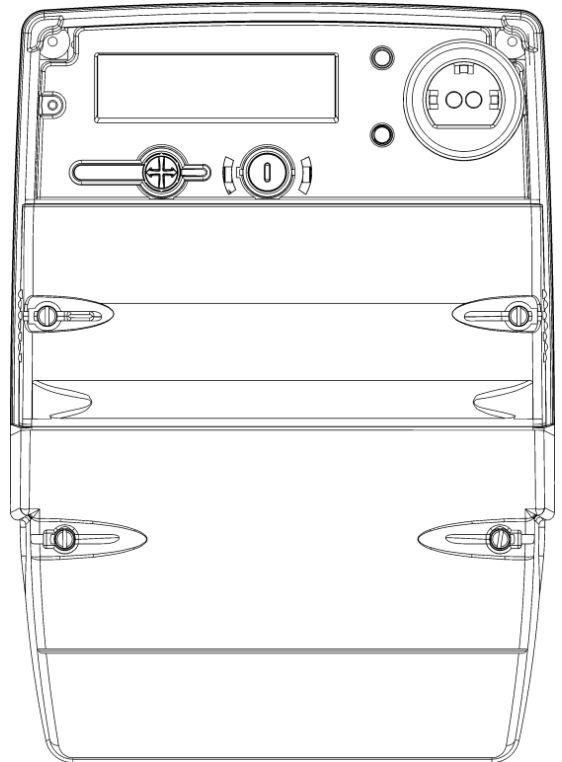




Premier 211 electricity meter with Skyline-i 543/033 communication module



User Manual

BGX701-075-R03

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As part of Secure Meter's continuous endeavour to improve product design, specifications mentioned are liable to change.

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Important

As part of Secure Meters continuous endeavour to improve product design, the specifications mentioned in this manual are liable to change anytime and therefore availability of features is product variant specific.

Specifications / features listed in this document are the most advanced available with Secure Meters on the date of release of this document, and hence should not be considered as default. Availability of all or some of the same depends upon the product variants and may not be readily available. Sales team should be contacted for queries, if any.

No part of the manual, or its content thereof, must be published, distributed, scanned or copied, in either electronic form or otherwise, without prior information and express consent of Secure Meters.

While all efforts have been made by Secure Meters to minimize errors, some errors may inadvertently exist. Secure Meters undertake to correct such errors wherever possible, and request feedback from users in this regard.

Secure Meters reserve the right to alter some or whole of the specifications mentioned in this document without any prior notice.

For any queries or clarifications, the user is requested to email the Secure Meters' support team at tech.support@securetogether.com.au

In most countries, electrical installations comply with more than one set of regulations issued by National Authorities or by recognized private bodies. It is essential to take into account these local constraints.

Secure Meters have duly conducted product quality tests as per regulations based on the observance of rigorous safety rules in the design and realization of the product.

In order to prevent tampering, the meter should be appropriately sealed after installation. Inappropriate handling of the seal may cause damage to the meter thus creating a false impression of being tampered with.

Please take note of the warning and caution icons presented in this manual as follows:



**Possible
Electric Hazard**

This icon indicates the existence of dangerous electrical voltage. These operations must only be performed by qualified personnel.



Caution

This icon warns the user to take special precautions whilst performing an operation. The procedure must be followed as described in the manual.

Disclaimer

Secure Meters assume no responsibility for damage caused to the meter under the following circumstances:

- Irregular maintenance / improper installation
- Imprudence or carelessness during installation
- Normal (or abnormal) wear and tear of insulation
- Accidental contact with hazardous elements
- Immersion of meter in water
- Handling of meter by unauthorised persons
- Handling of meter by inebriated persons

Precautions and safety practices

- This product must be installed and serviced only by trained personnel. We strongly recommend reading the “Premier 211 installation manual” thoroughly before installing the product.
- Energy meters are generally installed in electrically hazardous areas. To minimise the risk of electrical shock, stay away from loose or exposed electrical connections. If there is loose or exposed electrical wiring near the meter, initiate appropriate preventive measures.
- The electrical installation of electronic meters at a site requires an adequate understanding of all governing rules and regulations.
- Keep the meter away from fire, rain and direct exposure to water.
- The meter may be damaged, either in part or completely, if it falls from a height.
- It is recommended to immediately cut off the electricity supply upon occurrence of a fault within the meter.
- Ensure that the load does not exceed the current range specified on the rating plate.
- Appropriate fuses and circuit breakers must be used in accordance with the rating of the meter.
- Secure Meters recommend regular installation checks to be carried out, especially when product is installed at locations posing high risk of degradation or corrosion, such as under direct strong sunlight, areas with high ambient temperature and little ventilation, areas near heat sources such as a furnace, areas where the meter is regularly exposed to chemical fumes, etc.
- When enabling the external antenna always ensure that it has been plugged into the SMA connector under the module.
- To ensure optimal performance of the radio system with the meter, the radio antenna should be fitted externally if the meter (or modem) is installed inside a metal enclosure.
- Always refer to installation & associated documentations and follow the instruction and the practices described. Manual should be strictly referred for details wherever the caution symbols are used on the product.
- If the meter is not used in the manner specified in the manual, the protection provided by the meter may be impaired.
- Safety practices must be followed as open position of the supply or load control switch does not provide isolation from the mains network.
- The installer is responsible for coordinating the rating and the characteristics of the supply side over current protection devices with the maximum current rating.
- Supply to the metering equipment must be isolated by removing active isolation link at the supply side to allow safe access before installation or removal.
- Do not use solvents or abrasive materials to clean the meter, use only a soft and dry cloth and isolate the meter from the supply before cleaning it.
- Premier 211 is maintenance-free meter as it has no interchangeable or serviceable parts. To ensure a robust user experience, adhere to the environmental and technical specifications; and follow the instructions and safety measures to avoid risk of injury or damage to the equipment. For any further queries, you may contact the nearest sales representative.

Commonly used acronyms

Acronym	Description
ANSI	American National Standard Institute
3G	Third Generation of broadband cellular networking
4G	Fourth generation of broadband cellular networking
PC-FR	Poly Carbonate-Fire Retardant
LCD	Liquid Crystal Display
LED	Light Emitting Diode
SMA	Sub-Miniature version A
DIP	Demand Integration Period
WAN	Wide Area Network
HES	Head end system
ID	Identity
TOU	Time Of Use
MD	Maximum demand
SIP	Survey Integration Period
QoS	Quality of Supply
IEC	International Electro-technical Commission
I/O	Input Output
UTRN	Unique transaction reference number
UART	Universal asynchronous receiver/ transmitter

1 Product overview and operating principle

Premier 211 is a three phase, single element CT operated meter with fixed CT ratings. It supports credit mode of operation for Smart Metering. The meter supports 230V (+20%/– 20%) connection with the current of 5-20A. It has a relay of 2 Ampere and two fixed pulse outputs, one for Active Import and other for Reactive Import. It is used with a Skyline-i 543/033 intimate modular communication module.

Skyline-i 543 communication module supports 4G (with fallback on 3G).

Skyline-i 033 communication module supports 3G (with fallback on GPRS).

The communication module sits on front belly of the meter cover. It serves as the communication gateway to the Head End System (HES) via a Wide Area Network (WAN).

The modular communication design provides the flexibility to upgrade or change the meter's communication technology without the need to remove the meter or break metrological seals. The communication module connects the meter to HES over 4G/3G. This communication provides remote data transfer between the meter and HES either as per the request or according to the schedule. The Zigbee module connects the communication module with other HAN devices –In Home Display (IHD).

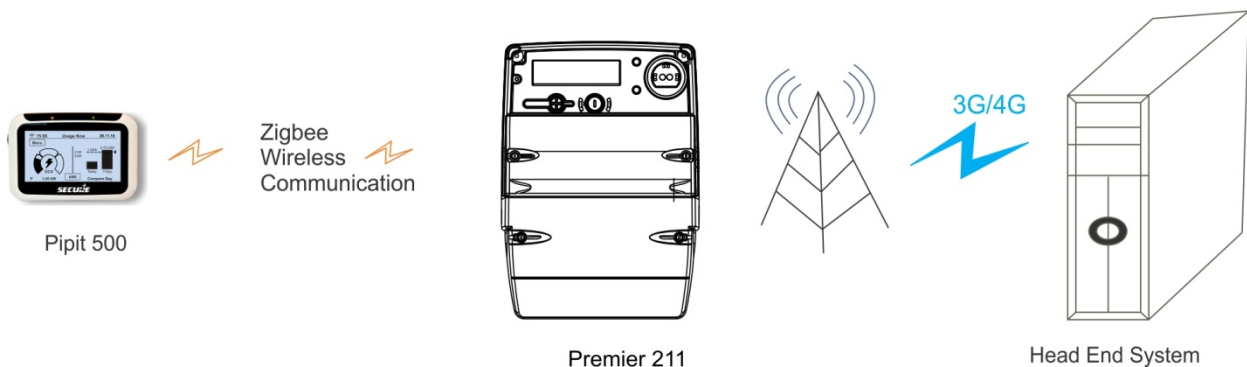


Figure 1: Operational scenario (with Skyline-i 543/033)

It has an ANSI optical communication port for local communications and a user interface consisting of two push buttons which allows the user to select and display the data.

Commands or changes of configuration can be delivered to the meter in the form of authorised messages or UTRNs. UTRNs are encrypted codes that are valid only in the meter for which they are generated.

Relay disconnection / reconnection can be done remotely over the WAN or locally. A Mains frequency based clock or a battery-backed internal clock maintains the meter's date and time. Removal of the terminal cover and main cover is detected and logged in power-on condition.

Internal sensors monitor external magnetic fields allowing magnetic events to be logged and reported. The meter supports a maximum of two pulse outputs for calculating energy consumption. In addition, a 2A relay is integrated into the meter for demand management.

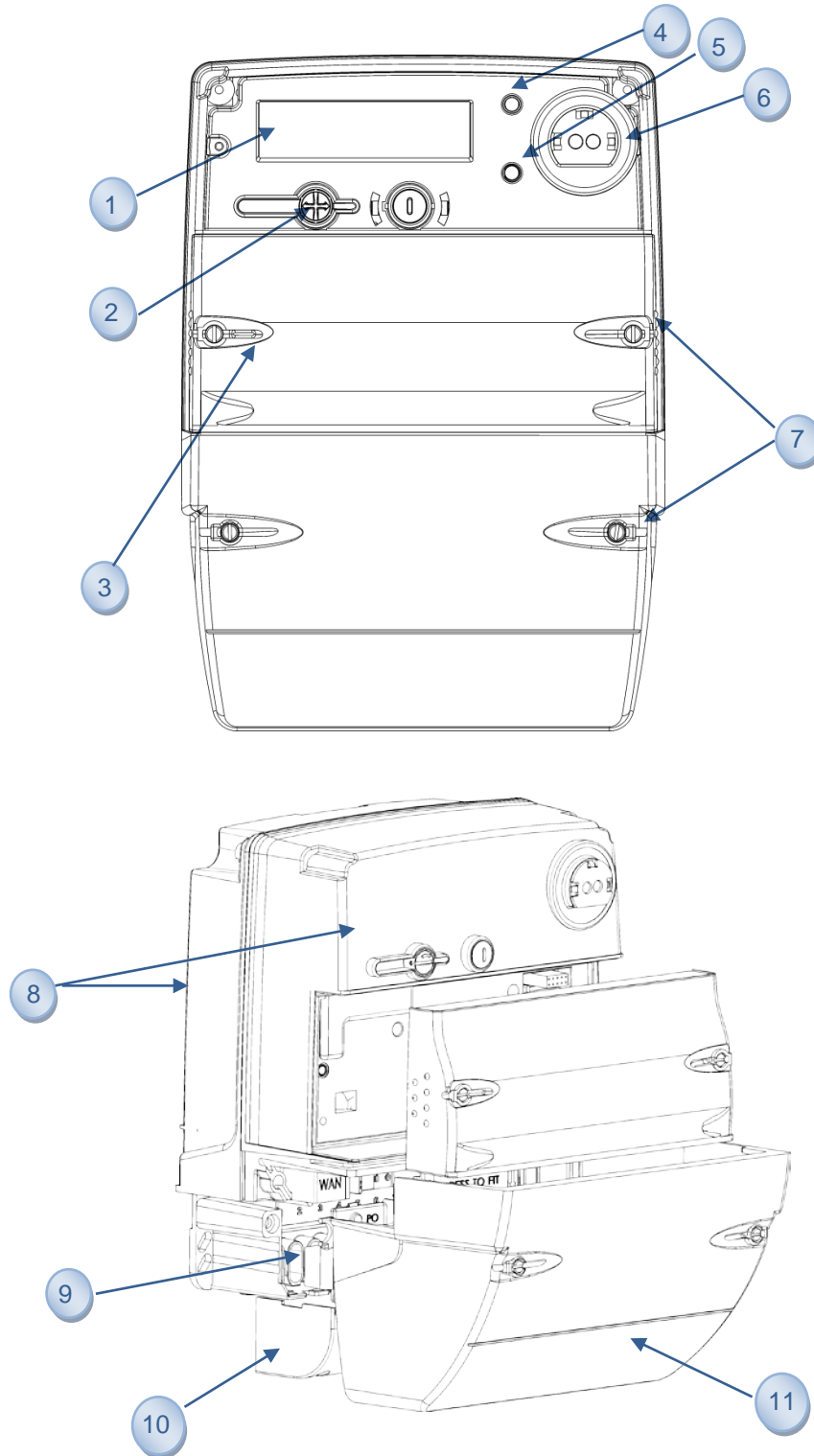
Note:

