

Metering Technical Services: EM1210 Series Single Phase Two Element Electronic Meters - Installation & Use

25th March 2011



25th MARCH 2011

ISSUE 3

UNCLASSIFIED

UNCONTROLLED COPY IF PRINTED

UNCLASSIFIED

PREPARED BY: METER LABORATORY TEAM LEADER

AUTHORISED BY: GROUP MANAGER METERING SERVICES

DOCUMENT NUMBER: CEOM8014.53 - ISSUE 3

This plan is copyright. No part may be reproduced by any process without written permission, except as permitted under the copyright act.

DISCLAIMER

- 1 Essential Energy may change the information in this document without notice. All changes take effect on the date made by Essential Energy. A print version is always an uncontrolled copy. Before using this document, please ensure that it is still current.
- 2 This document may contain confidential information. Restrictions on the use and disclosure of confidential information by employees are set out in your contract of employment. Restrictions on the use and disclosure of confidential information by contractors are set out in your contract of engagement with Essential Energy. Sub-contractors are bound by the confidentiality provisions set out in their contract with the contractor engaged by Essential Energy.

© 2011 ESSENTIAL ENERGY

UNCLASSIFIED

CONTENTS PAGE

1	INTRODUCTION	5
2	WHY THESE INSTRUCTIONS ARE IMPORTANT	5
3	FEATURES OF THE EM1210 METER.....	5
3.1	Meter Connections	6
3.2	Programming	6
3.3	Meter Display	6
3.4	Internal Battery	6
3.5	Documentation	7
3.6	Installation	7
3.6.1	Wiring Diagrams	7
3.6.2	Drilling Template.....	8
3.6.3	Sealing	8
3.6.4	Consumption Indicators	8
3.7	Errors and Warnings.....	8
3.7.1	Error Monitoring.....	8
3.7.2	Error Codes	9
3.7.3	Warning Display.....	9
3.7.4	Commissioning Checks	9
3.8	Removal and Returns	10
3.8.1	Removal	10
3.8.2	Returns.....	10
3.9	Grid Interactive Generation Plants	10
3.10	Boost Feature.....	11
3.11	Maintenance Applications	11
3.12	Pulse Outputs.....	11
4	READING THE EM1210 ELECTRONIC METER	12
4.1	kWh – Rate A (Peak) Element 1	12
4.2	kWh – Rate B (Shoulder) Element 1.....	12
4.3	kWh – Rate C (Non Controlled Off Peak) Element 1	13
4.4	Total kWh (Controlled Load) Element 2 only displayed on meters programmed for “Controlled Load”	13
4.5	Total kWh (Export) only displayed on meters programmed for “Grid Interactive”	13
4.6	Maximum Current (Export Element 2) only displayed on meters programmed for “Grid Interactive”	14
4.7	Date	14
4.8	Time	14
4.9	Display Segment Test.....	15
4.10	Program ID	15
4.11	Error Indicator (When Displayed)	15
4.12	Additional Battery Warning Display.....	16

UNCLASSIFIED

5 WIRING DIAGRAMS 16

 5.1 M1-03: Single Phase Metering for Domestic & GSR Tariffs with 1 & 2 Element Metering with Off Peak 17

 5.2 M1-14: Single Phase Metering for Domestic & GSR Tariffs with 2 Element Metering with Off Peak & Boost 18

 5.3 CEM8014.67 Gross metering arrangement Single Phase installation (Optional load control - Single Phase Grid Connected Inverter) 19

 5.4 CEM8014.68 Gross metering arrangement Three Phase installation (Single Grid Connector Inverter) 19

6 KEY TERMS AND DEFINITIONS 19

7 REFERENCES 19

8 REVISIONS..... 19

UNCLASSIFIED

1 INTRODUCTION

To introduce a standard arrangement for the installation and use of the EM1210 Single Phase Two Element Electronic Meters across Essential Energy. This document covers multiple applications of the EM1210 dual element meter.

This Code of Practice forms an integral part of Essential Energy's standard metering arrangements and will ensure a common approach to both the programming and commissioning of electronic meters.

This document applies to all Essential Energy's staff, contractors, and authorised service providers.

2 WHY THESE INSTRUCTIONS ARE IMPORTANT

A specially programmed meter to simultaneously register import and export energy will be available for single phase Grid Interactive metering applications.

(**Note:** Different wiring configuration applies depending on the specific application – refer to appropriate diagrams attached).

The EM1210 Grid Interactive Meter will be available to Accredited Service Providers' and Essential Energy personnel utilising the standard requisition process.

The EM1210 Controlled Load Meter - programmed for controlled load application will be available internally to Essential Energy personnel only, for replacement of previously installed meters having both Principal and Controlled load function that have failed in service. This maintenance activity can only be carried out by Essential Energy personnel. The controlled load meter shall not be made available for any new installations.

