Eskom	Standard	Technology

Title: **STANDARD FOR PARTICULAR REQUIREMENTS OF BASIC PREPAYMENT METERS**

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1. Introduction

This document defines the particular requirements for Eskom's basic prepayment split meters that are acquired via an Eskom contract.

As this document only defines the functionality of the products, it will be necessary to also refer to the SANS 1524-1 and IEC 6205X series for the complete requirements.

2. Supporting clauses

2.1 Scope

SANS 1524-1 specifies the minimum requirements for a prepayment meter but it does not specifically deal with the product functionality. Many requirements in SANS 1524-1 incorporate various options and some requirements are currently only preferred options. This standard stipulates the detailed functional requirements to achieve the standardisation of prepayment meters within Eskom and to ensure that the equipment will fulfil Eskom's specific needs.

Since the original development of the Electricity Dispenser (ED), various other concepts for prepayment meters have been developed. This specification is applicable for single and three phase split prepayment meter designs.

This document does not define the requirements for "smart" meters that typically contain time-of-use or remote load limiting functionality.

2.1.1 Purpose

The purpose of this document is to provide a standard that ensures the basic prepayment split meters will comply with Eskom's functional and electrical requirements.

2.1.2 Applicability

This document shall apply throughout Distribution Division.

2.2 Normative/informative references

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] IEC 62052-11 Electricity metering - General requirements, Tests and test conditions - Part 11: Metering equipment

[2] IEC 62053-21 Electricity metering equipment (a.c.) - Part 21: Particular requirements - Static meters for active energy (classes 1 and 2)

[3] IEC 62055-31 Electricity payment metering systems - Part 31: Particular requirements - Static payment meters for active energy (classes 1 & 2)

[4] IEC 62055-41 Electricity metering - Payment systems - Part 41: Standard transfer specification (STS) - Application layer protocol for one-way token carrier systems

[5] IEC 62055-51 Electricity metering - Payment systems - Part 51: Standard transfer specification - Physical layer protocol for one-way numeric and magnetic card token carriers

[6] IEC 62055-52 Electricity metering - Payment systems - Part 52: Standard transfer specification - Physical layer protocol for a two-way virtual token carrier for direct local connection

[7] IEC 60529 Degrees of protection provided by enclosures

[8] BS 7856 Code of practice for Design of alternating current, watthour meters for active energy (classes 1 and 2)

[9] SANS 1524-1 Electricity payment systems - Part 1: Payment meters

[10] SANS 1524-1-2 Electricity payment systems - Part 1-2: Surge protective devices for the protection of payment meters.

[11] SANS 1524-4 Electricity payment systems - Part 4: National prepayment electricity meter cards

[12] STS 101-1 Interface specification - STS 101-1: Standard transfer specification (STS) - Physical layer mechanical and electrical interface for virtual token carriers

[13] STS 201-1 Companion specification - STS 201-1: Standard transfer specification (STS) - Meter function object: Register Table for electricity payment meters

[14] ST 240-76628631 Eskom specification: Standard for sealing metering equipment

2.2.2 Informative

[15] IEC 62051 Electricity metering - Glossary of terms

[16] IEC 62055-21 Electricity metering - Payment systems - Part 21: Framework for standardisation

[17] IEC 60950-1 Information technology equipment - Safety Part 1: General requirements

[18] SANS 10142-1 The wiring of premises - Part 1: Low-voltage installations

[19] SANS 15417 Information technology: Automatic identification and data capture techniques - Code 128 bar code symbology specification

[20] SANS 156 Moulded-case circuit-breakers

[21] SANS 767-1 Earth leakage protection units - Part 1: Fixed earth leakage protection circuit-breakers

[22] ST 240-76619477 Eskom specification: Procedure for the Request For Modification (RFM) on prepaid meters

[23] ST 240-76619489 Eskom specification: Accelerated Environmental Stress Test for Solid State Electricity Metering Equipment

2.3 Definitions

2.3.1 General

Definition	Description
Active unit	The metering unit that plugs into the passive unit (or socket). The Active unit may often (but not necessarily) include the Customer interface Unit.
Base	The back cover of the active unit. The active unit will plug into a standard socket.
Basic prepayment meter	A prepayment meter without a real time clock and other advanced features. Such a meter can typically not support time of use tariffs.
Customer Interface Unit	The portion of a meter that contains interfaces (input and/or output) to interact with the meter. The Customer interface Unit is often included with the Measurement Unit to form a self-contained meter, but it may also exist as a separate Unit e.g. in the implementation of a split meter.
Measurement Unit	As defined in SANS 1524-1 with the additional meaning that the term Measurement Unit may also be used to describe a complete meter where the Measurement Unit and Customer interface Unit are contained inside a single device. Also known as Measurement Control Unit.