The operational scenario is similar for Skyline-i 033 except that the communication with IHDs over HAN is not supported. For Skyline-i 033 variant, any functionality, feature or step related to IHD or HAN must be ignored throughout the manual.

2 Product description

This section describes the salient features of the product.

2.1 Premier 211 main features



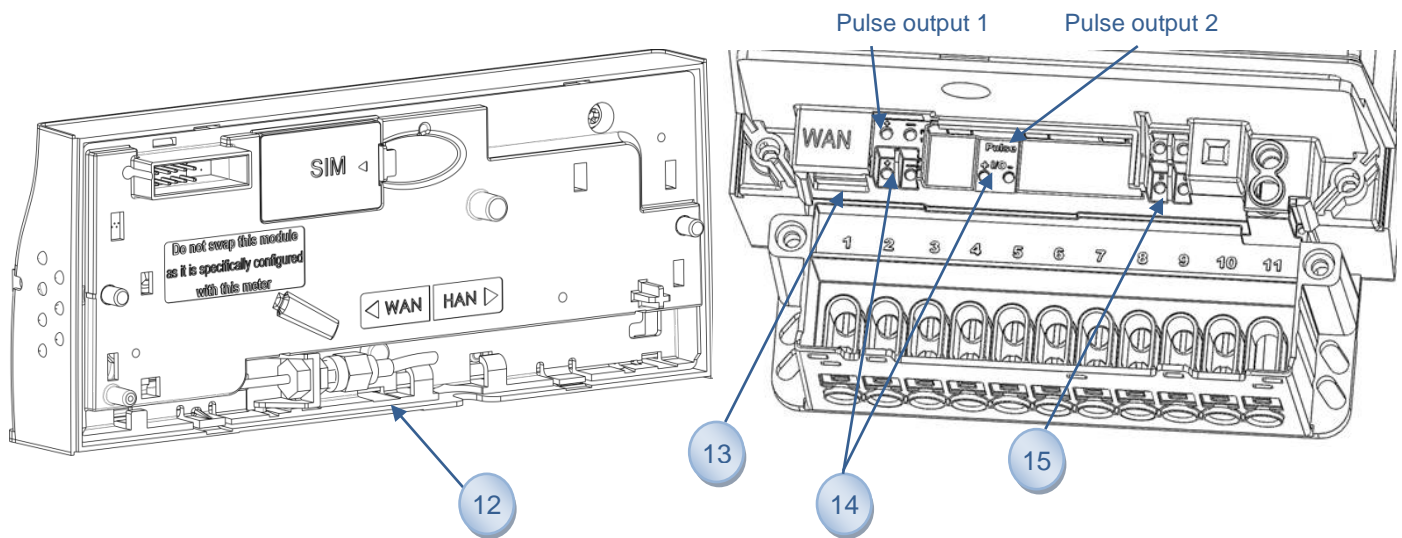


Figure 2: Premier 211 electricity meter

Fixed Plate–Information is fixed and is common for all meters of this type.

1. **LCD display** - A large multi-segment LCD supporting alpha-numeric characters displays the information and values for various electrical parameters recorded by the meter.
2. **Push Buttons** - Two push buttons Left and Right, allow interactions with Premier 211. These buttons are used for various user operations such as display navigation, boost operation etc.
3. **Communication Module** – To facilitate AMI communication, Premier 211 provides a modular compartment; into which, a communication module can be fitted as required.
4. **Metrological LED (Fixed)** - This LED is provided on the meter main face plate and flashes according to the rate of energy consumption measured by the meter. It is used for testing the accuracy of the meter and as a visual indication of the rate of energy consumption.
5. **Metrological LED (Configurable)** - This LED is provided on the meter main face plate and is configurable at production for any of the four Quadrants.
6. **ANSI optical port** - An electrically isolated optical port is provided for external communication to prevent tampering / damage to the meter from spurious external electrical signals.
7. **Sealable Screws** - These screws facilitate the sealing arrangement necessary after the installation of the meter in the field.
8. **Meter Base and Front Cover** - The base or enclosure of the meter is made of a high-grade fire-retardant poly-carbonate. The front cover, made of the same material, is fastened to the base with screws. A sealing arrangement is provided to prevent tampering.
9. **Terminals and Terminal Block** - A terminal block, capable of sustaining high temperature, is provided in the meter with adequate provisions for connecting wires to the meter.
10. **Secondary Terminal Cover**- The secondary terminal cover provides additional protection for the live terminals of the meter and keeps them inaccessible even after removal of the main terminal cover.
11. **Extended Terminal Cover**–The extended terminal cover protects the terminal connections from tamper or interference, provides safety from hazards and provides security of add-on modules.
12. **SMA connector for external antennas** - SMA (Sub-Miniature Version A) connector is available under the module to connect a compatible external antenna (WAN and HAN) on the Premier 211.
13. **RJ 45 Port**: This port is not accessible to the user.
14. **Pulse Outputs** – Two fixed pulse outputs, one for Active Import and other for Active Export. The outputs will be potential free.
15. A **2A Relay** is provided in the Premier 211 meter which is used for managing load control applications.

2.2 Information printed on Premier 211 front cover

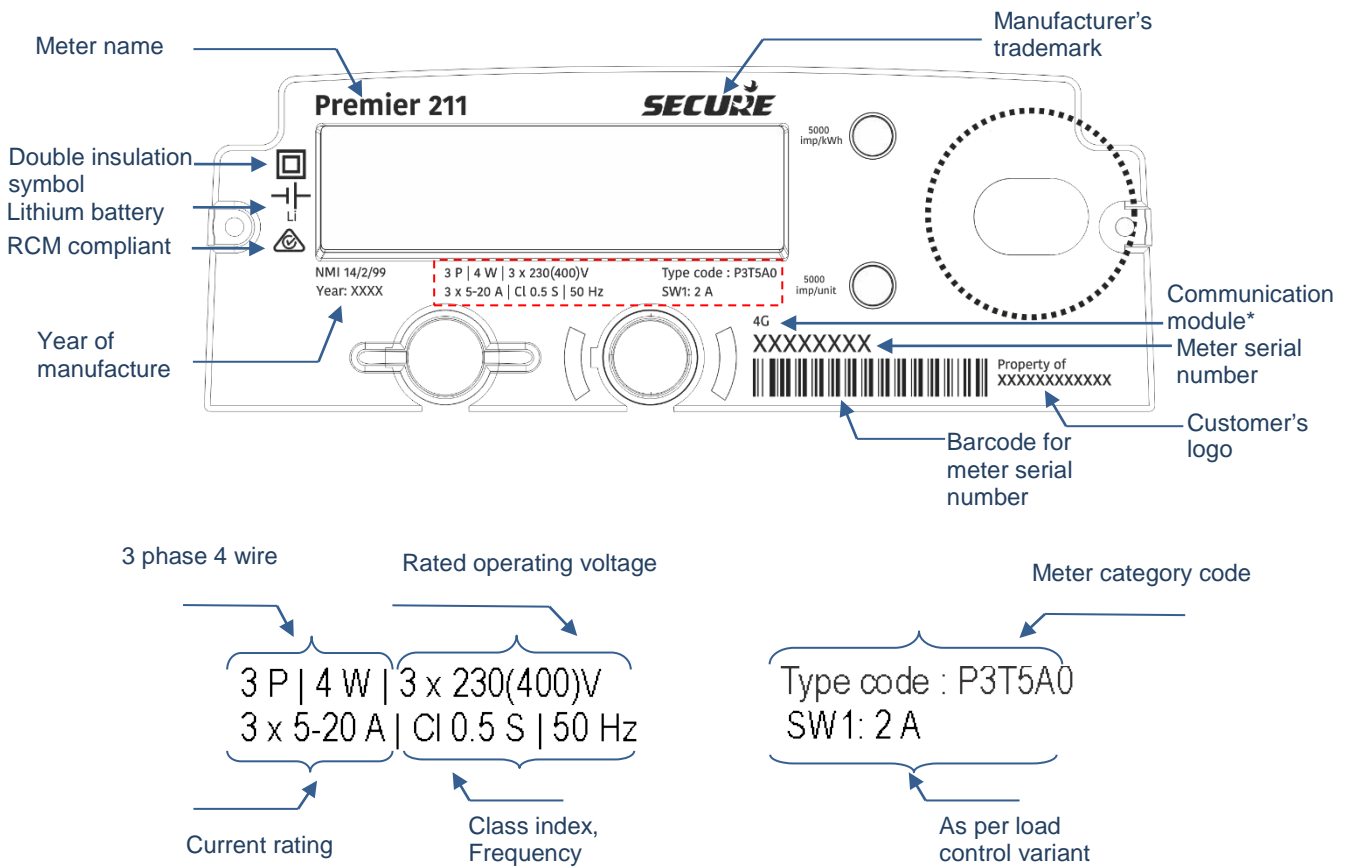


Figure 3: Information on the Premier 211 front cover

*The Communication module information will be available on the front cover only for Premier 211 fitted with Skyline-i 543.

2.3 Premier 211 display and button details

Premier 211 is equipped with a large multi-segment alpha-numeric LCD display and two buttons for the essential user interface.

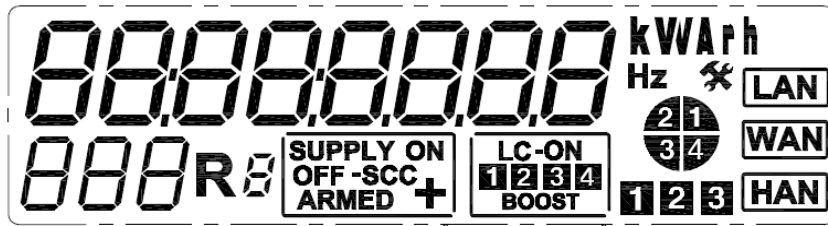



Figure 4: Segment Check for the LCD Display

The LCD screen has various sections and annunciators for displaying specific bits of information such as relay or load connection status, parameter values, user messages etc. An annunciator or a section corresponding to the demanded information is illuminated at the time of display. When powered, the LCD is capable of displaying a group of related electrical parameter values together on a single page.

