Metering Specification

Adelaide University

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Revision History

Revision	Author	Description	Date
0.1	J. Gore	Draft for comment.	08 Aug 2023
1.1	J. Gore	Updated Meter Specification to comply with the UofA Network zero trust requirements of using DHCP (Dynamic Host Configuration Protocol) supported hardware. Inclusion of Ethernet Gateways for connection of RS-485 Serial Devices to the UofA Network. Addition of a 'Special Meter Specification Considerations" section for consideration in project specifications.	13 Nov 2023
1.2	J. Gore	Updated Meter Specification with Engagement and Delivery model.	21 Nov 2023
2.0	J. Gore	Updated Meter Specification for Adelaide University consolidating metering selections and delivery model	27 Nov 2025

1 Introduction

The intent of this document is to recommend a standard metering specification for Adelaide University (AU) to implement across their assets to maintain a consistent approach to features and data sets for the monitored electrical services and assets.

This document contains a table of recommended meters by electrical service and asset type, using unique AZZO-AU part numbers to reflect a pre-configured device (in some cases multiple devices) and an agreed pricing model.

This document provides a detailed section on each AZZO-AU part as a specification guide, that can be used by Adelaide University's design consultants.

The document also contains an appendix with the associated vendor part number/s used to derive the AZZO-AU part, where more specific information and data sheets need to be reviewed.

2 AU and AZZO Engagement Model

Adelaide University and AZZO use the following engagement model; a flow chart is provided in the appendix.

Engagement Model (Refer to Appendix for Flow Chart):

1. Adelaide University procure hardware through AZZO using this specification and order form in the appendix. Hardware procurement includes:
    a. Selected hardware
    b. Hardware pre-configuration for Adelaide University Energy and Power Management Systems and Network.
2. The Contractor (Electrical, Mechanical or Other), engage AZZO for the delivery of the Project and Engineering Services applicable for the metering, which typically includes the following:
    a. **Project Management** - Contractor and stakeholder engagement, coordination, delivery, HSEQ.
    b. **Design** – Network architecture, metering selection, documentation
    c. **Integration** – Setup and configuration of meters and monitored equipment in EPMS software.
    d. **Testing** – Checking and validating communication of equipment from site to software.
    e. **Commissioning** – Confirming equipment readings, measurements and functions and overall EPMS integration achieves project and Adelaide University objectives.
    f. **DLP monitoring** – Monitoring connected devices to the EPMS system communication and log health during DLP period after which monitoring becomes part of the maintenance agreement in place.

3 Meter Specification and Part Number List

3.1 Meter Specification

The following table shows the recommended meter types for the various metered services. Deviation from these recommendations should be in consultation with AZZO, to ensure alternative meter types are in accord with Adelaide University's Energy and Power Management objectives and strategies.

Metered Service	Meter Part No.
DNSP Point of Connection.	AZZO-AU-9000
Main Switch Board/whole building incoming feeds.	AZZO-AU-8000
Generator feeds.	AZZO-AU-8000
Solar PV feeds.	AZZO-AU-8000
BESS feeds.	AZZO-AU-8000
PQ Sensitive Equipment.	AZZO-AU-8000
Mechanical Services Switch Boards.	AZZO-AU-5560
Mechanical Services Equipment	AZZO-AU-5560
Light & Power DBs.	AZZO-AU-5560
All Commercial Tenancies <100A	AZZO-AU-133-DIRECT-NMI
All Commercial Tenancies >100A	AZZO-AU-133-CT-NMI
NCC Section J Metering Compliance Only.	AZZO-AU-3150-DIRECT AZZO-AU-3250-CT

Table 1: Meter Specification Table

3.2 AZZO-AU Meter Part Number

The following table lists the various AZZO-AU specified meters, variants of these are available to suit installation and operational considerations (ie ELV auxiliary power for UPS backup consideration of critical power quality or control applications where 24VDC backup power is provided instead of 230VAC UPS).

