-M 2064

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**	DSMR-T 59	**Port**	P3, P0	**Applicable**	E meter, G meter

5.2.5 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

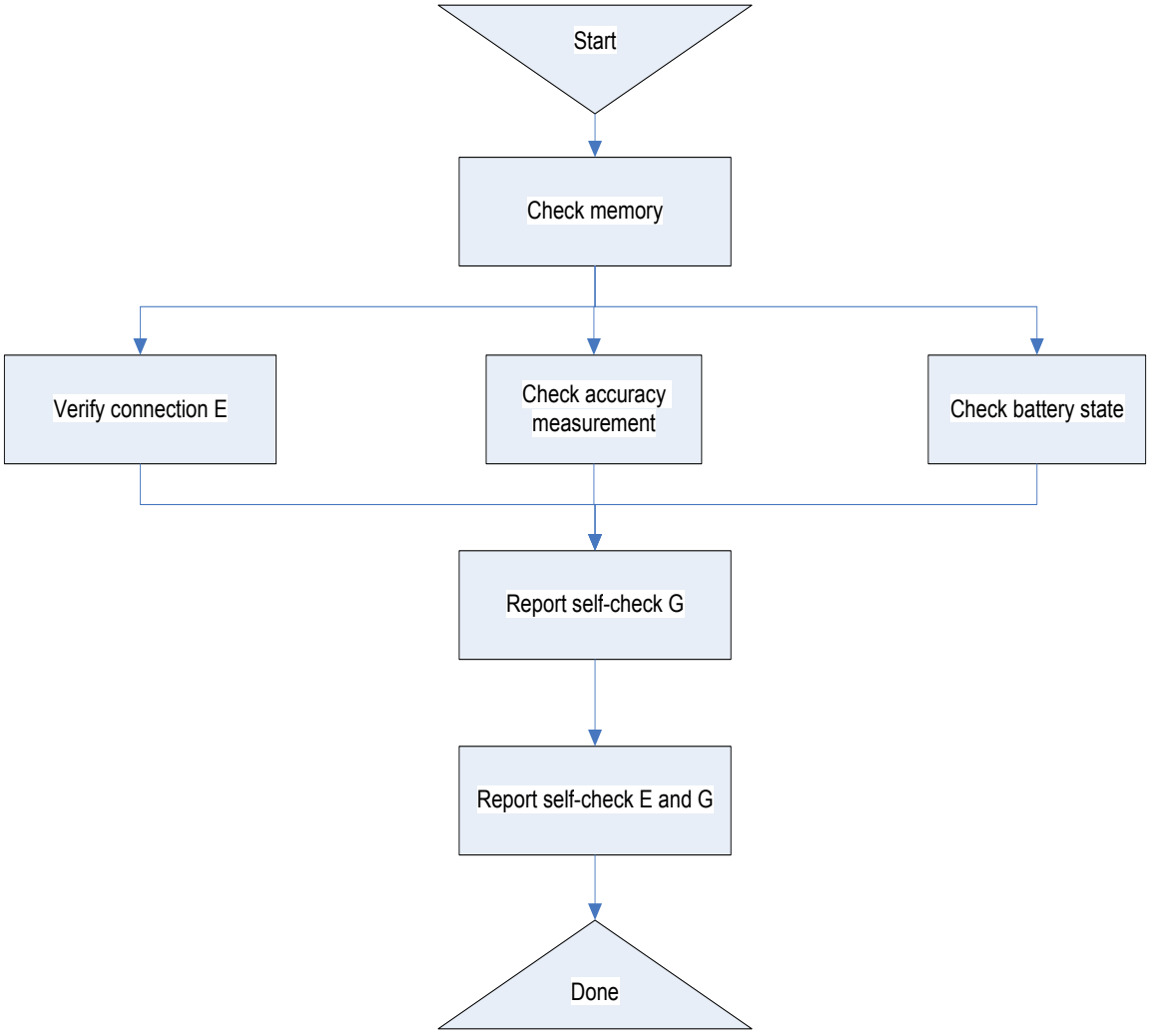


Figure 5-9: Perform self-check

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 163

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, G Meter

5.2.5.1 Check memory

DSMR-M 164

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 may 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 165

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, P3.2	**Applicable**	E Meter, G Meter

5.2.5.2 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 166

Description	The meterological 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 should 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

5.2.5.3 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 167

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 168

Description	At installation the moment that the alarm should re 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 169

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, P3.2	**Applicable**	G Meter

5.2.5.4 Verify connection E

DSMR-M 170

Description	The E meter shall issue a normal error if the meter is not correctly connected to the grid, i.e. that phase inversion occurred.						
Rationale	The self-check is executed as part of the installation process. It is therefore important that a single phase meter verifies that no phase inversion occurred during installation.						
Fit criterion	The error for phase inversion shall at least contain the generic attributes for errors. The error shall also be shown on the display.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3, P3.2	**Applicable**	E Meter

DSMR-M 171

Description	The E meter shall issue a normal error if not all phases of a poly-phase meter are connected correctly to the grid.						
Rationale	The self-check is executed as part of the installation process. It is therefore important that a poly-phase phase meter verifies that all phases are connected correctly before the meter is deployed.						
Fit criterion	The error for incorrect connection of phases shall at least contain the generic attributes for errors. The error shall also be shown on the display.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3, P3.2	**Applicable**	E Meter

5.2.5.5 Check meter display

DSMR-M 172

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

5.2.5.6 Report self-check G

DSMR-M 173

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 174

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 provide the result of the self-check locally too, 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

5.2.5.7 Report self-check E and G

DSMR-M 175

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, P3.2	**Applicable**	E Meter, G Meter

5.2.5.8 Performance

DSMR-M 2065

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**	DSMR-T 60	**Port**	Display	**Applicable**	E meter, G meter

5.2.6 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.

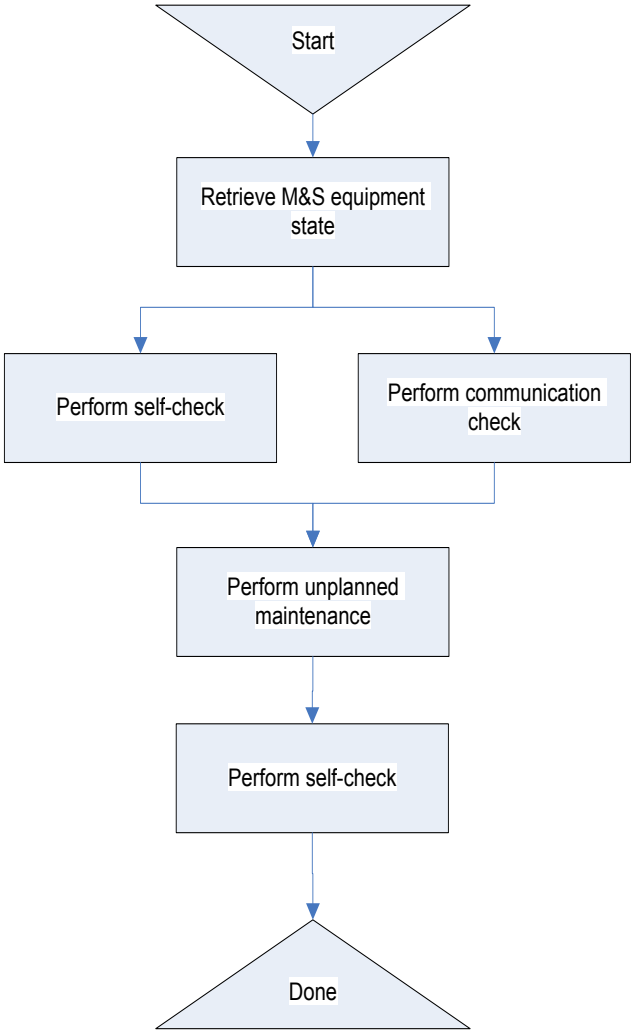


Figure 5-10: Unplanned maintenance on-site

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-

5.2.6.1 Retrieve M&S equipment state

DSMR-M 177

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, P3.2	**Applicable**	E Meter

5.2.6.2 Perform self-check

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

DSMR-M 178

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, P3.2	**Applicable**	E Meter

5.2.6.3 Perform communication check

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

5.2.6.4 Perform unplanned maintenance

There are no requirements for performing unplanned maintenance on equipment.