Definition	Description
Overcurrent Protection	A function provided by ECU to serve as a fault protection feature by disconnecting the load when a fault current is detected.
Passive Unit	Also called a socket (for conformity with IEC terminology). The service connection is terminated in the passive unit and the active unit plugs into the passive unit.
Power Limiting	An automatic load disconnection function provided in prepayment meters to limit the average power consumed, to the value programmed in the meter with the relevant STS management token. The average power consumed is calculated over a number of pulses and is therefore not suitable to serve as input for any protection feature.
Prepayment Meter	A generic term for prepayment devices encompassing ED, ECU, split ED and other metering devices. This term is also interchangeably used with the word "meter" in the same context.
Socket	The passive unit where the service connection is terminated. The active unit plugs into the socket.
Split Meter	Meter where the Measurement Unit and Customer interface Unit are contained in separate enclosures.
Token Carrier	As defined in IEC 62055-31
Token Carrier Interface	As defined in IEC 62055-31

2.3.2 Disclosure classification

Controlled disclosure: Controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

Abbreviation	Description
APDU	Application Protocol Data Unit (As defined in IEC 62055-41)
ASCII	American Standard Code for Information Interchange.
BCD	Binary Coded Decimal.
CENELEC	European Committee for Electrotechnical Standardization
CIU	Customer Interface Unit
ECU	Electricity Control Unit; A prepayment meter with earth leakage and overcurrent protection built in. Category as defined in SANS 1524-1
ED	Electricity Dispenser. A prepayment meter without either earth leakage or overcurrent protection. Category as defined in SANS 1524-1
HHU	Hand Held Unit.
ISO	International Organization for Standardization
MU / MCU	Measurement Unit or Measurement Control Unit
SANS	South African National Specification
SGC	Supply Group Code
STS	Standard Transfer Specification

Abbreviation	Description
TCDU	Transportation Class Data Unit (As defined in IEC 62055-41)
UIU	See CIU - Customer Interface Unit
VTC	Virtual Token Carrier

2.5 Roles and responsibilities

Not applicable.

2.6 Process for monitoring

Governed by the Eskom National Contract process

2.7 Related/supporting documents

- ST 240-76619477 Eskom standard: Procedure for the Request For Modification (RFM) on prepaid meters
- ST 240-76619489 Eskom standard: Accelerated Environmental Stress Test for Solid State Electricity Metering Equipment

3. Requirements

3.1 Fundamental requirements for meters

All meters shall comply with the requirements of SANS 1524-1 unless differences are defined in this standard which will take precedence.

3.2 Mechanical enclosure design

All prepayment meters (single phase as well as multiphase) shall be designed as split meters.

The installed Measurement Unit shall have an IP rating 54 or better according to IEC 60529.

The Customer Interface Unit shall have an IP rating of 52 or better according to IEC 60529.

Single phase split prepayment meters shall be designed to comply with either of the following two enclosure options:

1) The Measurement Unit enclosure shall conform to the standard circuit breaker mounting format that is suitable for mounting on a 35 mm DIN rail or alternatively with dual-rail mounting capability.

or

2) The base of the Measurement Unit shall conform to the BS 7856 enclosure and mounting arrangement. The terminals position and spacing shall be according to the same BS requirements with the addition that screw clamp terminals to be used. The Measurement Unit shall be in a high impact resistant case. The meter cover shall be dust-proof and sealable. If a terminal block cover is provided, the cover shall be sealable independently from the meter cover.

Multi-phase split prepayment meters shall be designed to comply with enclosure option (2).

For enclosure options (1) and (2), the main “Live” and “Neutral” terminals shall be located on the bottom of the installed meter with the cables entering from the bottom. **The Live and Neutral terminals shall be screw clamp type terminals with flat clamping areas inside the terminal clamp**.

Refer to Annex B for further details about the meter enclosure formats.

3.3 Meter dimensions

3.3.1 Single-phase meter that conforms to the standard circuit breaker mounting format

- Maximum height: 140 mm
- Maximum width: 65 mm
- Maximum Depth (from base plate): 110 mm

3.3.2 Single-phase meter that conforms to the BS 7856 enclosure standard

- Maximum height: 210 mm
- Maximum width: 145 mm
- Maximum Depth (from base plate): 110 mm

3.4 Conformal coating

Conformal coating is not required for the printed circuit boards inside the Measurement Unit and Customer Interface Unit.