3 FEATURES OF THE EM1210 METER

- Electronic, single phase, two element, whole current meter
- 100 Amps per individual element or 100 Amps combined
- Bottom connected
- Class 1 accuracy
- Programmable for different applications.



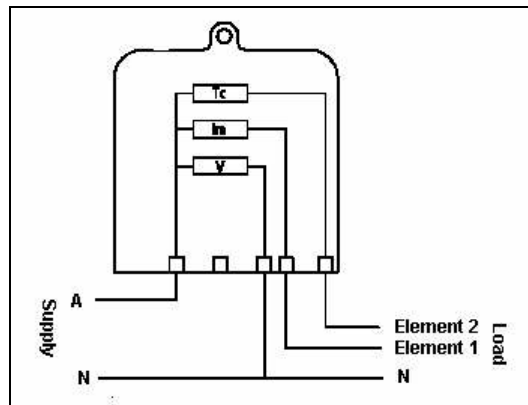
UNCLASSIFIED

The EM1210 meter will provide load profile data which supports a time of use (TOU) tariff, while offering a flat rate tariff concurrently – May also be programmed for import /export application.

The dimensions of the meter are:
140mm(W) x 227mm(H) x 71mm(D). (Including Terminal Cover).

Since the EM1210 has a similar mounting configuration to traditional single phase disc and A11 electronic meters, it should not be necessary to modify the meter panel when replacing an existing single phase meter.

3.1 Meter Connections



The meter connections are shown above.

3.2 Programming

All EM1210 meters supplied by Essential Energy are identifiable to their application and pre-programmed accordingly.

The Grid Interactive program provides load profile data which supports an Import Time Of Use tariff, plus a total export tariff. This meter is identified by a white label Stating "Grid Interactive" mounted externally on the bottom left hand corner of the meter. This meter may also have a unique colour coding.

The Controlled load program used for maintenance purposes provides load profile data which supports an Import Time of Use tariff, plus a total Import for a Controlled Load tariff. This meter is identified by a white label Stating "TOU" mounted externally on the bottom left hand corner of the meter.

Note: Meters programmed for Principal and Controlled load function is only available to Essential Energy Staff for maintenance purposes – No new controlled load applications will adopt the two element meter.

3.3 Meter Display

The meter display continually scrolls between 8 or 9 registers at six second intervals. Further detail regarding these registers is shown in clause 4.0.

3.4 Internal Battery

The meter contains an internal battery which is required to maintain time and calendar functions during outage times. Should the battery voltage fall below acceptable limits an error is displayed on the meter register.

UNCLASSIFIED

3.5 Documentation

Each separate metering element/rate is identified by a display code.

Registration recorded for the element/rate will be shown on the scrolling display along with the register code, i.e.

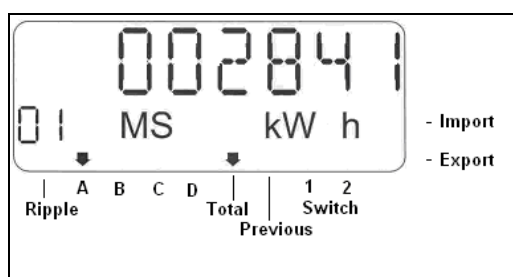
Display Code:

01 is for Total Import KWh (Principal Tariff) Rate "A" and indicates registration during Peak periods.

02 is for Total Import KWh (Principal Tariff) Rate "B" and indicates registration during Shoulder periods.

03 is for Total Import KWh (Principal Tariff) Rate "C" and indicates registration during Off Peak periods.

70 is for Total Export KWh and indicates registration for all energy supplied to the Grid.



e.g: The display indicating 2841 units on Element 1 Rate "A"

The EM1210 Grid Interactive meter must be identified on all notification paperwork submitted as having registers 01, 02, 03, indicating imported energy and register 70 indicating all energy exported to the network.

The EM1210 Principal and Controlled load tariff meter must be identified on all notification paperwork submitted as having registers 01, 02, 03 indicating imported energy for the Principal tariff and register 90 indicating controlled load consumption.

The meter must also be identified as having 6 dials on any paperwork submitted.

3.6 Installation

EM1210 meters programmed for import/export function are used for all Grid interactive installations employing a single phase inverter. EM1210 meters programmed for Principal and Controlled load tariff function are provided for Essential Energy's maintenance purposes only for use on existing installations where two element meters had been utilised for a load control application previously. **Note:** Load control requires a different, dedicated program and is restricted by a separate item/catalogue number.

3.6.1 Wiring Diagrams

Typical wiring diagrams for the EM1210 meter are included in Section 5.

UNCLASSIFIED

3.6.2 Drilling Template

For initial deliveries of the EM1210 meter Drilling Templates will be included with the meter. Once this process has expired, additional templates may be obtained by the following means.

Essential Energy staff may contact the Metering laboratory.

- Authorised service providers can access then print these documents from the Essential Energy website www.essentialenergy.com.au/content/approved-accredited-service-providers
Please check actual dimensions match those which are written on the template after printing.

