

5 Meter Displays

5.1 Display and navigation structure

The E470 SMETS2 meter has a display structure which provides end users with information relating to the meter’s operation. The structure is consistent between the two operational accounting modes, "Credit" and "Prepayment".

5.2 Display examples

The following section details the typical displays that are supported by the meter and includes the following:

- Time/date displays
- Total register displays
- Rate register displays
- Instantaneous value displays

5.2.1 Time displays

The meter supports the following time and date displays which always display local time.



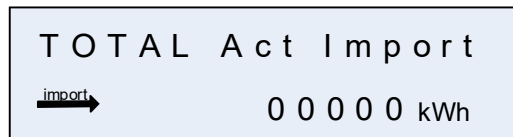
The date is shown in the value field in format DD.MM.YY.



The time is shown in the value field in format HH:MM:SS

5.2.2 Total registers

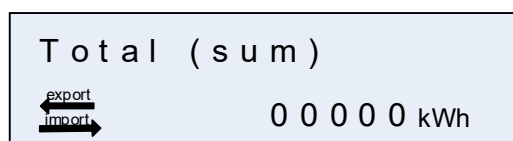
The following is a list of display formats for total energy registers. Examples are shown with 5 significant figures and no decimal places, as per the meter display resolution (see section 8.2).






Total active import energy



Total active export energy




Total active energy (sum) (import + export)

<p>Total (net)  0 0 0 0 0 kWh</p>	<p>Total active energy (net) (import – export)</p>
<p>Total (ind.) Q 1 0 0 0 0 0 kvarh</p>	<p>Total reactive energy quadrant 1 (import inductive)</p>
<p>Total (cap.) Q 2 0 0 0 0 0 kvarh</p>	<p>Total reactive energy quadrant 2 (import capacitive)</p>
<p>Total (ind.) Q 3 0 0 0 0 0 kvarh</p>	<p>Total reactive energy quadrant 3 (export inductive)</p>
<p>Total (cap.) Q 4 0 0 0 0 0 kvarh</p>	<p>Total reactive energy quadrant 4 (export capacitive)</p>
<p>Total Rea Import  0 0 0 0 0 kvarh</p>	<p>Total reactive import energy (kvarh)</p>
<p>Total Rea Export  0 0 0 0 0 kvarh</p>	<p>Total reactive export energy (kvarh)</p>
<p>Total App Import 0 0 0 0 0 kVAh</p>	<p>Total apparent import energy (kVAh): +VA (QI+QIV)</p>
<p>Total App Export 0 0 0 0 0 kVAh</p>	<p>Total apparent export energy (kVAh): +VA (QII+QIII)</p>

5.2.3 Rate registers

The meter displays time of use (TOU) rates and block rated registers.

<p>Rate XX  0 0 0 0 0 kWh</p>	<p>TOU Rate xx - active import energy (kWh) (rates 1 to 48)</p>
---	---

```

Block XX TOU XX
import 00000 kWh
    
```

Block xx TOU Rate xx – active import energy (kWh) (Block 01 to 04, TOU Rate 01 to 08)

The import and export representation arrow is for Active energy only.

5.2.4 Instantaneous values

The meter displays instantaneous values for power, power factor, voltage, current, frequency and meter balance.

```

Power Active
      xxxxx . xx kW
    
```

Instantaneous Active Power (kW)

```

Power Reactive
      xxxxx . xx kVar
    
```

Instantaneous Reactive Power (kvar)

```

Power APPARENT
      xx . xx kVA
    
```

Instantaneous Apparent Power (kVA)

```

Power Factor
      xxx . xxx
    
```

Power Factor

```

Voltage
      xxxxxx . x V
    
```

Voltage (V)

```

Current
      xxxxx . xx A
    
```

Current (A)

```

Frequency
      xxxxxx . x Hz
    
```

Mains Frequency (Hz)

```

Credit Mode Bal
      £      x . xx
    
```

Meter Balance (Credit Mode)

5.2.5 Active firmware version

The meter can display the currently active firmware version of the meter. The top line shows the actual meter firmware version while the bottom line is for internal use. The current firmware version is also displayed on start up for approximately 2 seconds.

```
V X X . X X . X X . X X
X X X X X X
```