3.5 Tamper sensor

If a tamper sensor is fitted that senses entry into the Measurement Unit enclosure, it shall not disconnect the load. However it may log and/or display relevant indicators.

Tamper or fraud detection methods which are automatically set and reset by meter registers, are preferred and may optionally be provided. Some proposed detection methods have been identified and are indicated in the STS Companion specification, STS 201-1.

3.6 Sealing

Provision shall be made for sealing of the Measurement Unit with Eskom approved seals in accordance with ST 240-76628631. Where the terminals are contained inside the enclosure, they may be sealed with the same seal(s) as the enclosure.

Where implemented, the seals shall be applied in such a way that it will not be possible to undo/loosen the mounting screws used to secure the Measurement Unit, without breaking these seals. It shall further be impossible to obtain access to the inside of the Measurement Unit or to the connection terminals without breaking the seals.

The seals shall be applied in such a way that they will be easily visible when viewing an installed Measurement Unit from the front.

Any additional parts or cover plates that may be required to install or seal a meter shall be supplied with the meter.

It shall be possible to install, remove and seal a meter without requiring any special tools. (This requirement excludes standard Field Technician tools like screwdrivers, pliers, side cutters etc.)

Also refer to clause 3.8 for further sealing requirements of interface ports.

3.7 Marking of meter for all meter types

The meter number (decoder reference number) and barcode shall be clearly and permanently displayed on the front of the Measurement Unit enclosure as defined in SANS 1524-1 clause 5.1. (Note that the Manufacturer Codes for prepayment meters are administered by the STS Association and are different from the codes used for conventional meter manufacturers.)

It shall be possible to clearly display the meter number(s) on the CIU for the currently active Measurement Unit of a split meter. It shall further be possible to change the displayed number(s) accordingly whenever the Measurement Unit or the CIU is replaced.

The CIU for a split meter, shall display the STS compliant logo at least 7mm high and be clearly visible from the front of the installed device. The Measurement Unit for a split meter shall also display the STS logo to be visible when the unit is installed, but it may be smaller in size.

Other information as defined in SANS 1524-1 clause 5.1 shall also be displayed.

Every Measurement Unit and CIU shall clearly signify the following matching colour indications, to facilitate easy identification of the communication type for the main user interface:

Table 1: Colour assignments for CIU communication

Colour	Communication type
White or none	No remote interface provided (i.e. not a split meter)
Gray or black	Power Line Carrier (PLC)
Yellow or orange	Pilot Wire communication
Blue or green	RF communication
Pink or purple	Other communication type
Red	Reserved

3.7.1 Manufacturing and configuration information marked on all meters

The following minimum manufacture/configuration related information shall be visible from the outside of an uninstalled Measurement Unit. The information shall be protected in such a manner that it is not possible for a customer to delete, change or otherwise make illegible the information displayed on an installed Measurement Unit. It is therefore recommended that this information be applied to the back cover of the Measurement Unit, or to the side of a circuit breaker format enclosure.

1) Meter model/version number (as per RFM or meter approval.) Refer to document ST 240-76619477 for further information.

2) Date of manufacture and guarantee expiry date, (a tolerance of two weeks will be allowed for these dates.)

3) Supply Group Code.

4) Tariff index.

5) Amp limit or Power limit.

6) Calibration accuracy.

7) Interface type to the CIU for a split meter, e.g. “Power Line” or “RF Comms”

3.8 Interfaces

3.8.1 CIU communication interface

The communication interface between the Measurement Unit of a split meter and the CIU shall be via PLC (Power Line Communication) or RF (Radio Frequency) communication, providing reliable communication over at least a 100 meter communication distance.

- For the RF interface to the CIU, a multi-channel communication connection shall be applied over the license exempt frequency bands. If communication is unsuccessful in one channel, another channel must automatically be used.

- For the PLC interface to the CIU, Orthogonal Frequency-Division Multiplexing (OFDM) modulation shall be used in the CENELEC A band, for example: G3-PLC, IEEE 1901.2 etc. communication protocol.

Note: The purpose of specifying the specific protocols are not to achieve inter manufacturer compatibility, but are instead to ensure reliable communication in all environments and over the necessary distance.

3.8.2 Micro USB interface port

In addition to the communication interface to the CIU, the prepayment Metering Unit shall also provide an interface port that may be used for connection to a HHU, meter configuration tool or other communication device.