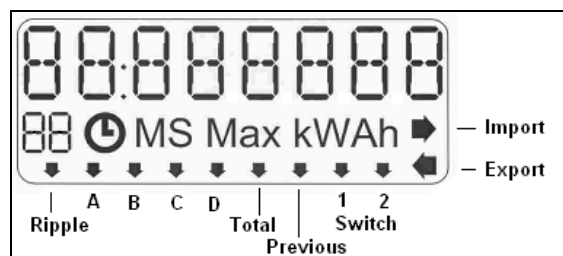
3.6.3 Sealing

The terminal cover has a single sealing point which must be utilised upon completion of the installation. The main cover will be sealed by the manufacturer.

3.6.4 Consumption Indicators

The EM1210 meter has a single consumption indicator; this is a pulsing calibration LED which is positioned at the centre top of the meter. This LED only pulses when energy being imported is greater than energy being exported.

The rate at which the LED pulses is equivalent to 1 pulse for every Wh which exceeds the export energy.



3.7 Errors and Warnings

3.7.1 Error Monitoring

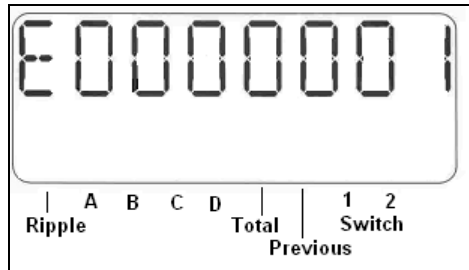
The EM1210 meter continually performs checks of its internal operations. Should an error be detected, then the meter stops scrolling and displays an error message.

Note: If an error message is displayed, the meter must be left in situ, notify Essential Energy staff locally and the faulty meter will be replaced by Essential Energy staff as a maintenance activity.

UNCLASSIFIED

3.7.2 Error Codes

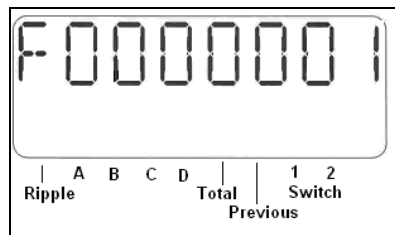
This code is identified by register indication 'E'. The error display reports internal errors associated with the meter. If no errors are to be reported, then the display will not be visible. Should an internal error occur, the meter will cease scrolling and display the error code.



eg. The display indicating error 000001

3.7.3 Warning Display

This display is only shown when reporting a status or condition which requires evaluation, such as low battery or reverse energy flow. Fault conditions will still require rectifications as with error conditions, but the consumption data will still be capable of being read, and should not be compromised in any way.



eg. The display indicating a low battery warning

3.7.4 Commissioning Checks

- VISUALLY inspect all connections and ensure there are no loose connections
- VISUALLY inspect the wiring and confirm it is configured as per the appropriate wiring diagram for the specific installation requirements. Refer to diagrams supplied with this Code of Practice
- APPLY voltage potential to the meter and check the meter display to confirm it is scrolling and no errors are displayed
- ENSURE the date and time are correct. (Eastern Standard time is the standard)
- ATTACH a suitable load to the meter (eg Household load or a 100W lamp) to element one
- VIEW the Calibration LED, this should pulse at a rate equivalent to the load attached.(eg 30-60 seconds with a 100W load)
- REPEAT for element two to confirm correct function
- SEAL the meter terminal cover in accordance with established guidelines
- COMPLETE and submit paperwork as appropriate.

UNCLASSIFIED

3.8 Removal and Returns

3.8.1 Removal

As with all electronic meters it is not possible to retrieve data or meter readings while the meter is de-energised. Therefore readings must be documented from each register prior to disconnection and or removal of the meter. For the EM1210 Electronic Meter, this will necessitate four separate readings to be taken. All energy readings will need to be recorded for registers 01, 02, 03, and either 70 or 90 depending on the meter application.

Where insufficient space is offered on the Notification of Service Work or Essential Energy’s internal meter change sheet, a second or third form is to be submitted as required and endorsed accordingly.

Where an EM1210 meter cannot be read due to meter errors, a notation stating “unable to read” is to be made on the Notification of Service Work or Meter Change Notice.

3.8.2 Returns

Methods of return are not within the scope of this document.

Therefore, until further notice, existing policies regarding returns will remain in place.

However please be aware that these devices contain batteries which begin to discharge when disconnected, so their prompt return is desirable.

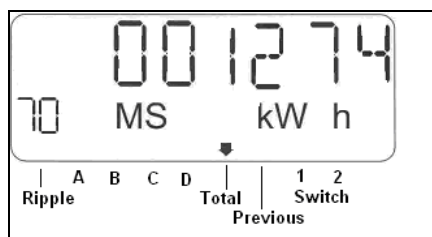
3.9 Grid Interactive Generation Plants

The EM1210 device is capable of monitoring both forward and reverse energy flows. The energy recorded is divided into separate registers for these differing flows.