5.3 Network use cases

This section provides a description of network use cases. These use cases only apply in case the GO is responsible for managing the network. The networks for layout with PLC communication or meshed telecom networks are considered to be managed by the GO. For situations where metering installations are connected directly to a mobile telecom network (which is operated by a telecom provider) or Internet using IP communication, the use cases do not apply.

The DC equipment connects two networks using potentially different communication media. The potential combinations of communication media can include:

- PLC network to mobile telecom network;
- Meshed telecom network to mobile telecom network.

It is expected that new communication technology using multiple networks will occur during lifecycle of the equipment that is subject of this document.

Although the technology in these configurations differs, the functionality of the equipment (and therefore the DC) remains the same. The use cases presented in the following sections focus on the generic functionality and project this functionality on the various equipment used.

Besides connecting multiple networks the DC may provide functionality to optimise communication. Ways to optimise communication include:

- Data compression;
- Reducing the time to keep a connection open;
- Optimising response times.

The use cases presented in the following sections describe as much of the generic optimisations as possible.

5.3.1 Use case: Install DC equipment

This use case provides a description of the installation process of DC equipment and the requirements on the equipment needed to support the process.

Trigger	Description
Need for installation of DC	DC equipment needs to be installed to host M&S equipment that will be installed in the part of the grid that will be hosted by the DC.
Malfunctioning of the concentrator	The grid operator replaces the equipment as a result of the malfunctioning of the concentrator equipment.
End of life of concentrator	The grid operator replaces the equipment because it has reached its end of life.

Pre-conditions

- The DC equipment is in the state as delivered by the vendor.

Parameters

- Configuration information.

Post-conditions

- The DC equipment is fully operational in the production environment.

Assumptions

- None.

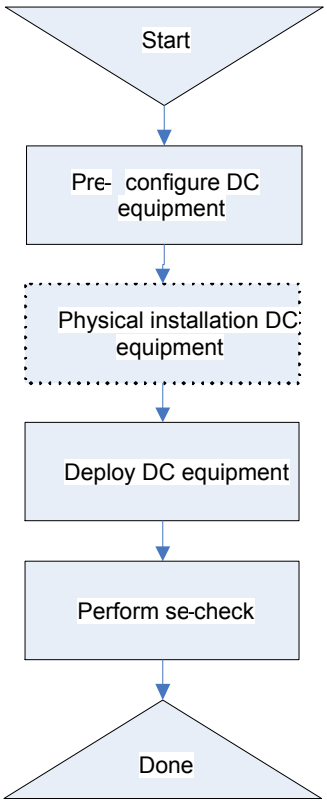


Figure 5-11: Install DC equipment

DSMR-M 179

Description	The vendor of the DC equipment shall deliver a software package that supports adjustment of the configuration of the equipment.						
Rationale	The GO will configure the DC equipment. In order to facilitate this process the GO needs an automated tool to modify the configuration of the DC equipment.						
Fit criterion	The tool provided by the vendor of the equipment shall support the complete pre-configuration functionality for all DC equipment.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

5.3.1.1 Pre-configure DC equipment

During the activity of pre-configuring the GO prepares the equipment for installation.

DSMR-M 180

Description	The DC shall provide functionality to set the internal clock to national standard time before it is installed.						
Rationale	The clock in the DC will not be adjusted to national standard time on delivery. Before the equipment is deployed however, it needs to have the time set in order to function correctly.						
Fit criterion	By the time the DC is physically installed the time of the internal clock shall deviate less than 30 seconds from national standard time.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

DSMR-M 129a

Description	The DC shall provide functionality to automatically adjust to daylight savings time and back.						
Rationale	National standard time includes two shifts of an hour every year: switch to daylight savings time and back. The DC 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 30 seconds from national standard time at any time.						
History	Apr. 2008	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

DSMR-M 187

Description	The DC equipment shall provide functionality to specify the metering installations that are hosted by it prior to installation of the DC equipment.						
Rationale	In order to facilitate the process of automatically establishing a connection between the meter and the DC, the DC may need information on the metering installations that it will host, although the algorithm for establishing a connection between a DC and a metering installation does not require the information to be available in the DC.						
Fit criterion	The DC shall store the equipment identifiers for hosted equipment.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.1.2 Physical installation DC equipment

DSMR-M 181

Description	The DC shall facilitate a secure connection to the grid.						
Rationale	The connection of the DC to the grid is not used for distribution purposes. The only reason to connect the DC to the grid is for communication. There is no need for heavy wiring.						
Fit criterion	The construction of the DC shall contain connectors suitable for 2.5 mm^2 wiring.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

DSMR-M 182

Description	The DC shall incorporate network adapters for both networks.						
Rationale	In order to reduce costs for installation the DC shall incorporate network adapter for both networks: the connection to the metering installation and the connection with the central system.						
Fit criterion	The DC shall be delivered as a single installable unit.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

DSMR-M 183

Description	The vendor of the DC shall indicate the maximum number of metering installations that can be hosted by a single DC. Furthermore, the vendor shall provide insight in the performance characteristics of the DC as a function of the number of hosted metering installations.
Rationale	The number of metering installations that can be handled by the DC differs considerably for the various communication technologies. Furthermore the number of hosted metering installations may depend on the layout of the grid. In order to enable

	the GO to make the right choices the vendor shall provide information on this subject.						
Fit criterion	The GO can acquire insight in the optimal number of metering installations that are hosted by a single DC.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

5.3.1.3 Deploy DC equipment

DSMR-M 184

Description	The DC shall provide functionality to set location information during installation.						
Rationale	GO's will set location information in the equipment for network management and maintenance reasons. The location information typically consists of the identifier of the mid-voltage station or geographical co-ordinates.						
Fit criterion	*Fit criterion will differ per GO*						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

DSMR-M 185

Description	The DC equipment shall provide functionality to set the function location (identifier for the DC).						
Rationale	GO's will specify the function location by means of the grid co-ordinates of the hub or any other value.						
Fit criterion	*Fit criterion will differ per GO*						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.1.4 Perform self-check

DSMR-M 186

Description	The DC shall provide functionality to invoke 'Use case: Perform self-check DC equipment' and retrieve the results locally (local DC port 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 DC equipment'.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local, P3.2 or Display	**Applicable**	DC

5.3.1.5 Performance

DSMR-M 2066

Description	The activities for the process of installing DC 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 DC 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**	DSMR-T 61	**Port**	P3 and P0	**Applicable**	DC

5.3.2 Use case: Un-install DC equipment

This use case provides a description of the process of uninstalling DC equipment and the requirements on the equipment needed to support the process.

Various triggers exist for uninstalling DC equipment as indicated in the table below.

Trigger	Description
Change of telecom network	Developments in telecom technology are rapid. As a result a telecom network that is a good fit now may be out-of-date in the near future. For this reason replacement of (part of) the DC equipment is a realistic scenario.
Malfunctioning equipment	In case the GO experiences malfunctioning of DC equipment he can decide to replace (part of) the equipment.
End of life cycle	In case the life cycle of (part of) the DC equipment is complete, it is uninstalled.

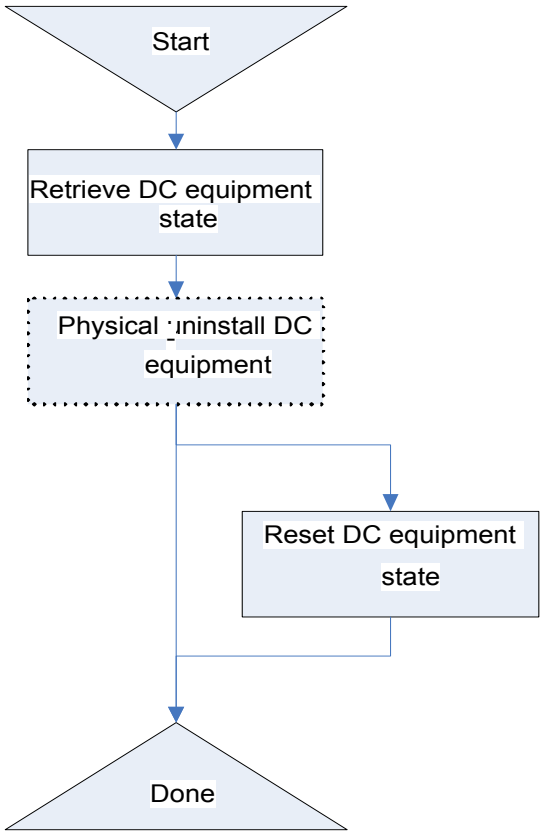


Figure 5-12: Un-install DC equipment

Pre-conditions

- DC equipment or part of it has to be uninstalled.