Active Firmware Version

5.2.6 MID displays

The meter can display the approved and calculated checksums (CRC).

```
A P P R X X X X X X X X
M I D C R C
```

Approved CRC

```
C A L C X X X X X X X X
M I D C R C
```

Calculated CRC

5.2.7 Charge displays

The meter can display the standing charge.

```
S t a n d i n g   C h a r g e
£           x . x x
```

Standing charge
(pounds and pence)

5.3 Credit mode status displays

The following section details the displays that can be seen in the varying status that are supported when in credit mode of operation

5.3.1 Credit mode balance

Meter in credit mode, Supply On, Credit meter balance shown.

```
C r e d i t   M o d e   B a l
 import →           £ 0 . 0 0
```

Credit mode balance

5.3.2 Supply armed ready for reconnection

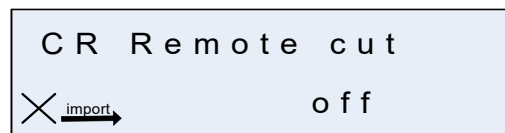
Meter in credit mode, Supply Armed ready for reconnection.

```
C R   P r e s s   B   f o r
 import →           E l e c
```

Press B for electricity
reconnection

5.3.3 Supply disabled due to remote disconnection

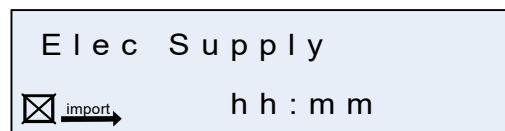
Meter in credit mode, Supply disabled due to remote disconnection command.



Supply disabled

5.3.4 Customer PIN enabled but not entered

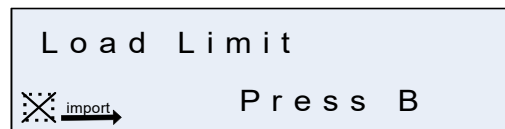
Display when customer PIN enabled but not entered. Supply status could be any of off, arm or on.



PIN enabled but not entered

5.3.5 Load limit exceeded

Display when customer has exceeded load limit Supply status armed.

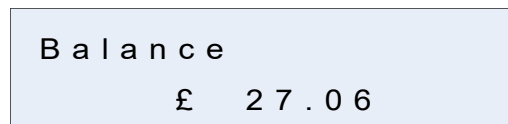


When load limit is exceeded the supply control switch box symbol flashes

5.4 Prepayment displays

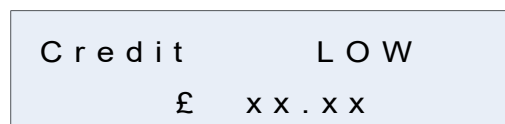
The following section details the supported prepayment displays and the various scenarios that define the operation of the meter.

5.4.1 Remaining credit



5.4.2 Credit low

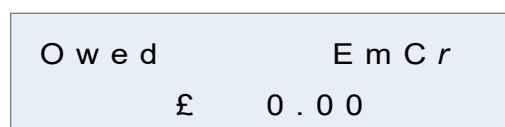
The meter can show when the remaining credit has fallen below the low credit level.



Credit Low

5.4.3 Credit exhausted and emergency credit available

Shown where the meter has exhausted its remaining credit and emergency credit is available for use.



Emergency credit available, no remaining credit

5.4.4 Emergency credit available with remaining credit

The meter can display that emergency credit is available when the meter balance is above zero

C r e d i t	E m C r
£ 0 1 . 5 1	

Emergency credit available with remaining credit

5.4.5 Emergency credit accepted

When the user has chosen to accept emergency credit the meter will show a confirmation action to accept or reject emergency credit.

E C A c c e p t	A = N O
B = Y e s	

Accept emergency credit

5.4.6 Emergency credit accepted but not in use

Where the user has confirmed to accept emergency credit, but the meter balance has not fallen below the activation point the meter will display an alternating message between the accepted screen and the remaining credit screen.