It shall be possible to inject all the supported STS tokens via the port and read the results where provided. It shall also be possible to read and/or write all the mandatory registers directly through the port as defined in STS Companion specification, STS 201-1.

Additional proprietary information may optionally be transferred through this port, but it shall not be possible to change any settings which are normally encrypted under STS, or insert credit into the meter, unless such information is encrypted as STS tokens.

The physical communication interfaces are defined as the following two Interface Types for the different meter implementations:

3.8.2.1 Type A interface

This is the industry standard interface for use in meters designed as a self-contained unit; (i.e. ED and ECU devices).

Not supported in split meters.

3.8.2.2 Type B interface

Requirements for the Type B interface shall apply for all types of split meters, as defined in clause 6 of the STS Interface specification STS 101-1. Note that the communication protocol for the Type B interface remains the same as that used for the Type A interface.

3.8.2.3 General

As defined in clause 6.1 of the STS Interface specification STS 101-1.

3.8.2.4 Mechanical interface

3.8.2.4.1 Terminal layout

As defined in clause 6.2 of the STS Interface specification STS 101-1.

Figure 1: Micro USB type B – receptacle

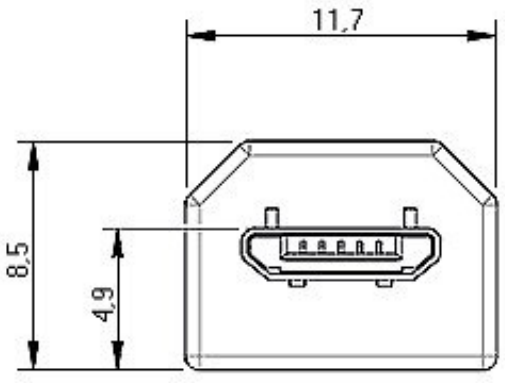

Figure 2: Clearance required for Micro USB type B – plug

3.8.2.5 Electrical interface

As defined in clause 6.3 of the STS Interface specification STS 101-1.

3.9 Climatic requirements

The requirements of SANS 1524-1 clause 6 shall apply.

3.10 Electrical requirements

The requirements as specified in SANS 1524-1 clause 7 shall apply

3.10.1 Safety related requirements

The requirements as specified in SANS 1524-1 clause 7 shall apply for a meter that excludes safety disconnection, overcurrent protection and earth leakage protection.

3.10.2 Accuracy class

Prepayment meters shall be of accuracy class index 2 or better.

3.10.3 Current rating

The basic current for a single phase meters shall be 10 A or less. The basic current for multi-phase meters shall be 20 A or less per phase.

The maximum current for a single phase meter shall be at least 60 A but not more than 100 A. The maximum current for a multi-phase meter, shall be at least 80 A but not more than 100 A per phase.

Note: The maximum current as defined here, is the electrical rating of the meter and is not a software implemented feature. It is separate from, and in addition to any power limiting features that may be provided in the meter and which are configured via STS tokens.

3.10.4 Protection disconnect

As defined by SANS 1524-1 clause 7.9 and meters of utilization category UC1.

3.10.5 Power Limit and Out of Credit disconnect

The prepayment meter shall have a power limiting function that will automatically disconnect the load when the average power consumed, exceeds the maximum allowed. This function is not intended as a system protection feature.

The prepayment meter shall be able to decrement the credit register past zero, into negative values (and display it as such), if the load is not successfully disconnected when all available credit has been consumed. The negative credit value shall then be subtracted from any new credit entered into the meter.

The disconnection device (for "Power Limiting" and "Out of Credit" conditions) may be single-pole and shall be adequately protected to ensure that disconnection of the load circuit cannot be prevented by external influences e.g. magnetic field interference or mechanical intrusion/damage. (See clause 3.10.8)

The prepayment meter shall store the remaining credit to non-volatile memory at intervals of not greater than 25 kWh. This requirement shall be in addition to any other storage mechanisms that are employed.

3.10.6 Additional requirements for prepayment meters with internal load switches

If an internal load switch is used as a disconnection device, the prepayment meter shall comply with the additional requirements specified in IEC 62055-31 Annex C.

3.10.6.1 General switching criteria

The prepayment meter shall automatically switch the load switch to the "on" state when the supply to the meter is available and the following conditions exist:

1) There is credit available

2) The meter is not in a tampered state;

3) The meter is not in a power limiting state

4) There is not an earth fault or overload condition detected by the meter.