For meters which are to be used on Grid Interactive installations, a specialist program will be installed. To assist with identification, the meter will bear a label stating “Grid Interactive” and the meter will be colour coded.

Additional registers will display Exported Energy Total, and the Maximum Current experienced with Element two during export.

Register 70 Displays Export Total Energy.

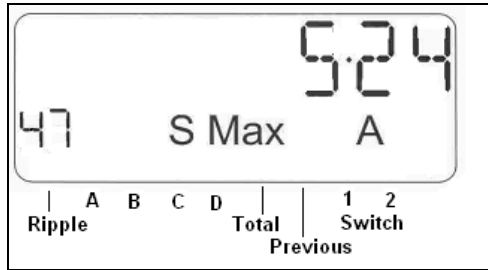


eg. The display indicating 1274kWhs – Export Energy

Register 47 Displays Maximum Current, Element Two, export.

***Note:** Register 47 is not a billing register and therefore does not have to be recorded on meter notification paperwork.

UNCLASSIFIED



eg. The display indicating 5.24 Export Amps- Element two

Drawings CEM8014.67 and CEM8014.68 in Attachment A display the EM1200's connections for Grid Interactive Generation applications.

Any enquiries regarding metering for Grid Interactive Generation Plants should be directed to Essential Energy's Technical Enquiries Group by calling 13 23 56.

3.10 Boost Feature

This feature is not available in any of the standard issue meters.

3.11 Maintenance Applications

Some superseded applications utilising "Two Element meters" may have included the use of an inbuilt load control device. As any further purchases of EM1210 meters will not include this feature, Frequency Injection receivers are to be fitted when exchanging any of these older devices.

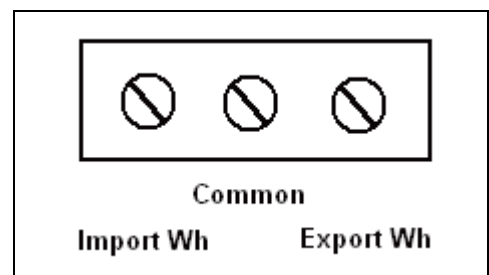
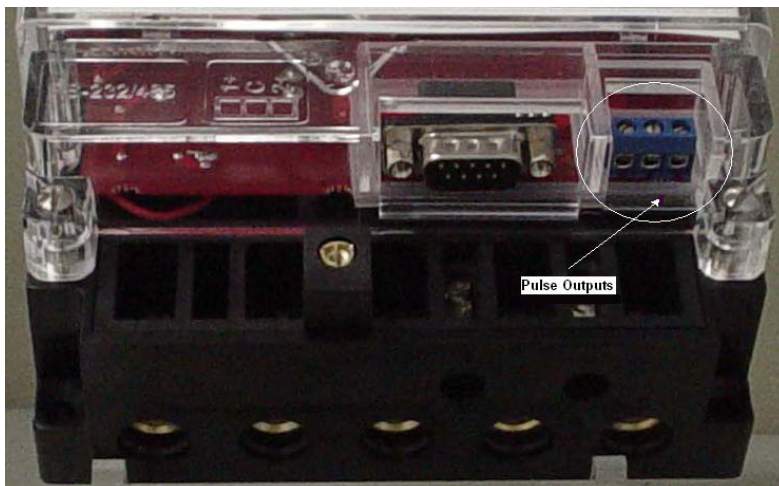
3.12 Pulse Outputs

In some instances there may be a requirement to provide output pulses from the EM1210 to equipment owned and operated by the consumer. In such cases, wiring connections are to be provided in accordance with the wiring diagram below.

These outputs pulse are in the form of open collectors, with a maximum rating of 32 volts DC and 5 milliamps. Pulse output connections will be polarity conscious.

The value of each pulse provided by the meter will be equivalent to 1.0 Wh/Pulse.

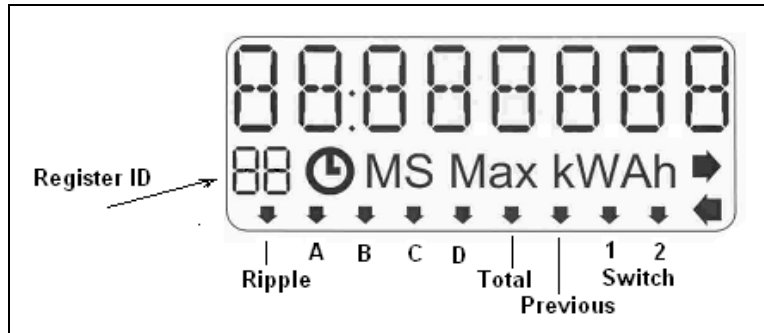
* Note Import Wh pulses do not include any consumption by the consumer's inverter.



UNCLASSIFIED

4 READING THE EM1210 ELECTRONIC METER

The EM1210 meter is a single phase dual element meter.