C r e d i t
£ 0 1 . 5 7

Emergency credit accepted but not in use

E m C r A c c e p t e d
£ 0 5 . 0 0

5.4.7 Emergency credit accepted and in use

Once the meter has begun to use emergency credit the meter display will alternate the displayed information between the amount of emergency credit used and the amount that is remaining.

O w e d
£ 0 1 . 5 1

Emergency credit in use

E m C r R e m a i n i n g
£ 0 3 . 4 9

5.4.8 Emergency credit low and owed

Where the emergency credit used has fallen below a low credit remaining value the meter will alternate between the value of emergency credit used and indicate low remaining emergency credit.

O w e d
£ 0 4 . 0 0

Low remaining emergency credit

E m C r	L o w
£ 0 1 . 0 0	

5.4.9 Emergency credit exhausted and owed

Once the meter has exhausted its emergency credit amount, it will alternate its display with a zero-emergency credit remaining value and the amount of emergency credit owed.

O w e d
£ 0 5 . 0 0

Emergency credit exhausted

E m C r	R e m a i n i n g
£ 0 0 . 0 0	

5.4.10 Prepayment displays with active non-disablement

Where the meter is in a non-disablement period the meter will display the character 'F' for the duration of the non-disablement period. The prepayment displays will operate in the same manner as described above. Examples of these can be seen below.

C r e d i t		F
£	x x . x x	

Remaining credit – active non-disablement period

C r e d i t	L O W	F
£	x x . x x	

Low credit – active non-disablement period

5.4.11 Emergency credit in use – active non-disablement period

E m C r	R e m a i n i n g	F
£	0 1 . 5 1	

(alternating between remaining and used).

O w e d		F
£	0 3 . 4 9	

5.5 Debt management displays

The meter supports two types of debt collection, payment based and time based.

The following details the meter displays that support each debt operation.

5.5.1 Payment based debt displays

5.5.1.1 Debt remaining

Where the meter is set up to perform payment based debt collection it will display the amount of debt that the customer has outstanding.

D E B T 3 R E M A I N I N G £ 1 5 . 1 0	Debt remaining
--	----------------

5.5.1.2 Debt collection percentage

The meter will display that amount of debt that will be collected from each top-up that will be performed (detailed as a percentage per payment).

D E B T 3 % P E R P M N T 1 0 %	Debt collection percentage per payment
--	--

5.5.1.3 Maximum debt collection per week

The meter will detail the maximum amount of debt that it will be able to collect per week from payment top-ups received.

D E B T 3 M A X P E R W K £ 5 0 . 0 0	Maximum debt collection per week
--	----------------------------------

5.5.1.4 Debt amount paid

The meter will detail the total amount of debt that has been paid based on the payments that have been processed by the meter.

D E B T 3 A M N T P A I D £ 2 0 . 1 2	Amount of debt paid
--	---------------------

5.5.2 Time based debt displays

5.5.2.1 Debt remaining

Where the meter is set up to perform time based debt collection it will display the amount of debt that the customer has outstanding.

D E B T 1 R E M A I N I N G £ 2 0 . 1 2	Amount of debt remaining
--	--------------------------

5.5.2.2 Debt collection interval

The meter will display that amount of debt that will be collected; detailing the time-period for each collection and the amount of money that will be collected at each interval.

```
DEBT 1 /      1 4 4 0 m i n
      £   0 0 . 4 0
```

Debt collection period
(One hour or one day)

5.5.2.3 Debt collection not configured

The meter will display a 'not configured' notification if it has not been set up to collect a time-based debt.

```
DEBT 1 NOT CONFIG
      £   0 0 . 0 0
```

Debt collection not configured

5.5.2.4 Debt amount paid

The meter will detail the total amount of debt that has been paid based on the payments that have been processed by the meter.

```
DEBT 1 AMNT PAID
      £   1 5 . 1 0
```

Amount of debt paid

14 Credit mode

14.1 Display and navigation structure in credit mode

Figure 22 shows the top-level credit mode display and navigation structure. An overview of the main components of the display structure are:

Default display – In credit mode the default display is the total meter index in kWh for active import (see section 14.3).

