



SRSM and Beyond Smart Meter Specification

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Document Control

1.1 Version History

Version	Date	Author	Description
1_1	April 2008	Simon Harrison	Draft based on content of Smart Metering Operational Framework Proposals and Options v1

This document is a development of Schedule H of the Smart Metering Operational Framework Proposals and Options document – the development history of which is shown below.

Version	Date	Author	Description
0.1	June 2006	Alan Knight Scott & Neil Taylor	Initial draft
0.2	3 rd July 2006	Simon Harrison	New draft following IMF meeting on 28.06.06
0.3	18 th July 2006	Simon Harrison	Updated following comments received and meeting to discuss revisions
0.4	7 th September 2006	Jason Brogden	Updated with comments from all ERA Supplier meeting 20.07.06
0.5	20 th September 2006	Simon Harrison	Updated following review and 1 st Electricity Specification meeting
0.6	11 th October 2006	Simon Harrison	Updated following 1 st Gas Specification meeting Updated following 2 nd Electricity Specification meeting and for comments received Table in 2.6 amended to remove redundant references and introduce logical order. Updated following 2 nd Gas Specification meeting and for relevant comments received
0.7	23 rd October 2006	Simon Harrison	Updated following detailed review and comment from workgroup attendees
1.0	30 th October 2006	Simon Harrison	Updated for baseline & distribution as part of external consultation exercise
1.1	8 th December 2006	Simon Harrison	Updated following review of external consultation comments
2.0	15 th December 2006	Simon Harrison	Updated following ERA Supplier review
2	19 th January 2007	Simon Harrison	Updated to include additional statement regarding document status.

Version	Date	Author	Description
			Approved by Steering Group
2.1	21 st February 2007	Simon Harrison	Updated to a consolidated format - covering gas and electricity requirements in a single document
2.2	6 th March 2007	Simon Harrison	Updated prior to and following workshop for project team comments and user group review
2.3	16 th March 2007	Simon Harrison	Updated following review and comment with National Weights and Measures Laboratory (on v2.1) - updates relate only to Measuring Instruments Regulations
2.4	31 st May 2007	Simon Harrison	Updated following Information Request exercise with external metering experts. Updates also applied following development of related SRSM products. Updated also for inclusion of meter specification in Smart Meter Operational Framework Updated following SRSM Delivery Workshop to review Information Request Response
2.5	26 th June 2007	Simon Harrison	Updated following comment and review with Suppliers.
2.6	6 th July 2007	Simon Harrison	Updated following comment and review with Suppliers
2.7	30 th July 2007	Alastair Manson	Included clarifications according to BEMCA review, updated with formatting changes
3	3 rd August 2007	Simon Harrison	Final amendments based on BEMCA comments, and preparation for inclusion in Operational Framework Baseline version

1.2 Related Documents

Title	Date
The Measuring Instruments (Active Electrical Energy Meters) Regulations SI 2006:1679	2006
The Measuring Instruments (Gas Meters) Regulations 2006: 2647	2006
BS7856 : 1996 Code of Practice for design of alternating current, watt hour meters for active energy (classes 1 and 2)	15th November 1996
BS EN 62055-31:2005 Electricity Metering - Payments Systems - Particular Requirements - Part 31: Static payment meters for active energy (classes 1 & 2)	2005

Title	Date
BS EN 50470-3:2006 Electricity Metering Equipment - part 3 - particular requirements - Static meters for active energy (class indexes A, B and C)	2006
WELMEC 7.1 Issue 2 - Development of Software Requirements	May 2005
WELMEC 7.2 Issue 1 - Software Guide	May 2005

1.3 Intellectual Property Rights and Copyright

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1.4 Disclaimer

This document presents proposals and options for the operation of smart metering in Great Britain. It does not present a complete and final framework for the operation of smart metering in Great Britain and the proposals or options presented do not represent all possible solutions. We have used reasonable endeavours to ensure the accuracy of the contents of the document but offer no warranties (express or implied) in respect of its accuracy or that the proposals or options will work. To the extent permitted by law, the Energy Retail Association and its members do not accept liability for any loss which may arise from reliance upon information contained in this document. This document is presented for information purposes only and none of the information, proposals and options presented herein constitutes an offer.

2 Introduction

2.1 Purpose

This specification provides a clear statement of the Operational Framework requirements of the minimum functions/features that define a smart meter.

It does not preclude or restrict Suppliers or other parties from delivering additional functionality on their meters. The Operational Framework schedule 'Additional Functionality Required for Interoperability' includes detail of functions and features that require specification to ensure they are interoperable.

Further information on the SRSM project is available from:

www.energy-retail.org/smartmeters

2.2 Scope

This specification provides a minimum functional specification for gas and electricity smart meters. This will allow energy Suppliers to build more detailed requirement specifications.

The required asset life of the meters over and above that required by the Measuring Instruments Regulations is a commercial consideration for individual parties and is not included in this specification.

2.2.1 Consumer Display Unit

Suppliers may choose to include a consumer display unit (CDU), separate from the smart Metering System, as part of their overall smart metering solution. Similarly, customers may make their own decisions about using a customer display unit and the type of unit they prefer.

The features, use and types of such units will be subject to a number of variables, such as consumer choice, regulatory requirements, technology advance or Supplier differentiation.

Specification of consumer display units is therefore outside the scope of the Operational Framework, but a requirement for the capability for 2 way communication with these devices is included as mandatory function of a smart meter. The Operational Framework schedules 'Local Device Standards' and 'Local Communications Solutions Options' will apply to display devices.

3 Glossary of Terms, Definitions and Abbreviations

Please note that this is a digest of the glossary contained in the main Smart Metering Operational Framework document.

Term	Meaning
Access Control	The method by which the Operational Framework controls access to smart Metering Systems, smart metering data and associated devices.
Authorised Party	Means the Supplier or another person authorised by configuration of the Access Control security policies in the Metering System to interrogate or configure the Metering System. Authorised Parties could include a communications service provider, a meter operator, a network operator etc.
CDU (Consumer Display Unit)	A general term used to refer to display devices that present consumption (and other) information.
Data Exchange	Electronic interactions including the transmission of data between Metering Systems and Authorised Parties or Metering Systems and Local Devices
ERA	Energy Retail Association
Hand Held Unit	A mobile device, usually used by a Meter Worker, capable of interaction with a Metering System using Local (or WAN) Communications. Could also include devices that interact with a Metering System using a dedicated optical port.
Interoperability	To allow a smart Metering System to be used within market rules by the registered Supplier, its nominated agents and parties selected by the customer without a change of Metering System. Security of the smart Metering System infrastructure, with structured Access Control, is a key interoperability requirement.
Local Communications	Communications between a Metering System and Local Devices within the premises in which the Metering System is installed.
Local Device	A Local Device can be any piece of equipment within premises that communicates directly with the Metering System using Local Communications.
Metering System	A single device or meter, or a combination of devices used to deliver the Lowest Common Denominator as defined in the Operational Framework Schedule L 'Smart Meter Functional Specification'.
Meter Variant	Classification of meter type under the Operational Framework. A 'Standard' variant is suitable for installation at the majority of meter points in Great Britain. Other variants

	<p>exist to cover specific supply, circuit or customer issues at a site.</p> <p>Examples include Polyphase, Semi-Concealed or 5 Terminal variants.</p> <p>The full table of Meter Variants can be found in Schedule L 'Smart Meter Functional Specification'.</p>
Meter Worker	<p>A generic Operational Framework term referring to any person attending an installed Metering System for the purposes of installation, maintenance, investigation, replacement or removal of the Metering System.</p> <p>Includes existing energy industry defined roles of Meter Operator, Meter Asset Maintainer, Meter Reader, Data Retriever etc.</p>
Open Standard	<p>The European Union definition of an open standard (taken from "European Interoperability Framework for pan-European eGovernment Services") is:</p> <p>The standard is adopted and will be maintained by a not-for-profit organisation, and its ongoing development occurs on the basis of an open decision-making procedure available to all interested parties (consensus or majority decision etc.).</p> <p>The standard has been published and the standard specification document is available either freely or at a nominal charge. It must be permissible to all to copy, distribute and use it for no fee or at a nominal fee.</p> <p>The intellectual property - i.e. patents possibly present - of (parts of) the standard is made irrevocably available on a royalty-free basis.</p> <p>There are no constraints on the re-use of the standard.</p>
Operational Framework	Smart Metering Operational Framework Proposals and Options
SRSM Project	Supplier Requirements of Smart Metering project. Exercise in 2006-08 undertaken by ERA to develop the Operational Framework
Supplier	Means an energy retail business
WAN (Wide Area Network) Communications	Communications between a Metering System and a remote Authorised Party

4 Meter Specification

4.1 Overview of Specification

This schedule represents the ongoing development of the smart meter specification, and as such includes details of comments or the rationale where appropriate that has been used within the SRSM project to develop the specification. The specification is subject to ongoing change control methodologies and baselined versions will be released as appropriate.