Parameters

- Equipment identifiers for the parts of DC equipment that have to be uninstalled;

Post-conditions

- DC equipment or part of it has been uninstalled.

Assumptions

- - none -

5.3.2.1 Retrieve DC equipment state

DSMR-M 189

Description	The DC shall provide functionality to invoke use case 'Retrieve DC equipment state'.						
Rationale	It is assumed that network management is handled by a dedicated system. In order to facilitate network management the DC equipment shall be able to provide the information necessary for network management. The information provided by the current use case is primarily used to verify consistency of data in the network management system and the equipment in the field.						
Fit criterion	Retrieval of the DC state during un-installing DC equipment shall comply with the description of use case 'Retrieve DC equipment state'.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.2.2 Physical un-install DC equipment

DSMR-M 190

Description	Communication with other equipment than the equipment hosted by the DC, shall not be effected in anyway by the removal of the DC equipment.						
Rationale	The DC is not supposed to serve as an essential communication component for equipment that is not hosted by it.						
Fit criterion	Communication of equipment hosted by another DC than the one that is un-installed shall not be effected by the un-installation of the DC.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

5.3.2.3 Reset DC equipment state

DSMR-M 191

Description	The DC shall provide functionality to reset the DC equipment state after the equipment is physically uninstalled.						
Rationale	In case equipment is uninstalled it may be suitable for re-use. For this reason it is needed to reset the equipment state to for instance the original settings as delivered by the vendor.						
Fit criterion	The DC equipment shall provide functionality to reset the equipment state to the original settings as delivered by the vendor.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.2.4 Performance

DSMR-M 2067

Description	The activity of un-installing DC equipment (excluding physical un-installation) shall be completed in a limited period of time.
Rationale	Un-installing DC equipment requires retrieving the state from the equipment. After this 'virtual' un-install the physical un-install is executed. The time needed for the physical

	un-install is not included in this requirement.						
Fit criterion	The completion rates and times to be met are: P3 P0 99 %: 2 minutes 1 minute						
History	Nov. 2007	**Origin**	DSMR-T 62	**Port**	P3 and P0	**Applicable**	DC

5.3.3 Retrieve DC equipment state

This use case provides a description of the process of retrieving the complete state of the DC equipment.

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

Trigger	Description
Un-install DC equipment	Before equipment is physically uninstalled the GO may 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.

Pre-conditions

- The state of the equipment is unknown or unavailable.

Parameters

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

Post-conditions

- The state of the equipment is available.

Assumptions

- -none-

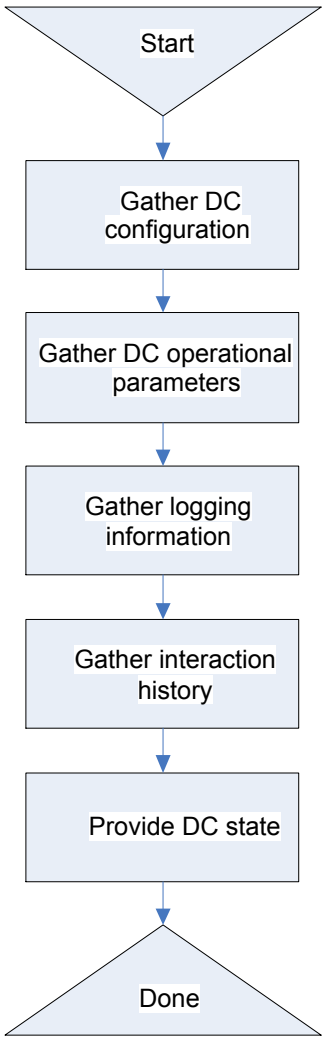


Figure 5-13: DC Equipment state

5.3.3.1 Gather DC configuration

The DC state consists of information in the equipment that was inserted by the GO (refer to section 2.5.2.1 for a complete description of the configuration).

DSMR-M 193

Description	The DC shall provide functionality to retrieve the DC configuration.						
Rationale	Information on the configuration is used for maintenance purposes and for troubleshooting the equipment.						
Fit criterion	The information retrieved as the DC configuration shall at least contain the information specified in section '2.5.2.1'.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.3.2 Gather DC operational parameters

The operational parameters for the DC equipment include all parameters that are set on the equipment on behalf of GO's (refer to section 2.5.2.2 for a complete description of the operational parameters for DCs).

DSMR-M 194

Description	The DC shall provide functionality to retrieve the DC 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 equipment shall at least contain the information specified in section '2.5.2.2'.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.3.3 Gather logging information

The DC equipment is required to store logging information on changes to the operational parameters or the configuration of the equipment. The current 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 195

Description	The DC shall issue a logical error in case of an incorrect interval to retrieve logging and interaction history for.						
Rationale	The interval to retrieve logging and interaction history for can be provided as open or closed interval. For an open interval the timestamp for either the beginning or for the end of the interval is provided. In case of a closed interval timestamps for both begin and for the end are provided. In the latter case the timestamp for the beginning shall be before the timestamp of the end of the interval otherwise a logical error is issued.						
Fit criterion	The logical error issued for an incorrect interval shall, besides the generic attributes for errors, contain at least the following information: ▪ Timestamps for the beginning and for the end of the interval.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

DSMR-M 196

Description	The DC shall provide logging information and errors registered for the indicated interval.						
Rationale	The DC 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 DC shall provide on request of an external entity the 1000 most recent log items or the log items for the designated interval.						
History	Nov. 2007	**Origin**	NTA+	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.3.4 Gather interaction history

The interaction history is usually combined with logging information to solve problems with equipment. The interaction history is also useful for determining the performance of equipment and communication.

The interaction history represents the external activities of the equipment whereas the logging information represents internal activities.

DSMR-M 197

Description	The DC shall record the details of each interaction with external equipment.						
Rationale	In order to interpret the logging information and the state of equipment it is important to know which interaction took place between the equipment and external entities.						
Fit criterion	The details recorded for each interaction shall at least include the following information: ▪ Equipment identifier of the external entity that the equipment communicated with; ▪ Timestamp of the moment that the request was received (if applicable); ▪ Timestamp of the moment that the response was sent (if applicable); ▪ Type of the activity requested.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

DSMR-M 198

Description	The DC shall provide sufficient information on interactions with external entities to interpret logging information.						
Rationale	Interaction with external entities is usually related to use cases. A use case is invoked by interaction with an external entity. During the execution of a use case usually multiple events are logged. The number of items in the interaction history can therefore be less than the number of logged events.						
Fit criterion	The DC shall provide the interaction information for the 200 most recent interactions with the equipment.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.3.5 Provide DC state

DSMR-M 199

Description	The DC shall provide the complete DC state, logging information and interaction history.						
Rationale	The logging information is used to derive how the equipment came in the state it is in.						
Fit criterion	The DC state and auxiliary information shall at least contain the following information: • Complete configuration and operational parameters for DC equipment; • Complete logging information; • Complete interaction history.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.3.6 Performance

DSMR-M 2068

Description	The activity of retrieving the state of DC equipment shall be completed in a limited period of time.						
Rationale	The state of DC equipment is retrieved for problem solving.						
Fit criterion	The completion rates and times to be met are: P3 P0 99 %: 5 minutes 1 minute						
History	Nov. 2007	**Origin**	DSMR-T 63	**Port**	P3 and P0	**Applicable**	DC

5.3.4 Use case: Perform self-check DC equipment

The purpose of this use case is to provide the GO insight in the functioning of the DC 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 and installation.
On-demand	The GO wants to execute a self-check on-demand. This typically happens after installation or maintenance on the equipment.
Install DC equipment	A self-check on the equipment is performed as part of the installation process.

