BEC44(09)

Technical manual

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BEC44(09) product overview

The BEC44(09) meter is a single-phase STS pre-payment electricity meter with a DIN rail mounting and is ideal for residential applications.

The solution comprises two elements, a measurement control unit (MCU), more commonly known as the meter and a user interface unit (UIU) which is the consumer's keypad interface.

The installation is termed "split" or "split metering", as the metering device is separated from the consumer's interface. The meter is housed outside the consumer's premises, for example in a street kiosk or pole top box, which enables easy access for the utility.

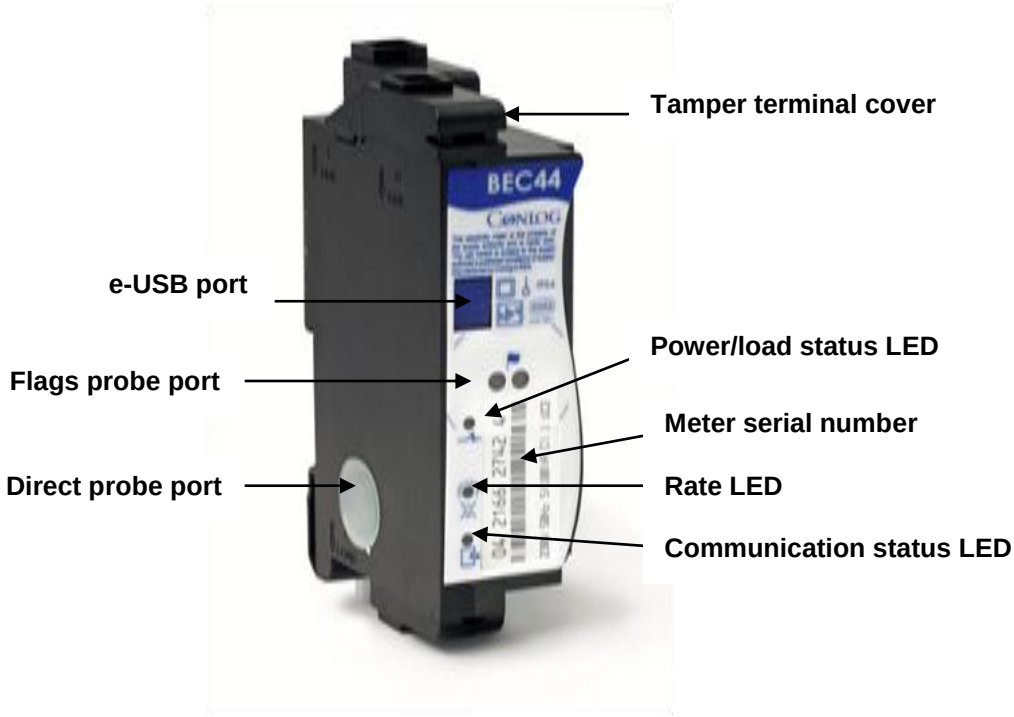
The UIU is installed in the consumer's premises for easy user access. The UIU is used by consumers to enter their electricity tokens, to view information regarding their consumption and other functional abilities.

The BEC44(09) solution provides a number of innovations, where the device can operate as a smart pre-payment meter or post-payment meter. The device has over 50 programmable functions, to provide a high level of customisation for each utility.

Figure 1: The BEC44(09) and the UIU

Item	Measurement control unit (MCU) or meter	User interface unit (UIU)
Mounting	DIN rail	Bracket
Installation	Meter box, kiosk or similar Outside consumer premises	Wall mounted Inside consumer premises

The measurement control unit (MCU)



What the LEDs mean

Communication status LED (yellow)

This LED indicates that there is communication between the meter and the consumer's keypad or UIU.

- LED is flashing: data is being received and transmitted between the meter and the UIU.
- LED is permanently off: there is no communication between the meter and the UIU.
- LED is permanently on: there is a short circuit on the communication cable between the meter and the UIU.

Power / load status LED (green)

This has a dual function - it indicates that the meter is powered and also indicates if the consumer's supply is connected.

- LED is permanently on: the meter is powered and the consumer's supply is connected.
- LED is flashing: the meter is powered but the consumer's load is disconnected.