Details of individual sections are summarised below:

Table 1: Premier 211 LCD Segment / Annunciator Details

S. No.	Icon / Segment	Details / Remark
1.	00000000	Alpha-numeric main value indicator - This segment displays the values of pre-configured parameters in an interactive mode. It also displays the health status of the meter and messages on the transactions performed with the meter.
2.	kVA r h	Unit indicators - These icons display unit values using combination of characters like k, V, W, A, r and h.
3.	+	Sensitive load indicator -This icon indicates presence of Sensitive load mode in the meter.
4.	Hz	Frequency indicator - This icon indicates supply frequency unit.
5.	000	Display code indicator - This icon indicates individual display ID assigned to each of the displayed parameter. This code allows distinction between two similar displays.
6.	R0	NOT USED
7.		Energy quadrant annunciators - glowing of a particular quadrant indicates the instantaneous information about the energy flow, as follows - <ol style="list-style-type: none"> 1 Active import, Reactive import, Lagging PF 2 Active export, Reactive import, Leading PF 3 Active export, Reactive export, Lagging 4 Active import, Reactive export, Leading PF









8.		LC-ON 1 represents the relay state (ON/ARMED).
9.		Supply will be permanently in ON state SCC: Not used
10.		NOT USED
11.		NOT USED
12.		WAN communication indicator - Indicates presence of 4G/3G/GPRS communication modules.
13.		Indicates that the meter is paired or ready for pairing with the HAN device
14.		Service status mode indicator - Indicates that attention and due service by authorised personnel is needed for maintenance e.g. Real Time Clock failure.
15.		Phase annunciators - Indicate the presence of supply voltages at the respective phase. The annunciators also flash if reverse current is detected in any of the phase.

Table 2: Operations possible through Premier 211 push buttons

S. No.	Function	Details
1.	Parameter Navigation	Premier 211 may be configured to display a desired list of parameters. These parameters are logically grouped to appear as a different display page, each of which is assigned an individual display ID.
2.	Metrological LED configuration	The metrological LED can be configured to flash on desired energy channel using the parameter navigation function. Note: This is applicable only till midnight cross over, following which, it switches to the factory configured settings. The same is applicable for a power interruption.

2.4 Using the display

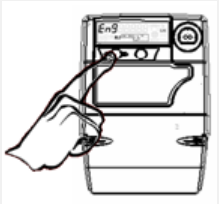
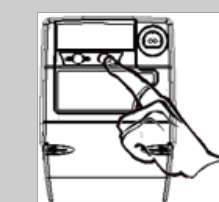
Two modes are available for viewing the displays in the meter:

- Push Button Mode
- Auto Mode

Push Button Mode

The push buttons provided on the front panel can be used to navigate through various displays, switching to a different display mode.

Table 3: Push Button Display Mode

S. No	Button	Action
	Left button	Advances to next page or display the first parameter of the next page.
	Right button	Selects the next parameter in the current page sequence

Auto Mode

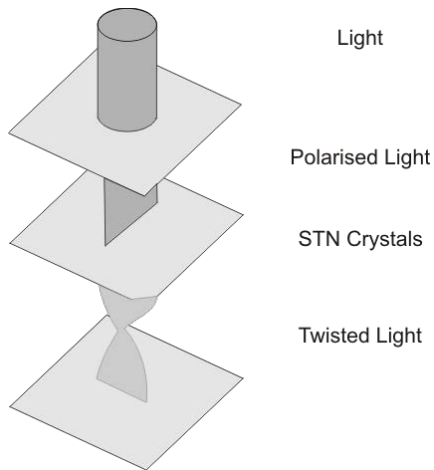
Auto Mode is the default mode for Premier 211 display. The configured parameters scroll automatically within a specified period. The auto cycle ends with a brief sleep mode of two minutes, following which the display cycle is repeated. Upon power interruption, the display starts in auto mode.

A complete list of sample display screens are shown under [Appendix 1: LCD displays](#).

2.4.1 Display types and viewing arrangements

Premier 211 uses a Super Twisted Nematic (STN) type Liquid Crystal Display (LCD) which offers more contrast than normal TN types. Twisted Nematic Display is the most commonly used crystal display used in digital devices. A STN display contains a liquid crystal sandwiched between two plates of glass, which twists and untwists at varying degrees to allow light to pass through. When no voltage is applied to a STN liquid crystal cell, the light is polarised to pass through the cell. In proportion to the voltage applied, the liquid crystal cells can twist from 180° to 270° changing the polarisation and blocking the light's path.

The example shown below illustrates how the longitudinal polarisation is twisted after passing through STN Crystal Display.



The figure below illustrates the meter display from two different positions:

Case 1: When the meter display is viewed from a level above the meter.

Case 2: When the meter display is viewed from a level below the meter.

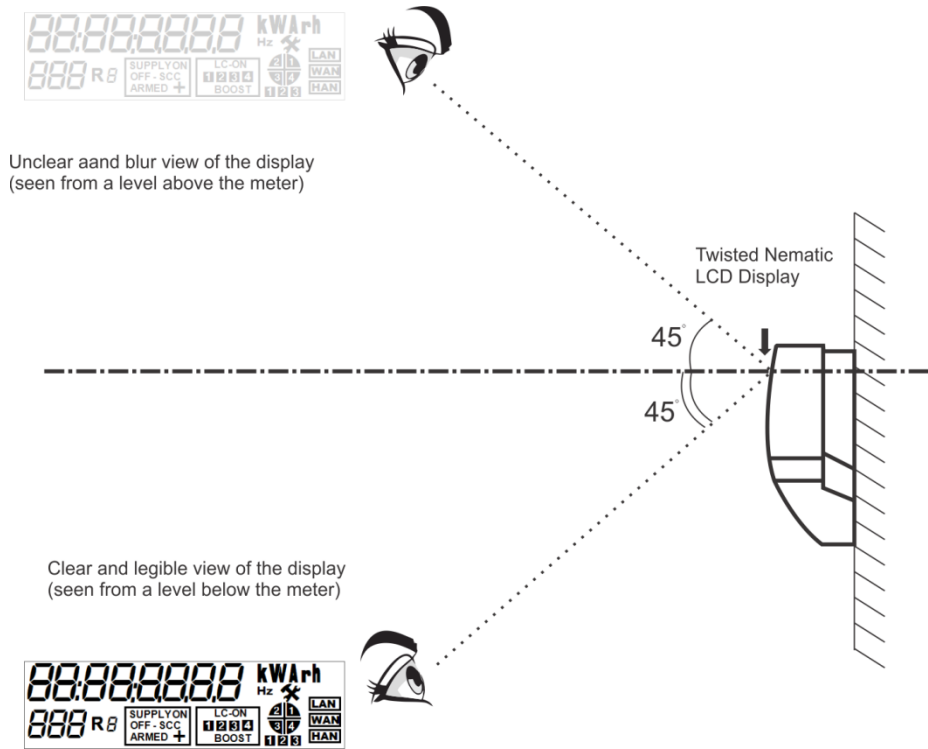


Figure 5: LCD Viewing Angle

3 Meter specifications

This section describes the mechanical, electrical, compliance, hardware and environmental specifications for the Premier 211 meter.

3.1 General specifications

S. No.	Specification	Description	
1	Mechanical	Dimensions (mm)	252 (H) x 180 (W) x 118 (D) without hook (with 35 mm extended main terminal cover)
		Weight	2.2 kg approx. (Actual weight may vary with variants)
		Mounting	Projection type
		Front cover	Translucent PC-FR grade V0
		Base	Opaque, PC-FR material
		Communication module cover	Opaque, PC-FR material
		Terminal cover	Opaque, PC-FR material
		Secondary terminal block cover	Opaque, PC-FR material
		Extended terminal block cover	PC-FR grade V0, Opaque without U cut, 35 mm from terminals
		Terminal block	Opaque 10% glass filled PC-FR grade V0, matt finish
		Rating plate	Opaque, PC-FR material
		Main load terminal screws	Screw M4*8mm (brass, nickel plated)
		Minimum bore diameter for main terminals	5.0 mm, suitable for 4 mm ² multi-strand copper cables
		Bore Diameter of Pulse I/O	4 mm, Suitable for 2.5 mm ² cables
Sealing provision	<ul style="list-style-type: none"> 2 seals at the back of the meter (upper screws) 2 seals under the terminal cover 		

			<ul style="list-style-type: none"> • 2 seals on the terminal cover • 1 optional seal for configuration button • 2 seals on the module
		Sealing screw	Captive type, made of brass, sealing hole diameter 2mm
		Display	Super-twisted Nematic (STN) LCD with backlight
2	Electrical	Connection, Supply	3 Phase, 4 Wire, Current transformer operated
		Voltage measuring element	Voltage divider
		Current measuring element	CT
		Measuring Elements	Three
		Reference Voltage (Supply Voltage)	230V± 20%
		Reference current range	5A Ib, 20A I _{max} (per phase)
		Frequency	50 Hz ±5%
		Power Factor	0.5 Lag - Unity - 0.8 Lead as per IEC/AS 62053-21 for Active Energy 0.25 Lag - Unity - 0.25 Lead as per IEC/AS 62053-23 for Reactive Energy
		Accuracy	Class .5 for Active Energy Class 2.0 for Reactive Energy
		Metrology LED	Two LEDs, 5000 pulses/unit
		RJ45 port/connector	Option not accessible
		Load control relays	230 VAC, 2 A (volt free)
		Pulse Output	27Vdc, 27mA (volt free)
		Non-volatile memory	2MB Flash, Data retention up to 15 years
Connecting Cables (Recommended -As per service and installation practices)	Type	PVC, V-90, Copper	
	Size	4 mm ² (conductor diameter) for 20A	
	Voltage rating	600/1000V	

			Normal temperature rating	75°C
		Communication module	Nominal Voltage: 4V(+/-0.1V) Maximum load: 1.4A (Peak)	
3	Protection	Dielectric Strength	<ul style="list-style-type: none"> Withstands 415 VAC continuous Impulse 10 kV @0.5 J in accordance with IEC/AS 62052.11 12kV @ 9J in accordance with latest NMI M6-1 	
4	Compliance	Reference Standard	AS62052.11, AS 62053.22,AS 62053.23,AS62056.21, AS62054.21, NMI M6-1	
		Lighting Interference	AS62056.21 (16k Lux under controlled conditions)	
		Environmental Protection	IP54 with suction	
		Protective class	II	
5	Environmental	Storage Area	<p>The meter is designed for indoor (/outdoor)* use, in accordance with IEC 60721-3-3:1996.</p> <p>*Ideally the meter should be stored and operated in a dry, well ventilated, climate-controlled building. Rapid changes in temperature and humidity should be avoided.</p>	
		Operating Temperature as per AS standard	Range	Outdoor Meter
			Specified operating range	-10 °C to +55 °C
			Limit range of operation	-10 °C to +70 °C
			Limit range for storage	-25 °C to +70 °C
		Operating Temperature as per NMI M6	Limit range for transportation	-25 °C to +70 °C
			Specified operating range	-10 °C to +60 °C
			Limit range of operation	-20 °C to +70 °C
			Limit range for storage	-25 °C to +70 °C
		Limit range for	-25 °C to +70 °C	

			transportation	
		Operating Humidity	Annual mean	< 75 %
			For 30 days, spread in a natural manner over one year	95 % (non- condensing)
			Occasionally on other days	85 %
6	Power Consumption (As per IEC 62053-61)	Voltage Circuit	< 2 W/phase and < 3.3 VA /Phase average Skyline- i 033 fitted) < 2.5 W/Phase and < 3.5 VA/ Phase (with communication)	
		Current Circuit	< 0.2 VA @ Ib/phase and < 7.5 VA @ I _{max} /phase as per IEC 62053-61	
7	Additional information	Altitude level	Altitude level up to 2000 m	
		Meter type	Outdoor	

3.2 Firmware

The meter supports the following firmware:

- Metrology firmware

Metrology firmware controls the measurement functions. It also provides an operating system for the application firmware. This firmware is fixed and cannot be upgraded.

- Application firmware

Application firmware controls the functions of the meter outside of metrology. It is possible to remotely upgrade this firmware to change the meter operation. Upgrading or updating the firmware will not affect the meter data unless the update involves changing the parameters of such data. Information related to load survey, transactions, events and storage or contents in billing registers are not affected during these upgrades.