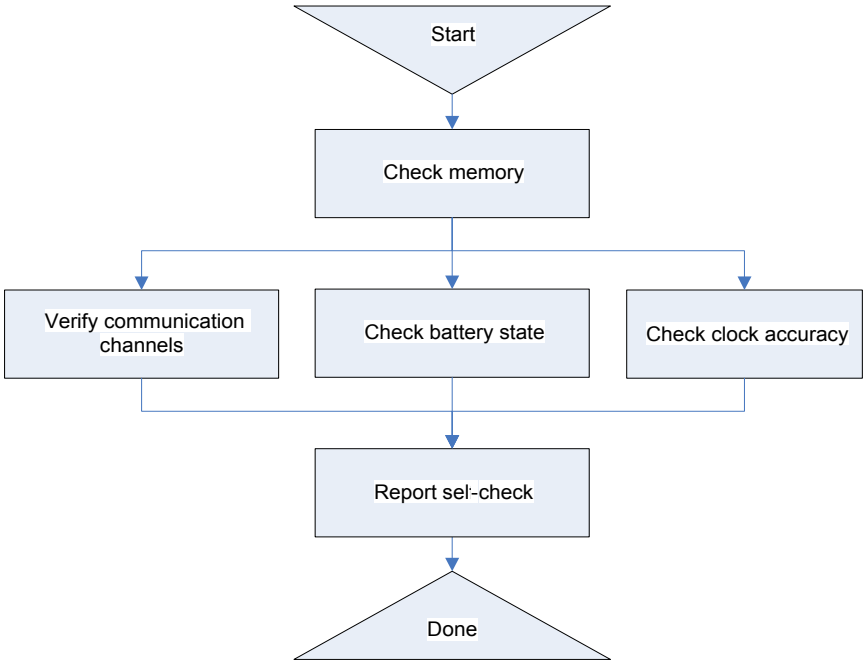


Figure 5-14: Perform self-check DC

Pre-conditions

- The overall condition of the DC equipment is unknown.

Parameters

- -none-

Post-conditions

- The overall condition of the DC equipment is known.

Assumptions

- -none-

DSMR-M 201

Description	The DC equipment shall automatically execute a self-check each time power re-occurs on the DC.						
Rationale	During a period in which there is no power on the DC, the DC 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 DC equipment shall verify that the equipment functions correctly after each outage and each time it is connected to the grid.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

5.3.4.1 Check memory

DSMR-M 202

Description	The DC 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 may 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 DC equipment shall verify that the memory of the equipment is consistent.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

DSMR-M 203

Description	The DC equipment shall issue a logical 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 logical error for inconsistent memory in DC equipment shall contain the generic attributes for errors.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3.2	**Applicable**	DC

5.3.4.2 Check clock accuracy

DSMR-M 204

Description	The DC equipment shall be able to determine the deviation of the internal clock since the previous self-check.						
Rationale	For maintenance reasons it is important to have an indication on the accuracy of the clock. In cases where the clock is too inaccurate, the equipment may need to be replaced.						
Fit criterion	The DC equipment shall verify that the maximum deviation of the clock did not exceed a predefined (configurable) deviation at any time since the previous self-check.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

DSMR-M 205

Description	The DC equipment shall issue a logical error for each time it detects that the time of the internal clock deviated more than a pre-defined number of seconds.						
Rationale	GO's wants to be informed on clock inaccuracy before the inaccuracy exceeds the pre-defined level.						
Fit criterion	The error for clock deviation shall, besides the generic error attributes contain at least the following information: ▪ The deviation in time (specified in seconds); ▪ Timestamp of when the previous self-check was executed.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3.2	**Applicable**	DC

5.3.4.3 Check battery state

Under some circumstances the application of a battery is essential (e.g. for backup purposes). 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 206

Description	The DC equipment using a battery shall be able to determine the remaining lifetime of the battery.						
Rationale	In case of a dead battery the equipment may not be able to provide all functionality. 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 (i.e. a simple counter will not do).						
Fit criterion	The equipment shall be able to determine the remaining lifetime of the battery at any given moment within a range of a year.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

DSMR-M 207

Description	The DC equipment using a battery shall issue a logical error if the remaining lifetime of the battery is determined to be in the range of 1.5 and 2.5 years.
Rationale	GO's wants to be informed on the lifetime of batteries in order to plan and executed replacement. The remaining lifetime is used to determine if replacement of the battery can be combined with other on-site maintenance.

Fit criterion	The error for battery lifetime shall, besides the generic attributes for errors, at least contain the following information: ▪ The remaining lifetime of the battery (specified in days).						
History	Nov. 2007	**Origin**	I&M	**Port**	P3.2	**Applicable**	DC

5.3.4.4 Verify communication channels

DSMR-M 208

Description	The DC equipment shall verify that the communication channels that it is connected to are available for usage.						
Rationale	After installation it is important to make sure that the equipment is correctly connected to the communication channels. Although situations may occur where there is no equipment to communicate with, the DC equipment has to make sure that the channels for both networks are available.						
Fit criterion	The DC shall determine if carriers are available for both channels it is connected to.						
History	Nov. 2007	**Origin**	I&M	**Port**	n.a.	**Applicable**	DC

DSMR-M 209

Description	The DC equipment shall issue a logical error if for a network the channel is unavailable.						
Rationale	For DC equipment to be operational both channels have to be available.						
Fit criterion	The error for unavailable channels shall, besides the generic attributes for errors, contain information on the networks for which a channel is unavailable.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3.2	**Applicable**	DC

5.3.4.5 Report self-check

DSMR-M 210

Description	The DC shall indicate if the self-check succeeded or failed.						
Rationale	The DC gathers the results of the self-check and reports if the self-check failed.						
Fit criterion	If any of the verifications of the self-check failed, the self-check shall fail. If all verifications pass, the self-check shall report success. The result of the self-check shall at least contain the following information: ▪ Result of self-check; ▪ Timestamp for the execution of the self-check;						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.4.6 Performance

DSMR-M 2069

Description	The activity of executing a self-check on DC equipment shall be completed in a limited period of time.						
Rationale	A self-check is performed in multiple situations. Under some circumstances it is automatically executed (e.g. on power-up), sometimes it is executed on demand. In all situations however, a remote self-check is considered to be an 'online' activity.						
Fit criterion	The completion rates and times to be met are: P3 P0 99 %: 2 minutes 5 seconds						
History	Nov. 2007	**Origin**	DSMR-T 64	**Port**	P3 and P0	**Applicable**	DC

5.3.5 Use case: Verify topology

The purpose of this use case is to verify the topology of equipment in a network. The use case is executed as part of the installation process to verify that equipment is installed correctly.

Trigger	Description
Install equipment	During installation information is registered on the equipment installed at a location. This information is stored in a central system and is verified by the current use case.

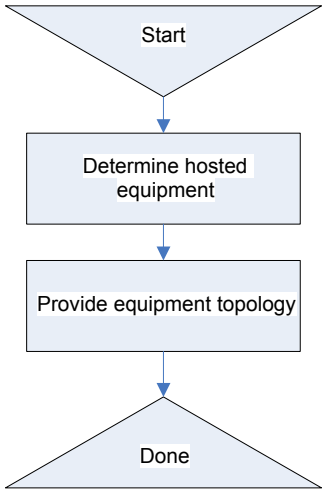


Figure 5-15: Verify topology

Pre-conditions

- The topology of a piece of equipment is uncertain.

Parameters

- Equipment identifier for the equipment, assigned by the GO, for which to verify the topology;

Post-conditions

- The topology of the equipment is available or the equipment is not found;

Assumptions

- The current use case description is based on the assumption that the E meter functions as a local host to all other equipment installed at the premises of a consumer;
- The current use case description is based on the assumption that the DC functions as a gateway;

- The current use case description is based on the assumption that breakers and valves have no individual equipment identifiers assigned.

5.3.5.1 Determine hosted equipment

DSMR-M 212

Description	The DC shall provide functionality to determine if a specified piece of equipment is hosted by it either directly (e.g. an E meter) or in-directly (e.g. a G meter via an E meter).						
Rationale	Equipment can be misplaced, especially during the roll out phase. For these situations the system shall provide facilities to verify the location and topology.						
Fit criterion	Given the equipment identifier for a piece of equipment, the DC can determine if this equipment is hosted by it or not.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.5.2 Provide equipment topology

DSMR-M 213

Description	The DC shall provide functionality to report on equipment hosted by it.						
Rationale	This functionality is especially useful to determine if a piece of equipment is deployed under a given DC.						
Fit criterion	The DC shall report on the specified piece of equipment and any collocated equipment by providing at least the following information: ▪ Equipment identifier for the DC assigned by the GO; ▪ Equipment identifier for the E meter assigned by the GO; ▪ Equipment identifier for the G meter (if any) assigned by the GO;						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.2	**Applicable**	DC

5.3.5.3 Performance

DSMR-M 2070

Description	The activity of verifying the equipment topology shall be completed in a limited period of time.						
Rationale	Verifying the topology is executed as part of the installation process. This implies that it is an 'online' activity.						
Fit criterion	The completion rates and times to be met are: P3 P0 99 %: 2 minutes 5 seconds						
History	Nov. 2007	**Origin**	DSMR-T 65	**Port**	P3 and P0	**Applicable**	E meter, G meter, DC

5.4 Communication use cases

Please note that the communication use cases presented in this section apply to communication handled by DC equipment only. The networks mentioned in the current section are therefore the networks operated by the GO. Communication over networks operated by telecom providers is not subject to the requirements presented in this section.