Where a Comment or Rationale is written in italics this indicates that it is subject to ongoing discussion or development.

The functions and features described within this schedule relate to a “Metering System”, and this could comprise a single device or meter, or a combination of devices used to deliver the functionality.

Where a function or feature is not included in this specification, but that function or feature requires definition for interoperability purposes, as a result of particular data or business process requirements, it is recorded in the Appendix “Additional Functionality Required for Interoperability”.

4.2 Gas Meter Functionality

Requirements for gas smart Metering Systems that are reliant upon the meter itself having a method for controlling flow are subject to cost considerations. In most instances this will mean a valve, but other technologies could be used.

- Specifically G1.4, G1.5, C3.1, C3.2, C6.2, G10.1 and all of section [11] in section 5 below.
- Each of these requirements are mandatory functions where a gas smart meter includes a valve.

The presence of a valve (or equivalent), and the functionality dependent upon such, is desirable in all gas smart meters. Inclusion of a valve (or equivalent) in all gas smart meters is conditional upon the cost of including one in every gas smart meter.

In the event that costs prohibit the inclusion of a gas valve (or equivalent) in every gas smart meter, an additional Meter Variant will be added to the table in Section 6. The new variant would be a gas meter without a valve (or equivalent).

4.3 Lowest Common Denominator

As described in the purpose section, this schedule provides a baseline statement of the minimum specification of requirements for a smart meter. The minimum specification, defined in section 5 below and subject to the provisions of 4.2 above, will be termed as the "Lowest Common Denominator".

Once installed, each smart meter must be able to be managed by any gaining Supplier without the need for replacement, corrections, site visits or special measures other than for reasons of failure.

4.4 Design Principles

It is a requirement of the Operational Framework that smart meter design takes account of the following principles:

- A Smart meters will be ergonomic, accessible and user friendly to the widest range of customers.
- B The user interface of the meter will be simple to use and navigate. It must be intuitive, clear and unambiguous.
- C The design of the user interface must meet the requirements of the customer first, with technical, diagnostic or 'Meter Worker' interface activity made separate from customer activities.
- D Navigation or screen display order will be common across all smart meters for an agreed minimum set of initial customer facing processes. The same principle will apply to Meter Worker/engineer screens to enhance interoperability for field operations.¹
- E Wherever possible, and without unnecessary constraints on the innovation of meter manufacturers, all smart meters will present customers with a similar user interface/use of symbols/screen design.
- F Smart meters will be adaptable to future conditions, capable of upgrade and adaptation so they can accommodate, to a large extent, technology advance.

4.5 Future Proofing

Where possible, future proofing has been considered in the definition of this specification and the creation of the Operational Framework.

¹ Definition of common navigation screens and the order and content of those screens is subject to detailed design work and is documented in the Operational Framework schedule 'Software Environment Requirements'.

5 Smart Meter Functional Specification

The table below presents the functions and features for each numbered category in the following order:

- Common to both gas and electricity smart meters, numbered as Cn.n
- Features required for gas smart meters only, numbered as Gn.n
- Features required for electricity smart meters only, numbered as En.n

Where information from the Measuring Instruments Regulations has been provided by the National Weights and Measures Laboratory relating to specific functions and features, this is recorded in blue against the specific functions or features or groups of functions and features.

No	Function/Feature	Associated Functions ²	Comments/Rationale
1	Physical Attributes of Meter		
Common			
C1.1	The meter will meet all current statutory and legislative metrology requirements at the time of deployment	12	Complies with The Measuring Instruments Regulations 2006 Includes the use of approved metrology software ³
Gas			
G1.1	The meter will measure and display consumption in Cubic Metres	12	Measuring Instruments Regulations (Gas) – Units – Schedule 1 Part 1 Clause 17: - Metered quantity shall be displayed in cubic metre, or in kilogram. Capacities compatible with domestic usage profiles. For example 6 or 16 cubic metres per hour.

² Where the associated function is not preceded by a letter to indicate C – common, G – gas, E – electricity then it is referring to all of the functions within the group referenced – e.g. Associated Function 12 means all of the functions/features within section 12 – Legislative Requirements

³ Metrology software shall be separate from other software on the meter – see WELMEC Guides 7.1 & 7.2

No	Function/Feature	Associated Functions ²	Comments/Rationale
G1.2	The meter will have a visible physical index, excluding any decimal places, with a minimum of: - 5 digits for U6/E6 (or equivalent) meters - 6 digits for U16 (or equivalent) meters	C1.1, C3.3, C6.1	<p>Measuring Instruments Regulations (Gas) – Indication of Result – Part 1 Clause 10:</p> <ul style="list-style-type: none"> - Indications of the result shall be by means of a display or hardcopy. - Display of result must be clear and unambiguous and accompanied by such marks and inscriptions necessary to inform the user of the significance of the results. Easy to read under normal conditions of use. Additional indications may be shown provided that they cannot be confused with the metrologically controlled indications. -In the case of hardcopy the print or record shall also be easily legible and non-erasable. <p>Suitability (Schedule 1 Part 1 Clause 17):</p> <ul style="list-style-type: none"> - An indicating device shall have a sufficient number of digits to ensure that the quantity passed during 8000 hours at Qmax does not return the digits to their initial values. - Requirement for a test element to enable tests to be carried out in a reasonable time. <p>Decimal points for purging could be implemented through use of LCD registers and restricted to engineer access only to avoid customer confusion when reading meter Electronic displays should show leading zeroes. Decimal points required for purging⁴ The requirement is to purge the meter of at least five times the capacity of enclosure of the meter: e.g. for U6 & E6 meters this equates to 0.01 cu metres. i.e. the meter must read in increments of at most 0.01 cu. metres. Existing U6 & E6 meters read to three decimal points i.e. 0.001 cu metres.</p>

⁴ References: ‘Gas Safety (Installation & Use) Regulations; Regulation 22’, ‘British Standard; BS 6891’, Institute of Gas Engineers & Managers publication IGE/UP/1b: ‘Tightness testing and purging of domestic sized Natural Gas Installations (includes up to and including a capacity of 16 cu metres/hour’

No	Function/Feature	Associated Functions ²	Comments/Rationale
G1.3	The meter will have a secure, tamper resistant identification plate showing meter details listed in comments.	C1.1	<p>Measuring Instruments Regulations (Gas) – Information to be borne by and to accompany the relevant instrument – Schedule 1 Part 1 Clause 9:</p> <ul style="list-style-type: none"> - manufacturer's mark or name - information in respect of its accuracy - information in respect of the conditions of use - measuring capacity - measuring range - identity marking - number of the EC-type examination certificate or the EC design examination certificate - information whether or not additional devices providing metrological results comply with the provisions of these Regulations. <p>Markings and inscriptions (Schedule 4):</p> <ul style="list-style-type: none"> - CE marking and M marking - Notified Body identification number. <p>All marks and inscriptions shall be clear, non-erasable, unambiguous and non-transferable.</p> <hr/> <p>In addition to the Measuring Instruments details above:</p> <ul style="list-style-type: none"> Serial Number Machine Readable Barcode⁵ containing Serial Number and smart Meter Variant code Operational Framework Variant Type (see table in section 6) Year of Manufacture Q Max – maximum flowrate Q Min – minimum flowrate P Max – maximum pressure Pulse Value where appropriate⁶ Unit of Measurement

⁵ Machine Readable Barcode in accordance with ISO/IEC 15416:2000 standard [symbology (code 39 or code 128) to be provided following consultation with manufacturers]

⁶ Pulses would not be appropriate for ultrasonic meters.