All segment display – After viewing the initial default the next display shown in the sequence is the all segment display check (see section 14.4).

Tariff display list – The tariff display list is accessed from the default display by holding button B and then navigating through the individual items by further presses of button A. The tariff list displays information for tariff TOU registers, tariff block counters and tariff TOU block registers (see section 14.5).

PIN enabled – The PIN display if configured requires the users previously configured PIN to be entered to gain access to further displays held by the meter. This is a feature to ensure consumer data privacy if enabled (see section 14.6).

Credit status display – Accessible from the all segment display using button A. (NOTE that access can also be PIN protected). The display will show the status of the meter (see section 14.7).

Boost menu – The boost menu is accessed via a short press of the B button when viewing the total active import display (see section 14.8).

Customer menu – The customer menu is accessed via a long press of the B button when viewing the credit status display. The customer menu contains the following functionality (see section 14.9);

- PIN management
- Viewing of Event Log
- Viewing of Power Log
- ALCS management

Rolling display list – a list of meter values (rolling registers and PIN displays) accessible from the credit status display holding button A and then navigating through the individual items by further presses of button A (see section 14.10).

Supply control – The supply control switch management can be accessed from the credit status display by pressing the B button. The credit status will define this access (see section 14.11). If PIN protection is enabled, then PIN entry is required before access is granted (see privacy PIN entry dialogue structure shown in *Figure 20*).

Service Menu – The service menu is only accessible by removal and replacement of the meter terminal cover, and is only for the access of the utility meter or test engineers (see section 14.12).

The service menu allows the following actions to be performed:

- Enter In Service Test Mode
- HAN Join / Unjoin management
- View the Security Log for the meter