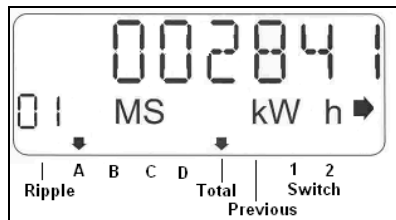
Register Identifier

The meter will scroll between 8 or 9 differing display registers at rates of 6 seconds per item. There is also a "Scroll" button which allows for manual override of these standard hold times.

These displays are as follows and are shown in the sequence they will appear on the meter.

4.1 kWh – Rate A (Peak) Element 1

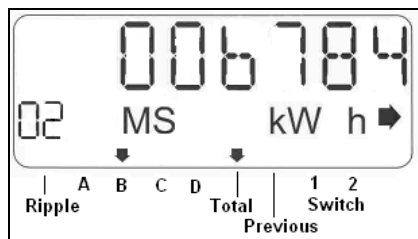
This display is identified by register number 01. The display indicates the kWh registration for the principal tariff (eg Domestic or Non Urban) between the Times of 07:00 – 09:00 plus 17:00 – 20:00 weekdays. Registration will be displayed in Whole kWhs.



eg. The display indicating 2841kWhs on Rate A – Principal Tariff
(6 Seconds hold time)

4.2 kWh – Rate B (Shoulder) Element 1

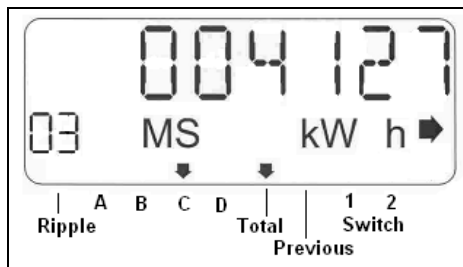
This display is identified by register number 02. The display indicates the kWh registration for the principal tariff (eg Domestic or Non Urban) between the Times of 09:00 – 17:00 plus 20:00 – 22:00 weekdays. Registration will be displayed in Whole kWhs.



eg. The display indicating 6784 kWhs on Rate B – Principal Tariff
(6 Seconds hold time)

4.3 kWh – Rate C (Non Controlled Off Peak) Element 1

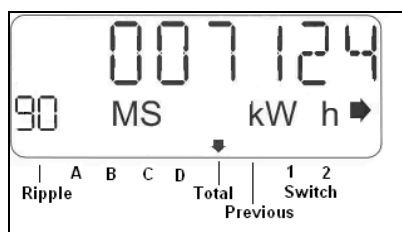
This display is identified by register number 03. The display indicates the kWh registration for the principal tariff (eg Domestic or Non Urban) between the Times of 22:00 – 07:00 weekdays and all weekends. Registration will be displayed in Whole kWhs.



eg. The display indicating 4127kWhs on Rate C – Principal Tariff
(6 Seconds hold time)

4.4 Total kWh (Controlled Load) Element 2 only displayed on meters programmed for “Controlled Load”

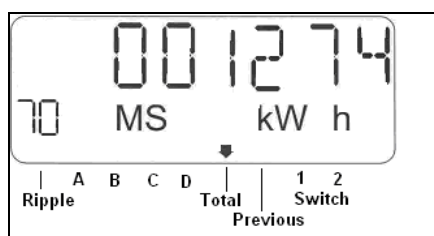
This display is identified by register number 90. The display indicates the kWh registration for the controlled load tariff (eg OP1 or OP 2). The times of registration will be determined by the external control device. Registration will be displayed in Whole kWhs.



eg. The display indicating 7124kWhs – Controlled load Tariff
(6 Seconds hold time)

4.5 Total kWh (Export) only displayed on meters programmed for “Grid Interactive”

This display is identified by register number 70. The display indicates the kWh registration for all energy exported to the network. Registration will be displayed in Whole kWhs.



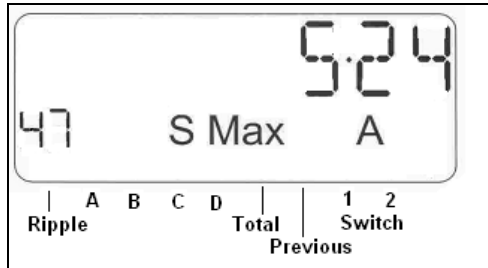
eg. The display indicating 1274kWhs – Export Energy
(6 Seconds hold time)

UNCLASSIFIED

4.6 Maximum Current (Export Element 2) only displayed on meters programmed for "Grid Interactive"

This display is identified by register number 47. The display indicates the maximum amplitude for current which has flowed from the installation to the network through element two. This register will not be used for billing purposes.