Rate LED (red)

This LED is red in colour and has a dual function. It indicates the rate of consumption and is also used to verify the accuracy of the meter.

- The LED flashes faster to indicate a rapid consumption of electricity.
- The LED pulses 1,000 times for every kWh of energy measured.

The user interface unit (UIU)

The UIU is installed in the consumer's premises, with two communication wires that are connected to the meter. The meter is usually located outside the building.

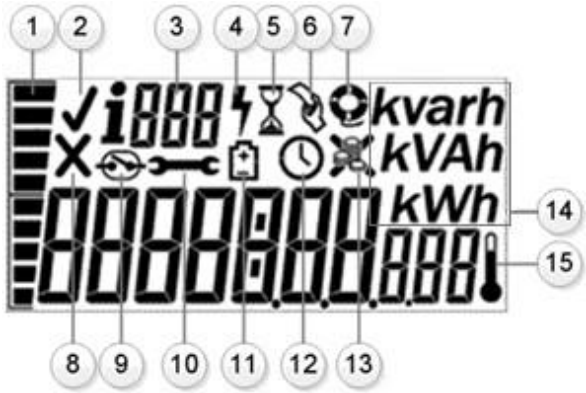
The UIU has a two-part construction - the base, and the numeric keypad and LCD display. The numeric keypad is used to enter tokens and initiate user functions.

Note
The communication cables between the meter and the UIU are not polarity sensitive.

LCD interface

The UIU has an LCD screen that displays consumer data and meter information. To view all icons on the display, enter *#002#* on the keypad.

The icons on the display indicate the following:



1. Bar indicator representing:
    - Consumption
    - Abnormal trip
    - Menu items
2. Token or short code entry accepted indicator
3. Short code entry
4. Consumer's electricity supply connection indicator
5. System busy
6. Token required
7. Emergency credit indicator / life line mode
8. Token or short code entry rejected
9. Manual reconnection required
10. Technical assistance required
11. Low battery indicator, if applicable
12. Timed load reduction indicator
13. Currency units indicator
14. Units of measurement
15. Over temperature indicator

Bar indicator

Depending on what you are viewing, the bar indicator represents the following:

1. **Consumption**

    Each segment of the bar indicator represents 10% of the maximum permissible load. For example, if the load limit is set to 16.4kW, then each segment represents 1.6kW.

2. **Abnormal trip**
   If a consumer's supply is disconnected, the segments of the bar indicator flash.

3. **Menu item**
   When you are viewing more information about a selected function that requires more than one screen to display all information, the segments of the bar indicator represent the screen display you are viewing.

Virtual token carrier (VTC)

The BEC44(09) meter supports three VTC interfaces.

Direct probe port (type A)

- This port is primarily used to extract data from an uninstalled meter using a hand-held unit, as it enables the interrogator unit to supply power to the meter.
- The physical port is shared with the e-USB and flags interfaces, so you can only use one channel at a time.
- The flags port takes priority.

e-USB connector port (type B)

Important
This is not a standard USB port as found on personal computers. For information on the specifications of this port, see the STS101-1 document.

- This port is primarily used to extract data from an installed meter using a hand-held unit.
- The physical port is shared with the direct probe and flags interfaces, so you can only use one channel at a time.
- The flags port takes priority.
- This port is optically isolated, so you are protected and totally isolated from the mains supply.
- This port only operates when the meter is powered.
- You cannot power the meter through this interface.

Flags port

- This port is primarily used to extract data from an installed meter using a hand-held unit.
- The physical port is shared with the direct probe and e-USB interfaces, so you can only use one channel at a time.
- The flags port takes priority.
- This port is optically isolated, so you are protected and totally isolated from the mains supply.
- This port only operates when the meter is powered.
- You cannot power the meter through this interface.