5.4.1 Use case: Set up communication

Trigger	Description
New M&S equipment is installed	In case new M&S equipment is installed, the equipment tries to set up communication by finding a host.
M&S equipment could not reach host	In case M&S equipment could not reach its host for a pre-defined amount of time, the M&S equipment tries to re-establish the communication through a host.

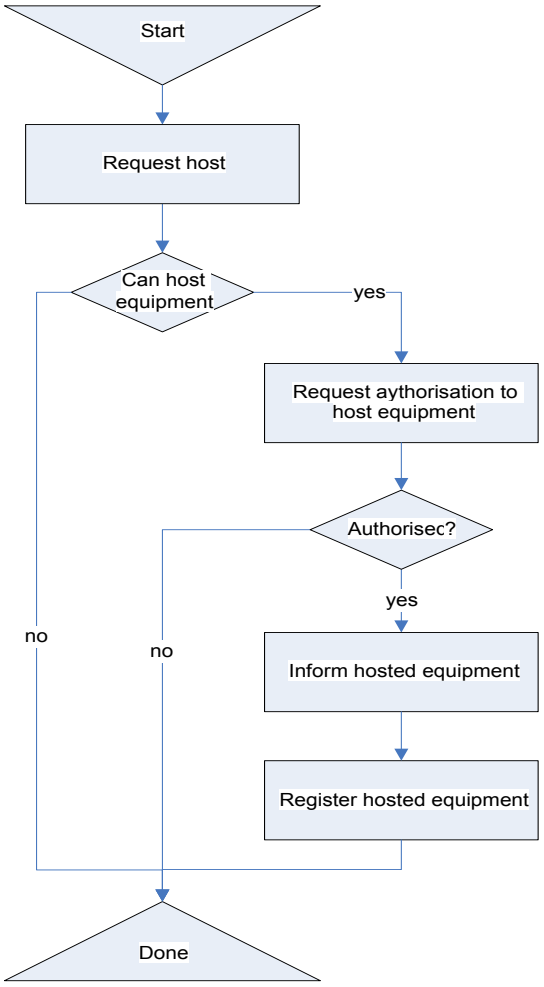


Figure 5-16: Set up communication

Pre-conditions

- The M&S equipment does not have a host for communication or cannot reach the host.

Parameters

- Location information of the requesting equipment

Post-conditions

- The M&S equipment has established a contract with an authorized host.

Assumptions

- -none-

5.4.1.1 Request host

DSMR-M 215

Description	The E meter shall provide functionality to automatically issue a request for a host.						
Rationale	M&S equipment relies on a host for communication. In cases where M&S equipment has no host yet or cannot reach its host, it will automatically be registered by a (new) host. The request contains the location information of the requester.						
Fit criterion	In case there was no communication between M&S equipment and its host for a period of 24 hours the M&S equipment shall automatically be registered by a new host.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3.1	**Applicable**	E Meter, DC

5.4.1.2 Request authorization to host equipment

DSMR-M 216

Description	The DC shall provide functionality to respond to a request for a host issued by M&S equipment by requesting the central system authorization to host the M&S equipment.						
Rationale	It is important that relationships between hosts and hosted equipment are centrally registered. The host therefore asks for authorization. The request to host M&S equipment contains the location information of the M&S equipment, this information can be used.						
Fit criterion	The DC equipment shall issue a request for authorization to serve as a host for the requesting equipment containing the location information of both the M&S equipment and the DC equipment.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3.2	**Applicable**	DC

DSMR-M 217

Description	The DC shall provide functionality to handle the reply from the central system to a request to host for M&S equipment.						
Rationale	Besides the authorization, the host may need information on the hosted equipment in order to be able to communicate with it in a safe manner. Consider for example of encryption keys which can be exchanged together with the authorization.						
Fit criterion	The DC equipment shall register the relevant information on hosted equipment that is provided in the reply to the authorization request.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3.2	**Applicable**	DC

5.4.1.3 Inform hosted equipment

DSMR-M 218

Description	The DC shall provide functionality to inform M&S equipment that it is authorized to host

	it.						
Rationale	After the new host is authorized the hosted M&S equipment is informed of the fact that it has a new host. The hosted equipment can then use the new host for communication.						
Fit criterion	The DC shall inform the M&S equipment on its role as a host, by sending the hosted equipment its equipment identifier.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3.1	**Applicable**	DC

DSMR-M 219

Description	The E meter shall provide functionality to register its host's equipment identifier.						
Rationale	In case the GO experiences communication problems with M&S equipment he may use information on the host of the equipment to try to solve the problem.						
Fit criterion	The state of E equipment includes the identifier of the host as the 'DC' attribute in the E configuration. The M&S equipment shall therefore register the host and provide the hosts equipment identifier as part of the M&S equipment state.						
History	Nov. 2007	**Origin**	I&M	**Port**	P0, P3.1	**Applicable**	E meter

5.4.1.4 Register hosted equipment

DSMR-M 220

Description	The DC shall provide functionality to register hosted equipment.						
Rationale	In case the GO experiences communication problems with M&S equipment he may use information on the hosted equipment to try to solve the problem.						
Fit criterion	DC equipment shall provide a list of equipment identifiers for hosted equipment as part of its state. The DC equipment shall register the equipment identifier of all hosted equipment.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.1	**Applicable**	DC

DSMR-M 221

Description	The DC shall provide functionality to un-register hosted equipment.						
Rationale	In case M&S equipment acquires another host, the old host may have to be informed of the fact that is not considered as the host for the designated M&S equipment anymore.						
Fit criterion	The DC will remove the M&S equipment from the list of hosted equipment if that equipment isn't hosted anymore.						
History	Nov. 2007	**Origin**	I&M	**Port**	Local DC port, P3.1	**Applicable**	DC

5.4.1.5 Performance

DSMR-M 2071

Description	The activity of setting up communication shall be completed in a limited period of time.		
Rationale	Setting up communication is executed as part of the installation process. This implies that it is an 'online' activity.		
Fit criterion	The completion rates and times to be met are:		
		P3	P0
	99 %:	2 minutes	1 minute

History	Nov. 2007	Origin	DSMR-T 66	Port	P3 and P0	Applicable	E meter, G meter, DC

5.4.2 Use case: Communication check

This use case provides a description of the process of determining the availability of the communication channel by equipment. The main purpose of this use case is to determine if an error was caused by malfunctioning equipment or by a communication failure.

Trigger	Description
GO experiences a problem with equipment	If the GO does not receive responses of equipment within the pre-determined interval, the GO wants to determine if this is caused by malfunctioning equipment or by failing communication.
Unplanned on-site maintenance	A communication check is performed as part of the process of unplanned on-site maintenance.

Pre-conditions

- The GO experiences a problem with equipment

Parameters

- Equipment identifier for the equipment for which to determine if communication is possible;
- Time out for the request (specified in milliseconds);

Post-conditions

- The GO has determined if the problem was caused by communication failure or malfunctioning equipment

Assumptions

- -none-

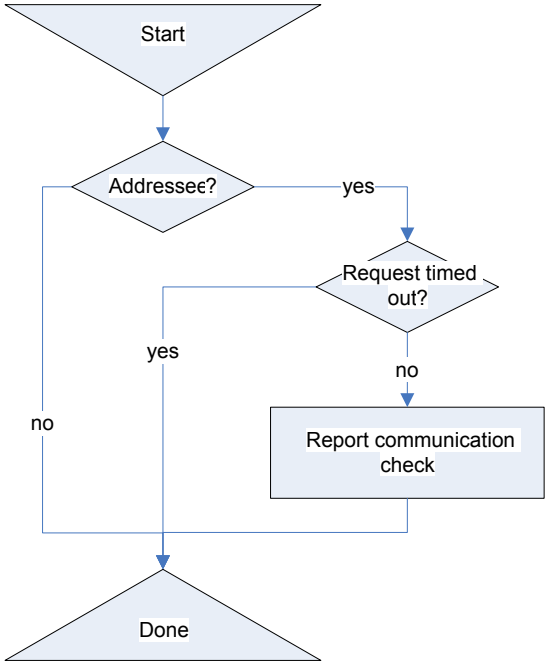


Figure 5-17: Communication check

5.4.2.1 Report communication check

DSMR-M 223

Description	The DC shall provide functionality to respond to a communication test initiated by the central system in case it is the addressee of the test and the request did not time out.						
Rationale	Executing a communication test is only useful if a specified time for completion is included. The time for the test to be completed is therefore provided as a parameter (time out). If the specified time has passed, the test is timed out (aborted) and the test failed. The central system will assume that no communication with the designated equipment is possible (within the indicated amount of time).						
Fit criterion	Communication check is done indirectly by asking the status or an on demand read of a value from the DC or the meter.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3.2	**Applicable**	DC