The meter shall not have an interface that will allow the user to manually switch the load switch to the “on” position, apart from the normal function to enter credit which may indirectly cause the load switch contacts to close. (Such a manual button/interface will provide an easy means for the user to switch into intentional faults in attempts to fuse the contacts together.)

3.10.6.2 Power limiting switch criteria

The following procedure shall be employed, to restrict the number of switching cycles, when the meter is disconnecting the load, in order to limit the average power consumed:

1) Reconnect the load up to five times with 30 s intervals, if the consumption is more than the programmed limit

2) After five attempts, wait for 30 min (the lockout period) if the consumption is still above the limit before repeating the procedure.

3) The meter shall give a clear indication if the load has been disconnected to limit the power. This indication shall exist for as long as the load switch is in the "off" state due to this condition.

4) A time-out procedure shall be implemented to reset the load limiting timers when no overload condition has been detected for approximately 30 min.

3.10.7 General disconnect requirements

When the supply voltage is removed from the prepayment meter or falls below 80% of the rated voltage, the meter may optionally disconnect the load, provided that the meter shall automatically re-connect the load when the supply voltage is restored to more than 80% of the rated voltage. Alternatively the meter shall not disconnect the load when the supply voltage is removed or drops below 80% of the rated voltage.

No combination of influence quantities within the limits specified in SANS 1524-1 shall cause the meter to supply un-metered electricity, fail to interrupt the load on expiry of credit or execute unspecified load interruptions; (i.e. “nuisance tripping”).

3.10.8 Effects of magnetic fields

It shall not be possible to influence the switching operation of the load switch by applying a magnet with the following characteristics, to any user accessible part of the prepayment meter.

The electromagnet to test the effects of externally produced magnetic fields is described in IEC 62053-21 Annex B.

Table 2: Required magnet characteristics

Distance from magnet surface in mm	Magnetic field strength in Tesla (1 Tesla = 10 k Gauss)
0	1,20
20	0,43
40	0,17

3.11 Functional requirements

In addition to the requirements given in clause 9 of SANS 1524-1 the following shall apply.

All the user interface items shall be visible and accessible on front of the meter for a self-contained unit, or on the Customer Interface Unit of a split meter. They may optionally be displayed on the Measurement Unit of a split meter as well.

In addition to any displays on the Customer Interface Unit, the consumption rate indicator, as well as some indication of the load switch status, shall be displayed on the Measurement Unit of a split meter.

The consumption rate indication on the Customer Interface Unit will not be used for calibration purposes and need only serve as a visual indication for the customer of approximate/proportional consumption rate.

The Customer Interface Unit shall incorporate a practical power source like user replaceable batteries, to enable the display and allow token entry when the meter has disconnected the load. The Measurement Unit itself shall not require any batteries to operate correctly.

3.11.1 Token entry indication

Prepayment meters, that operate with numeric tokens shall:

1) Display the numbers entered during token entry

2) Have the means to remove digits, one at a time, from the end of a partially entered number, for example, a "Backspace" button.

3) Have the means to clear a partially entered number, for example, a “Clear" or "Enter" button.

4) If a keypad is provided for token entry, the standard telephone layout shall be used with four rows and three columns of numbers. The zero button may be enlarged but must be usable directly under the “8” digit. The “✶” and “#” buttons are optional and may be re-branded as required.

5) If additional buttons are required, they must be separated from the normal keypad buttons.

6) Braille tactile texture shall be provided on the “5” button, and preferably also on any “Clear" and/or "Enter" buttons.

7) All successful button presses shall provide tactile and/or audible feedback.

3.11.2 Token result indication

The prepayment meter shall at least uniquely display the following conditions:

1) Rejection of a token

2) Acceptance of a token. (A prominent indication of the token data content is acceptable)

3) Used (or duplicate) token.

4) Old (or expired) token

5) Meter key has expired (if implemented)

6) Token lockout active (See IEC 62055-52 Clause 6.6.7)

Additional status information as defined in IEC 62055-52 Clause 6.8.3.7 may optionally be displayed.

3.11.3 Load status indication

A unique indication shall be provided that, either power is supplied to the load circuit, or that the load circuit is switched on. For example; an illuminated indicator in the load circuit, or the circuit-breaker switch in the "on" position will both be sufficient. This indication shall be provided on the Measurement Unit of a split meter, in addition to the unique load indications as described below for the Customer Interface Unit of split meters.

Prepayment meters shall provide unique indications if the load has been disconnected due to the following conditions:

1) No credit available

2) Power consumption exceeded the maximum power limit as set with an STS token.