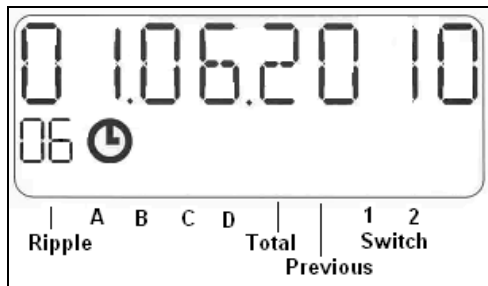
Registration will be displayed in Amps to a resolution of two decimal places.



eg. The display indicating 5.24 Export Amps- Element two
(6 Seconds hold time)

4.7 Date

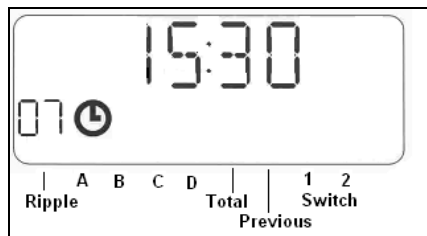
This display is identified by register number 06 and will be displayed in the format DD.MM.YYYY.



eg. The display indicating the 1st June 2010
(2 Second hold time)

4.8 Time

This display is identified by register number 07. Time will be displayed in 24 hour format and will always be set to Eastern Standard Time.

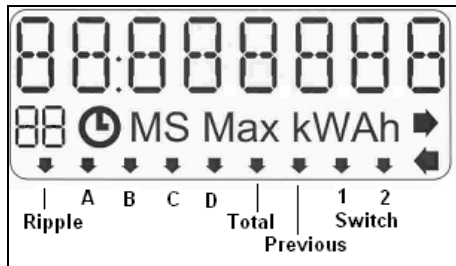


eg. The display indicating 15:30
(2 Second hold time)

UNCLASSIFIED

4.9 Display Segment Test

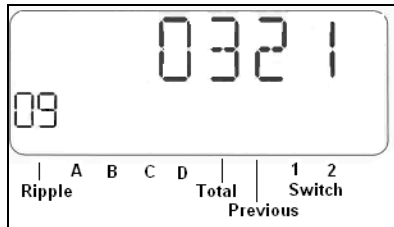
This display enables the user to confirm that all parts of the display are operational. It is essential to confirm the display to validate any readings taken.



Display Segment Test
(2 Second hold time)

4.10 Program ID

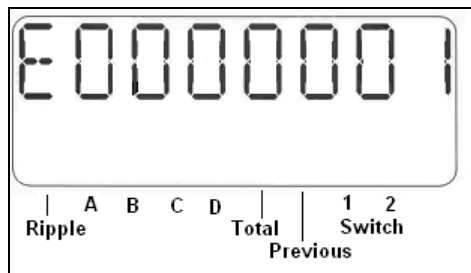
This display is identified by register number 09 and will be displayed in the format



eg. The display indicating program 321
(2 Second hold time)

4.11 Error Indicator (When Displayed)

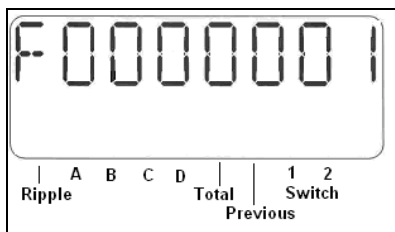
This display is identified by register indication E. This display reports internal errors associated with the meter. If no errors are to be reported then the display will not be displayed. Should an internal error occur the meter will cease scrolling and report an error code. A service call is required to clear this error.



eg. The display indicating error 000001
(No scrolling)

4.12 Additional Battery Warning Display

This display is only visible when reporting battery faults and is identified by register indication F. The meter contains an internal battery which is used to maintain time and calendar functions during outage times. At midnight the meter performs a test of this reserve battery. Should the battery voltage fall below acceptable limits an error is displayed. A service call is required to clear this error.



eg. The display indicating a low battery warning
(2 Second hold time)

It is acknowledged that this will not be possible under all circumstances, eg "Boost applications as described above, or where there are space restraints, in these instances specialist maintenance meters may be sourced from the metering Laboratory ph 02 67017427.

