



# SIENNA SSP DIN-R PLC

## Split Single Phase DIN Rail Mount Power Line Communications Prepayment Electricity Meter

### This Meter can now be offered with WiFi/Bluetooth via the CIU

Building on the versatility of the SIENNA Product range the Customer Interface Unit can be supplied with external communications enabling remote access from both a Utility and Consumer perspective.

The meter is rated at 230V (80A) with an operating temperature range of -15 °C to +55 °C with Class 1 active energy accuracy. The terminal arrangement is bottom connect and the IP rating of the meter is IP54.

The meter is configurable for either STS pre-payment or post-payment operation. It incorporates a tamper detection and disconnection feature. Communication with the meter is via an IEC 62055-52 protocol optical port.

In the split metering configuration, there are two types of Customer Interface Unit(s). A common Base footprint CIU which plugs into the Eskom standard Socket and a Stand Alone CIU with battery back-up and can be wall mounted. Both CIU's will have the option for the WiFi/Bluetooth connectivity.

#### METERING CONTROL UNIT (MCU)

The MCU consists of the metering control elements: metrology circuits; STS token decryption and load monitoring with respective disconnecting and reconnecting actions. The IEC 62055-52 optical interface is used for 2-way communication such as data extraction and STS token transfer.

#### CUSTOMER INTERFACE UNIT (CIU)

The CIU serves as the customer interface to the meter. The large LCD display has language independent icons indicating the meter status. A low credit threshold function notifies the user of a low credit condition by audible alarm and indication on the LCD. The keypad incorporates braille features for the partially sighted.

The WiFi/Bluetooth connectivity feature allows access to the meter with the use of either a smartphone or computer. This enables the user to perform remote actions and view available data.

## THE SCOPE OF THE SYSTEM

### Utility use cases

Tariff rebates based on live time-of-use data

- Incentivise reducing peak time usage
- Managed through regular power measurements
- Resolution configured for billing/rebate purpose

Real time load limit adjustments

- Supports load shedding feature
- Enables restricted flow in the case of unpaid bill
- Consumers incentivized to opt into load limiting during peak demand
- High load devices (Eg: geyser, pool pump) can be managed by meter (if appropriate control device in place)
- If time-of-use tariff in place, consumer could set their own automatic load limits

Remote connect and disconnect

- Disconnect due to unpaid bills
- Disconnect due to tampering – enables remote communication of tamper condition
- Landlord could disconnect due to unpaid bills by a tenant
- Consumer could disconnect an unoccupied dwelling (eg: holiday home)
- The Utility action would need to override the Consumer/landlord action and lock out the meter.

Accurate tariff levels and behaviour based on usage

- Tariffs can be applied on usage and consumption rather than purchased units
- Different behaviour can be remotely selected based on the tariff type
  - Eg: Life Line tariff consumers may get “trickle” usage (eg: max 100W load) when no credit is available.

Post-paid billing

- Remote reading of usage for post-paid customers
- Remote switching between prepaid/post-paid

SSEG for prepay and post-paid customers

- Remote access to the meter data (specifically the import and export registers) and control of the meter (eg: mode switching) enables SSEG.
- Refund/rebate of electricity export
- Refund/rebate for bidirectional-always-positive penalties
- Remote mode change (unidirectional/bidirectional, import only)

Meter auditing & anomaly detection

- Remote reading of available credit
- Remote monitoring of tamper state
- Correlating available credit and usage with purchasing data
- Pro-active management of consumers with high load demand during peak load times

Enhanced maintenance and monitoring

- Remotely monitor line voltage, frequency and power factor
- Identify faults remotely
- Early detection and diagnosis of faults and anomalies
  - Eg: could detect a particular phase in an area has lower than expected voltage. This assists a technician to find and resolve the fault in less time.

### End user use cases

Remote loading of a credit token

- Automatic loading of purchased tokens - no need to enter into meter
- Remote loading of tokens for family members
- Remote loading of tokens

Low credit warnings and automatic top-ups

- User can be notified when credit is low
- User can configure automatic top up when credit is below a certain threshold

Enables visually impaired meter interface

- Voice read out of available credit via mobile app
- Direct loading of token onto meter - no need to view token and enter via keypad

Remote connect and disconnect

- Landlord could disconnect due to unpaid bills by a tenant
- Consumer could disconnect an unoccupied dwelling (eg: holiday home)
- Utility action must be able to override the consumer/landlord action

Load profiling

- Load profiling for energy audit

### KEY BENEFITS

- Utility can manage demand
- Utility can remotely configure to Prepaid or Post-Paid
- Utility can manage unpaid bill when in Post-Paid Mode
- Metering and Consumption data is available to the Utility
- Remote loading of Credit token
- Monitoring and Control of appliances
- Quality of supply monitoring.
- Remote notification of tampering