Note: The current firmware name and version are available in meter readings and on the meter's display.

3.3 Handling, storage and operating conditions

The Premier 211 meter is an electronic device containing delicate components, which should be handled carefully during transit, storage, and installation. The meter should be protected from physical vibration and shocks. Wherever possible the meter should be kept in its original packaging until it is installed at the customer's site. Temperature and humidity must be maintained within the limits expressed in the above table.

Proper installation and removal procedures should be followed, in order to prevent damage or injury. Physical damage to the meter's case could indicate damage to internal components. Under no circumstances should an attempt be made to install a damaged meter.

A visual inspection should be performed before installing the meter. The following should be checked, as a minimum:

- No evidence of external damage or missing parts

- No missing or damaged wiring
- No evidence of overheating

Ideally the meter should be stored and operated in a dry, well ventilated, climate-controlled building. Rapid changes in temperature and humidity should be avoided.

3.4 Standards and external certification

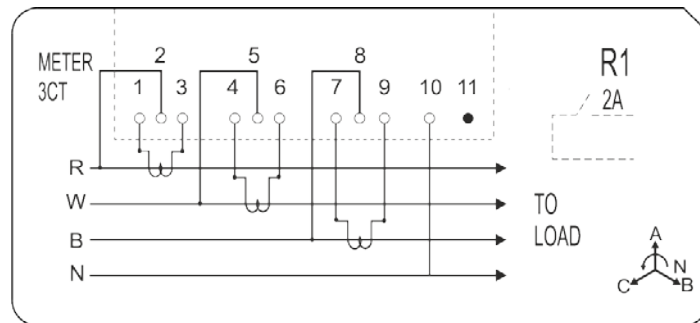
The Premier 211 meter with internal communication module conforms to the following standards:

Table 4: Standards

Electrical requirements	AS62052.11, AS62053.22, AS62053.23, NMI M6-1
Environmental	EN 60068-2-6, EN 60068-2-75, EN 60068-2-27, EN60529 IP54
Resistance to Heat and Fire	EN 60695-2-10, EN 60695-2-11
GSM/4G/3G Module related:	
GSM/4G/3G	ETSI301 511, ETSI 301 908-1, ETSI301 908-2, RCM certification
EMC and Radio Spectrum Matters	EN 301 489-01 with performance criteria from EN301 489-07

3.5 Connection terminals

The following diagram shows the internal connection for Premier 211.



4 Functional specifications

Premier 211 is configured with the Default or Credit mode as per the supplier's request. The meter mode settings are downloaded when the meter becomes part of Smart Metering System and is connected to Head End System using WAN.

4.1 Meter operating modes

Premier 211 meters are designed to operate in any one of the following modes:

- a) Default mode
- b) Credit mode

4.1.1 Default mode

When Premier 211 is enabled with the Default operating mode, it supports the following features:

- c) Credit mode with single rate tariff
- d) Remote disconnection and reconnection ('ARMED' state) of relay
- e) Events and tamper detection
- f) Scheduled transfer of profiles, alerts, meter readings
- g) Load profiling
- h) Load limiting

Notes:

01. In Default mode, meter does not perform any scheduled billing.
02. In the Default mode, relay always remains in connected state.
03. In the default mode, the meter logs the load profile data for Total Import Active energy (kWh) with a SIP interval of 30 minutes.

4.1.2 Credit mode

This mode supports billing actions (refer to 'Billing Snapshot' in Section 4.2.5.2) and displays the total of import kWh register along with total export kWh (if applicable).

This mode also supports the following functionality:

- a) Time of Use (TOU)
- b) Remote disconnection and reconnection ('ARMED' state) of relay
- c) Load profiling
- d) Load limiting
- e) Events and tamper detection
- f) Scheduled transfer of profiles, alerts and meter readings

4.1.3 Commissioning mode

After physically installing the meter the commissioning process is carried out to join other devices to the WAN system as well as register them with the HES.

If carried out correctly and there is sufficient 4G/3G signal strength, then the entire commissioning process should take less than ten (10) minutes.

4.1.3.1 Relay cycling in commissioning mode

The relay can be turned ON or OFF via switch cycling in commissioning mode. The meter automatically exits the relay cycle mode on successful completion of the relay cycle test. If the relay cycle test fails and no button is pressed, the meter exits this mode after the 30-minute timeout duration.

4.2 Registers, load profile and snapshots

This section describes the different types of registers available in the meter for logging energy, load profile, demand, snapshots and so on.

4.2.1 Main energy registers

Premier 211 measures, records and displays metered energy values for import and export active and reactive energy. The following four cumulative energy registers are configured as energy channels for the measuring element:

- a) Active Total Import
- b) Active Total Export
- c) Reactive Total Import
- d) Reactive Total Export

The meter maintains data for each assigned energy type. The cumulative value of each energy register is made available on the meter display as well as in meter reading snapshots.

Note: The cumulative energy values are available on the meter display and in meter reading snapshots. On meter's display, energy is shown in 1 kWh/kVAh resolution. In load profile data, cumulative energy values are displayed in 1K or 0.1K resolution.

4.2.2 Rate registers

The following two energy channels are supported for rate registers.

- a) (Net) Imported Active Energy (kWh)
- a) (Net) Exported Active Energy (kWh)

Note: The energy registers can be reset locally (via UTRN transaction) or remotely, however, these are not configurable.

4.2.3 Maximum demand (MD) registers

Premier 211 calculates Maximum Demand (MD) for Active Import and Active Export energies. The MD value in the MD register is updated whenever the average demand over the programmed Maximum Demand Integration Period (DIP) exceeds the currently stored MD value. The new MD value is recorded in the meter along with the date and time of its occurrence. For example, if the currently stored MD value is 2 kW and an average demand calculated over the next DIP is 3 kW then the new 3 kW MD value which is stored in the MD register along with the DIP start time.

The default DIP is 30 minutes (Not configurable) with the MD register resetting automatically on every billing action.

Note:

When a backward time set within a 5 SIP interval (including the current SIP) is performed in the meter, and if MD was recorded previously in any of these SIPs, the MD values may appear to be inconsistent with reference

to adjusted SIP interval. This happens because in addition to current values, the meter also adjusts previously logged consumption values in the backward synced SIP(s) thus leading to enhanced SIP interval reading.

4.2.4 Load profile

Load Profile survey data comprises the energy consumption recorded by the meter at the end of fixed intervals for a predefined number of days.

Standard (Primary) load profile

Premier 211 can be configured to store 201 days of 5 minutes' load profile data, 1212 days of half-hourly load profile data, 605 days of 15 minutes' load profile data and 2423 days of hourly load profile data for each energy channel on a first-in-first-out (FIFO) roll over basis. The data is stored in non-volatile memory which can be read locally via the ANSI port or sent to the HES.

The meter supports load survey logging for the following energy types:

- a) Total Import Active energy (kWh)
- b) Total Export Active energy (kWh)
- c) Total Import Reactive energy (kVarh)
- d) Total export Reactive energy (kVarh)
- e) Status Flags (Time set, Data change, Power fail, Reverse run, Phase failure, Hardware failure and Data reliability)

The consumption of load survey data of a particular load profile is recorded at end of the interval period. The meter maintains the configured parameters with a resolution of 10 Wh/VArh with any residual fraction being carried forward into the next period.

Notes:

- ✎ The meter will record time stamped load profile values at the end of each SIP. It is possible to read load survey data from a defined SIP on a particular date to a desired SIP on some other date.
- ✎ Load survey data is not available on the meter display.

Diagnostic (Secondary) load profile

Diagnostic profile survey data comprises the energy consumption recorded by the meter at the end of fixed intervals for a predefined number of days. Premier 211 can be configured to store 4320 records of parameter data on a first-in-first-out (FIFO) roll over basis, irrespective of the SIP interval. The data is stored in non-volatile memory and can be read locally via the ANSI port or sent to the HES on request via the communication module over 4G/3G.

The meter supports load survey logging for the following energy types:

- a) Voltage Phase 1
- b) Voltage Phase 2
- c) Voltage Phase 3
- d) Max. Voltage Phase 1
- e) Max. Voltage Phase 2
- f) Max. Voltage Phase 3
- g) Min. Voltage Phase 1
- h) Min. Voltage Phase 2
- i) Min. Voltage Phase 3
- j) Line Current Phase 1
- k) Line Current Phase 2
- l) Line Current Phase 3

- m) Max. Line Current Phase 1
- n) Max. Line Current Phase 2
- o) Max. Line Current Phase 3
- p) Min. Line Current Phase 1
- q) Min. Line Current Phase 2
- r) Min. Line Current Phase 3
- s) Angle between Voltage V1 to Line current L1
- t) Angle between Voltage V2 to Line current L2
- u) Angle between Voltage V3 to Line current L3
- v) Processor Temperature

The meter supports diagnostic profile logging at 1,2,3,4,5,6,10,12,15,20, and 30-minute SIP intervals.

Note:

If a new load survey configuration with updates to energy channel selection is loaded in the meter, all previous data in the primary profile is preserved, however, it is erased in the secondary profile. If a load survey configuration with modified SIP interval is loaded in the meter, all previous data from primary as well as secondary profile is erased. So be sure to read the data before commencing a new configuration. Also, all data in secondary profile is lost if a forward time synch adjustment of more than 300 SIPs is performed in the meter.

4.2.5 Energy snapshot logging

Premier 211 logs the following four types of snapshots:

- a) Midnight snapshot
- b) Billing snapshot
- c) Audit snapshot
- d) Current snapshot (available only on request and not stored in the meter)

The snapshot data consists of the following information as per its configuration:

- Basic information consisting of the snapshot time, last billing snapshot time, the cause of snapshot and site ID.
- Device information consisting of the supplier ID, meter serial number, meter firmware name, commodity type and the meter type.
- Current tariff information consisting of the tariff type, tariff ID, tariff label and the meter mode.
- Cumulative energy register values for active import, reactive import, active export and reactive export.
- Time of Use (TOU) energy rate register values based on the tariff type and charging scheme.
- Maximum demand values for active import and active export energy along with its time of occurrence.
- Credit mode information consisting of meter account balance, cost of consumption and standing charges since last billing at the time of snapshot.
- TOU energy rate register advance values based on the tariff type and charging scheme of the current active tariff.
- New tariff information (i.e. tariff type, tariff ID, tariff label and the meter mode) which is available when the current tariff or price have been changed.

Following energy parameters are supported for snapshot logging:

- a) Total Import Active energy (kWh)
- b) Total Export Active energy (kWh)
- c) Total Import Reactive energy (kVarh)
- d) Total export Reactive energy (kVarh)

All snapshots have a date and time stamp, snapshot reason and the last billing date and time. Snapshot data is available for all configured energy types.

4.2.5.1 Midnight Snapshot

Premier 211 takes a daily snapshot of the energy registers at each midnight and stores the data for the last 14 days. The snapshot data is updated daily on an FIFO basis.

The meter does not record midnight snapshots for days when power was off for the complete day. For example, if the meter power was off at 11:45 PM on Monday and resumed at 10.00AM on Wednesday, the midnight snapshot is logged only for Wednesday and not Tuesday.

4.2.5.2 Billing Snapshot

The meter will take a snapshot of its energy registers for billing purpose for any of the following actions:

- Change of tariff
- Price change
- Scheduled billing date
- On-demand billing
- Change of meter operating mode
- Occurrence of an abnormal event, for example, corruption of energy register
- Change of Supplier
- Change of Tenancy

The meter stores a total of thirteen (13) billing snapshots. Billing snapshot data is updated on a FIFO basis.

On change of tariff and meter operating mode, a billing snapshot is performed before the event.