No	Function/Feature	Associated Functions ²	Comments/Rationale
G1.4	<p>The meter shall be capable of remote disabling of gas supply and provide for the remote enabling the gas supply through the use of a valve.</p> <p>'Gas On' button/facility to enable customer to enable gas supply after an expected local or remote disabling of supply.</p> <p>This would include the customer running out of credit on a meter operating in debit mode, or a specific disable instruction from an Authorised Party.</p> <p>Meter functionality to operate as normal from 'remote' perspective when meter is disabled – e.g. Authorised Party can change mode of operation or download meter readings.</p>	G1.5, C3.1, C3.2, G10.1, 11	<p>Measuring Instruments Regulations (Gas) – Suitability – Schedule 1 Part 1 Clause 16: - A relevant instrument shall be suitable for its intended use taking account of the practical working conditions and shall not require unreasonable demands of the user in order to obtain a correct measurement result.</p> <p><i>This function would be mandatory for a gas meter with a valve (or equivalent means of disabling the flow of gas through the meter). See 4.2 above.</i></p> <p>Safety is the paramount concern.</p> <p>Gas supply must not be restored remotely – the customer must always confirm the restoration of supply. This is as present for gas prepayment customers. Where an Authorised Party has disabled the meter remotely, they can instruct the meter to enable supply, but the customer must confirm that it is safe to do so before the supply is restored</p> <p>Restoration following an unplanned loss of supply will continue to be the responsibility of the Transporter.</p> <p>Meter to include appropriate messages to customer to ensure appropriate use of Emergency Control Valve.</p> <p><i>Requirement may be subject to clarification of gas disconnection and reconnection regulations and Health and Safety legislation.</i></p>
G1.5	<p>The requirement is that following disablement of supply, when the button on the meter is pressed to restore gas supply, the meter should check if gas flows at the point of the button press.</p> <p>The meter should only enable supply when there is no flow or usage detected at the point of the button press.</p>		<p><i>This function would be mandatory for a gas meter with a valve (or equivalent means of disabling the flow of gas through the meter). See 4.2 above.</i></p> <p>Potential safety improvement to ensure that all gas appliances are off when supply is restored. Could also be used identify leaks in the customer's premises.</p> <p>This would be an improvement over the current arrangements for restoring supply on gas prepayment meters where the customer has run out of credit.</p> <p>Function to be configurable by Authorised Party to accommodate customer appliances where it is not possible to prevent flow of gas once valve is opened – e.g. self-igniting boilers, or where it is not possible for a customer to push the button themselves.</p>
Electricity			
E1.1	The meter will measure and display consumption in kilowatt hours (kWh)	12	Demand in kW, for possible CDU or maximum demand utilisation, can be derived from the data items.

No	Function/Feature	Associated Functions ²	Comments/Rationale
E1.2	The meter will have a visible physical register(s) with a minimum of 5 digits, excluding decimal places	C1.1	<p>Measuring Instruments Regulations (Electricity) – Indications of Result – Schedule 1 Part 1 Clause 11:</p> <ul style="list-style-type: none"> - Indications of the result shall be by means of a display or hardcopy. - Display of result must be clear and unambiguous, easy to read under normal conditions of use and not be confused with other indications. - Hardcopy result must be easily legible and non-erasable. - A relevant instrument shall be fitted with a metrologically controlled display accessible without tools to the consumer. The reading of this display is the measurement result that serves as the basis for the price to pay. <p>Suitability – Schedule 1 Part 1 Clause 17:</p> <ul style="list-style-type: none"> - Display of the total energy shall have sufficient number of digits to ensure operation for 4000 hours at full load. <p>Decimal points for accuracy testing and commissioning could be implemented through use of LCD registers and restricted to engineer access only to avoid customer confusion when reading the meter.</p> <p>Electronic displays should show leading zeroes.</p>
E1.3	The meter will have a secure, tamper resistant identification plate showing meter details listed in comments	C1.1	<p>Measuring Instruments Regulations (Electricity) – Information to be borne by and to accompany the relevant instrument – Schedule 1 Part 1 Clause 10:</p> <ul style="list-style-type: none"> - manufacturer's mark or name - information in respect of its accuracy - information in respect of the conditions of use - measuring range - identity marking - number of the EC-type examination certificate or the EC design examination certificate - information whether or not additional devices providing metrological results comply with the provisions of these Regulations. - Units of measurement and their symbols <p>Markings and Inscriptions – Schedule 4:</p> <ul style="list-style-type: none"> - CE marking and M marking - Notified Body identification number. <p>All marks and inscriptions shall be in English, clear, nonerasable, unambiguous and non-transferable.</p>

No	Function/Feature	Associated Functions ²	Comments/Rationale
			In addition to the Measuring Instruments details above: Serial Number Machine Readable Barcode ⁷ containing Serial Number and smart Meter Variant code Operational Framework Variant Type (see table in Section 6) Current Rating Voltage Rating Year of Manufacture Number of Phases Frequency Rating
E1.4	The meter will be capable of remote disabling of electricity supply and provide for the remote enabling the electricity supply through the use of a contactor or in-line switch. Battery backup ⁸ required to maintain essential functionality when electricity supply is 'off' Meter functionality to operate as normal from 'remote' perspective when the supply has been – e.g. Authorised Party can change mode of operation or download meter readings.	E1.5	Measuring Instruments Regulations (Electricity) – Suitability – Schedule 1 Part 1 Clause 17: In the event of loss of electricity in the circuit, the amounts of electrical energy measured shall remain available for reading during a period of at least 4 months. Changes to Enable/Disable status should always be recorded and may be transmitted to Authorised Parties to enable them to keep track of activity at the meter point May require a message from Authorised Party to allow customer to enable supply. Include configurable self-disconnection override to prevent customers self-disconnecting due to lack of credit on meter when operating in debit mode,
E1.5	The requirement is that following disablement of supply: Power failure ⁹ – meter should enable automatically following a power failure. Remote Disable – a 'Power On' or 'Accept' button should be pushed by the customer before supply through the meter is restored	E1.4	Safety is the paramount concern – meters should not enable without a confirmation from a customer at the premises, except where interruption to supply was not planned Use of a parental lock or other child protection technique to ensure that supply is not enabled erroneously. An example could be use of a short code to accept 'priority' messages – "Press #1# to accept this message". Function to be configurable by Authorised Party to accommodate customer circumstances where access to the meter is difficult, allowing Authorised Parties to enable supply without

⁷ Machine Readable Barcode in accordance with ISO/IEC 15416:2000 standard [symbology (code 93 or code 128) to be provided following consultation with manufacturers]

⁸ Battery backup to be compliant with Clause 5.11.2 and Annex D of BS EN 62055-31

No	Function/Feature	Associated Functions ²	Comments/Rationale
	Without supply due to no credit on meter – a 'Power On' or 'Accept' button should be pushed by the customer before supply through the meter is restored Ability to remotely access meter even when there is no credit on it or the supply to the customer has been remotely disabled using the meter		a button press by the customer.
E1.6	Energy consumption of meter shall be compliant with clause 7.3.1 of BS EN 62055-31. Energy consumption of the Metering System shall be compliant with Supply Licence.	12	Meter design to ensure that any energy consumption by the meter itself should be on the supply side, rather than the customer side.
2	Installation & Maintenance		<p>Suitability – Schedule 1 Part 1 Clause 16:</p> <ul style="list-style-type: none"> - A relevant instrument shall be suitable for its intended use taking account of the practical working conditions and shall not require unreasonable demands of the user in order to obtain a correct measurement result. - A relevant instrument shall be robust and its materials of construction shall be suitable for the conditions in which it is intended to be used. - The relevant instrument shall be able to be installed to operate in any position declared by the manufacturer in its installation instruction. <p>Information to be borne by and to accompany the relevant instrument (Clause 9):</p> <ul style="list-style-type: none"> - Information accompanying meter shall include instructions for installation, maintenance, repairs, permissible adjustments. <p>Putting into use requirements (Schedule 1 Part 2 Clause 18):</p> <ul style="list-style-type: none"> - Measurement of residential use shall be performed by means of any Class 1.5 relevant instrument, or by Class 1.0 relevant instruments which have a Qmax/Qmin ratio equal or greater than 150. - Measurement of commercial and/or light industrial use shall be performed by any Class 1.0 or Class 1.5 relevant instrument. - The person responsible for installing a relevant instrument shall have regard to the requirements under paragraph 12(b) and (c) and shall ensure that the relevant instrument is appropriate for the accurate measurement of consumption that is foreseen or foreseeable. <p>Allowable errors (Clause 3) with particular reference to Climatic, Mechanical and Electromagnetic</p>

⁹ Where electricity supply to the meter is not present, as a result of a power outage, or de-energisation, the meter will not be capable of delivering the functional requirements of this specification that rely upon electrical power, except where stated.