3) Electrical or other fault detected

3.11.4 Power indicator

An obvious power indication shall be provided when power is supplied to the meter. An active display or regularly pulsed indicator (independent of any meter state, including 'no-load') shall be sufficient. This indication shall be provided on both the Measurement Unit and the Customer Interface Unit of split meters.

3.11.5 Consumption rate indicator

The optical characteristics of the consumption rate indicator on the Measurement Unit shall comply with the requirements specified in IEC 62052-11.

The consumption rate indication shall be provided on the Measurement Unit of a split meter as well as on a self-contained meter, for calibration/verification purposes.

The consumption indication shall also be provided on the Customer Interface Unit of a split meter but that indication is only intended as a visual indicator for the user.

3.11.6 Credit display

The prepayment meter shall have a numeric credit display and shall indicate if more units are available than can be displayed, for example, by displaying all the numerals 9.

In the event that the available credit is decremented into negative values, the negative credit value shall be displayed as such on the normal credit display and registers of the meter.

3.11.7 Communication indicator

The Customer Interface Unit for a split meter shall provide a unique indication that the communication to the Measurement Unit is active and working correctly.

3.12 STS token entry and decryption

All meters shall comply with the STS /prepayment requirements as defined by IEC 62055-41, IEC 62055-51 and IEC 62055-52 for kWh based credit tokens unless where differences are defined in this specification.

All prepayment meters shall be capable of operating as uniquely coded numeric token STS units without requiring any modifications.

3.12.1 Token entry lockout

The criteria as defined in IEC 62055-52 clause 6.6.7 shall apply

When token entry lockout is active, the remaining lockout time shall be maintained in a relevant lockout time register. It shall be possible to read the remaining lockout time for the Virtual Token Interface The same lockout functionality shall not be applied for the short code requests, (which are specified in Annex A).

3.13 Other requirements

When subjected to environmental stress tests, based on ST 240-76619489 (Accelerated Environmental Stress Test), a sample of prepayment meters shall demonstrate satisfactory operation equivalent to at least 10 years of continuous field operation.

3.14 Packaging

Every prepayment meter shall be supplied with a low coercivity meter card that complies with the requirements of SANS 1524-4. The Meter (Decoder) number shall be clearly and permanently marked on the front of the card with a font of at least 3mm high, but embossing is not required. Since Eskom does not make use of card expiry, these meter cards shall be programmed according to the ISO option that excludes the expiry date from track 2 data.

The magnetic data on track2 of the card shall be encoded according to SANS 1524-4 with the correct meter number and other configuration data of the meter.

Every prepayment meter shall be supplied with all the necessary mounting screws and sealing plates/plugs.

The meter serial number with barcode shall be printed onto the packaging of the meter, along with Supply group code, tariff index and power limit. Where multiple meters are supplied within one package all the serial numbers and barcodes of the individual meters shall be printed onto the packaging to allow scanning of the barcodes without unpacking the package.

4. Authorisation

This document has been seen and accepted by:

Name and surname	Designation
P Moyo	General Manager: Power Delivery Engineering
S Mkhabela	Senior Manager: Distribution

5. Revisions

Date	Rev	Compiler	Remarks
June 2017	2	J. O'Kennedy	- Only allow split meters for single phase and multi-phase - Add fourth terminal with increase of meter width - Communication to CIU must be RF or PLC based - Tamper sensor allowed but must not disconnect load - Several requirements removed that are already in the SANS 1524-1 or IEC 602055 specifications
July 2014	1	J. O'Kennedy	- Changed document from DSP 34-1635 to new format 240-76625601 revision 1. - 3.2 Required IP rating of 51 for EDs / ECUs and IP rating of 54 for all other meters. - 3.2 IP rating of 52 for CIU. - 3.2 Terminals for split-meters shall be at the bottom of the meter and be of the screw clamp type. - 3.3 Maximum dimensions specified for single phase meters. - 3.4 Conformal coating is not required. - 3.10.5 Explicitly stated that negative credit shall be displayed. - 3.11 CIU must have guaranteed power source. - Annex B added with proposed meter layout.
Nov 2010	1	J. O'Kennedy	- Corrected image for USB receptacle and include clearance dimensions.
Dec 2009	0	J. O'Kennedy	- Document number changed to 34-1635 with revision 0. - Revision of original specification to refer to IEC 62055 series of specifications and new rev. SANS 1524-1 - Associated STS Companion specifications used.