Product specifications

Voltage ratings

Nominal voltage (-20% +15%)	220 - 240 V AC	110 – 127 V AC
Supply frequency (±5%)	50 Hz / 60 Hz	60 Hz

Current ratings

Base current (I_b)	5 A
Maximum current (I_{max})	100 A
Minimum starting current Class 1 Class 2	 20 mA 25 mA
Utilisation category	UC2
Minimum start up (230V)	130 V
Minimum operating (230V)	120 V AC

Nominal power consumption

1.2 W / 9 VA

Accuracy

Class 1 or 2
(maintained throughout life of product)

Over voltage rating

1.8 times the nominal voltage for 48 hours

Short circuit rating

Short-circuit withstand 3.0 kA

Protection

Power overload	Thermal overload
Current overload	Line / load reversal
Over / under voltage	Extreme over current
Delayed reconnection	

Environmental

Operating temperature	-10°C to +55°C
Storage temperature	-25°C to +70°C
Humidity	95% non-condensing
IP rating	IP 54 (meter and user interface unit)
RF immunity	30 V/m

Status indicators

	Power / load status LED
	MCU / UIU communication status LED
	Rate LED (1 000 pulses / kWh)

Installation

Footprint	DIN rail mounted (35mm) asymmetrical
Insulation class	Double insulation

Terminals

	Live	Neutral	Common
Type	Cage clamps	Cage clamp	Spring clamp
Size	25mm²	16mm²	0.7mm²

Interrogation

Type	Direct probe, USB, flags

Security

	Security seals
	Terminal cover
	Tamper detection

Packaging

Units per carton	10 per carton
Carton weight (including box)	3.12kg
	For further packaging information, please contact Conlog.

Installing the metering device (MCU)

Important
Before installing the meter, take note of the following precautions:

- The wiring must be performed by a certified installation electrician and must conform to the prevailing government standards and safety regulations.
- This product is not a protection device and so requires the use of a suitable upstream and downstream breaker.
- When wiring the meter, ensure that the incoming supply is isolated by switching off the upstream breaker.
- We recommend that if you are connecting aluminium cables to this product, you use bi-metal lugs.
- We recommend that the meter is installed in an enclosure with an IP54 rating or higher.
- For installation of the UIU, see the *Installing the User Interface Unit (UIU)* section, or refer to the installation guide shipped with the device.

Cabling specification	
Cable	***Size***
Live wire	25mm^2
Neutral wire	16mm^2
Communication wires	Maximum 0.7mm^2 Single core recommended

Tools and accessories for a mounting
1 x 6mm insulated terminal screwdriver
1 x insulated side cutters
2 x security seals
At least 45mm of DIN rail

To install the meter:

1. Remove the terminal cover (*Figure 2*-A) by sliding it outwards.
2. Connect the incoming live supply to L LINE (*Figure 2*-B).
3. Connect the incoming neutral supply to N LINE (*Figure 2*-C).
4. Connect the outgoing live supply to L LOAD (*Figure 2*-D).
5. Connect the communication wires for the UIU to COMMS (*Figure 2*-E) by pushing the orange clips and inserting the wires. The terminals are not polarity sensitive.
6. Ensure that all terminal screws are securely tightened, all cables are securely held in place and that no bare wiring is exposed.
7. Replace the terminal cover.
8. Insert the white security seal into the terminal hole of the outgoing live L LOAD.
9. Secure the terminals by threading steel wire through the security holes and crimping.