No	Function/Feature	Associated Functions ²	Comments/Rationale
		Environments	
			See Appendix A for Measuring Instruments Regulations detail relating to accuracy and operating condition requirements
Common			
C2.1	The requirement is that remote instructions/reconfiguration and retrieval of data can be carried out locally by Authorised Party in case of communications failure	C9.2	<p>Measuring Instruments Regulations (Electricity) – Protection against corruption – Schedule 1 Part 1 Clause 9: The metrological characteristics of a relevant instrument shall not be influenced in any inadmissible way by the connection to it of another device, by any feature of the connected device itself or by any remote device that communicates with the instrument.</p> <p>See Operational Framework schedules – ‘Interaction with Metering System Processes’ & ‘Metering System Work Processes’</p>
C2.2	The meter shall ensure that fault and tamper logs are accessible only by Authorised Parties	C7.5, C9.2, C8.2	<p>Measuring Instruments Regulations (Gas) – Protection against corruption – Schedule 1 Part 1 Clause 8: - A hardware component that is critical for metrological characteristics shall be designed so that it can be secured. Security measures foreseen shall provide for evidence of an intervention. - Software that is critical for metrological characteristics shall be identified as such and shall be secured</p> <p>Measuring Instruments Regulations (Electricity) – Protection against corruption – Schedule 1 Part 1 Clause 9: - A hardware component that is critical for metrological characteristics shall be designed so that it can be secured. Security measures foreseen shall provide for evidence of an intervention. - Software that is critical for metrological characteristics shall be identified as such and shall be secured.</p> <p>Except where appropriate to notify the customer and enable Authorised Parties to determine need for site visit – e.g. Availability of communications signal</p>
C2.3	The meter will send messages as required by an Authorised Party in event of meter diagnostic alerts or special customer circumstances		<p>Measuring Instruments Regulations (Electricity) - Suitability – Clause 17: In the event of loss of electricity in the circuit, the amounts of electrical energy measured shall remain available for reading during a period of at least 4 months.</p>

No	Function/Feature	Associated Functions ²	Comments/Rationale
			<p>Covers meter systems faults and tampers</p> <p>To be stored within memory until 'cleared' by Authorised Party</p> <p>For electricity, could also be used as a customer special needs alarm if meter configured to communicate messages when supply is interrupted for a customer with continuous supply needs</p> <p>See Operational Framework Schedule 'Interaction with Metering System' Business Processes</p>
Gas			
G2.1	The meter will conform with existing standards for fixing screws/pipe work requirements		
G2.2	The meter will be suitable for installation in a recognised existing gas meter locations, conforming with statutory requirements	12	<p>To include meter boxes, semi-concealed, compartments, ground boxes etc. Required variants are listed below this table.</p> <p>It is acknowledged that certain meter locations may not be suitable for smart meter installation if particular communications solutions are selected, e.g. metal meter boxes could inhibit signals for Local Communications.</p>
G2.3	The meter design shall facilitate in situ maintenance		For identifiable, economically justified maintenance – specifically the replacement of batteries or communications components.
G2.4	The meter will have a battery life consistent with asset life of meter under average use profiles of functionality, including communications, valve and meter display.		<p>Measuring Instruments Regulations (Gas) – Suitability – Schedule 1 Part 1 Clause 16: - A dedicated power source shall have a lifetime of at least five years. After 90 % of its lifetime an appropriate warning shall be shown.</p>
			<p><i>Subject to cost, Supplier requirements and potential cost of field activity to replace batteries.</i></p> <p><i>It is understood that current battery technology supports a 10 year asset life for a prepayment meter with a typical customer usage profile.</i></p> <p><i>Batteries are a specific solution to the power requirements of a gas meter, alternative technologies could be used.</i></p>
Electricity			

No	Function/Feature	Associated Functions ²	Comments/Rationale
E2.1	<p>The meter will conform to BS7856 for terminal spacing and fixing screw requirements for single phase meters.</p> <p>The meter will conform with BS50470, with particular regard for: 'The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating'.</p>		<p>Measuring Instruments Regulations (Electricity) – clauses relating to Durability, Reliability, Protection against corruption and Suitability. Suitability Schedule 1 Part 1 Clause 17: - A relevant instrument shall be suitable for its intended use taking account of the practical working conditions and shall not require unreasonable demands of the user in order to obtain a correct measurement result. - A relevant instrument shall be robust and its materials of construction shall be suitable for the conditions in which it is intended to be used. - The relevant instrument shall be able to be installed to operate in any position declared by the manufacturer in its installation instruction.</p> <p>All single phase 4 terminal meters must have main terminal spacing and lower fixing hole centres which dimensionally accord with the provisions of BS 7856 Single phase single element 5 terminal meters, i.e. where the 5th terminal is internally switched to provide a supply to time restricted loads (off peak heating etc.), must also accord with the provisions of BS 7856 in respect of the four principal terminals and lower fixing hole centres.</p>
E2.2	<p>The meter will be suitable for installation in recognised existing electricity meter locations</p>	12	<p>Measuring Instruments Regulations (Electricity) – Putting Into Use – Schedule 1 Part 2 Clause 19: - Subject to sub-paragraph (2), measurements may be performed by means of any relevant instrument provided that the temperature range to which a relevant instrument is exposed is not wider than the range specified by the manufacturer in relation to that relevant instrument in accordance with paragraph 3(1)(a) and Table 1 of this Schedule. - Class A relevant instruments may not be used when operating outside the temperature range of an upper temperature limit of 30 °C to a lower temperature limit of 5 °C. - The person responsible for installing the relevant instrument shall determine the correct current range and assess the climatic environment, so that the relevant instrument is appropriate for the accurate measurement of consumption that is foreseen or foreseeable. See also Allowable errors (Schedule 1 Part 1 Clause 3) with particular reference to Climatic, Mechanical and Electromagnetic environments</p> <p><i>Installation requirement is mandatory, but cost may determine the number of different classes required by the Suppliers. Ideally Suppliers would like to specify class B meters. Cost differences between accuracy class A and class B to be determined before Suppliers set their final requirements.</i></p> <p>It is acknowledged that certain meter locations may not be suitable for smart meter installation if particular communications solutions are selected, e.g. metal meter boxes</p>

No	Function/Feature	Associated Functions ²	Comments/Rationale
			could inhibit signals for Local Communications.
3	Modes of Operation		Measuring Instruments Regulations (Gas) – Protection against corruption – Clause 8: - The metrological characteristics of a relevant instrument shall not be influenced in any inadmissible way by the connection to it of another device, by any feature of the connected device itself or by any remote device that communicates with the instrument.
Common			
C3.1	The meter will be able to operate in each of the following payment modes: - Credit - Debit	11	Measuring Instruments Regulations (Electricity) - see essential requirements for: Durability, Reliability, Protection against corruption and Suitability. <i>This function would be mandatory for a gas meter with a valve (or equivalent means of disabling the flow of gas through the meter). See 4.2 above.</i> This functionality is required for all electricity meters. For clarity, credit mode will be similar to the existing credit meters. Operation in debit mode will require the customer to maintain a credit balance on the meter to ensure supply, subject to Emergency Credit and non-disconnection period provisions. Debit mode shall include a simple Pay As You Go mode alongside a debt recovery mode similar to that used in existing prepayment meters. It is envisaged that debit will operate without the requirement for a physical payment device that is inserted into the meter.
C3.2	The meter will be able to switch between credit and debit operation only on remote or local instruction from an Authorised Party	C3.1, 11	<i>This function would be mandatory for a gas meter with a valve (or equivalent means of disabling the flow of gas through the meter). See 4.2 above.</i> To be possible for installed meters regardless of the state of supply to the meter.
C3.3	The meter will be able to be configured to operate as a multi rate meter.	8	Number of registers/rates to be configurable for time of day, type of day, consumption threshold ('block tariffs') etc. For electricity the minimum number of registers/rates will be 1 for import and 1 for export. See Operational Framework Schedule 'Data Definition' for detail of how customer products could be modelled in a smart meter. Registers must be clearly labelled using the rules in the Operational Framework schedule 'Data Definition'. The identifier of each register must be displayed on the meter alongside the relevant value for the register. For example 'Night', 'Weekend', 'December', '01', 'Export' etc. Registers used for Settlement purposes – 'Supply Indices' must not be changeable or capable of reset. Registers used for non-Settlement purposes can be reset. Non Settlement register types