6. Development team

The following people were involved in the development of this document:

- Jimmy O'Kennedy PTM&C
- Edison Makwarela PTM&C
- Shawn Papi Research, Testing & Development

7. Acknowledgements

Not applicable.

Annex A – Short Code Instructions

(Normative)

Test/Display Description	Required	Short Code Instruction	Test No. as defined in STS
Standard defined items			
Test all	Mandatory	000	0
Test load switch	Mandatory	001	1
Test displays	Mandatory	002	2
Test input device	Optional	003	6
Accumulated energy consumed	Mandatory	004	3
Key Revision & Key type	Mandatory	005	4
Tariff Index	Mandatory	006	5
Max power limit	Mandatory	007	7
Tamper status	Required if function exists	008	8
Available credit	Mandatory	009	
Phase power unbalance	Required if function exists	010	11
STS reserved		011- 029	
Manual configuration items			
Supply Group Code	Mandatory	030	
Manufacturer specific		031- 049	
Status/measured items			
Instantaneous power	Mandatory	050	9
GPS Coordinates (shown in two screens)	Required if function exists	051	
STS reserved		052- 069	
Manufacturer specific		070- 099	
Manufacturing configuration			
Meter number	Mandatory	100	
Firmware version	Mandatory	101	10
Primary VTC Protocol version	Mandatory	102	
Primary VTC Table ID (FOIN) e.g. "15.1.0"	Mandatory	103	
Primary Token Carrier Type e.g. “02”	Mandatory	104	
Primary encryption Algorithm e.g. “07”	Mandatory	105	
Key Expiry Number e.g. “255”	Mandatory	106	
Manufacturer Code e.g. “01”	Mandatory	107	
IIN (Issuer Identification Number) e.g. "600727"	Mandatory	108	
STS reserved		109- 149	
Manufacturer specific		150- 199	

Operational statistics			
Value of last credit token entered (others optional)	Mandatory	200	
ID of last credit token entered (others optional)	Mandatory	201	
Value of 2nd last (to n) credit token entered (even numbers)	Optional	202- 248	
ID of 2nd last (to n) credit token entered (uneven numbers)	Optional	203- 249	
Manufacturer specific		250- 299	
Water tariffs			
Water factor	Required if function exists	300	12
STS reserved		301- 399	
Electricity tariffs (e.g. Currency, block & TOU)			
Tariff rate	Required if function exists	400	13
Manufacturer specific		401- 449	
STS reserved		450 - 999	

Annex B – Enclosure Formats

(Normative)