- a) Change of tariff – the meter takes a billing snapshot before activation of a new tariff configuration. Change of tariff comprises the following:
 - Change of tariff scheme
 - Tariff type
 - TOU seasonal calendar
- b) Price change – the meter takes a billing snapshot whenever the prices are revised or changed.
- c) Scheduled billing date – the meter takes a billing snapshot on the scheduled billing date. The billing period can be configured in days, weeks or months. If the meter is in a power OFF state at the scheduled billing time then it will take the snapshot when power is resumed, this will not affect the next billing date.
- d) On-demand billing – the meter takes a billing snapshot on receipt of a request for an on-demand bill. The snapshot data recording will depend on the billing reference which can be configured either as immediate or at midnight. If the billing reference is configured for midnight, then the previous midnight snapshot is taken as the billing snapshot.
- e) Change of meter operating mode – a billing snapshot is taken when the meter's operating mode is changed from Credit to Default or vice versa.
- f) Change of Supplier – on change of supplier the meter performs a billing action and a billing snapshot is taken before the change of supplier and a second snapshot is taken after the change has taken place (if configured).
- g) Change of Tenancy – on change of tenancy the meter performs a billing action and a billing snapshot is taken before the change of tenancy and a second snapshot is taken after the change has taken place (if configured).

4.2.5.3 Audit snapshot

Premier 211 takes an audit snapshot when any of the following actions are performed:

- a) Meter time set
- b) Over the Air (OTA) firmware change- In this case two snapshots are taken, one before and the other after the firmware change.

The meter stores ten (10) audit snapshots on a FIFO basis.

4.2.5.4 Current snapshot

The meter will record the current value of its energy registers which is sent to the HES on receipt of a current snapshot request.

4.3 Metrology LEDs

Two calibration LEDs are provided on the meter main face plate. They flash in direct proportion to the rate of energy consumption, as determined by the meter pulse weight. By default, one LED flashes to indicate Active import (total) NET energy consumption at 5000 impulse/kWh and the second LED flashes to indicate the consumption values of the configured energy type at 5000 impulse/kWh or kVAh.

4.4 Time keeping

The Premier 211 clock maintains time in hours, minutes, and seconds format.

All data logging (e.g. load survey data, events data, maximum demands and snapshots) take place using the standard time whereas displayed date and time use local time (i.e. standard time + DST offset). The tariff rate register switching operation can be configured to use standard or local time. Scheduled billing dates always use standard time.

When the meter's time is invalid for any reasons an RTC failure event is logged and an alert is sent to the HES (if configured). The following activities that rely on meter time for their correct operation are affected or suspended:

- Rate Register switching (the meter continues with the last active rate price)
- Maximum demand updates
- Scheduled billing actions
- Delayed or scheduled meter configurations
- DST activation or deactivation
- Load survey operation
- Events logging will be as per the meter's current time
- The date and time on the meter display will appear as '-----'
- Midnight snapshots will be taken with standard time
- Standing charges

The following two methods can be used to adjust a meter's invalid time:

1. Time setting from the HES (Head-end-system)
2. Time synchronisation from the communication module

In order to distinguish time, set events between time synchronisation from the communication module and time setting from HES, the issuer ID in the case of time synchronisation is logged as '0' which is the same as at manufacturing.

Note: Meter can be configured to operate either on 'Crystal only' or 'Mains based sync' for time synchronisation.

4.4.1 Setting time from the HES

The meter time can be set forward or backward to an absolute value via an authenticated command from HES.

Forward time set

In the case of forward time setting, the missing SIP values for standard and diagnostic profiles will be logged as "-----" which is considered as invalid SIP. The missing SIP values for a power OFF condition are also logged in a similar manner.

The time set flag is shown:

01. In the SIP from which time is changed and
02. In the SIP to which time is forwarded. No data change flag is set in this case.

Backward time set

The following are applicable for a backwards time set:

01. **Backward time set within a SIP:** In this case the meter treats it as an extended SIP. Time set and data change flags will be shown in this SIP.
02. **Backward time set within 5 SIP (including the current SIP):** In this case cumulative value of 4 SIP (excluding current SIP) energy will be preserved and will be adjusted in upcoming SIPs. In the 1st SIP (to which backward time is set) time set flag will be shown and data change flag will be shown in 1st and upcoming SIP in which energy value is adjusted. Data change flag will be always set in first SIP of backward time set irrespective of energy adjustment.
03. **Backward time set more than 5 SIP (including the current SIP):** In this case the meter invalidates all the upcoming SIP data and logs new values as normal processing. Here, time set flag will be shown in the 1st SIP to which time is backward set but no data change flag will be set.

Note:

All previous Load profile data is lost when this type of adjustment is performed in the meter. So be sure to read the data before commencing this operation.

4.4.2 Synchronising time from the communication module

The meter time synchronisation sent from the communication module via time synchronisation command will take place only when the time drift, i.e. the default time difference between the meter time and the communication module time is between 3 seconds and 50 seconds. The time synchronisation is always implemented within a demand or survey integration period boundary (whichever is less) and therefore sometimes the adjustment may be delayed until the next DIP or SIP.

When the time drift is less than the minimum time synchronisation thresholds the meter will accept the time synchronisation request but will not implement the change.

When the time drift is greater than the maximum time synchronisation thresholds the meter will reject the time synchronisation request and will allow time adjustment using the time setting to an absolute value from the HES.

4.5 UTRN transactions

A Unique Transaction Reference Number (UTRN) is a code is required to modify existing configurations in the meter. A maximum of 100 UTRN events can be recorded by the meter (either accepted or rejected). There are three types of UTRNs:

- a) Relay connection UTRN: used to disconnect the relay or change the relay state to 'ARMED'; a supply UTRN will have information such as the date and time of the transaction, transaction source, activation time and intended relay state.
- b) Engineering service UTRN: used for the following configurations in the meter with immediate effect:
 - o Switch the meter operating mode to the default mode
 - o Clear event logs. Security log is not cleared.
 - o Clear site ID
 - o Clear load profile data and snapshot data
 - o Reset energy registers
 - o Force relay connection, if already in Armed state

Note:

An engineering service UTRN will have the date and time of the transaction, transaction source and the type of service performed.

- c) Local configuration UTRN: used to perform time set or other configuration activities locally. A UTRN (provided by HES) is transferred into the meter first which allows the meter's port to perform configuration related activities locally for a specified time.

4.6 Meter mode switching

Default operation mode

Premier 211 can be switched to the default operation mode via the engineering service UTRN or on receipt of an authenticated command.

Credit operation mode

Premier 211 can be switched to the credit operation mode on receipt of an authenticated command only.

The meter can be configured either with immediate effect or for a future date. Switch mode requests for future dates can be cancelled remotely by authorised users. If power is OFF during the scheduled date and time, the switchover will occur when the power is restored.

Scheduling of the meter mode change for a future date will not disturb the current settings in the meter until the specified date and time is reached.

The meter performs a billing snapshot at the time of mode switching.

4.7 Meter configuration

The following parameters are configurable in Premier 211 meters via authenticated commands:

- Tariff type
- Tariff rates
- DST
- Sensitive load customers (relay interrupt is permanently disabled).
- Mode of operation
- Site ID
- Supplier information
- Billing period
- Password configuration

- Primary and secondary (Quality profile) load survey
- Event configuration
- System parameter settings
- Reset Counter
- Demand limit configuration/ Load Limiting
- Change of supplier and tenancy
- Cancel delayed configuration. This will cancel all delayed configuration including scheduled meter configuration, scheduled relay activation and scheduled COT or COS.
- Pricing information
- Standing charges

Notes:

- Each of the above configurations can have different treatment rules for meter operation.
- The meter verifies and authenticates the commands it receives over WAN before executing them. If authentication fails, the meter rejects the command. The meter sends acknowledgement on receiving configuration commands having schedules and actions to be performed on a future date and will execute the command on the intended date and if configured will send event notification to HES. These future dated commands can be cancelled or overwritten by a new command.

4.7.1 Tariff configuration

Premier 211 can be configured with tariff regimes for the following three (3) energy types:

1. Import
2. Export
3. Import and Export

The meter can be configured with tariff rates for kWh consumption for different times of the day and seasons. The tariff activation date can be configured either with immediate effect or for a later date and time. The following parameters are configurable:

- Tariff configuration information
- Time of Use (TOU) calendar
- Tariff price matrix
- Tier labels
- Billing period

4.7.1.1 Import Tariff

Up to 48 TOU registers can be assigned allowing a different TOU register to be used every half hour. Each TOU register can have its own rate.

Time of Use (TOU) tariff registers

Users are charged different tariff prices at different times of the day. An example is shown below:

TOU	Time pattern	Rate charged
TOU1	00:00 – 14:00	R1
TOU2	14:00 – 20:00	R2
TOU3	20:00 – 00:00	R3

Premier 211 meters supports configuration of TOU tariff structure for 4 seasons, 4 weeks, 17 days, 48 switching points per day and 70 special dates.

4.7.1.2 Export Tariff

This tariff is used only for recording energy generation and accounting is done as per defined rate price.

4.7.1.3 Import and Export Tariff

Import and Export tariffs will have a combined tariff for import and export. In this case, both import and export tariffs can be configured to use a shared TOU calendar.

Notes:

- When the activation date for meter configuration is in past then meter activates the tariff immediately.
- The schedule for a tariff to be activated at a future date can be set in one-minute resolution.
- A tariff assigned for a future date can be cancelled via an authenticated command.
- The meter can store two tariffs in its memory at one time. One of them is in an active state and the other can be configured for scheduled activation at a future date.
- If meter is configured for import tariff only and current runs into the reverse direction, then meter logs the reverse run event. But if meter is configured with Import and export tariffs, and current runs into the reverse direction then no reverse run event is logged.

4.7.2 Resetting counters

The following counters can be reset via authenticated commands:

- Time set
- Power On
- Terminal cover open
- Main cover open
- Load limit exceed

4.7.3 Demand limit configuration

Demand limit configuration for load limiting (i.e. relay control) can be sent to the meter via authenticated commands.

If configured, the relay will be disconnected due to overload and an event will also be logged. After the load limit restoration period, relay will automatically come into the ARMED state to enable reconnection via the user interface.

4.8 Change of supplier (COS)

On receipt of a COS request any delayed COS request will be cancelled and the meter will perform one or more of the following actions, depending on the configuration:

- Performs a billing action before and after change of supplier.
- Takes a billing snapshot before and after change of supplier; if the meter is operating in Credit mode then the meter balance is also reset.
- Resets tariff to its Default mode value.
- Clears snapshot registers, historical load profile information, UTRN log, account log, hardware log, configuration log, supply quality log, operating condition log, supply log and tamper log.
- Changes the meter's relay state to 'Off' or 'ARMED' state.

After COS activation the meter logs an event, together with the date and time of COS activation, and then performs the following actions:

- Cancels all delayed tariffs having the old supplier ID.
- Updates the current active tariff with the new supplier ID and supplier name.
- Communicates all meter data over WAN.

4.9 Change of tenancy (COT)

On receipt of a COT request any delayed COT request will be cancelled and the meter will perform one or more of the following actions, depending on the configuration:

- Performs a billing action before and after change of tenancy.
 - Takes a billing snapshot before and after change of tenancy; if the meter is operating in Credit mode then the meter balance is also reset.
- Resets tariff to its Default mode value.
- Clears snapshot registers, historical load profile information, UTRN log, account log, hardware log, configuration log, supply quality log, operating condition log, supply log and tamper log.
- Changes the meter's relay state to 'Off' or 'ARMED' state.

After COT activation the meter logs an event, together with the date and time of COT activation, and then makes the load profile data from the SIP of effective day of COT available.

In the case of change of tenancy, the following three situations may occur:

1. The tenant has left the premise without notification,
2. The tenant notifies that he is leaving the premise immediately, or
3. The tenant notifies that he will leave the premise on a future date.

On receipt of the above information from the new tenant, the supplier sends a COT request to the meter immediately. On receipt of this request the meter performs all the actions listed above immediately and stores the following information related to the new tenant that will be made available:

- Daily consumption
- Load profile data

Note:

On activation of a new COT, Skyline automatically synchronises with the meter to acquire the new data set after purging the historical data.