No	Function/Feature	Associated Functions ²	Comments/Rationale
			are detailed in the Operational Framework schedule 'Data Definition' and include: <ul style="list-style-type: none"> - Time based registers – 'Time of Day' - Consumption based registers – 'Block Tariffs' - Calendar based registers – 'Type of Day' The meter can use combinations of registers of the types listed. Register configuration will be possible for installed meters regardless of the state of supply to the meter. .
C3.4	The requirement is that the meter mode of operation – credit/debit and 'rate' settings - can be configured remotely and only by Authorised Party	C2.1, C3.3, C9.2	
4	Communications		Measuring Instruments Regulations (Electricity) – Protection Against Corruption – Clause 9: Measurement data, software that is critical for measurement characteristics and metrologically important parameters stored or transmitted shall be adequately protected against accidental or intentional corruption. Measuring Instruments Regulations (Gas): Durability, Reliability, Protection against corruption and Suitability.
Common			
C4.1	The meter will use resilient 2 way communication between Metering System and Authorised Party		Measuring Instruments Regulations (Gas) – Protection against corruption – Schedule 1 Part 1 Clause 8: - Measurement data, software that is critical for measurement characteristics and metrologically important parameters stored or transmitted shall be adequately protected against accidental or intentional corruption. Continuity of communications must be resilient enough to be able to survive a change of tenancy, a change of Supplier or the customer choosing different Suppliers for gas and electricity. See Operational Framework schedule WAN Communications Solution(s)
C4.2	The meter will have the capability for resilient communications to and from Local Device(s).		See Operational Framework schedules Local Communications Solution(s) and Local Device Standard
C4.3	The meter will acknowledge the application of remote instructions by Metering System to an Authorised Party as required.		
C4.4	The requirement is that any communications to an Authorised Party will accurately reflect values held in the meter at the date and time of the communications		

No	Function/Feature	Associated Functions ²	Comments/Rationale
	session.		
5	Functionality		<p>Measuring Instruments Regulations (Electricity) - Durability, Reliability, Protection against corruption and Suitability.</p> <p>See Suitability (Schedule 1 Part 1 Clause 17):</p> <ul style="list-style-type: none"> - Meters shall be suitable for its intended use taking account of the practical working conditions and shall not require unreasonable demands of the user to obtain a correct measurement result. - Below the rated operating voltage the positive error of the relevant instrument shall not exceed 10 %. - When the voltage is applied with no current flowing in the current circuit (current circuit shall be open circuit), the relevant instrument shall not register energy at any voltage between $0.8 \cdot U_n$ and $1.1 U_n$. - The relevant instrument shall start and continue to register at U_n, PF = 1 (polyphase relevant instruments with balanced loads) and a current which is equal to I_{st}. <p>See Protection against corruption (Schedule 1 Part 1 Clause 9):</p> <p>Measurement data, software that is critical for measurement characteristics and metrologically important parameters stored or transmitted shall be adequately protected against accidental or intentional corruption.</p> <p>Durability Schedule 1 Part 1 Clause 15:</p> <p>(1) A relevant instrument shall be designed to maintain an adequate stability of its metrological characteristics over a period of time estimated by the manufacturer, provided that it is properly installed, maintained and used according to the manufacturer's instruction when in the environmental conditions for which it is intended.</p>
Common			
C5.1	The meter will provide on-demand readings ¹⁰	C4.1	<p>Measuring Instruments Regulations (Gas) - Durability, Reliability, Protection against corruption and Suitability.</p> <p>Dependent on communication protocol used, but the meter should provide 'Automated Meter Reading' functionality.</p> <p>This would include providing timed and stored meter readings when the Metering System is 'polled', e.g. provide daily readings at a weekly 'poll'.</p>

¹⁰ Where reading is stated within the specification, the requirement is for a meter reading, or meter advance as configured in the meter, not a pulse count

No	Function/Feature	Associated Functions ²	Comments/Rationale
C5.2	The meter will send readings according to a schedule configured by an Authorised Party		Authorised Party to determine when and how many readings are sent. Authorised Parties will determine and apply any operational practices to avoid spikes in data traffic. For example readings for a number of Metering Systems could be taken at the same point in time, but transfer of the data could be staggered if required.
C5.3	The meter will have an internal clock for date and time. It will maintain time with a resolution of one second. It will maintain a date including year and century. ¹¹		Operates on GMT (but will display in local time) Meter will manage leap years Accurate to ±2 hours over asset life. Remotely adjustable by Authorised Party, e.g. automatic synchronisation, where this is supported by the communications solution. Meter to maintain a log of clock resets and faults
C5.4	The meter will be remotely configurable by Authorised Party	C9.2	To be used for business events – change of Supplier, change of tenant, change of tariff, change of agent etc. See Operational Framework schedules ‘Interaction with Metering System Processes’, and ‘Access Control Specification’
C5.5	The meter will operate such that meter configurations and other functionality to be date bound – ‘effective from’ or ‘effective to’ where appropriate	C5.3	Will assist with smearing communications future notifications of mass events – e.g. price changes Will also control access security for Authorised Parties Each ‘Effective To’ entry requires a corresponding ‘Effective From’ entry... See ‘Access Control Specification’
C5.6	The meter will respond to requests from Authorised Parties for data refreshes	7, C4.4, C5.1	Could include: Read requests Meter detail requests Consumption data requests Meter diagnostic report requests Complete meter data requests See Operational Framework schedules ‘Data Definition’ and ‘Interaction with Metering System Processes’
C5.7	The meter will ensure that remote software/firmware upgrades are carried out by Authorised Parties only. Any software/firmware updates must be performed	C9.2	Where applicable, firmware for hardware components (e.g. Communications hardware, display drivers etc.) will be upgradeable. Metrology software shall not be affected by any updates to other software.

¹¹ Time management within the meter shall be compliant with BS EN 62055-31 Annex D

No	Function/Feature	Associated Functions ²	Comments/Rationale
	remotely with full reversion to the previous version available in the event of any unexpected result.		Only approved metrology software should be uploaded to the meter. See Operational Framework schedules 'Software Environment Requirements' and 'Interaction with Metering System Processes'
C5.8	The meter will perform currency conversion of values and balances held as pounds sterling to euros as a once-and-for all activity. The timing and exchange rate for this activity to be configured by Authorised Party	6, 11	Will update all meter data items that use a currency value – e.g. debt balances, emergency credit threshold etc. See Operational Framework schedule 'Interaction with Metering System Processes'.
C5.9	The meter shall require that a customer positively acknowledges messages/instructions from Authorised Parties or as required by business processes.	C4.3, C9.2, C6.8	Typically a button press by customer to acknowledge message/instruction on meter. As with other business processes, the meter can be configured to send a notification to an Authorised Party following customer acknowledgement. Meter may require a PIN no, coded button sequence or child lock to prevent message acknowledgement that is not genuine or safe – the requirement for such protection will be determined locally based on customer and site requirements. See Operational Framework schedule 'Interaction with Metering System Processes'
Gas			
G5.1	The meter will use updated calorific and correction values to enable calculation of kW and kWh consumption	C7.4, 11	To be used to deliver a consistent customer experience to electricity, where consumption can be viewed as a value on the meter itself. A requirement for debit operations.
Electricity			
E5.1	The contactor/in-line switch will be opened when the power exceeds a configurable predetermined threshold set by an Authorised Party	E1.6	The predetermined threshold can be set to a level where the switch would never be opened. The power setting should not normally exceed the maximum power rating of the meter, unless set to such a value to inhibit this function
E5.2	The meter will have Import/Export capability	E1.6	
6	Meter Display	<p>Measuring Instruments Regulations (Electricity) – Indication of result – Schedule 1 Part 1 Clause 11:</p> <ul style="list-style-type: none"> - A relevant instrument shall be fitted with a metrologically controlled display accessible without tools to the consumer. The reading of this display is the measurement result that serves as the basis for the price to pay. - The indication of any result shall be clear and unambiguous and accompanied by such marks and inscriptions necessary to inform the user of the significance of the result. Easy reading of the presented result shall be permitted under normal conditions of use. Additional indications may be shown provided they cannot be confused with the metrologically controlled indications. <p>Suitability (Schedule 1 Part 1 Clause 17):</p> <ul style="list-style-type: none"> - Meters shall be suitable for its intended use taking account of the practical working conditions and shall 	