14.2 Top level display structure – credit mode

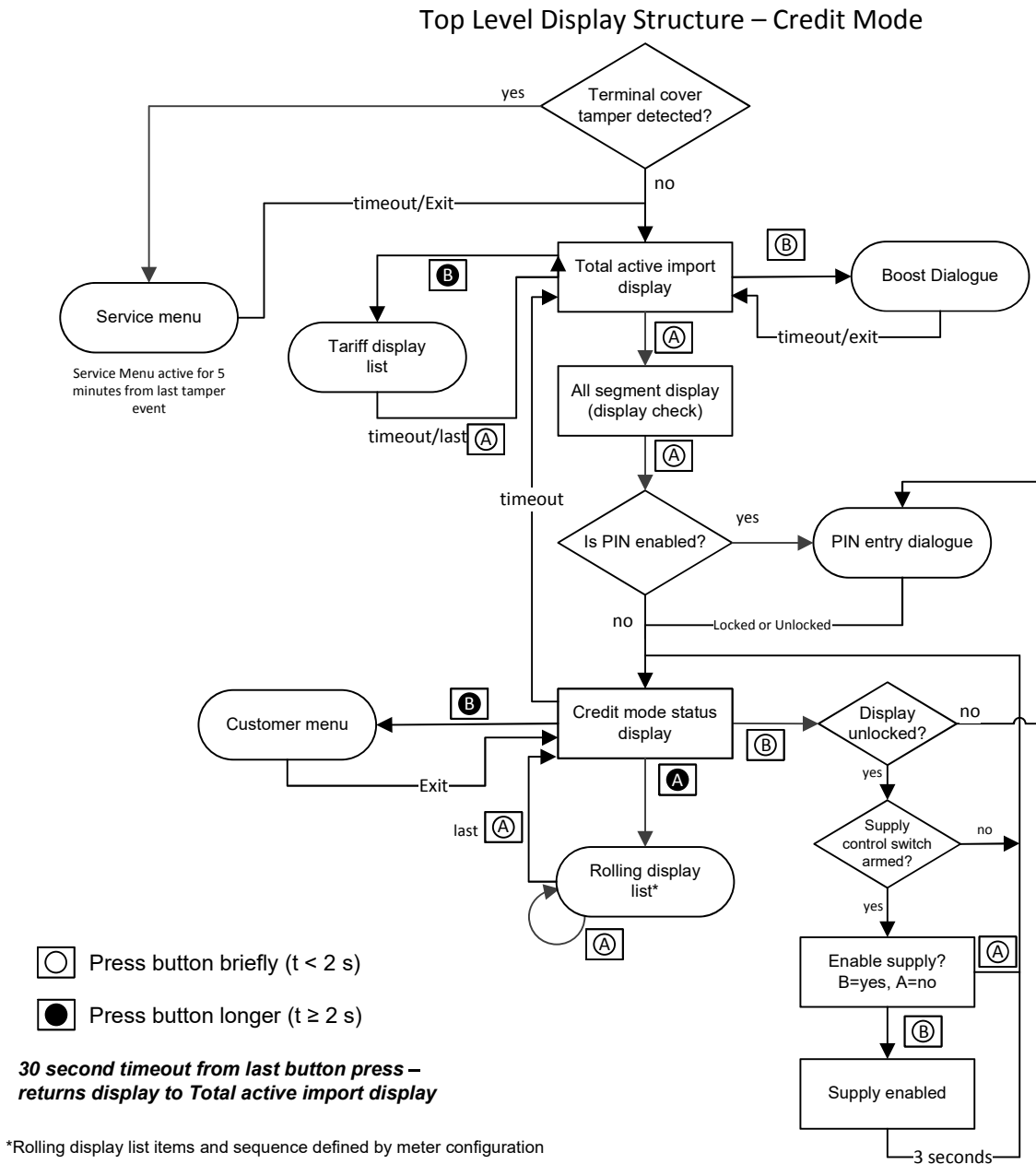


Figure 22 Credit mode display and navigation structure

14.3 Default display

The default display of the meter in credit mode will show the total active import energy information. This will be:

- a) the Active Import energy consumed in the currently active rate when the meter is configured with a TOU tariff, or
- b) the Active Import energy consumed in the currently active Block x TOU y register when the meter is configured with a Block TOU tariff.

Selecting the A button will direct the user to the All Segment display

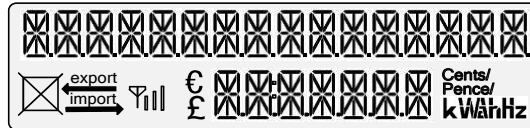
Pressing and holding the B button for $>2\text{s}$ will direct the user to the Tariff Display List.

14.4 All segment display

The all segment display is shown immediately after the default display.

Selecting the A button will direct the user to the Credit Mode Status display.

If PIN entry has been enabled selecting the A button will direct the user to the PIN Entry display.



14.5 Tariff display list

The tariff display list will show the information for the following registers:

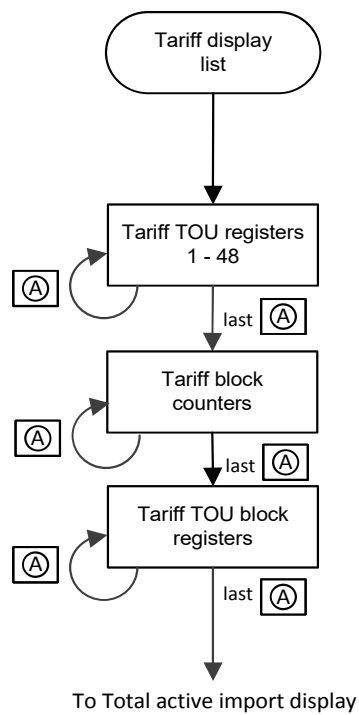
- TOU Registers
- Block Counters
- TOU Block Registers

Pressing and holding the B button will direct the user to the Tariff registers.

The first display shown is the Tariff TOU register, pressing the A button will display the details of the configured registers, continuing to press the A button will direct the user to the Tariff Block counters, again using the A button to scroll through the details will direct the user to the Tariff TOU Block registers.

The last press of the A button will direct the user back to the Total Active Import display.

NOTE: The Tariff display screens will timeout 30 seconds from the last button press and return to the total active import display.



Press button briefly ($t < 2$ s)

Press button longer ($t \geq 2$ s)

30 second timeout from last button press – returns display to Total active import display

Figure 23 Tariff display list

14.6 PIN entry

If PIN entry has been enabled, then after selecting the A button on the all segment display the user is taken to the PIN entry screen

From the PIN entry screen the user is required to enter a pre-entered 4-digit code.