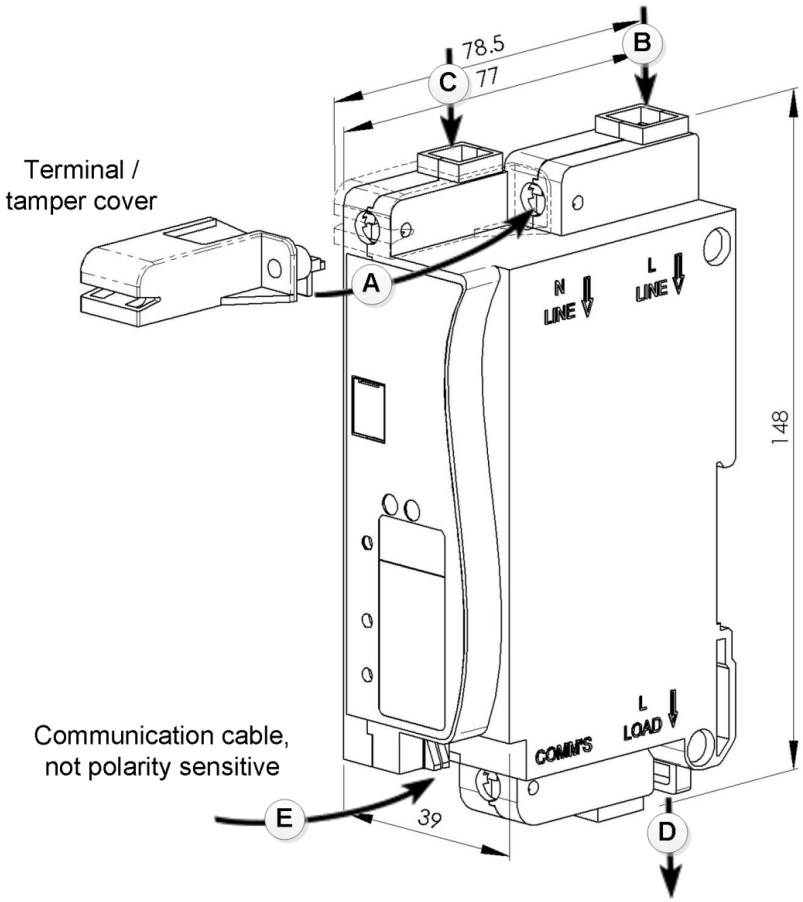


Figure 2: MCU side view

Installing the user interface unit (UIU)

Important
This UIU can only be used with (08) and (09) series meters.

To install the UIU:

1. Place the wall mount bracket against the wall, ensuring that the unit is level and that the communication cable can pass through the cable entry hole (*Figure 3-1*-A).

2. Mark and drill 6mm holes for the two mounting holes and insert the wall plugs (*Figure 3-1*-B).

3. Pull the communication cable through the cable entry hole. Ensure that no more than 100mm of cable is protruding.

4. Cut and strip the ends of the communication cable. To ensure a good connection, we recommend that at least 15mm of cable is stripped.

5. Connect the communication wires for the UIU by pushing back on the orange clips and inserting the wires (*Figure 3-2*-A).

6. Curl up the surplus communication cable, ensuring that it does not get damaged when securing the unit to the bracket.

7. Slide and clip the unit onto the base (*Figure 3-3*-A).

8. Insert and tighten all screws, ensuring that the unit is securely fastened in position and that the unit is not twisted or distorted (*Figure 3-3*-B).