4.10 Relay operations

The relay has three states – ON, OFF, and ARMED. The relay can be driven in these states by any of the following:

- a) Connecting/disconnecting relay remotely (UTRN)
- b) Tamper events
- c) Relay cycling in commissioning mode
- d) CoS / CoT
- e) Load limiting

The relay is actively driven to its intended state, thereafter it will change depending on the above events. In the case of power outage, the meter will resume the same state it was in before the power outage.

By default, relay is in OFF state and its state can be changed through remote command.

‘ARMED’ state of relay:

For safety reasons an ‘ARMED’ state is introduced between the relay OFF and ON states. This gives user the control to reconnect their supply from the meter when it is safe to do so (e.g. appliances are off). When the meter’s relay is in ‘ARMED’ state, the ‘LC ON 1’ icon will blink on its LCD and an appropriate message will be displayed which signifies that the meter is ready to reconnect relay and is waiting for the user input.

Closing the relay from the ‘ARMED’ state:

When the relay is in the ‘ARMED’ state, the ‘LC ON 1’ icon will blink on the meter’s LCD followed by the message ‘PRES LB’ and ‘CONNECT’. On pressing the left push button on the meter it then displays ‘PRES RB’ followed by ‘CONFIRM’. On pressing the right push button within 30 seconds the relay will close reconnecting the supply otherwise it will stay in the ‘ARMED’ state and the meter’s display will revert back to the previous display sequence i.e. ‘PRES LB’ followed by ‘CONNECT’.

4.10.1 Relay action sequence

The following table describes the sequence of action for the relay action when an appropriate command is issued:

Table 5: Relay action

Command received	Relay current state	Relay action sequence
Relay disconnection	ARMED	Disconnected immediately
Relay disconnection	ON	Disconnected immediately
Relay disconnection	OFF	Remains OFF
Relay connection	ARMED	Remains in ARMED state
Relay connection	ON	Continues to remain in ON state
Relay connection	OFF	Switches to ARMED state

4.10.2 Connecting/disconnecting relay remotely

In Premier 211, the relay can be in ARMED, ON or OFF state remotely using the authenticated supply command (i.e. via UTRN) either immediately or on a scheduled date (in 30 minutes’ resolution). The scheduled date must be within 365 days (compile time configurable) from the current date. The meter will not accept the supply UTRN for any scheduled date which is more than the configured number of days.

The meter accepts a request for relay disconnection even, if it is already open due to another reason. However, to close the relay any other reason for disconnection should not exist. For example, if the relay is already open and a remote command for relay disconnection is sent to the meter, in this case meter shall accept the command. The relay will only close (by user interaction) after remote reconnection (ARMED) command and credit update has been received.

Auto-disconnect functionality for remote reconnection

This is considered as safe reconnection mechanism. When a remote command to reconnect the relay is received by the meter, if there is x amount of load already ON at the site, the relay contactor connects however disconnects again (based on P time) if the load detected is above a certain predefined threshold.

4.10.3 Tamper events

Premier 211 can be configured to disconnect the relay when it detects a tamper event. Following tamper events are configured for supply disconnection:

- Removal of the main meter cover
- Removal of the terminal cover
- Occurrence of magnetic tamper
- Occurrence of over load
- Occurrence of over current

The meter is programmed to record the following as tamper events:

- Removal or restoration of the main meter cover
- Removal or restoration of the terminal cover
- Occurrence and restoration of magnetic tamper
- Occurrence and restoration of over current
- UTRN attack (relay operation is not allowed)

If the relay is disconnected due to any of the above events, then restoration of such event resets the tamper flag and drives the relay to its ARMED state from where a user can reconnect their supply by using the push button on meter.

4.10.4 Load limiting

The relay will open (if configured to do so) when a defined Load limit is exceeded.

After the load limit restoration period relay is put in ARM state to enable reconnection via the user interface.

4.10.5 CoS/CoT

Relay operation is based on action controlled during CoS/CoT activation as per the below table:

Table 6: CoS/CoT

Relay's current state	Action	Result	Remarks
ARMED	Supply disconnection	Disconnected immediately	Clear All other ARM reasons. Supply off Reason: CoT/CoS
	Supply ARM	Relay comes in ARM mode	No new event logging

ON	Supply disconnection	Disconnected immediately	Supply off Reason: CoT/CoS NOTE: Relay will come back in ARM mode on receiving supply UTRN with connect option. (All other reasons for relay disconnection must be cleared)
	Supply ARM	Supply gets disconnected and relay comes in ARM mode	Meter logs supply off event (Reason CoT/CoS) followed by Supply ARM Event with reason: CoT/CoS
OFF	Supply disconnection	Relay remains off	No event log, only OFF reason is updated with CoT/CoS
	Supply ARM	Relay comes in ARM mode	Only if relay is not disconnected due to account or configured event reason

4.11 Pulse output functions

Premier 211 provides two fixed (non configurable) pulse outputs:

1. Pulse output 1 is configured on Active import energy with 50 impulse per kWh.
2. Pulse output 2 is configured on Reactive import energy with 50 impulse per kVAh.

4.12 Detecting and logging events

Premier 211 detects the following types of logs and can store a maximum of one hundred (100) events for each on a rolling first in first out (FIFO) basis in eight (8) separate groups:

- Hardware
- Quality of supply
- Tamper
- UTRN
- Supply
- Security
- Configuration
- Operating Condition (Over load event)

Note: The threshold values and persistence time are configurable for voltage, current and temperature current monitoring related events.

Each event is recorded along with its date and time of occurrence. The meter will retain event data after decommissioning, un-pairing, change of supplier. Event logs are cleared by using an Engineering service UTRN.

Note: Alerts for event logging and acknowledgment is configured via authorised command.

4.12.1 Hardware

Occurrence of hardware events in the meter such as low battery, battery failure, device memory error, program fault, ambient temperature exceeded, clock invalid or relay welding, or relay failure are logged in the meter's hardware event log along with the date and time of their occurrence.

If configured, the meter can send alerts for such events to the HES.

Note:

Refer to status code of above mentioned events on Page 2 of display list.

4.12.2 Quality of supply (QoS)

Occurrence of events such as supply loss, supply restoration, under voltage, over voltage, over current, voltage swell, sag and exceeded temperature are recorded in the meter's QoS event log along with the date and time of their occurrence.

Table 7: QoS

Parameters	Occurrence P Time (Sec)	Occurrence Threshold		Restoration P Time (Sec)	Restoration Threshold	
		Default	Configurable up to		Default	Configurable up to
Reverse Run	60	8% I _{max}	100% I _{max}	60	5% I _{max}	99% I _{max}
Over Voltage	60	106% V _{nom}	150% V _{nom}	60	103% V _{nom}	149% V _{nom}
Under Voltage	60	90% V _{nom}	99% V _{nom}	60	93% V _{nom}	100% V _{nom}
Swell Voltage	10	110% V _{nom}	150% V _{nom}	10	107% V _{nom}	149% V _{nom}
Sag Voltage	10	86% V _{nom}	99% V _{nom}	10	89% V _{nom}	100% V _{nom}
Normal Voltage	60	-		60	-	
Over Current	60	100% I _{max}	125% I _{max}	60	97% I _{max}	124% I _{max}
Exceeded Temperature	60	85 °C	100 °C	60	75 °C	99 °C

Supply loss and restoration are notified to the HES.

4.12.3 Tamper

Premier 211 can be configured to disconnect the supply when it detects a tamper event and send alerts for such events to the HES. The meter is programmed to record the following as tamper events together with the date and time of their occurrence:

- Removal or restoration of the meter main cover and terminal cover
- Occurrence and restoration of magnet tamper
- Occurrence and restoration of Reverse run. Please refer **Table 7** for threshold values.

If configured, the meter can send alerts for such events to the HES.

4.12.4 UTRN

The UTRN transaction events are recorded in the meter's UTRN event log along with their date and time of occurrence.

- Supply operation
- Engineering service UTRN for the following services
 - Enable/disable HAN joining
 - Leave HAN
 - Clear event logs, site ID, profile data and snapshot data,
 - Reset energy register
 - Local configuration control
 - Switch to default
 - Force connect if ARM
- Vend and optional tariff
- Retained credit.
- Rejected UTRNs with reason

If configured, the meter can send alerts for such events to the HES.

4.12.5 Supply

Each time the meter's relay state is changed due to local, manual or remote supply disconnection, arming and reconnection, an event is recorded in the supply log along with the date and time of the occurrence. For relay arming, the meter records the 'ARMED' to connect reason code too.

If configured, the meter can send alerts for such events to the HES.

4.12.6 Security

The following activities are recorded in the security events register:

- Password change
- Device locking or unlocking
- Device key change
- HES public key change
- Security clearance grant or release
- Excessive firmware upgrades (two per day) and relay operations (20 per day)
- Unauthorized access or attack
- Local configuration enabled or disabled
- Energy register reset

4.12.7 Configuration

The meter records the following changes in its configuration event log:

- Receipt or activation of meter configuration
- Switching to Credit modes
- Profile and event configuration
- Time setting (WSE and communication module)
- Cancellation of delayed meter configuration
- Configuration, enabling or disabling of DST
- Setting the Site ID

- Receipt or activation of the meter firmware
- On demand billing
- Completion of installation
- Change in System Parameter setting
- Counter reset
- Demand limit configuration
- Receipt or activation of change of supplier request
- Receipt or activation of change of tenancy request
- Change in time source

If configured, the meter can send alerts to the HES for all the above events.

Note:

Certain operations such as firmware upgrade or relay switching can only be performed a fixed number of times within a 24 hours' duration. For example, firmware upgrade can only be performed twice a day and relay switch operation is restricted to 20 times a day. If the number of operations exceeds the defined limit, the meter logs it as an event and takes preventive action as per pre-set rules.

4.13 Communication channels

Premier 211 with the Skyline-i 033/543 communication module has the following communication channels:

- ANSI optical port - this port, fitted on the meter is designated as Port-1 and is used to communicate with the meter locally. The port supports a maximum data rate of up to 38400 baud. It can be used to read consumption data and other information locally. This port can be enabled or disabled using a service UTRN.
- 4G/3G WAN module- for communication to HES.

Notes:

- To manually perform a transaction with the meter through the optical port, the ID issued by the external device should always be zero or else an error message will be displayed and the transaction will not be performed.
- In case of remote transaction, the ID should always be incremental to the previously issued ID.
- Communication module - facilitates communication between the meter and the HES

4.14 Meter reading data

The following information can be read from the meter using the supported communication protocol:

- Meter date and time
- Application firmware name and version
- Metrology firmware name and version
- Unique identifiers such as meter serial number, NMI, electricity supplier information, product type identifier which is the device ID (e.g. electricity meter), device type along with description, meter activation date and time, activation status, meter removal date and time, cumulative energy, rate registers.
- Mode of operation (Default or Credit)
- Configuration details
- Tariff structure and tariff information
- Snapshot data and midnight data
- Meter diagnostic data

- Events, tampers, faults and alerts
- Load profile
- Supplier information (Supplier ID, name, start date and site ID)

4.15 Engineering services

The meter supports the following services for various engineering operation via the Engineering UTRN. This UTRN can be entered into meter via local port tool and WSE command. Multiple services also can be sent to meter in a single UTRN. This will be effective immediately.

Enable HAN Joining:	Enables key for commissioning/HAN joining process
Disable HAN Joining:	Disables the key for commissioning process, and notifies the communication module to disable its HAN joining.
Leave HAN:	Notifies the communication module to leave the existing HAN network and after receipt of successful acknowledge from communication module, it enables the key for commissioning process.
Clear event logs:	Clears the events from selected event logs. Security log is not cleared.
Clear Site ID:	Clears the site ID, vulnerable consumer setting and delayed tariff, if any.
Clear load profile data:	Clears the load profile and voltage profile data
Clear snapshot data:	Clears all snapshot data. All the information related to historical cost & consumption from meter display and respective attributes will be cleared.
Reset energy register:	Clears main energy, rate and demand register
Local configuration control:	Allows local port to communicate for specified window defined in UTRN transaction.