AZZO-AU Meter Part No.	Part Description
AZZO-AU-9000	**Standard**: Panel mount, CT Type, 230VAC Aux - *Speak to AZZO if a variant is required.*
AZZO-AU-8000	**Standard**: Panel mount, CT Type, 230VAC Aux - *Speak to AZZO if a variant is required.*
AZZO-AU-5560	**Standard**: Panel mount, CT Type, 230VAC Aux - *Speak to AZZO if a variant is required.*
AZZO-AU-133-DIRECT-NMI	**Standard**: Din mount, <100A direct connect, NMI certified. (Requires AZZO-AU-600-Gateway, or Meter Supporting Gateway Function)
AZZO-AU-133-CT-NMI	**Standard**: Din mount, 5A current transformer, NMI certified. (Requires AZZO-AU-600-Gateway, or Meter Supporting Gateway Function)
AZZO-AU-3150-DIRECT	**Standard**: Din mount, <63A direct connect (for NCC Requirement Only)
AZZO-AU-3250-CT	**Standard**: Din mount, CT Type, 230VAC Aux (for NCC Requirement Only)

Table 2: AZZO-AU Meter Part Number Table

4 Meter Gateway Specification and Part Number List

4.1 Meter Gateway Specification

The following table shows the recommended meter gateway types for the RS-485 serial communication meters and devices (e.g. AZZO-AU-133-DIRECT-NMI, AZZO-AU-133-CT-NMI, AZZO-AU-3150-DIRECT, AZZO-AU-3250-CT). Deviation from these recommendations should be in consultation with AZZO, to ensure alternative gateway types are in accord with Adelaide University's Energy and Power Management objectives and strategies.

Applicable RS-485 Serial Devices and Other Interfaces	**AZZO-AU Gateway Functions. ***		
	AZZO-AU-600L	**AZZO-AU-800L**	**AZZO-AU-800P**
AZZO-AU-133-DIRECT-NMI AZZO-AU-133-CT-NMI AZZO-AU-3150-DIRECT AZZO-AU-3250-CT Other RS-485 Serial Devices Digital Inputs (WAGES)	Standard RTU/TCP Gateway. Key Features: • 24VDC • DHCP • Wi-Fi Capable ^ • 2 Digital Inputs	Advanced RTU/TCP Gateway. Key Features: • 24VDC • DHCP • Wi-Fi Capable ^ • Onboard Logging (where meters or devices do not support logging) • 2 Digital Inputs	Advanced RTU/TCP Gateway. Key Features: • Power over Ethernet (PoE) • DHCP • Wi-Fi Capable ^ • Onboard Logging (where meters or devices do not support logging)

Table 3: Gateway Specification Table

Symbol	**Description**
*	Meter type can be selected based on specific requirements (refer to Meter Technical Specification).
^	Where Wi-Fi is used and accepted by ITDS for connection of devices to AU's Energy and Power Management system an external antenna will be required.

Note. Where Gateways with specialist features or protocol conversion capabilities are required, these can be considered on a case-by-case basis for use in projects.

AZZO-AU Gateway Part No.	**Part Description**
AZZO-AU-600L	Standard Function with 24VDC auxiliary power.
AZZO-AU-800L	Advanced Function with 24VDC auxiliary power.
AZZO-AU-800P	Advanced Function with Power over Ethernet (PoE). *Note. Excludes digital Input function.*

Table 4: AZZO-AU Gateway Part Number Table

5 Meter Technical Specification

5.1 AZZO-AU-9000 meters

The AZZO-AU-9000 metering device shall have at minimum the following capability and functions:

1. Conform to AZZO-AU configuration standards for integration into Adelaide University's Power Monitoring and Operation Applications, and compliance with AU ITDS end point device requirements (i.e. DHCP configuration).

2. The voltage inputs of the meter shall provide a minimum of 4 phases, neutral and ground inputs. The meter shall support direct connection of low voltage circuits up to 600V (UL) or 690V (IEC) without need for voltage (potential) transformers. The meter shall support connection of medium and high voltage circuits through voltage (potential) transformers, and provide user definable primary and secondary transformer ratios.

3. The current inputs of the meter shall provide a minimum of five (5) inputs and support nominal input currents of both 5A and 1A. A secondary configuration option shall provide Low Voltage Current sensor inputs of +/-5.5Vpk.