DSMR-M 224

Description	The DC shall provide functionality to report the results of a communication test to the central system if it is the addressee of the test.						
Rationale	The result of the communication test is send by the addressee to the central system as a return value.						
Fit criterion	Communication check is done indirectly by asking the status or an on demand read of a value from the DC or the meter.						
History	Nov. 2007	**Origin**	I&M	**Port**	P3.2	**Applicable**	DC

5.4.2.2 Performance

DSMR-M 2072

Description	The activity of checking communication shall be completed in a limited period of time.						
Rationale	Checking communication is executed as part of the installation process. The amount of information exchanged during the communication check is kept to a minimum in order to facilitate fast response times.						
Fit criterion	The completion rates and times to be met are: P3 P0 99 %: 10 seconds 10 seconds						
History	Nov. 2007	**Origin**	DSMR-T 67	**Port**	P3	**Applicable**	E meter, G meter, DC

6 FUNCTIONAL DESCRIPTION DATA CONCENTRATOR

6.1 Introduction

In this chapter, the functional description of the data concentrator (data collector), abbreviated DC, will be presented. The DC will be placed between the CS and the meter(s); with this, the DC divides P3 into two parts. Please refer to *Figure 5-1: Overview P3.1 and P3.2 interfaces* for further explanation.

The final objective is that the DC will be interoperable, in both interfaces. In this chapter, the functionality of the DC will be described for each use case as described in Chapter 4 and 5. The functional requirements of the DC depend on the use case involved and these use cases may vary from very simple to very smart. In this chapter three possible use cases can be distinguished:

1. DC as network switch: DC only forwards requests to a particular meter and returns the responses;
2. DC as network router: DC has some intelligence regarding the grouping and de-grouping of meters
3. DC as smart component: DC has specific intelligence for supporting smart meters.

Since the DC must comply with all the use cases this means that the DC must be a smart component.

The DC must be able to support all use cases described in Chapter 4 and 5 where the CS is involved. This chapter only adds use cases specific for the DC. The table below gives an overview of the use cases described in chapter 4 and chapter 5 for which instances the DC will provide information already stored within the DC (for example: provide interval values), and for which instances the meter is requested directly on the initiative of the CS (for example: Provide actual meter read).

Use Case	Relevancy for DC	Access to meter initiated by DC (6.2)	Access to meter initiated by CS (6.3)
1 Provide periodic meter reads	Yes	Yes	Yes
2 Provide actual meter reads	Yes	No	Yes
3 Provide actual meter reads to P1	No	N.A.	N.A.
4 Provide interval values	Yes	Yes	Yes
5 Provide equipment status to P1	No	N.A.	N.A.
6 Provide power quality information	Yes	Yes	Yes
7 Provide outage information	Yes	Yes	No
8 Provide tamper history	Yes	Yes	No
9 (Dis)connect E	Yes	No	Yes
10 Apply threshold (electricity)	Yes	No	Yes

11 (Dis)connect G	Yes	No	Yes
12 Display standard messages	Yes	No	Yes
13 Sending long messages to port P1	Yes	No	Yes
14 Shift tariff times electricity	Yes	No	Yes
15 Synchronise time	Yes	Yes (See 6.4)	Yes (See 6.4)
16 Synchronise time G-equipment	No	N.A.	N.A.
5.1.2 Firmware Upgrade	Yes	No	Yes
5.2.4 Retrieve M&S equipment state	Yes	Yes	Yes
5.3 Network use cases	Yes	No	Yes
5.4 Communication use cases	Yes	No	Yes

Table 6-1: Access initiation overview

The configuration of the network decides which system initiates the communication, CS or DC. It may be necessary to change the settings provided in Table 6-1, for instance for optimizing the network. Some information is gathered on request of the energy supplier (e.g. interval values). When information is not requested, there is no need to gather this information.

6.2 Request daily information

This section describes the use case for retrieving daily information from the meters by the DC, and providing this information to the CS.

Trigger	Description
Time interval between daily request for information	The DC request the E meter to send all the accumulated daily information (including the G meter data) to be sent to the DC.
Not all required data is available	The DC retries to receive the required data.

Figure 6-1: Request daily information - trigger description

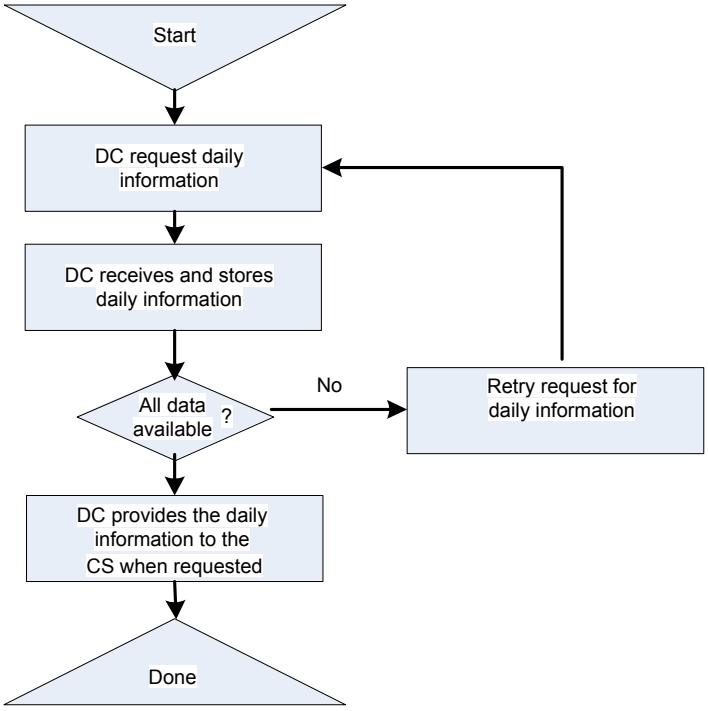


Figure 6-2: Request daily information - block diagram

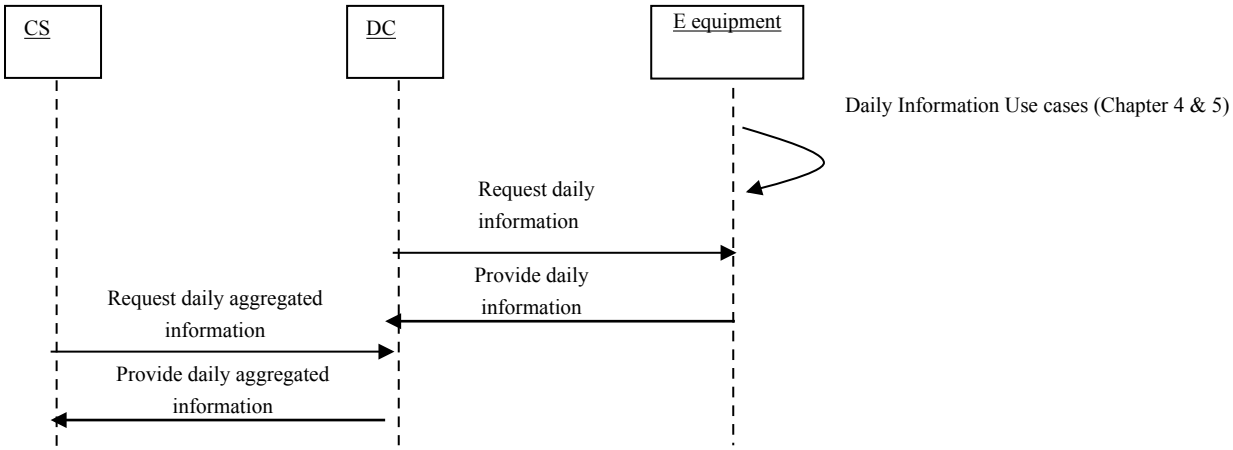


Figure 6-3: Request daily information - UML sequence diagram

Pre-conditions

- The CS needs to actualise its metering information.