4.16 Meter diagnostic data

The meter supports the reading of meter diagnostic data for diagnostic purpose. It contains the following data items:

- Device information having meter serial number, manufacturing serial number, firmware identity information, device temperature and so on.
- Supplier tariff information
- Meter operation data as cumulative energy registers, instantaneous electrical parameters (voltage, current and power factor, power frequency), and counters.

5 Communication module (Skyline-i 033/Skyline-i 543)

Premier 211 is supplied with Skyline-i 033 (without Zigbee module and 3G support) and Skyline-i 543 (with Zigbee module and 4G support).

5.1 Overview of Skyline-i 033 and Skyline-i 543

The communication module is fitted inside the meter's communication module and serves as the communication gateway to the Head End System (HES) via a Wide Area Network (WAN) and other smart metering devices via a Home Area Network (HAN). It communicates with electricity meter via an UART.

The communication module provides the flexibility to upgrade or change the meter's communication technology without the need to remove the meter or break metrological seals. The 3G/4G module connects the meter to the HES over the WAN providing remote data transfer between the meter and HES on request or as scheduled.

The communication module has an internal antenna for WAN and HAN communication. It also has provision for connecting an external antenna to support 3G/4G/Zigbee communication if the meter has to be installed in a location with poor signal strength.

5.1.1 Functions of Skyline-i 033/Skyline-i 543

The communication module has the following interfaces:

- Zigbee Module - a Zigbee 2.4 GHz low-power radio facilitates communication between other HAN devices such as IHD.
- 3G /4G WAN Module- for communication to HES.

It provides the following functions:

- Communication to/from HES via WAN
- Sends meter readings and status as scheduled or on demand
 - Sends notification of events (including connection status) if configured
 - Accepts commands from HES for Electricity meter Including payment mode, financial configuration, configuration of reading schedule, tariffs, change of supplier/tenancy, adding credit, arming/disconnecting relay, clearing event log, synchronise clock.
- Communication to/from HES via WAN
- Communication to/from HAN devices
- Manages firmware update for meter and HAN devices
- Notifies alerts from HAN devices to HES via 3G/4G
- Sends last gasp message to HES (if configured) when the meter indicates that supply voltage is below the threshold.

Note: Last gasp message will be sent only if configured and if optional backup power supply is fitted. Multiple mains power outage within a 10-minute window could affect the meter's ability to send a 'last gasp' message.

5.1.2 Skyline-i 543/033 Rear View

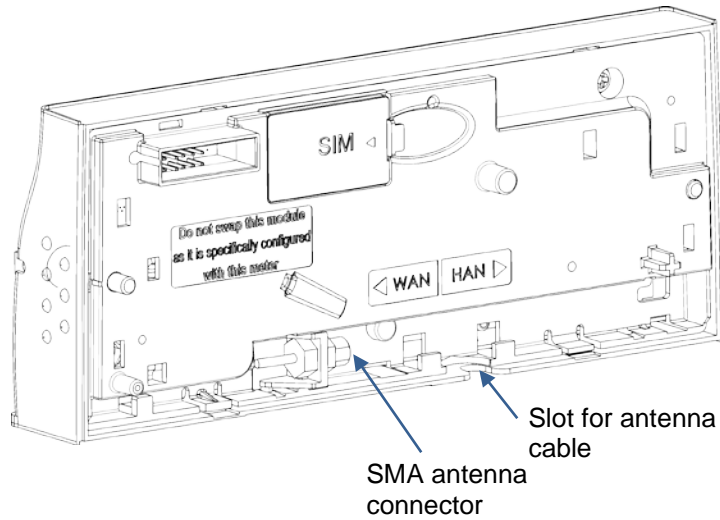


Figure 6: Inside of the communication module

5.2 Information on the communication module cover (Skyline-i 543/033)

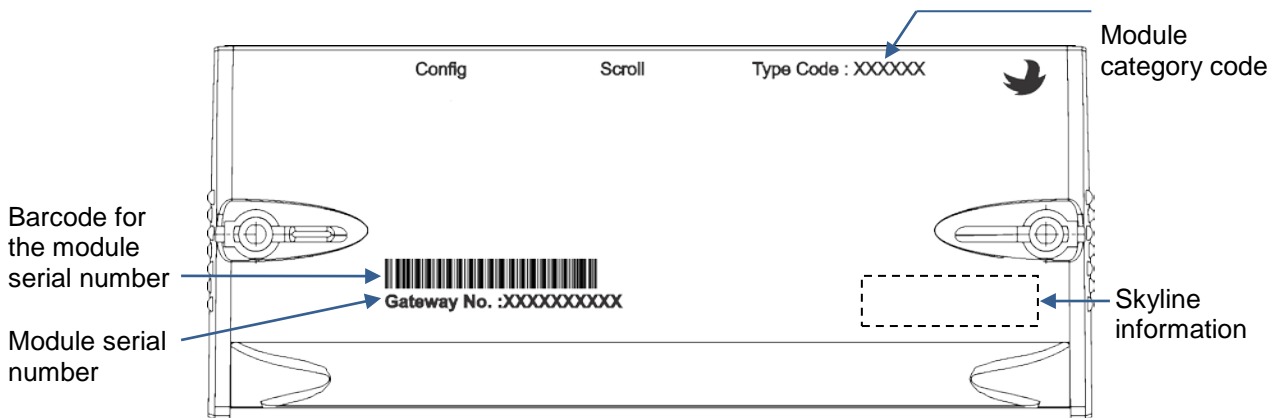


Figure 7: Skyline-i 033 front cover printings

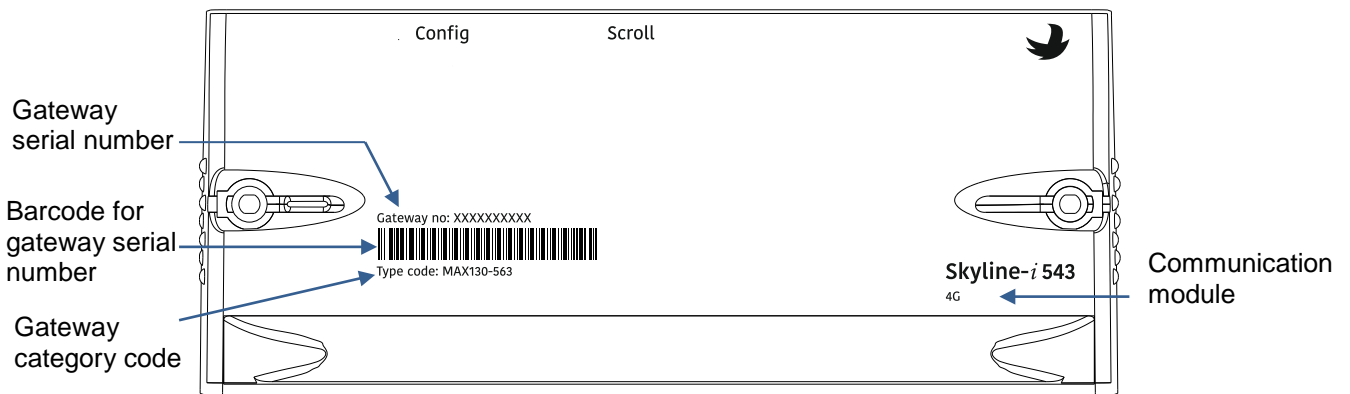


Figure 8: Skyline-i 543 front cover printings

5.3 10-Pin interface connector details (Skyline-i 543/033)

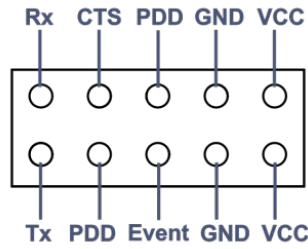


Figure 9: The communication module interface connector details

Pin	Name	Function
1	VCC	Isolated 4 V @ 1.4 A supply to the communication module
2	VCC	Isolated 4 V @ 1.4 A supply to the communication module
3	GND	Isolated ground for the communication module
4	GND	Isolated ground for the communication module
5	PDD	Power Down Signal to the communication module (Digital or 100 Hz of mains zero crossing signal).
6	Service/Event	Event notification pin, output from the meter micro controller.
7	CTS/Meter Busy	Not in use
8	3.3 V	3.3 V from the communication module
9	Rx	Receive signal from the meter micro controller.
10	Tx	Transmit signal to the meter micro controller.

Table 8: Functions of communication module interface connector PINs


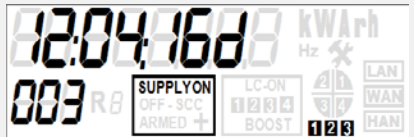

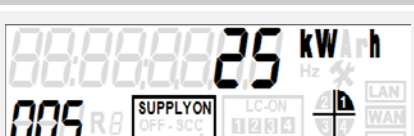
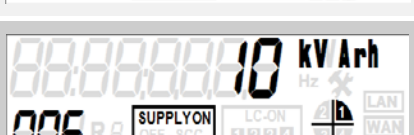
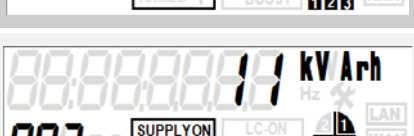
Appendix 1: LCD displays

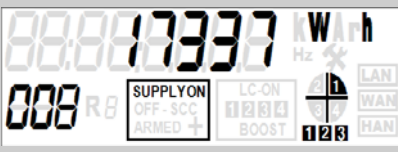
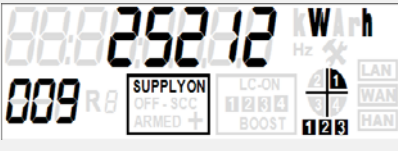
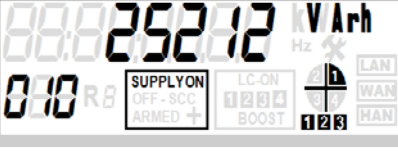

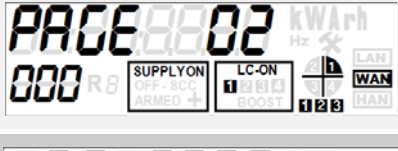
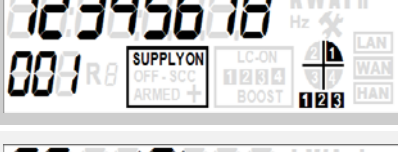

S.No	Description	Premier 211	PAYG	Credit	Default	
Page 0 (Configurable Display Page - Identifier displayed as configured at mfg.)						
1	Meter Local Time		YES	YES	YES	
2	Meter Local date		YES	YES	YES	
3	Net Active Import		YES	YES	YES	
4	Net Active Export		YES	YES	YES	
5	Net Reactive Import		YES	YES	YES	
6	Net Reactive Export		YES	YES	YES	
7	Active Import (E1) TOU1	NA	YES	YES	YES	
8	Active Import (E1) TOU2			YES	YES	NO
9	Active Import (E1) TOU3			YES	YES	NO
10	Active Import (E1) TOU4			YES	YES	NO
11	Active Import (E2) TOU1		YES	YES	NO	
12	Active Import (E2) TOU2		YES	YES	NO	
13	Active Import (E2) TOU3		YES	YES	NO	
14	Active Import (E2) TOU4		YES	YES	NO	