No	Function/Feature	Associated Functions ²	Comments/Rationale
			<p>not require unreasonable demands of the user to obtain a correct measurement result.</p> <p>Measuring Instruments Regulations (Gas) – Suitability – Schedule 1 Part 1 Clause 16: - A relevant instrument shall be fitted with a metrologically controlled display accessible without tools to the consumer. The reading of this display is the measurement result that serves as the basis for the price to pay.</p> <p>Indication of result (Schedule 1 Part 1 Clause 10): - The indication of any result shall be clear and unambiguous and accompanied by such marks and inscriptions necessary to inform the user of the significance of the result. Easy reading of the presented result shall be permitted under normal conditions of use. Additional indications may be shown provided they cannot be confused with the metrologically controlled indications.</p> <p>Suitability (Schedule 1 Part 1 Clause 16): - Meters shall be suitable for its intended use taking account of the practical working conditions and shall not require unreasonable demands of the user to obtain a correct measurement result.</p> <p>Units (Schedule 1 Part 1 Clause 17): - Metered quantity shall be displayed in cubic metre, or in kilogram.</p> <p>LCD screen (or other) physically attached to the meter and protected from interference or removal as for other components of the Metering System. Information presented on the meter display could be replicated by a CDU or other local display device within a customer premises, but without the assurance of the presence of such a device, the meter must be capable of displaying the mandatory requirements below.</p> <p><i>Please see Operational Framework Schedule A ‘Outstanding Issues’ for a detailed explanation of display requirements, currently subject to discussion with meter manufacturers as a potential inclusion to clarify requirements.</i></p>
Common			
C6.1	The meter will have an electronic display of meter register(s)	E1.1, G1.2, C3.3	Must be compliant with industry rules for accuracy and values displayed Where appropriate – i.e. more than one register is in use, the register name shall be displayed
C6.2	The meter will indicate the current mode of operation: Credit/Debit	C3.1	<i>This function would be mandatory for a gas meter with a valve (or equivalent means of disabling the flow of gas through the meter). See 4.2 above.</i>
C6.3	Whilst operating in debit mode, the meter will replicate the agreed minimum set display characteristics of existing non-smart prepayment meters as a minimum	11	Principle is that established current practice will be reflected at least; therefore smart metering will not represent a retrograde step. Examples of data to be stored and displayed are: tariff rate prices as well as the usage on each rate and standing charges.

No	Function/Feature	Associated Functions ²	Comments/Rationale
C6.4	The meter display will operate in English	C12.2	The meter will be able to display a character set compatible with a 16 segment display, allowing Authorised Parties to send messages in any language that can use that character set. See Section 6 – Meter Variants and Special Requirements.
C6.5	The meter will display a set of mandatory data items		<i>Definition of the final required set of mandatory data items to be displayed on the meter remains subject to resolution of outstanding options and issues</i> See Operational Framework schedule M 'Data Definition' for full set of data items to be stored from which the mandatory set for display will be derived.
C6.6	The meter will receive and display messages/instructions to the customer.	C4.3, C9.2, C5.9	Maximum message length of 160 characters (SMS message length) – such messages can be displayed by horizontal or vertical 'scrolling'. Messages to be maintained on meter until acknowledged by customer where required
C6.7	The meter will have a backlit display. Backlight can be configured not to be activated - suitable for meters in well lit locations, or to preserve battery life if required. Backlight to turn off after configurable predetermined period. Backlight should operate for installed meters regardless of the state of supply to the meter		The backlight will operate on response to button/key press to make display easier to read in low-light or difficult to read locations.
C6.8	The meter display will operate for installed meters where the meter has been disabled		
C6.9	The meter will display monetary values using the correct currency symbol character.	11	
7	Data Storage		Measuring Instruments Regulations (Electricity) – Protection against corruption – Schedule 1 Part 1 Clause 9: <ul style="list-style-type: none"> - Security measures foreseen shall provide for evidence of an intervention. - Software that is critical for metrological characteristics shall be identified as such and shall be secured. - Software identification shall be easily provided by the relevant instrument. - Evidence of a software intervention shall be available for a reasonable period of time. - Measurement data, software that is critical for measurement characteristics and metrologically important parameters stored or transmitted shall be adequately protected against accidental or intentional corruption. - The display of the total quantity supplied or the displays from which the total quantity supplied can be derived, whole or partial reference to which is the basis for payment, shall not be able to reset during

No	Function/Feature	Associated Functions ²	Comments/Rationale
			<p>use.</p> <p>Suitability (Schedule 1 Part 1 Clause 17):</p> <ul style="list-style-type: none"> - In the event of loss of electricity in the circuit, the amounts of energy measured shall be stored for a period of at least 4 months. <p>Measuring Instruments Regulations (Gas) – Protection against corruption – Schedule 1 Part 1 clause 8:</p> <ul style="list-style-type: none"> - Security measures foreseen shall provide for evidence of an intervention. - Software that is critical for metrological characteristics shall be identified as such and shall be secured. - Software identification shall be easily provided by the relevant instrument. - Evidence of a software intervention shall be available for a reasonable period of time. - Measurement data, software that is critical for measurement characteristics and metrologically important parameters stored or transmitted shall be adequately protected against accidental or intentional corruption. - The display of the total quantity supplied or the displays from which the total quantity supplied can be derived, whole or partial reference to which is the basis for payment, shall not be able to reset during use.
Common			
C7.1	The meter must ensure that data items stored within the meter, e.g. serial number, year of manufacture etc, must match what is displayed/printed on the outside of the meter	E1.3, G1.3	
C7.2	The meter is required to store the data items as defined in sections 2.4 – ‘Meter’ and 2.5 – ‘MPAN/MPRN’ of the Operational Framework schedule ‘Data Definition’		
C7.3	For meters with debit capability, the meter is required to store (in addition to those listed in C7.2) the data items as defined in section 2.6 - ‘Debit and Prepayment’ of the Operational Framework schedule ‘Data Definition’.	11, C7.2	
C7.4	The meter will record consumption over configurable time periods		Consumption intervals will be defined within the software and therefore adaptable to individual Suppliers’ tariff requirements.
C7.6	The meter will record diagnostic information	C2.3, C4.1	<p>Measuring Instruments Regulations (Gas) – Suitability – Schedule 1 Part 1 Clause 16:</p> <ul style="list-style-type: none"> - A relevant instrument powered from the mains (AC or DC) shall be provided with an emergency power supply device or other means to ensure, during a failure of the principal power source, that all measuring functions are safeguarded. - A dedicated power source shall have a lifetime of at least five years. After 90 % of its

No	Function/Feature	Associated Functions ²	Comments/Rationale
			<p>lifetime an appropriate warning shall be shown.</p> <ul style="list-style-type: none"> - An indicating device shall have a sufficient number of digits to ensure that the quantity passed during 8000 hours at Qmax does not return the digits to their initial values. - The relevant instrument shall have a test element, which shall enable tests to be carried out in a reasonable time - The errors of a relevant instrument at flows outside the controlled range shall not be unduly biased. - Where a relevant instrument is designed for the measurement of values of the measurand that are constant over time, the instrument shall be insensitive to small fluctuations of the value of the measurand, or shall take appropriate action. - When a relevant instrument has associated software which provides other functions besides the measuring function, the software that is critical for the metrological characteristics shall be identifiable and shall not be inadmissibly influenced by the associated software. - The relevant instrument shall respect the MPE in any flow direction or only in one flow direction clearly marked. <hr/> <p>Will include all recorded alerts, alarms, outages etc Covers Metering Systems faults and tampers To be stored within memory until 'cleared' by Authorised Party</p>
8	Memory		<p>Measuring Instruments Regulations (Electricity) – Suitability – Schedule 1 Part 1 Clause 17:</p> <ul style="list-style-type: none"> - In the event of loss of electricity in the circuit, the amounts of energy measured shall be stored for a period of at least 4 months. <p>Protection against corruption (Schedule 1 Part 1 Clause 9):</p> <ul style="list-style-type: none"> - Measurement data, software that is critical for measurement characteristics and metrologically important parameters stored or transmitted shall be adequately protected against accidental or intentional corruption. <hr/> <p>Measuring Instruments Regulations (Gas) – Suitability – Schedule 1 Part 1 Clause 16:</p> <ul style="list-style-type: none"> - A relevant instrument powered from the mains (AC or DC) shall be provided with an emergency power supply device or other means to ensure, during a failure of the principal power source, that all measuring functions are safeguarded. <p>Protection against corruption (Schedule 1 Part 1 Clause 8):</p> <ul style="list-style-type: none"> - Measurement data, software that is critical for measurement characteristics and metrologically important parameters stored or transmitted shall be adequately