4. The meter shall support measured and calculated metering parameters including four-quadrant metering, full range of 3-phase voltage, current, power and energy measurements, % unbalance, power factor (true & displacement – per phase and three-phase) demand (min/max, present demand interval, running average demand, and predicted demand), total harmonic distortion (THD), individual current and voltage harmonics readings.

5. The meter shall meet stringent IEC and ANSI measurement accuracy standards including ANSI C12.20 accuracy class 0.1, current class 2, 10 and 20, and IEC 62053-22 Class 0.1S (standard pending) and be fully compliant with IEC 61557-12 PMD. The low voltage current sensor input option shall be fully compliant with IEC61557-12 PMD.

6. The meter shall have a high-visibility color graphical display that is user programmable to display up to 6 parameters per screen. The meter shall be capable of displaying graphical metering data including at minimum spectral components and phasor diagrams. The meter shall be capable of displaying harmonics content in histogram format. The meter shall provide a minimum of two (2) display options consisting of a 96x96 mm (3.8") graphical color display with push-button control, and a 197x175 mm (7.0") graphical color display with touchscreen control.

7. The meter shall provide integrated I/O with at least eight (8) digital inputs, four (4) digital outputs, and two (2) relay outputs for equipment status/position monitoring and equipment control/interface. The digital (pulse) output operation shall provide kWh / kVARh total/imported/exported energy consumption.

8. The meter shall have the ability to add optional field expandable I/O modules of at least twenty-four (24) digital inputs with wetting source, eight (8) form-C relay outputs, sixteen (16) analog inputs and/or eight (8) analog outputs.

9. The meter shall provide multi-port Ethernet and serial communications with at least two (2) Ethernet ports and two (2) RS485 serial ports. The Ethernet ports shall support IPv4 and IPv6 with DHCP IP address assignment and offer E-mail on alarm, E-mail interval energy data, customizable web server, SNMP network management with traps, and PTP and NTP time synchronization. The meter shall provide an Ethernet-to-serial RS-485 gateway function. Industrial communication protocols supported by the meter shall include Modbus, DNP3, and IEC 61850. The meter shall provide enhanced cybersecurity features that include but are not limited to HTTPS in accordance with TLS 1.2.

10. To comply with cybersecurity directives, the meter shall have the ability to independently enable or disable communication ports, enable or disable communication protocols per communications port, and assign TCP/IP port numbers per communications protocol. The meter shall support secure protocols that include HTTPS in accordance with TLS 1.2. The meter shall provide a Security log to capture security related events such as log-in / log-out (whether successful or failed), configuration changes, resets, and other events identifying the date and time of the

event and the user name of the requestor. The meter shall support Syslog protocol to deliver security events to a network management server. The meter design shall include a Trusted Platform Module (TPM).

11. The meter shall be capable of self-identification on an Ethernet network without any device configuration or user interaction.

12. The on-board logging capability of the meter shall have non-volatile time stamps with on-board logging of I/O conditions, min/max values, energy and demand, maintenance data, alarms, and any measured parameters; trending and short-term forecasting of energy and demand. The meter shall have the ability to record any parameter in the meter, and trigger multiple such recordings in continuous succession (triggered manually or through internal event conditions, including periodic timers or set-point activity in which the meter has the capability of learning set-point limits based on the system behavior). The meter shall support user defined recording intervals down to ½ cycle. The number of records (depth), and overflow conditions (stop-when-full or circular) shall be user programmable and limited only by available memory.

13. The meter's on-board web server shall provide access to real-time values, power quality information, and basic meter configuration. The waveform viewing capability shall provide the ability to visualize all voltage and current phases of captured waveforms concurrently using a standard web browser; allows waveform selection, voltage and current phase selection, zooming in and out, panning with select zoom, saving and printing. The web interface shall be fully customizable with support for user defined web views.