Parameters

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

Post-conditions

- All available information from the E- and G- equipment within the service area is available in the CS.

DSMR-M 226

Description	The DC shall provide functionality to retrieve the daily information of all E- and G-meters in the DC service area.						
Rationale	Daily meter information (e.g. daily meter reads) for E and G needs to be available, according to §5.2.1 of NTA 8130. The DC shall collect all meter information for E and G in the DC service area and then send all meter information to the CS when requested.						
Fit criterion	The DC is able to address all meters in the DC service area and to retrieve daily: ▪ Periodic meter reads (Use case 1, chapter 4) ▪ Interval values (Use case 4, chapter 4) ▪ Power quality information (Use case 6, chapter 4) ▪ Outage information (Use case 7, chapter 4) ▪ Tamper history (Use case 8, chapter 4) ▪ M&S equipment state (Requirement 5.2.4) After a data retrieval has been carried out, all required data is available.						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.1	**Applicable**	DC

DSMR-M 227

Description	The DC shall check if all required data is available after a daily information retrieval and shall initiate requests when certain information is missing.						
Rationale	When the communication with certain electricity meters fails, the DC should make several attempts to retrieve the information at a later stage. The DC shall control the completeness of information autonomously.						
Fit criterion	The DC shall request missing information: • At least 20 days after the date for which information is missing.						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.1	**Applicable**	DC

DSMR-M 228

Description	The DC shall provide functionality to store the periodically retrieved daily information of all E- and G-meters in the DC service area.						
Rationale	Daily information (e.g. meter reads) for E and G need to be available, according to §5.2.1 of NTA 8130. The DC shall collect all information for E and G in the DC service area and then send all this information to the CS. It must be possible to store these data for a sufficient period, until the CS retrieves them.						
Fit criterion	The DC is able to store the daily information of all E- and G-meters in the DC service area for at least 20 days Data may not be lost during a power outage of the DC.						
History	Mar. 2008	**Origin**	NTA+	**Port**	n.a.	**Applicable**	DC

DSMR-M 229

Description	The DC shall provide functionality to send the retrieved daily information of all E- and G-meters in the DC service area on request to the CS.						
Rationale	Daily information (e.g. meter reads) for E and G needs to be available, according to §5.2.1 of NTA 8130. The DC shall collect all meter information for E and G in the DC service area and then send this information to the CS.						
Fit criterion	The DC is able to send the daily meter information of all E- and G-meters in the DC service area for a specified period to the CS.						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.2	**Applicable**	DC

DSMR-M 230

Description	The DC shall provide functionality to retrieve and/or supply the daily meter information of *one* specific E- or G-meter in the DC service area (specified by the equipment identifier) for a specified period on request.						
Rationale	When information is missing in the CS for a specific metering installation, the missing information can be requested by the CS to the DC, without retrieving all information for all E and G equipment in the service area..						
Fit criterion	The DC is able to send the daily meter information of *one* specific E- and G-meter in the DC service area for a specified period to the CS.						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.2	**Applicable**	DC

DSMR-M 2073

Description	The activity of retrieving daily information from the meters by the DC shall be completed in a limited period of time.						
Rationale	If the information retrieval takes too much time, this will cause delays in the meter data collection process.						
Fit criterion	The completion rates and times (needed to retrieve the daily information by the DC from all meters in its service area) to be met are: P3 P0 99 %: 20 hours 1 minute						
History	April 2008	**Origin**	DSMR-T 68	**Port**	P3	**Applicable**	DC

6.3 Use cases initiated by CS

This section describes the process of gathering and providing requests in the metering and switching equipment to external entities (see NTA 8130: § 5.2.4). This process is triggered by a request from the CS.

Trigger	Description
Requests received from CS	The DC forwards the requests to the appropriate metering equipment.

Figure 6-4: Requests - trigger description

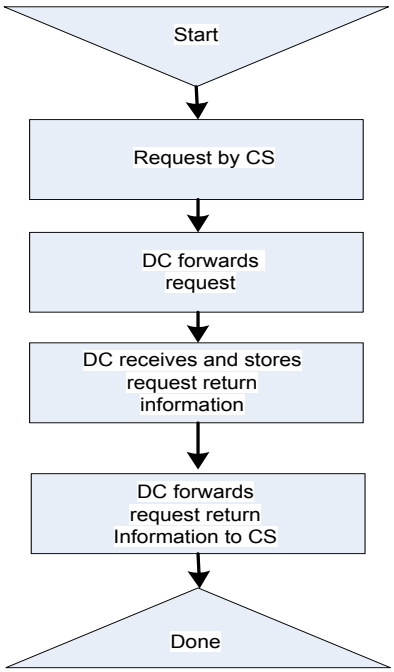


Figure 6-5: Requests - block diagram

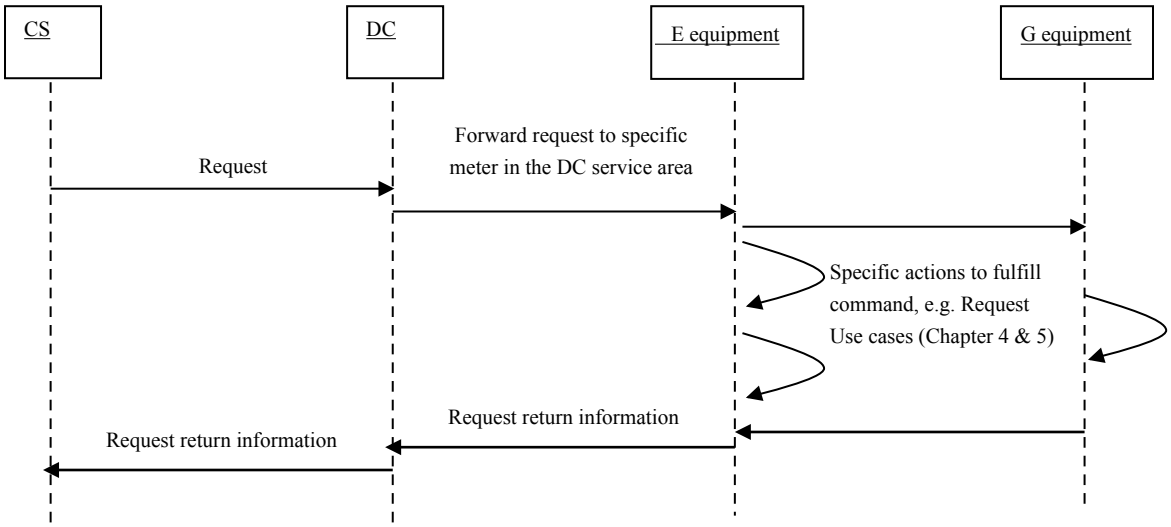


Figure 6-6: Requests - UML sequence diagram

Pre-conditions

None

Parameters

- Equipment identifier for the E or G meter.

Post-conditions

- The request has been forwarded to the E meter
- When applicable, the return information has been received by the CS

DSMR-M 231

Description	The DC shall provide functionality to bi-directionally communicate with the CS.						
Rationale	It is necessary that meters are able to communicate with the central CS through a central data concentrator, which is usually positioned in a substation.						
Fit criterion	The DC is able to receive requests from the CS and to process these requests.						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.2	**Applicable**	DC

DSMR-M 232

Description	The DC shall provide functionality to forward a request, which was sent by the CS, to the specified E-meter.						
Rationale	Commands are initiated by the CS and shall be forwarded by the DC to the specified E meter. Also some requests (e.g. an on demand read) shall be forward to the E meter.						
Fit criterion	The following requests, sent by the CS, shall be forwarded by the DC to the specified E-meter: ▪ Periodic meter reads (Use case 1, chapter 4) ▪ Actual meter reads through P3 (Use case 2, chapter 4) (For the G-meter the actual meter read is the last known value in the E-meter.) ▪ Interval values (Use case 4, chapter 4 ▪ Power quality information (Use case 6, chapter 4) ▪ (Dis)connect E (Use case 9, chapter 4) ▪ Apply threshold (Use case 10, chapter 4) ▪ (Dis)connect G (Use case 11, chapter 4) ▪ Display standard messages (Use case 12, chapter 4) ▪ Display long messages (Use case 13, chapter 4) ▪ Shift tariff times E (Use case 14, chapter 4) ▪ Firmware Upgrade (Requirement 5.1.2) ▪ Retrieve M&S equipment state (Requirement 5.2.4) ▪ Network use cases (Requirements 5.3) ▪ Communication use cases (Requirements 5.4)						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.1	**Applicable**	DC