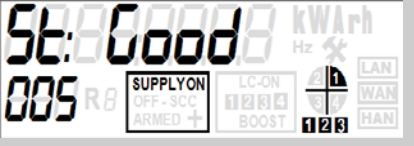
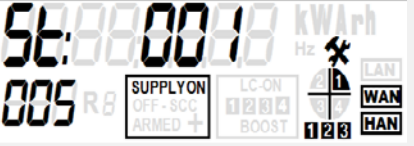
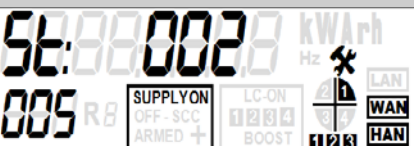
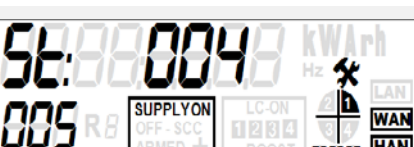
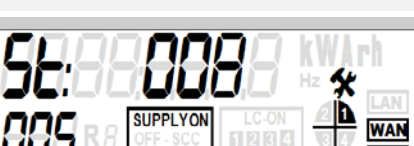
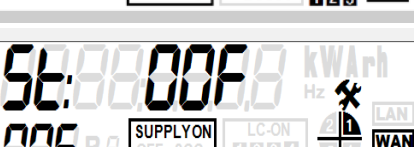
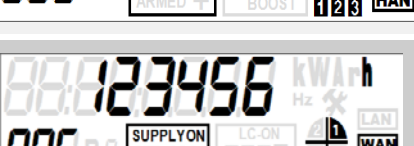
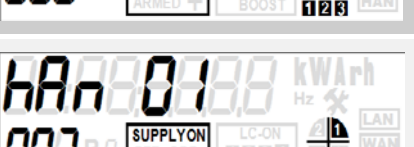
15	Active Export TOU1		YES	YES	NO
16	Active Export TOU2		YES	YES	NO
17	Meter status: Good		YES	YES	YES
	Meter status: NVM/Memory failure		YES	YES	YES
	Meter status: Clock invalid		YES	YES	YES
	Meter status: Low battery		YES	YES	YES
	Meter status: Battery failure		YES	YES	YES
	all status flags are set		YES	YES	YES
18	Tariff Name "8" characters only		YES	YES	YES







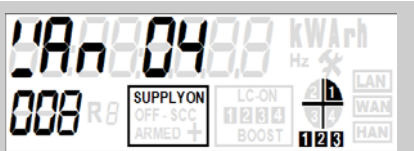




Page 1 (Cumulative Energy Values and High Resolution)

	Page number of the current displayed page		YES	YES	YES
1	Test all segments ON		YES	YES	YES

2	Meter Local Time		YES	YES	YES
3	Meter Local date		YES	YES	YES
4	Net Active Import		YES	YES	YES
5	Net Active Export		YES	YES	YES
6	Net Reactive Import		YES	YES	YES
7	Net Reactive Export		YES	YES	YES
8	Element 1 Active Import	NA	YES	YES	YES
9	Element 1 Active Export	NA	YES	YES	YES
10	Element 1 Reactive Import	NA	YES	YES	YES
11	Element 1 Reactive Export	NA	YES	YES	YES
12	Element 2 Active Import	NA	YES	YES	YES
13	Element 2 Active Export	NA	YES	YES	YES
14	Element 2 Reactive Import	NA	YES	YES	YES
15	Element 2 Reactive Export	NA	YES	YES	YES
16	Element 3 Active Import	NA	YES	YES	YES
17	Element 3 Active Export	NA	YES	YES	YES
18	Element 3 Reactive Import	NA	YES	YES	YES

19	Element 3 Reactive Export	NA	YES	YES	YES
20	Net Active Import High Resolution		YES	YES	YES
21	Net Active Export High Resolution		YES	YES	YES
22	Net Reactive Import High Resolution		YES	YES	YES
23	Net Reactive Export High Resolution		YES	YES	YES
24	Gross Active Import	NA			
25	Gross Active Export	NA			
26	Net Element 1 Active Import (Accessed from grid)	NA			
27	Net Element 2 Active Import (Accessed from grid)	NA			
Page 2 Diagnostic Data Display					
1	Page number of the current displayed page		YES	YES	YES
2	Meter serial number-lower order		YES	YES	YES
3	Meter serial number-higher order		YES	YES	YES

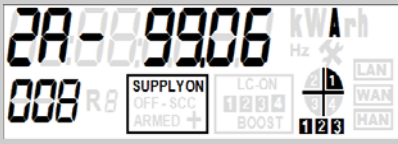
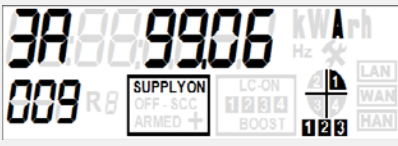
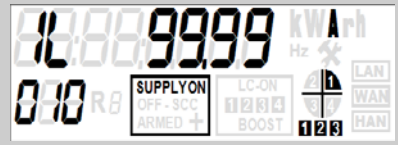
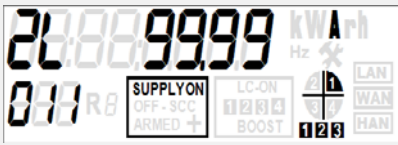
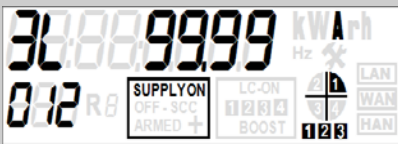
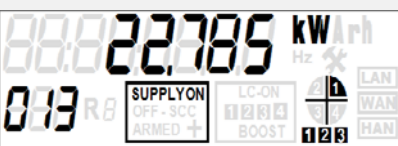
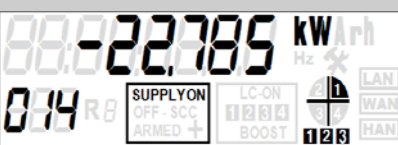
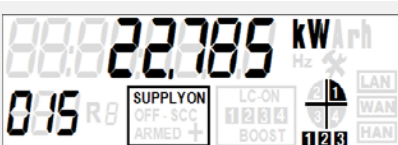
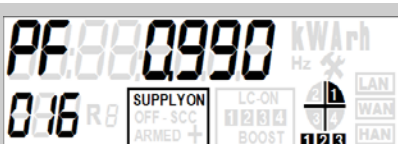


4	CLEM program name		YES	YES	YES
5	Tariff name		YES	YES	YES
6	Meter status: Good		YES	YES	YES
	Meter status: NVM/Memory failure		YES	YES	YES
	Meter status: Clock invalid		YES	YES	YES
	Meter status: Low battery		YES	YES	YES
	Meter status: Battery failure		YES	YES	YES
	all status flags are set		YES	YES	YES
7	Battery hours (displayed value in hours will be rolled over after 999999)		YES	YES	YES
8	"HAN closed"		YES	YES	YES

	"No network" or "HAN module not supported"		YES	YES	YES
	"Permit joining ON"		YES	YES	YES
	"No communication with HUB"		YES	YES	YES
9	"IDLE"		YES	YES	YES
	"Attempt going on"		YES	YES	YES
	"Connected"		YES	YES	YES
	"No Power"		YES	YES	YES
	"No communication with HUB"		YES	YES	YES
	10	No signal		YES	YES
Signal strength in dB			YES	YES	YES
11	Install code		YES	YES	YES






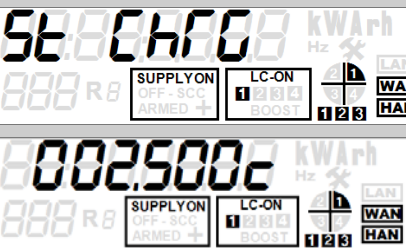
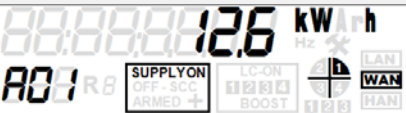
12	Diversity end date	NA			
13	Diversity end time	NA			
14	HAN antenna type Note: This display is available only if the meter is connected with Skyline-i 543.		YES	YES	YES
15	WAN antenna type		YES	YES	YES




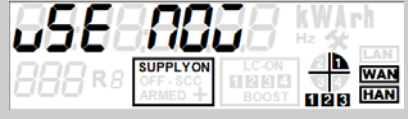
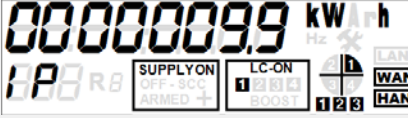

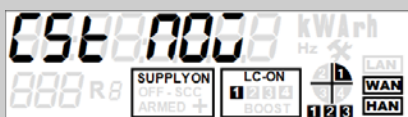

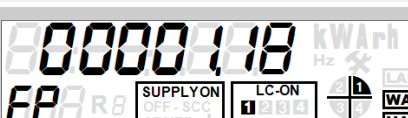
Page 3 Instantaneous Parameters

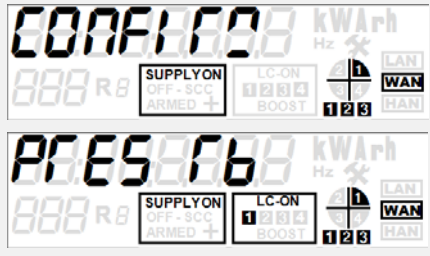


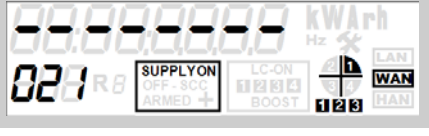
1	Page number of the current displayed page		YES	YES	YES
2	Frequency		YES	YES	YES
3	Scaling of the metrological LED-1		YES	YES	YES
4	Scaling of the metrological LED-2		YES	YES	YES
5	Voltage Phase 1		YES	YES	YES
6	Voltage Phase 2		YES	YES	YES
7	Voltage Phase 3		YES	YES	YES
8	Active Current Phase 1		YES	YES	YES

9	Active Current Phase 2		YES	YES	YES
10	Active Current Phase 3		YES	YES	YES
11	Line Current Phase 1		YES	YES	YES
12	Line Current Phase 2		YES	YES	YES
13	Line Current Phase 3		YES	YES	YES
14	Active Power Phase 1		YES	YES	YES
15	Active Power Phase 2		YES	YES	YES
16	Active Power Phase 3		YES	YES	YES
17	Power Factor Phase 1		YES	YES	YES
18	Power Factor Phase 2		YES	YES	YES
19	Power Factor Phase 3		YES	YES	YES

Page 5 (Tariff Name, Tariff Active Rates and Standing Charges)

1	Page number of the current displayed page		YES	YES	NO
2	Tariff Type		YES	YES	NO
3	Active Rate header		YES	YES	NO
4	E1 Active Import Rate register & Price "01" represents Active Rate Register "10.00" represents Active Rate Price(\$) Identifier shows (IP) for Import & (1) represents element.		YES	YES	NO
5	Active Export Rate register & Price. "03" represents Act. Rate Register "09.00" represents Act Rate price (\$) Identifier (EP) shows export.		YES	YES	NO
6	E2 Active Import Rate register & price "02" represents Act. Rate register "12.00" represents Act rate price(\$) Identifier (IP) represents Import and (2) represents element	NA			
7	Standing Charge Per Day "c" represents cents		YES	YES	NO
8	Active Import Rate register. "A01" represents Active Import rate register 1. Meter only displays configured registers.		YES	YES	NO

9	Active Export Rate Register. "b01" represents Active Export rate register 1. Meter only displays configured registers.		YES	YES	NO
10	Element 2 Active Import Rate Register. "C01" represents Active Import rate register 1 Element 2. Meter only displays configured registers.	NA			
Default/Auto Display					
1	Displays the current operating mode of the meter. *Followed by		NO	YES	NO
			NO	NO	YES
Displays customer's "Current Consumption".					
3	Using Now. This is consumption since last billing.(Header)		YES	YES	NO
	This is for consumption since last billing.(Value) *Followed by		YES	YES	NO
	This is for generation since last billing.(Value) *Followed by		YES	YES	NO
Displays customer's "Cost of Consumption".					
4	This is for cost of consumption & generation since last billing. (Header)		YES	YES	NO
	This is for cost of consumption since last billing. (Value)		YES	YES	NO
	This is for cost of generation since last billing. (Value)		YES	YES	NO

Ready Mode Display					
1	Press any button for connecting the main supply. Further, press left button to connect.	NA			
2	Press right button to confirm.		YES	YES	YES
Load Limit Display					
1	High Load (90% of over load threshold)		YES	YES	YES
2	Over Load		YES	YES	YES
BAD Display					
1	Bad display (Identifier displayed as config.)		YES	YES	YES

Notes

Notes

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BGX701-075

The logo for SECURE, featuring the word "SECURE" in a bold, italicized, purple sans-serif font. A stylized purple bird or wing icon is positioned above the letter "E".