14. The meter shall provide set-point driven alarming capability. The meter shall be able to generate an E-mail notification on an alarm condition. Alarm entries shall have millisecond resolution timestamps. The meter shall support consecutive high-speed triggers for alarms and waveform recording, triggering on a cycle-by-cycle basis with no "dead" time between events (i.e. no need for a re-arming delay time between events). The meter shall operate relays or initiate data logging captures on alarm conditions. The meter shall control any number of digital output relays in an AND or an OR configuration, using pulse mode or latch mode operation, for control and alarm purposes. The meter shall provide the capability to combine any logical combination of available set-point conditions to control an internal or external function/event.

15. The meter shall provide a time-stamped event log (1 millisecond resolution) with support for at least 500 events, programmable up to a maximum of 20000 events. The meter shall record date and time, cause and effect, and priority for each event; The meter shall record all events relating to set-point activity, relay operation, configuration, and self-diagnostics. The event recording response time shall be ½ cycle (8.3ms 60Hz, 10ms 50Hz) for high-speed events and 1 second for other events. The meter shall be capable of receiving time synchronization signals to ensure that the time stamps between devices on the same communications network are within +/- 1 millisecond; Precision time synchronization methods shall include GPS clock via RS485 serial port, IRIG-B (unmodulated) via digital input, and Precision Time Protocol (PTP) via Ethernet.

16. The meter's power quality analysis and compliance monitoring shall be fully IEC 62586, Edition 2 (2017) PQI-A compliant. The meter shall provide the following capabilities without separate software: Display statistical indicators of power quality on the front display; Provide statistical indicators of power quality that include, but are not limited to, voltage dips and swells, harmonics, frequency, rapid voltage change and mains signaling in accordance with EN 50160:2010 (Edition 4) power quality standard and provide an indication of pass / fail in a web interface. Concurrently with the EN50160 power quality analysis, the meter shall provide statistical indicators of power quality that include, but are not limited to, total harmonic distortion for voltage and current, total demand distortion for voltage and current in accordance with IEEE519:2014 power quality standard and provide an indication of pass / fail in a web interface. The meter shall compare power quality parameters (present, average or calculated values) with an absolute or relative setpoint, and alert (via e-mail or pager), or enable control (via a local interface to PQ mitigation equipment/control systems through relays and analog or digital outputs) when set-point is exceeded. The meter shall be certified by a third-party laboratory to the power quality standards IEC 61000-4-30, Edition 3 Class 'A' and IEC 61000-4-15 (Flicker) according to IEC 62586-2, Edition 2. The meter's low pass anti-aliasing signal filters shall meet the requirements of IEC 61000-4-7.

17. The meter shall simultaneously capture voltage and current channels for sub-cycle disturbance, transients, as well as multi-cycle sags, swells and outages in quick succession, without dead time between recordings. The rate shall be 1024 samples per cycle waveform recording, with minimum 17/20 microsecond transient capture (60/50 Hz). The meter shall provide the ability to record 180 cycles with thirty (30) cycles prior to the fault at 1024 samples per cycle minimum. The meter shall be configurable to provide up to 225 COMTRADE disturbance capture files for waveforms that are available via FTP and provide client notification of new captures through IEC 61850 (RDRE logical node). The meter shall have the ability to record over a minute of 1-cycle RMS values every ½-cycle for voltage, current, frequency, power, power factor and unbalance, based on a power system event, and record 30-seconds of 1-cycle RMS values prior to the event trigger.

18. The meter shall provide high-speed sag/swell detection of voltage disturbances on a cycle-by-cycle basis, providing duration of the disturbance, the minimum, maximum, and average value of the voltage for each phase during the disturbance. The meter shall detect disturbances less than one cycle in duration. The meter shall have the ability to determine the location of a disturbance more quickly and accurately by identifying the direction of the disturbance relative to the meter. The disturbance direction shall be captured in the device's event log, along with a timestamp and confidence level indicating level of certainty.

19. The meter shall provide a graphical flexible programming capability with programmable modules that access metered and input data. The meter shall be capable of deriving values and combinations of measured or calculated parameters, using arithmetic, trigonometric, logic, thermocouple linearization and temperature conversion functions. The meter shall have programming modules that can be arbitrarily linked together to create application functionality such as totalizations, efficiency measurements, load aggregation, control functions, load shedding, demand response, power factor correction, and compliance monitoring. The meter shall have the ability to read data from networked Modbus devices for the purposes of logging, exporting, aggregation, totalization, display visualization, web visualization or other user defined functions.