5 WIRING DIAGRAMS

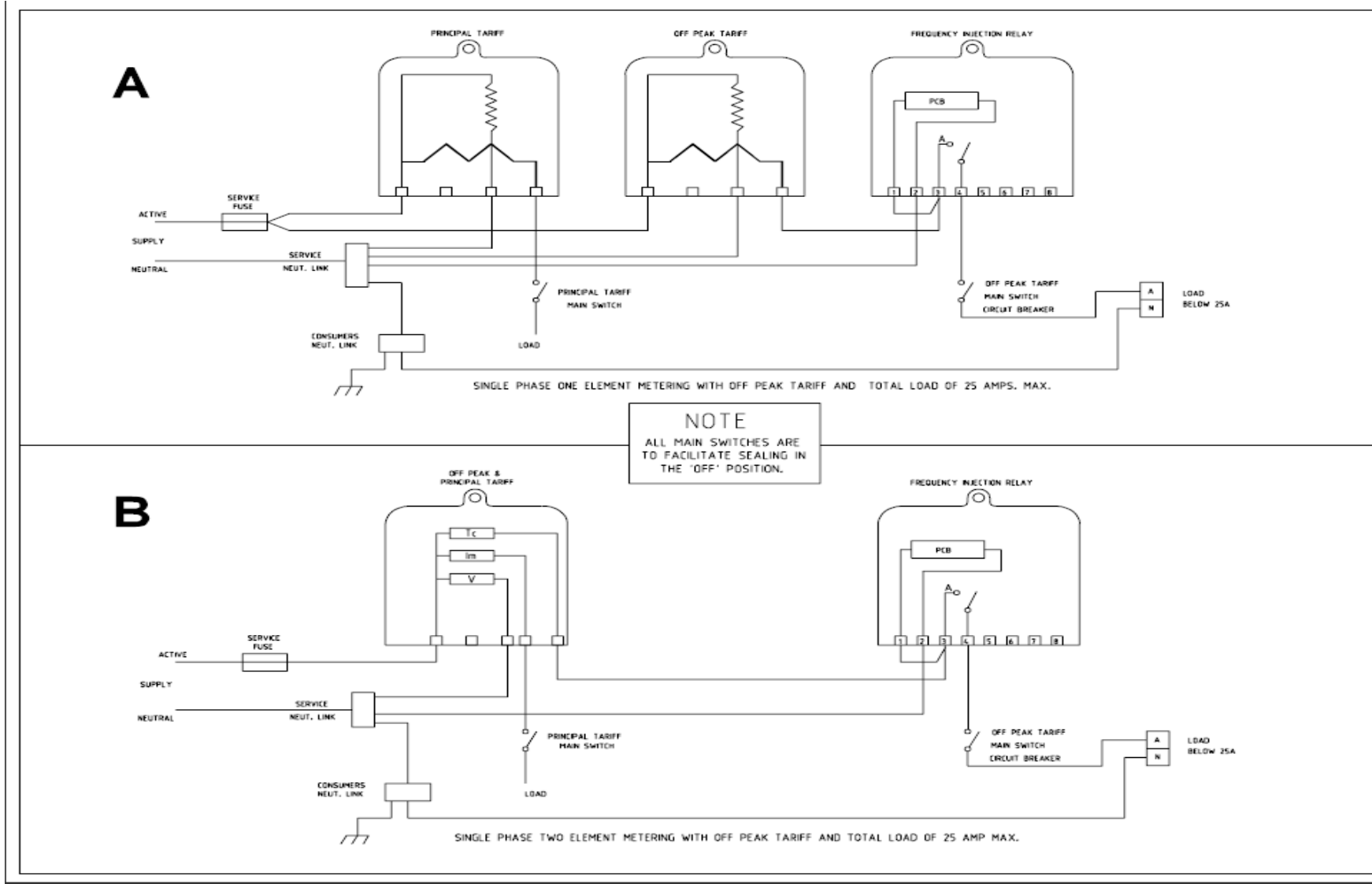
- M1-03 - Single phase metering for domestic & GSR Tariffs with 1 & 2 element metering with Off Peak. Ref Section "B"
- CEM8014.67 Single Phase Installation (Optional Load Control) Single Phase Grid Connected Inverter
- CEM8014.68 Three Phase Installation (Optional Load Control) Single Phase grid connected Inverter
- M1-14 - Single phase metering for domestic & GSR Tariffs with 2 element metering with Off Peak & Boost.

Notes: These diagrams appear on the following pages.

The versions of CEM8014.** series diagrams contained in this manual are "uncontrolled" and may have been superseded. Please refer to the Policy Library or Essential Energy website for the latest versions.