No	Function/Feature	Associated Functions ²	Comments/Rationale
			protected against accidental or intentional corruption.
Common			
C8.1	The meter will have sufficient memory to store a minimum of; For gas - 6 months of continuous half hourly interval data for total imported energy. For electricity - 3 months of continuous half hourly interval data for both total import and total export energy.	C5.1	Equivalent of 3 months half hourly data for 2 registers, or 6 months for 1 register, would be approximately 10,000 readings. The meter will include memory overhead sufficient to support the delivery of other functionality within this specification – e.g. one week of daily credit balances, previous tariff settings etc. <i>Specific requirements to be finalised.</i>
C8.2	The meter will have sufficient persistent memory to store an agreed minimum set of data for the lifetime of the meter.	7	<i>Data item requirements subject to further development.</i> <i>Function enables interrogation of memory if the meter has been removed or is off-line</i>
9	Security		<p>Measuring Instruments Regulations (Electricity) – Protection against corruption – Schedule 1 Part 1 Clause 9:</p> <ul style="list-style-type: none"> - The metrological characteristics of a relevant instrument shall not be influenced in any inadmissible way by the connection to it of another device, by any feature of the connected device itself or by any remote device that communicates with the instrument. - Security measures foreseen shall provide for evidence of an intervention. - Software that is critical for metrological characteristics shall be identified as such and shall be secured. - Software identification shall be easily provided by the relevant instrument. - Evidence of a software intervention shall be available for a reasonable period of time. - Measurement data, software that is critical for measurement characteristics and metrologically important parameters stored or transmitted shall be adequately protected against accidental or intentional corruption. <p>Measuring Instruments Regulations (Gas) – Suitability – Schedule 1 Part 1 Clause 16:</p> <ul style="list-style-type: none"> - Meters shall have no feature likely to facilitate fraudulent use, and minimise possibilities for unintentional misuse. - A relevant instrument powered from the mains (AC or DC) shall be provided with an emergency power supply device or other means to ensure, during a failure of the principal power source, that all measuring functions are safeguarded. <p>Protection against corruption (Schedule 1 Part 1 Clause 8):</p> <ul style="list-style-type: none"> - The metrological characteristics of a relevant instrument shall not be influenced in any inadmissible way by the connection to it of another device, by any feature of the connected device itself or by any remote device that communicates with the instrument.

No	Function/Feature	Associated Functions ²	Comments/Rationale
			<ul style="list-style-type: none"> - Security measures foreseen shall provide for evidence of an intervention. - Software that is critical for metrological characteristics shall be identified as such and shall be secured. - Software identification shall be easily provided by the relevant instrument. - Evidence of a software intervention shall be available for a reasonable period of time. - Measurement data, software that is critical for measurement characteristics and metrologically important parameters stored or transmitted shall be adequately protected against accidental or intentional corruption.
			See Operational Framework schedules 'Access Control Specification', 'WAN Communications Solution(s) Options', 'Local Communications Solution(s) Options', 'Protocol Specification' and 'Local Device Standards'.
Common			
C9.1	The meter will use data security measures to protect data from corruption, fraud, tampering and unauthorised access		Local protection measures could include use of PIN no or parental code on a keypad (which can be overridden remotely in case of lost/forgotten codes). See Operational Framework schedule 'Access Control Specification'
C9.2	The meters will be compliant with the Operational Framework schedule 'Access Control Specification'.		Use of security policies to restrict Authorised Party/Local Device access to data and grant rights to operate functionality.
10	Revenue Protection/Theft		Measuring Instruments Regulations (Electricity) – Suitability – Schedule 1 Part 1 Clause 17: Meters shall have no feature likely to facilitate fraudulent use, and minimise possibilities for unintentional misuse
Common			
C10.1	The meter shall be no more susceptible to fraud than modern non-smart meters.	C9.1	Fraud detection and notification is a fundamental requirement Needs to consider additional opportunities for fraud from introducing complex technologies Cannot be a retrograde step against existing fraud prevention and detection techniques
C10.2	The meter will issue alerts to Authorised Party when (attempted) fraud or a safety issue is detected. This function will operate whether meter is enabled or disabled (subject to battery life).	C2.3, C4.1, C7.6, C9.1, G10.1, E10.1	This function to operate in conjunction with G10.1 and E10.1, allowing Authorised Parties to configure which alerts will issue a message to an Authorised Party, and which will also disable supply.
Gas			
G10.1	The meter shall be able to be configured to disable supply upon detection of alerts for safety purposes and	G1.4, C10.2	<i>This function would be mandatory for a gas meter with a valve (or equivalent means of disabling the flow of gas through the meter). See 4.2 above.</i>

No	Function/Feature	Associated Functions ²	Comments/Rationale
	to protect customer equipment.		The following alerts are the minimum requirements, meters from differing manufacturers may include additional functionality. <ul style="list-style-type: none"> - Meter cover removal - Backward running, reverse energy - Attempted unauthorised electronic access - Flow of gas exceeds configurable level within a configurable time period – to detect possible leaks
Electricity			
E10.1	The meter shall be able to be configured to disable supply upon detection of alerts for safety purposes and to protect customer equipment.	E1.4, C10.2	The following alerts are the minimum requirements, meters from differing manufacturers may include additional functionality. <ul style="list-style-type: none"> - Terminal cover removal - Meter cover removal - Backward running/reverse energy on import register(s) - Attempted unauthorised electronic access - Contactor/switch bridged - Current exceeds configurable level within a configurable time period – to detect possible faults - Interruption of the neutral supply to the meter May require contactor/switch to be rated for fault breaking for electricity meter.
11	Debit Mode Operation		<p><i>This function would be mandatory for a gas meter with a valve (or equivalent means of disabling the flow of gas through the meter). See 4.2 above.</i></p> <p>Includes operation as Pay As You Go and with debt recovery facility as present on current Prepayment meters.</p> <p>Associated functions 3.1 & 3.2 for all of section 11.</p> <p>All requirements in section 11 refer to the meter functionality when operating in debit mode.</p> <p>Measuring Instruments Regulations (Electricity) – Information to be borne by and to accompany – Clause 10:</p> <p>Information for correct operation and any special conditions of use shall accompany the meter.</p> <p>Indication of Result – Clause 11:</p>

No	Function/Feature	Associated Functions ²	Comments/Rationale
			Display of result must be clear and unambiguous, easy to read under normal conditions of use and not be confused with other indications.
Common			
C11.1	The meter will be able to disable supply when there is no credit or emergency credit on the meter, and it is not during non-disable periods		
C11.2	The meter will be able to be configured to continue supplying energy to the customer even when there is no credit or emergency credit left on meter	C6.3	Will replicate functionality in some current meters that prevents power from going off on Xmas day, overnight on a Sunday, religious festivals, bank holidays etc. Non disable periods could be dates, days or time periods
C11.3	All metering and communications functionality will be available irrespective of credit balances.		
C11.4	When operating in debit mode the meter will manage (configurable recovery rate and amount to be recovered) fuel debt recovery		
C11.5	When operating in debit mode the meter will manage (configurable recovery rate and amount to be recovered) non-fuel debt recovery		Non-fuel debt non-payment or balance will not affect fuel supply.
C11.6	When operating in debit mode the meter will support an emergency credit facility	C6.3	
C11.7	When operating in debit mode the meter will manage available credit on the meter based on credit purchased and tariff settings		
C11.8	The meter will be able to accept credit remotely		
C11.9	The meter will process payment manually where payment has not reached the meter		To be used when communications has failed – e.g. customer enters code via buttons or keypad interface Could also be used by engineer to wind on 'credit'.
C11.10	Meter will record the total amount of credit that has been added to the meter		
C11.11	The meter will display a "low credit" warning message to the customer		
C11.12	The meter will accept remote updates of credit available and debt outstanding		To be used to reconcile meter with Supplier systems where appropriate.
12	Legal and Statutory Requirements		<i>Not an exhaustive list – these are Operational Framework requirements in addition to those required by</i>

No	Function/Feature	Associated Functions ²	Comments/Rationale
		<i>law</i>	
Common			
C12.1	The meter will be compliant with Disability Discrimination Act requirements	1, 6	See Section 6 for potential use of Meter Variants and Local Devices to meet legal requirements.
C12.2	The meters should conform with the Measuring Instruments Regulations	C1.1	
C12.3	The meter will be compliant with Data Protection Act requirements		Protection of customer and other sensitive information, particularly for meters installed where 3 rd parties can gain access.
C12.4	The meter will be compliant with relevant communications regulations and standards		

6 Meter Variants

Due to the variety of site and supply conditions across Great Britain, it is not possible to specify a “one size fits all” smart meter that covers the scope of the specification. Similarly, customers and Suppliers should not be excluded from the Operational Framework based upon the nature of the gas or electricity supply to individual premises.