5.2 AZZO-AU-8000 meters

The AZZO-AU-8000 metering device shall have at minimum, the following capability, and functions:

1. Conform to AZZO-AU configuration standards for integration into Adelaide University's Power Monitoring and Operation Applications, and compliance with AU ITDS end point device requirements (i.e. DHCP configuration).

2. High-visibility colour graphical display.

3. Direct connect to circuits up to 600 VAC, eliminating the need for voltage (potential) transformers; 5 A nominal current inputs.

4. Supported monitoring parameters: full range of 3-phase voltage, current, power and energy measurements, total harmonic distortion (THD), individual current and voltage harmonics readings, waveform capture, voltage and current disturbances (dip/swell) detection, ability to determine the location of a disturbance (upstream / downstream).

5. COMTRADE: up to 255 COMTRADE disturbance capture files available via FTP and providing client notification of new captures through IEC 61850 (RDRE logical node).

6. Power Quality compliance: without using separate software, determines statistical indicators of power quality that include, but are not limited to, voltage dips and swells, harmonics, and frequency in accordance with EN 50160 power quality standard and provide an indication of pass / fail in a web interface. EN 50160 and IEEE 519 compliance reporting; sag/swell detection; disturbance direction detection; waveform capture. Class S meter.

7. User customization: capable of deriving values for any combination of measured or calculated parameters, using arithmetic, trigonometric, and logic functions through graphical, flexible object oriented, programmable modules. Modules can be linked together in an arbitrary manner to create functionality such as totalizations, efficiency measurements, control functions, load shedding, demand response, power factor correction, and compliance monitoring.

8. Communications capability: multi-port Ethernet and serial communications with at least two Ethernet ports and one RS485 serial port. The Ethernet ports offer e-mail on alarm, e-mail interval energy data, web server, SNMP network management, NTP time synchronization, an Ethernet-to-serial RS-485 gateway, Modbus, DNP3, and IEC 61850.

9. On-board logging: non-volatile time stamped on-board logging of I/O conditions, min/max values, energy and demand, maintenance data, alarms, and any measured parameters; trending and short-term forecasting of energy and demand; custom alarming with time stamping; trigger alarms on at least 50 definable power or I/O conditions; use of Boolean logic to combine alarms.

10. I/O: at least three digital inputs and one digital output for equipment status/position monitoring and equipment control or interfacing with millisecond timestamp.

11. Expandable I/O: the ability to add optional I/O of at least 24 digital inputs and 16 relay outputs, 16 analogue inputs and 8 analogue outputs, or combinations of digital and analogue I/O in the field.

5.3 AZZO-AU-5560 meters

The AZZO-AU-5560 metering device shall have at minimum the following capability and functions:

1. Conform to AZZO-AU configuration standards for integration into Adelaide University's Power Monitoring and Operation Applications, and compliance with AU ITDS end point device requirements (i.e. DHCP configuration).

2. Connections and form factor - direct connect to circuits up to 600 VAC, eliminating the need for voltage (potential) transformers; five (5) amperes (A) nominal current inputs. Removable connectors for voltage inputs, control power, communications, inputs and outputs; easily mountable in the pre-made cutout without tools; form factor shall be ¼ DIN with 92 X 92 cut-out and 96 x 96 panel mount integrated display.

3. Supported monitoring parameters—full range of 3-phase voltage, current, power and energy measurements, power factor, frequency, total harmonic distortion (THD), individual power harmonics (up to 63rd order).

4. Accuracy standards - use four-quadrant metering and sample current/voltage simultaneously without gaps with 64 samples per cycle (zero-blind); comply with ANSI C12.20 class 0.2 and IEC 61557-12 class 0.2 for revenue meters.