DSMR-M 233

Description	The DC shall provide functionality to forward a broadcast request, which was sent by the CS, to all metering installations in the DC service area.						
Rationale	Commands are initiated by the CS and shall be forwarded by the DC to the specified E meter. Some requests (e.g. standard messages) shall be forward to all metering installations in the DC service area (For example, in Code Red situations).						
Fit criterion	A broadcast request, which was sent by the CS, will be forwarded by the DC to all metering installations in the DC service area. Broadcast is used for (but not limited to): - Display standard messages (Use case 12, chapter 4) - Apply threshold (Use case 10, chapter 4) - Synchronize time (Section 6.4)						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.1	**Applicable**	DC

DSMR-M 234

Description	The DC shall provide functionality to bi-directionally communicate with the E-meters in the distribution area serviced by the DC.						
Rationale	It is necessary that meters are able to communicate with the central CS through a central data concentrator, which is usually positioned in a substation.						
Fit criterion	The DC is able to forward information received from the E-meters in its distribution area to the CS.						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.1	**Applicable**	DC

DSMR-M 235

Description	The DC shall provide functionality to forward the request return information of the E- and G-meter, being sent by the E-meter, to the CS.						
Rationale	Under some circumstances an on demand requests are needed (e.g. consider a call-centre agent handling a customer complaint). This is required in NTA 8130 (see §5.2.4).						
Fit criterion	The request return information of the E- and G-meter, which have been sent by the E-meter, will be forwarded to the CS by the DC.						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.2	**Applicable**	DC

DSMR-M 236

Description	The DC shall provide functionality to monitor the progress of the forwarded commands. If the request return information of the E- and G-meter is not received within a specified amount of time, the DC will retry to retrieve the required data. In case of any error, this shall be reported to the CS.						
Rationale	Under specific circumstances, communication to the meter may fail. In this case the DC should resend the request in order to secure the service to the CS.						
Fit criterion	The DC will retry to retrieve the required data if this data has not been received in time. All errors (if any) will be reported to the CS.						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.1, P3.2	**Applicable**	DC

DSMR-M 2074

Description	The activity of gathering and providing requests in the metering and switching equipment to external entities shall be completed in a limited period of time.						
Rationale	If the activity of gathering and providing requests in the metering and switching equipment to external entities takes too much time, agreed service levels with SC's and ISP's cannot be met.						
Fit criterion	The completion rates and times to be met are: P3 P0 99 %: 5 minutes 1 minute						
History	April 2008	**Origin**	DSMR-T 69	**Port**	P3	**Applicable**	E meter, G meter, DC

6.4 Synchronise time DC and E-equipment

The general requirement DSMR-M 3 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. In case a DC is used, the CS has to be able to synchronise the time of the DC and the DC has to be able to synchronise the time of the metering equipment. This use case only applies to DCs that use the CS for clock synchronisation, other methods are allowed as long as general requirement DSMR-M 3 is met. The trigger description and UML sequence diagram are depicted in Figure 6-4.

Trigger	Description
Synchronise request from CS	A synchronise request is received from CS specifying the actual time.

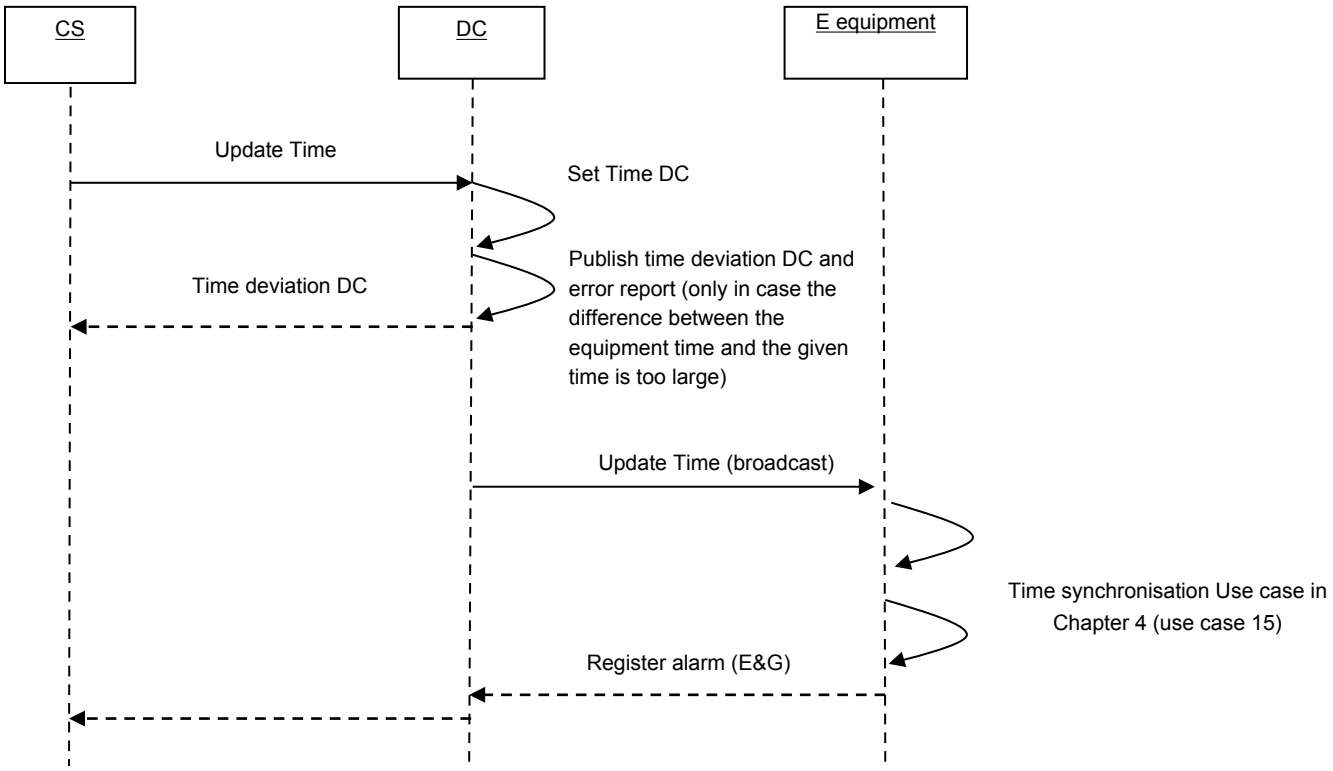


Figure 6-7: UML sequence diagram

Pre-conditions

- The internal clock of the DC and E equipment may deviate from the national standard time.

Parameters

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

Post-conditions

- The internal clock of the DC and E 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 actual time from the CS to the DC, and from the DC to the E equipment can be neglected, or should be accounted for by the CS and DC.

6.4.1 Synchronise time DC

DSMR-M 237

Description	The DC shall provide functionality to synchronise its internal clock..						
Rationale	It is required that the accuracy of the time of the DC is within limits. As it is not reasonable to equip DCs with clocks that meet the accuracy during their lifetime, the DC shall provide functionality to synchronise its clock to external entities.						
Fit criterion	The DC shall provide functionality to synchronise its clock to external entities.						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.2	**Applicable**	DC

DSMR-M 238

Description	The DC shall provide functionality to adjust the maximum deviation that is accepted compared to the actual time from the CS.						
Rationale	It is required that the accuracy of the time of the DC is within limits. As the acceptable limit may vary, the DC shall provide functionality to adjust the maximal deviation that is accepted.						
Fit criterion	The deviation of the clock shall be within the limits of accuracy. The maximum deviation can be adjusted in the DC (typically 30 seconds).						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.2	**Applicable**	DC

DSMR-M 239

Description	The DC shall issue a logical error for large time adjustments that occur in the DC.						
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 allowed, a logical error is issued that contains, besides the generic attributes for errors, at least the size of time adjustment in seconds.						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.2	**Applicable**	DC

6.4.2 Synchronise time E equipment

DSMR-M 240

Description	The DC shall provide functionality to synchronise the time of the E-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 DC shall provide functionality to synchronise the clock of the E meter.						
Fit criterion	After the clock of the DC is adjusted during clock synchronisation, use case *Synchronise time E-equipment* shall be invoked.						
History	Mar. 2008	**Origin**	NTA+	**Port**	P3.1	**Applicable**	DC

6.5 Use Cases for Installation and Maintenance

Chapter 5 provides the use cases for installation and maintenance that apply to all equipment, both M&S and DC equipment.