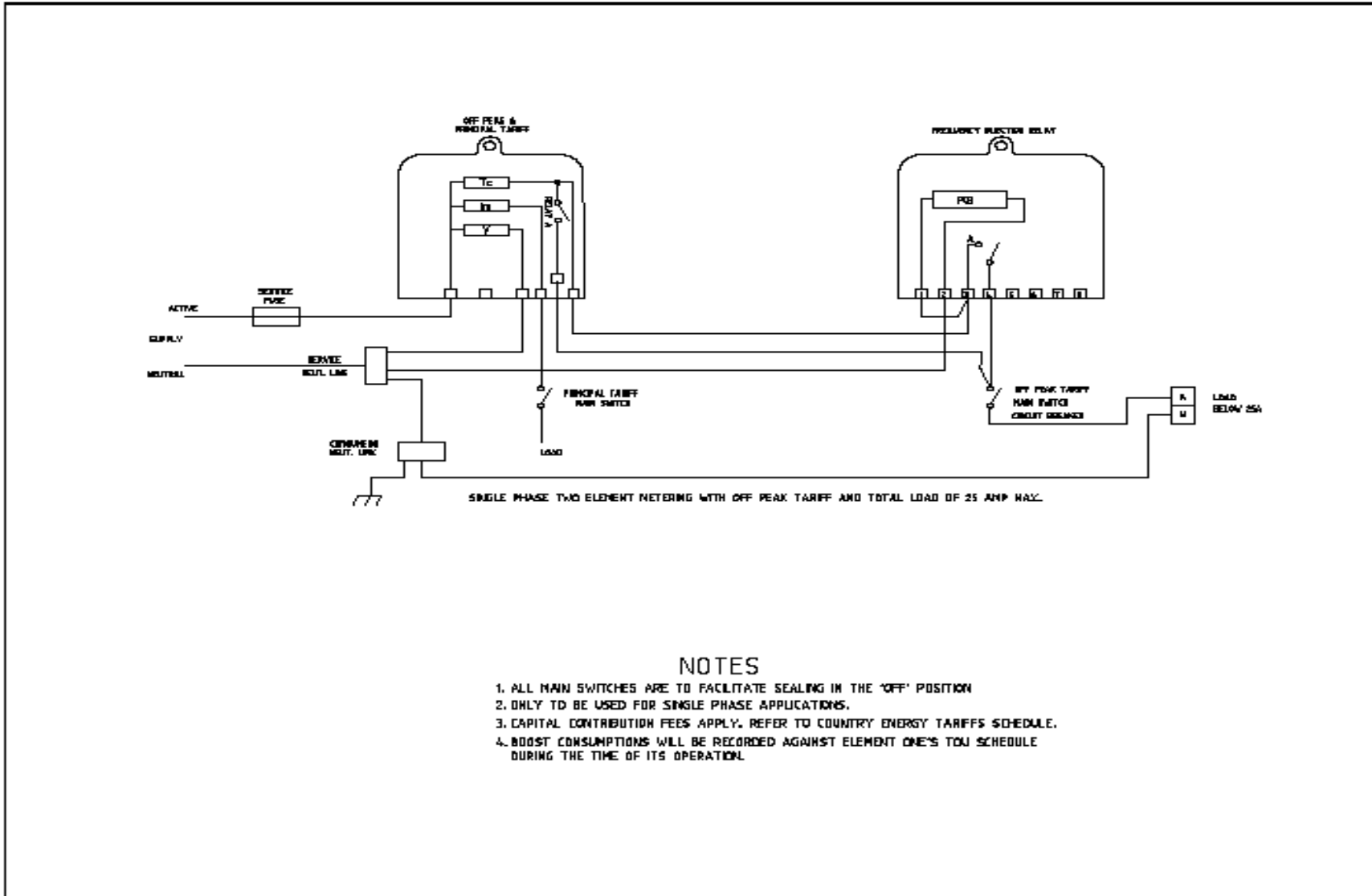
UNCLASSIFIED

5.1 M1-03: Single Phase Metering for Domestic & GSR Tariffs with 1 & 2 Element Metering with Off Peak



UNCLASSIFIED

5.2 M1-14: Single Phase Metering for Domestic & GSR Tariffs with 2 Element Metering with Off Peak & Boost



UNCLASSIFIED

5.3 CEM8014.67 Gross metering arrangement Single Phase installation (Optional load control - Single Phase Grid Connected Inverter)

The latest version of this document can be sourced through the Essential Energy Policy Library and is also available on the Essential Energy Website: www.essentialenergy.com.au/content/contestable-works through the Contestable Works link.

5.4 CEM8014.68 Gross metering arrangement Three Phase installation (Single Grid Connector Inverter)

The latest version of this document can be sourced through the Essential Energy Policy Library and is also available on the Essential Energy Website: www.essentialenergy.com.au/content/contestable-works through the Contestable Works link.

6 KEY TERMS AND DEFINITIONS

EM1210: Landis & Gyr Electronic Single Phase Two Element, meters. This series encompasses:

- EM1210 (Grid Interactive Meter)
- EM1210 (Controlled Load Meter)

Export Energy: Energy supplied from the consumers installation to the network.

Grid Interactive Metering: A metering configuration which permits Essential Energy to monitor both the imported and exported energy associated with a small retail customer having connected a small (<10Kw) renewable generator to the electricity distribution network.

Import Energy: Energy supplied from the network to a consumers installation.

TOU: Time of Use tariff

7 REFERENCES

CEM8014.67 Gross metering arrangement Single Phase installation (Optional load control – Single Phase Grid Connected Inverter

CEM8014.68 Gross metering arrangement Three Phase installation (Single Grid Connector Inverter)

8 REVISIONS

Issue Number	Section	Details of Changes in this Revision
2	3.12 3.6.4 3.7.4 3.1.1 & 3.1.2 3.6.2 5.1 Entire Document	Include clarification Note for Pulse outputs Alter "Consumption Indicator" wording Modify Commissioning Checks Change reference to 4.15 & 4.14 Alter Reference to Drilling Template Added Wiring Diagrams Standardised reference to EM1210
3	All sections	Updated template in line with Essential Energy branding