5. Display - Backlit dot-matrix LCD display, anti-glare and scratch resistant with a minimum of 128 x128 pixels, capable of displaying four values in one screen simultaneously; a summary screen to allow the user to view a snapshot of the system; support either integrated or remote display.

6. Support four (4) digital inputs for Demand Synch Pulse, Time Synch Input, and Conditional Energy Control; have two (2) digital outputs that operate either by user command sent over communication link, or in response to a user defined alarm or event.

7. Communications - serial RS-485 Modbus and Ethernet Modbus TCP; provide two Ethernet ports to allow wiring from meter to meter as a daisy-chain; be capable of serve data over the Ethernet network accessible through a standard web browser; the monitor shall contain default pages from the factory.

8. Onboard data logging capabilities - to log data, alarms and events; logged information will include data logs, minimum/maximum log files of selected parameter values, and alarm logs for each user defined alarm or event log; support the following on-board non-volatile memory—14 parameters every 15 minutes for 90 days.

9. Alarming capabilities - support 29 set-point driven alarms, four (4) digital alarms, (4) unary alarms, 10 Boolean alarms and five (5) custom alarms; user definable alarm events; set-point driven alarms shall be available for voltage/current parameters, input status, and end of interval status.

10. Firmware-upgradeable to enhance functionality through the Ethernet or serial communication connection and shall allow upgrades of individual meters or groups.

11. Integrated gateway functionality, enabling the capability to connect via Ethernet to downstream, serially connected devices.

12. Native BACnet/IP support with capability to communicate via Modbus TCP/IP and BACnet/IP simultaneously. Tested and approved by BACnet Testing Laboratories (BTL) as a BACnet Application Specific Controller (B-ASC).

13. Designed accordingly to eco-design complying with ISO 14062, especially MCCB materials shall be halogen free type; designed for easy disassembly and recycling at end of life, and comply with environmental directives ROHS and WEEE.

5.5 AZZO-AU-133-(DIRECT/CT)-NMI meters

The AZZO-AU-133 metering device shall have at minimum the following capability and functions:

Standards and Operation Conditions

1. Conform to AZZO-AU configuration standards for integration into Adelaide University's Power Monitoring and Operation Applications, and compliance with AU ITDS end point device requirements (i.e. DHCP configuration via AZZO-AU-600-Gateway or Meter).

2. The meter shall comply with Accuracy Standard AS/IEC 62053-22, Class 0.5S for Active Energy for CT and Direct Connect meters.

3. The meter shall comply with Accuracy Standard AS/IEC 62053-21 Class 0.5 for Reactive Energy for CT and Direct Connect meters.

4. The meter shall comply with Australian Standard AS 62052-11.

5. The meter shall be NMI approved for energy billing in Australia.

6. The meters secondary input shall be 5A/10A suitable for use with extended range Current Transformers; for loads under 80Amp a direct connect meter would be accepted.

7. The meter shall have a sampling rate at 128 samples per cycle.

8. The meter shall be self-powered from the three (3) phase measuring input and operate in any combination of phase presence in accordance with IEC 62053-61.

9. The meter shall comply to AEMO type 4 and type 5 installation.

10. The meter shall be DIN Rail Mounted.

11. The meter will support software for programming and data validation with vector, harmonic and waveform analysis.

12. The meter shall have a minimum of five (5) year warranty from supply of product.

Measurements

13. The meter shall measure real-time measurements of: voltage, current, powers (active, reactive, total), PF, frequency, neutral current, harmonics, voltage and current unbalance. Powers and PF shall include total value and per phase.

14. The meter shall provide 4 quadrant measurements – import, export for all active, reactive and total energy.

15. The meter shall measure import/export per phase when meter is configured for three (3) single phase operation.

16. The meter shall provide as a minimum harmonics analysis up to 40th harmonic for both voltage and current. It shall display each individual harmonic value, phase angle, THD (Total Harmonic Distortion), TDD (Total Demand Distortion) and K-Factor.

17. The meter shall display maximum demand for active, reactive and apparent power as well as per phase of current and voltage.