The pin is entered using the A and B buttons

The A button is used to increment the numbers through 0-9

The B button moves to the next digit

Holding the B button for 1s offers the entered PIN details to the meter

After 3 seconds if a valid Pin entry has been accepted by the meter, then the user can access the protected displays of the meter.

If an invalid PIN has been entered the user must repeat the sequence detailed above.

If no PIN has been enabled the user can Enable a PIN if the user chooses not to create the PIN at this point, then the B buttons should be selected which will return the user to the customer menu.

If the user wishes to enable the PIN then the A button should be selected, the display will then direct the user to the Enter PIN screen. The user should enter the required 4-digit PIN at this point followed by the A button, the user is then asked to enter the 4-digit PIN a second time to confirm that they match, if the Pins match the meter will save the details and notify that the PIN has been enabled and return the user to the customer menu.

14.9.2 View event log

From the customer menu if the user selects the A button twice they are directed to the View Event Log display; selecting the B button will enable the Rolling Event Log Data where the meter will display the recorded event details.

14.9.3 View power log

From the customer menu if the user selects the A button three times they are directed to the View Power Log display; selecting the B button will enable the Rolling Power Log Data where the meter will display the recorded event details.

14.9.4 Manage ALCS

From the customer menu if the user selects the A button four times they are directed to the ALCS display; selecting the B button will enable the testing of the ALCS setting.

Selecting the A button will direct the user to the Exit Menu where they can be directed back to the credit mode status display.

Test ALCS – on access to the test ALCS display the user is presented with a yes and no option, selecting the A button will exit the function, selecting the B button a change to the ALCS state will be applied for 5 minutes, after activation the user is directed back to the customer menu.

14.9.5 Join HAN

This provides the option to join a HAN (but not leave a HAN) as described in section 14.12.2.

14.10 Rolling display list

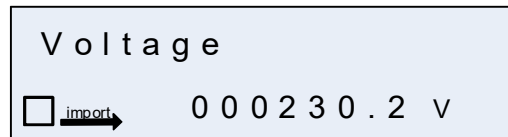
The Rolling Display List is accessible from the Credit Mode Status display by pressing the A button for >2s.

The content and order of the normal display list is indicated in *Table 9 "Rolling register listings"*.

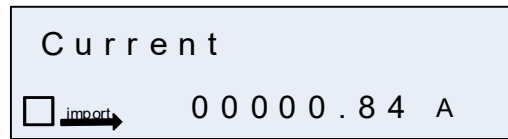
The user can step through the list of display items in the rolling display list using button A. For example, total active Import, voltage and current, would display as follows.



Press button A to navigate to the next item.



A further press of button A will navigate to the next item.



Once the end of the list has been reached the A button press will navigate the user to the credit status.

At any point the display will revert to the default display after a timeout period of 30 seconds from the last button press.



Note

Display items that are configured in this list but are designated as PIN protected will only be shown if a PIN has NOT been set or, if a PIN has been set and the correct PIN has been entered by the user.

14.11 Reconnect supply load switch

The user may require to access the enable supply display where a system initiated disable of supply has been performed, or if the meter entered a load limiting state.

Where PIN protection is not enabled the user is directed to the reconnect display with a short press of button A, from the Credit Mode Status display.

If PIN is enabled by the meter configuration the meter will require the entering of the PIN in the PIN entry dialogue before allowing access to the Credit Mode Status display.

If the user chooses not to reconnect the supply, then the A button should be selected and the user is returned to the credit mode status display.

For the reconnection of the supply the B button should be selected, the meter will then reconnect the supply load switch and indicate the action with a temporary reconnect message.

14.12 Service menu

The Service Menu provides utility engineers with the access to meter functions that are not for general consumer use.

The service menu can only be accessed by performing a removal and reconnection of the meter terminal cover (as detailed in section 19.)

The service menu allows the following actions to be performed.

- Enter In Service Test Mode
- HAN Join / Unjoin management
- View the Security Log for the meter