## PRIMARY STANDARD COMPLIANCE

|              |                                                                                                                                          |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------|
| IEC 62055-21 | Electricity metering – Payment systems – Part 21: Framework for standardization                                                          |
| IEC 62055-31 | Particular Requirements - Static Payment Meters for active energy (Classes 1 and 2)                                                      |
| IEC 62055-41 | Part 41: Standard Transfer Specification (STS) – Application Layer protocol for one-way token carrier systems                            |
| IEC 62055-51 | Part 51: Standard Transfer Specification (STS) – Physical Layer Protocol one-way numeric and magnetic card token carriers                |
| IEC 62055-52 | Part 52: Standard Transfer Specification (STS) – Physical Layer Protocol for a two-way virtual token carrier for direct local connection |
| SANS 1524-1  | SANS Electricity Payment Systems – Part 1: Payment meters                                                                                |
| DSP 34-1635  | ESKOM – Particular Requirements for Pre-payment meters                                                                                   |
| 240-76619489 | ESKOM – ALT Testing                                                                                                                      |
| IEC 62052-11 | General Requirements, tests and test conditions — Part 11: Metering Equipment                                                            |
| IEC 62053-52 | Electricity Metering Equipment (AC) — Part 52: Symbols                                                                                   |

## SPECIFICATIONS

| METERING CONTROL UNIT (MCU)  |                                                                                                         |
|------------------------------|---------------------------------------------------------------------------------------------------------|
| Voltage Range                | Un = 220V / 230V / 240V, 50Hz<br>(80 % Un to 115 % Un)                                                  |
| Frequency                    | 50Hz +/- 2%                                                                                             |
| Current range                | I <sub>b</sub> =5A, I <sub>max</sub> = 80A                                                              |
| Accuracy                     | Active Energy Class 1                                                                                   |
| Power supply and consumption | Power consumption with CU connected in the voltage circuit of the meter is less than 2W and 10VA.       |
| Rate Indicator               | 1000 imp/kWh                                                                                            |
| Temperature                  | -15 °C to +55 °C                                                                                        |
| Operating Range              |                                                                                                         |
| Humidity Operating Range     | <95 % RH                                                                                                |
| Protection Class (MCU)       | IP 54                                                                                                   |
| RF Immunity                  | 30V/m                                                                                                   |
| Terminal Arrangements        | 4 Terminal bottom connect                                                                               |
| Terminals                    | Current rating 100A (continuous).<br>Conductor diameter 8mm or 35mm <sup>2</sup>                        |
| Sealing                      | Meter enclosure sealed for life with terminal seal provision.                                           |
| Metering Modes               | STS prepaid and post-payment                                                                            |
| Disconnections               | Zero Credit, Tamper, Reverse Energy, Over and Under Voltage, Over and Under Frequency, Over Power Limit |
| Tamper                       | Magnetic, Relay CIU bypass, Reverse Energy Detection                                                    |
| Communication Option         | Optical port (IEC 62055-52), PLC                                                                        |
| Visual Indicators            | Rate, Relay Status, CIU Communication Status LEDs, LCD with language independent icons                  |
| Weight                       | 390g                                                                                                    |
| Dimensions (WxDxH)           | 55.9 x 110 x 105.5mm                                                                                    |
| Product Reliability          | Designed for a 15yr lifespan in the field                                                               |

## CUSTOMER INTERFACE UNIT (CIU)

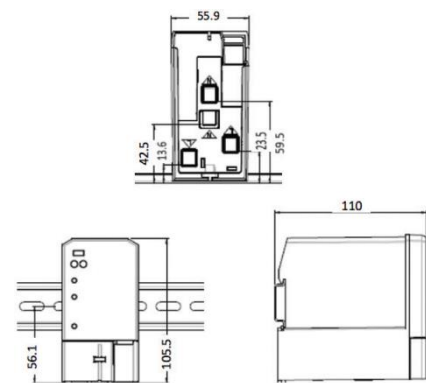
|                                      |                                                                                    |
|--------------------------------------|------------------------------------------------------------------------------------|
| User Display                         | LCD to 8 digits values & language independent icons                                |
| User Interface                       | CIU keypad incorporating braille features                                          |
| IP Rating                            | Relay CIU IP52<br>Standalone CIU IP52                                              |
| CIU Common Base (with relay)         | Relay rated to carry 80A 277VAC                                                    |
| CIU Standalone (with battery backup) | Batteries accessible from the back of the unit with mains isolation safety feature |

## PAYMENT MODES

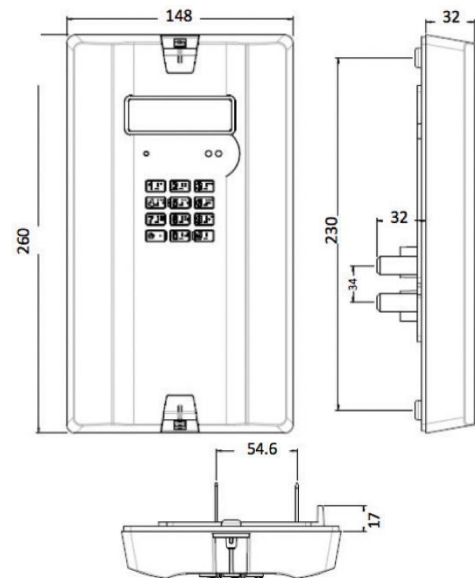
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|-----------------------|---------------------|
| Prepaid and Post-paid | Fully STS compliant |
|-----------------------|---------------------|

## DIMENSIONS (mm)

### MCU



### CIU (common base relay)



### CIU (standalone)