18. The meter shall have a minimum of two (2) pulse inputs for water and/or gas measurements and be scalable.

Logging, Memory & Alarms

19. The meter shall have on board non-volatile memory of 8MB
20. The meter shall support configuration of interval metering data with minimum storage of 300 days onboard the meter, based on interval data for either 5, 15, or 30 minute data logging.
21. The meter shall provide data logging of internal events and setup changes.
22. The meter logged data shall have date/time stamping based on real time clock (RTC).
23. The meter shall have upgradeable firmware through serial or Ethernet ports.
24. The meter shall have a minimum of 16 programmable alarm set- points.
25. The meter shall have an embedded programmable controller 25. The meter shall have the capability for 1 cycle response time.

Communication and Expansion Modules

26. The meter shall have as standard galvanic isolated RS-485 communication port with Modbus protocol
27. The meter shall have available as an option Ethernet (Modbus TCP) communications supporting simultaneously up to 4 TCP open sockets.

LCD Display

28. The meter shall have a backlight LCD display.
29. The meter shall have the LCD display ability to provide 10 alpha numeric character for energy identification

Configuration

30. The meter shall be configurable for either 3 phase or up to 3 single phase circuits for direct connect input or HACS input metering, per NMI approval.
31. The meter shall have the option for configuration on a 5A CT input for single phase per NMI approval.
32. The meter shall have the ability to be placed in test mode, ensuring the energy and demand accumulators do not account for consumed energy while being tested.
33. The meter shall have Time of Use (TOU) programmable Tariffs, Calendar functions, and Seasons.
34. The meter shall have 3 levels of password security for protection of meter setups and accumulated data such as energy and demand.
35. The meter shall be a SATEC EM133-XM or equal.

5.6 AZZO-AU-3x50-(DIRECT/CT)

This meter is nominated for use where compliance with the National Construction Code Section J is the only requirement and there is no strategic monitoring requirement.

If the NCC requirement necessitates the connection of these meters to a monitoring portal (typically when the building floor space is >2,500 m2), they are compatible with Adelaide University's Energy and Power Management Systems.

Speak to AZZO when the NCC requires connection to the EPMS for the most efficient and cost-effective solution.

Standards and Operation Conditions

1. Connections and form factor - **DIN-rail** clip-on design enables installation without tools; compact form factor designed for standard modular **DIN-rail** distribution boards with integrated front LCD display. Supports three-phase or single-phase + neutral systems up to 480 VAC line-to-line. Terminal blocks include dedicated connections for voltage inputs, current paths/CTs, and pulse output.

   AZZO-AU-3150 (Type - Direct Connect 63A)
   Direct-connected energy meter rated for circuits up to 63 A without the need for external current transformers.

   AZZO-AU-3250 (Type - Current Transformer 1A or 5A)

   CT-connected three-phase energy meter suitable for use with external 1 A or 5 A current transformers.

2. Supported monitoring parameters - Supports measurement of active energy (kWh) and provides monitoring of voltage per phase, current per phase, frequency, power factor, active power, and total system energy. Includes detection of phase loss, reverse energy flow, and wiring errors.

3. Accuracy standards - Complies with IEC 62053-21 Class 1, EN 50470-3 Class B, and IEC 61557-12 accuracy requirements for active energy metering. Uses simultaneous sampling of voltage and current across all phases for accurate sub-billing and cost allocation.

4. Display - Equipped with a backlit LCD providing clear visibility of measured parameters. Designed with high-contrast characters for readability in low-light installations. Displays system energy, phase-by-phase values, and wiring status; includes scrolling screens for simplified navigation.

5. Input / Output capabilities - Provides one (1) solid-state pulse output.

6. Communications – Modbus RS-485

7. Onboard data logging capabilities - The iEM3x10 does not include onboard data logging memory. Energy totals are stored in non-volatile memory, ensuring value retention after power outage.

8. Alarming capabilities - No internal alarming or set-point functions. Supports wiring error indication and reverse energy detection displayed locally on the LCD.

9. Firmware upgradeability - Firmware is fixed at factory and not user-upgradeable. The device provides stable long-term operation without field software updates.