The table below lists known smart Meter Variants that could be installed as a result of energy supply conditions. In order to be compliant with the Operational Framework, and compatible with the interoperability requirements, these variants replicate, except where noted, the specification in 5 above.

Variants listed with reduced or additional functionality will comply with all other relevant requirements of the Operational Framework and be able to utilise Operational Framework infrastructures or processes.

The Operational Framework schedule ‘Data Definition’ includes data items enabling market participants to identify Meter Variants.

Ref	Smart Meter Variant	Fuel	Description/Reason for Variant	Differences from Smart Meter Specification in Section 5
STD	Standard	Both	Standard Meter as defined in section 5 Gas meter suitable for all supplies within scope Electricity meter suitable for single phase supply up to 24 kilowatts (suitable for 100 amp metering) ¹²	None
GSC	Semi Concealed	Gas	Gas supply to premise requires a semi-concealed meter housing.	None apart from actual meter casing
CNR	Non-Roman Character Display	Both	Customer/Supplier requires meter display to operate using non-roman character set	Meter display hardware (and drivers) capable of displaying non-roman character and toggling between roman and non-roman character sets. Sub variants could include: - Chinese (simplified) - Cyrillic

¹² Meter terminal should safely accommodate both 16mm² and 25mm² cable for both 4 and 5 terminal variants

Ref	Smart Meter Variant	Fuel	Description/Reason for Variant	Differences from Smart Meter Specification in Section 5
				<ul style="list-style-type: none"> - Greek - Turkish - Hebrew - Arabic <p><i>In order to be interoperable for all Authorised Parties, all interactions with Metering System by Authorised Parties will be conducted in English.</i></p> <p><i>Meter display will be configurable by Authorised Party to allow non-roman characters to be displayed using appropriate languages for the customer.</i></p>
EPC	Polyphase with internal contactor	Electricity	Premise has polyphase supply	None apart from terminals appropriate to polyphase supply
EPN	Polyphase without internal contactor	Electricity	Premise has polyphase supply	Terminals appropriate to polyphase supply Absence of internal contactor/in line switch means meter is not capable of: <ul style="list-style-type: none"> - remote enable/disable - disable on fault tamper - debit operations
EPM	Polyphase with Maximum Demand and four quadrant measuring element	Electricity	Premise has polyphase supply and has a maximum demand profile class	No functional differences. Additional data items, memory capacity etc to accommodate 4 quadrant measurement and maximum demand. Data items required: <ul style="list-style-type: none"> - kW MD import - kVA MD import - kVARh lag import when importing kWh only - kVARh lead import when importing kWh only - kVARh lag import when exporting kWh only - kVARh lead import when exporting kWh only The meter will record kWh import and kWh export separately
E4T	4 Terminal with auxiliary switch	Electricity	Premise has switchable circuit for additional load	None apart from auxiliary switch
E5S	5 Terminal single Element	Electricity	Will require a contactor/switch for each outgoing circuit	None apart from additional terminal
E52	5 Terminal two Element	Electricity	Will require a contactor/switch for each outgoing circuit	None apart from additional terminal

6.1 Special Requirements

Where a Supplier chooses to offer particular display feature or customer interface functionality (such as a ‘talking meter service’) this could be delivered by distinct smart Meter Variants that will be compliant with this meter specification, or through the use of a CDU or other Local Device within the premises designed to accommodate particular customer requirements.

APPENDIX A: ADDITIONAL FUNCTIONALITY FOR INTEROPERABILITY

Version History

This appendix is a development of Schedule O of the Smart Metering Operational Framework Proposals and Options document – the development history of which is shown below.

Version	Date	Author	Description
0.1	26 June 2007	Simon Harrison	Initial draft
0.2	6 th July 2007	Simon Harrison	Updated following review with ERA Suppliers
0.3	3 rd August 2007	Simon Harrison	Updated for Operational Framework publication

1 INTRODUCTION

1.1 Purpose

This appendix defines the Operational Framework requirements for features or functions of a Metering System in addition to those detailed in the Lowest Common Denominator detailed within the ‘Smart Meter Functional Specification’ table.

The documentation of these requirements will ensure that a consistent approach is taken where necessary to ensure the ongoing interoperability of all Metering Systems.

1.2 Scope

This appendix specifies functionality and features in addition to the minimum ‘lowest common denominator’.

Only additional functions or features which could affect interoperability as defined in other Operational Framework Elements are included.

This means that if a meter is specified with a longer battery life or a colour display, those features will not adversely affect the interoperable nature of the Metering System and are not included in this schedule.

The ‘Smart Meter Specification’ includes provision for the use of distinct Meter Variants. Such Meter Variants are typically used to meet site (or customer) specific metering requirements, such as polyphase electricity supply, or a gas meter point requiring a semi concealed meter design. Where a specific Meter Variant creates interoperability requirements, that will be included in this schedule.

Commercial issues arising from the installation of Metering Systems with functionality or features in addition to the ‘lowest common denominator’ are out of scope.

2 Additional Functionality

2.1 General

Any function or feature in addition to the ‘lowest common denominator’ must comply with relevant legislation, chiefly the Measuring Instruments Regulations.

This schedule, subject to Operational Framework change control practices, will require ongoing amendment as new metering technology is deployed within the Operational Framework.

2.2 Format

Due to the potential variety of additional functionality, each type is presented in its own section, with:

- A Description and scope of the features/functions included
- B Specific Operational Framework requirements
- C Interoperability requirements of the additional features/functions

3 MODULAR CONSTRUCTION

3.1 Description and Scope

A number of meters are designed and constructed in a way that allows components of the meter to be replaced or upgraded without the need for the Metering System itself to be replaced. This is usually achieved by having removable sections of the meter housing giving access to hardware ‘modules’.

A clear example of this would be a meter with a communications module. The meter itself could remain in situ, but a suitably qualified Meter Worker could upgrade the module for commercial, maintenance or technological reasons.

Meters with modular construction are distinct from Metering Systems solutions that use a device-based approach. For example, where a Metering System includes a meter and a separate communications ‘box’, it would not be classified as a meter with modular construction under the Operational Framework.

For the purposes of the Operational Framework, only those modules that could affect interoperability are in scope. These include (for both gas and electricity smart meters):

- A Batteries
- B Local Communications hardware
- C WAN Communications hardware

D Memory

3.2 Operational Framework Requirements

All modular components of a Metering System should be suitably protected from interference or tamper. Wherever relevant this means protected by the meter seals. Therefore the use of slots, flaps or hatches that could compromise the physical or electrical integrity of the module or the meter itself, is not acceptable.

The design of Metering Systems of modular construction must protect metrological and other non-modular features and functions from interference or tamper. This protection must persist even when a module is being changed.

Modules must be capable of replacement without requiring interruption to the supply. This prevents any requirement for gas meter 'drop tests' or similar safety procedures.

3.3 Interoperability Requirements

For a modular Metering System to be interoperable for Operational Framework purposes it must meet the following requirements:

- A The modular construction of the meter must be identifiable to Authorised Parties, either by including an agreed character within the meter serial number or clearly identifying the modularity of the meter within the model name.
- B Any diagnostic information within meter alerts or logs derived from the operation of an individual module must include information enabling Authorised Parties to discern that the diagnostic information relates to a module rather than the whole of the Metering System.