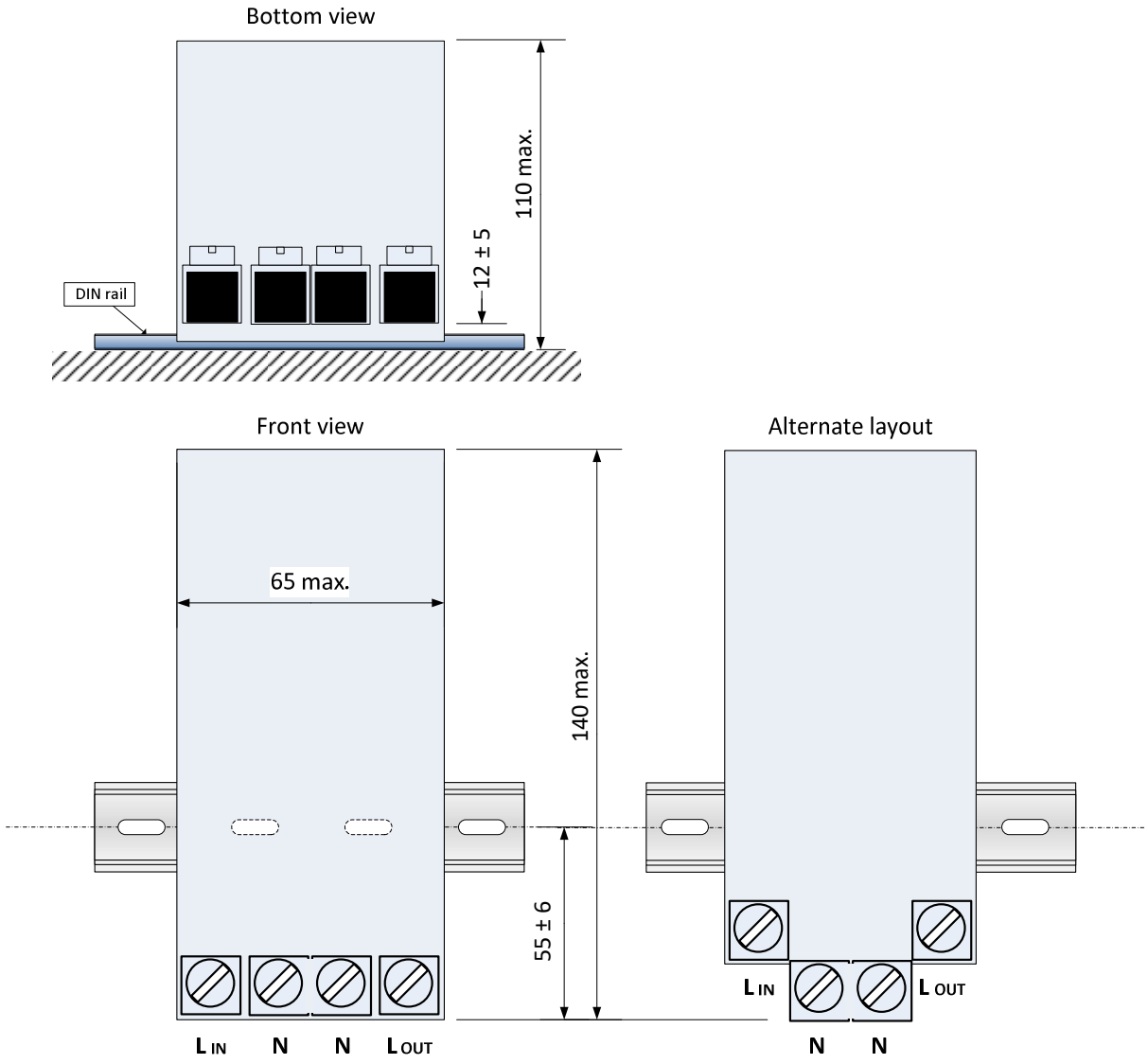

Figure B.1: Enclosure format for single-phase DIN rail mount meter

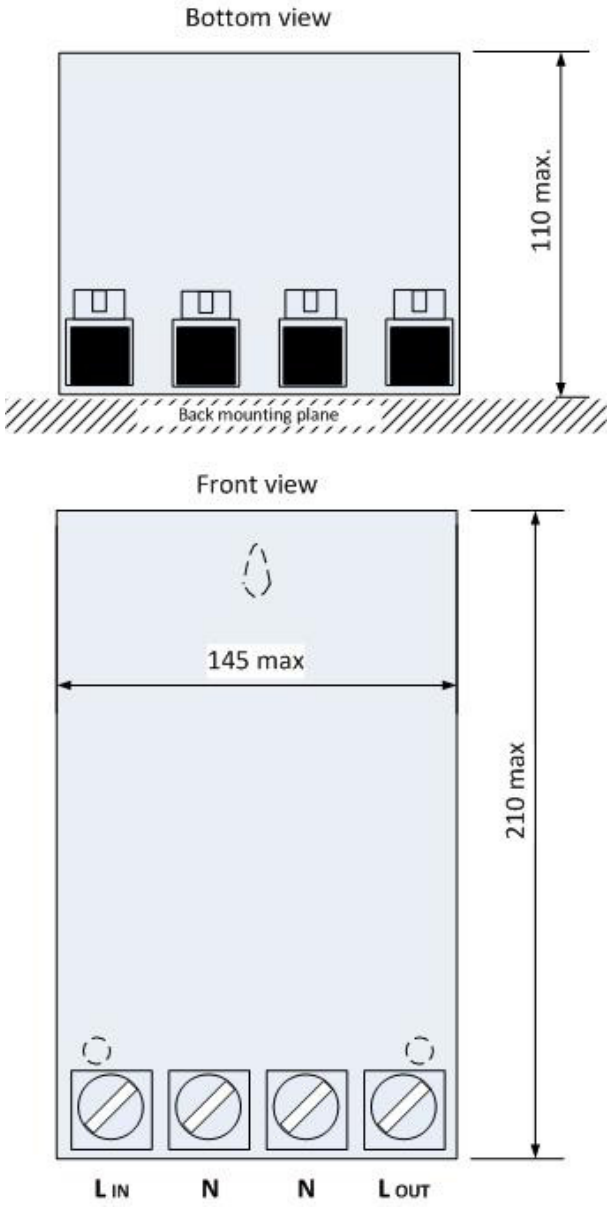

Figure B.2: Enclosure format for single-phase BS 7856 compliant meter