10. Environmental and sustainability design - Designed following Schneider Electric's eco-design principles to minimize environmental impact. Complies with RoHS, REACH, and WEEE directives. Manufactured with halogen-free plastics where applicable, and designed for recyclability and simplified end-of-life disassembly.

6 Special Meter Specification Considerations

6.1 Neutral CT for Harmonic Monitoring

For all electrical points of connection or building main switchboard supply points, it is recommended to have specified in the electrical design a 4th Current Transformer to monitor the neutral conductor, particularly for monitoring harmonic currents.

All AZZO-AU Meter models for this type of service support a 4th CT. Monitoring of the neutral will allow for harmonic studies and audits to be conducted in more detail, and in the event active harmonic filters are installed, can assist to verify their effectiveness.

Appendix A Metering and Gateway Hardware Vendors

The following table shows the meter vendors and vendor part numbers used to create the unique AZZO-AU part numbers. The AZZO-AU part numbers reflect pre-configuration and agreed pricing model between Adelaide University and AZZO.

AZZO-AU Model No.	Vendor	Vendor Part No. Variants *(AU Internal Reference Only)*
AZZO-AU-9000	Schneider Electric	• METSEION92040 (Standard) • METSEION92140 (ELV)
AZZO-AU-8000	Schneider Electric	• METSEPM8340 (Standard) • METSEPM8344 (DIN/LV) • METSEPM8310 (ELV) • METSEPM8314 (DIN/ELV)
AZZO-AU-5560	Schneider Electric	• METSEPM5560 (Standard) • METSEPM5563RD (DIN) • METSEPM5580 (ELV)
AZZO-AU-133-DIRECT-NMI	SATEC	• EM133-XM-100-50HZ-SE-CC
AZZO-AU-133-CT-NMI	SATEC	• EM133-XM-5-50HZ-SE-CC
AZZO-AU-600L	Schneider Electric	• PAS600L
AZZO-AU-800L	Schneider Electric	• PAS800L
AZZO-AU-800P	Schneider Electric	• PAS800P
AZZO-AU-3150-DIRECT	Schneider Electric	• A9MEM3150
AZZO-AU-3250-CT	Schneider Electric	• A9MEM3250
AZZO-AU-2220	Schneider Electric	• METSEPM2220 (Standard)

Appendix B Hardware Order Form

Please use the following form to order AZZO-AU parts and send to solutions@azzo.com.au

Project Reference:	
Date of Order:	
Date Hardware Required:	
AU Contact Name:	
AU Contact Number:	
Purchase Order No:	
Shipping Address:	
Project Notes	

Metering required to connect to EPMS.

AZZO-AU Model No.	Select Model	Quantity Required	Notes
AZZO-AU-9000	☐		
AZZO-AU-8000	☐		
AZZO-AU-5560	☐		
AZZO-AU-133-DIRECT-NMI	☐		
AZZO-AU-133-CT-NMI	☐		
AZZO-AU-600L	☐		
AZZO-AU-800L	☐		
AZZO-AU-800P	☐		

NCC Section J Metering Compliance Only.

AZZO-AU Model No.	Select Model	Quantity Required	Notes	EPMS Integration Required
AZZO-AU-3150-DIRECT (DIN Mount)	☐			Yes * ☐
AZZO-AU-3250-CT (DIN Mount)	☐			No ☐

* Integration to EPMS may be required for buildings with total floor space is greater than 2,500 m2, if required speak to AZZO about the most cost-effective RS-485 communication and gateway design.

Appendix C Hardware List Prices

AZZO-AU Part Number	Hardware List Price ($)
AZZO-AU-9000	$21,220
AZZO-AU-8000	$5,915
AZZO-AU-5560	$2,794
AZZO-AU-133-DIRECT-NMI	$895
AZZO-AU-133-CT-NMI	$825
AZZO-AU-600L	$949
AZZO-AU-800L	$2,016
AZZO-AU-800P	$2,016
AZZO-AU-3150-DIRECT	$636
AZZO-AU-3250-CT	$705

- List prices are subject to change according to vendor pricing updates.
- Supply of all goods are subject to AZZO's standard terms and conditions.

Appendix D AZZO-AU Engagement Model