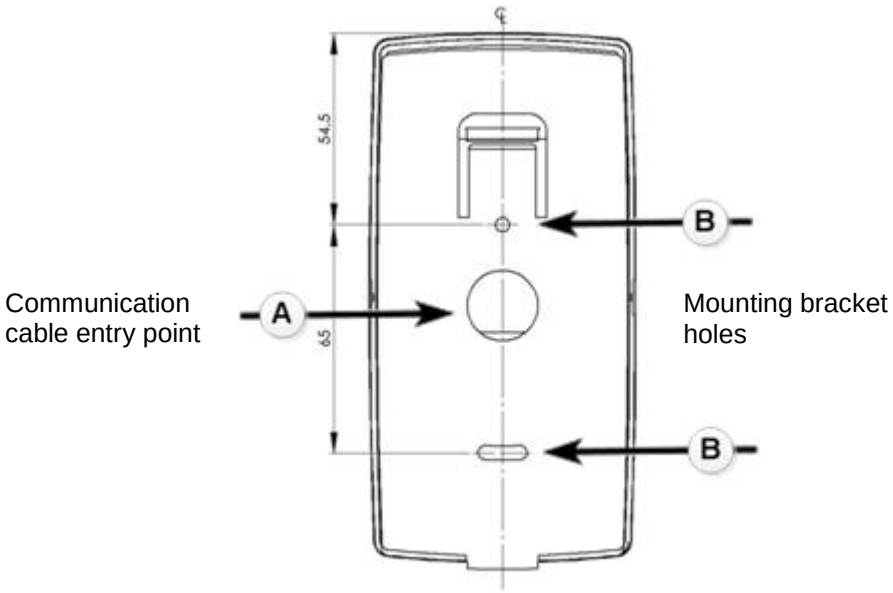


Figure 3-1: UIU base view

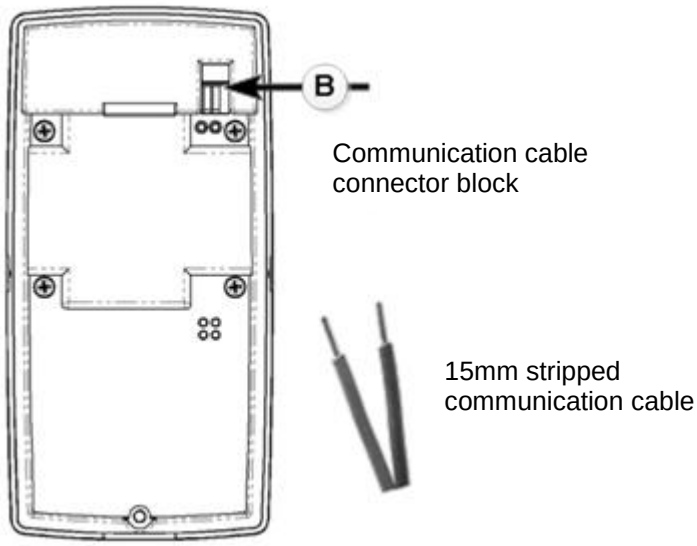


Figure 3-2: UIU back view

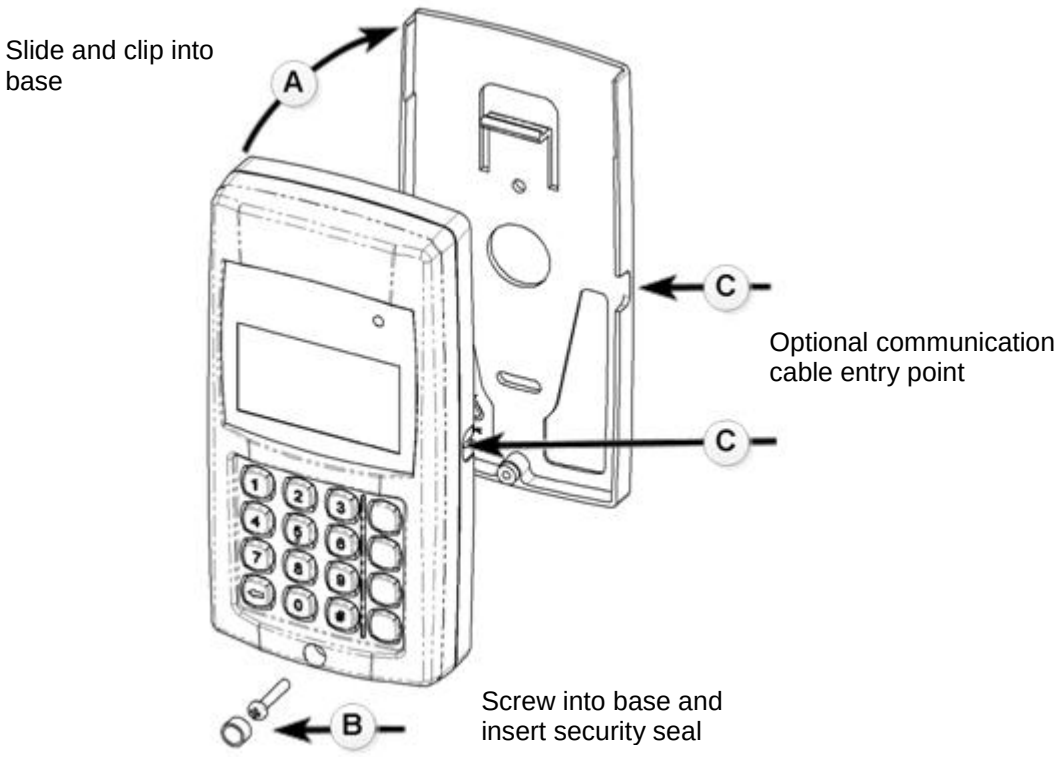


Figure 3-3: UIU side view

Installing a wireless solution

The BEC62(08) can be converted into a wireless meter, through the addition of a Wireless Meter Interface (WMI) which enables RF communication from the meter to the Wireless User Interface Unit (wUIU). It is important to note that the wireless solution requires a wUIU to be installed in the consumer's home.

To install the wireless meter interface (WMI):

The WMI is installed close to the meter to enable RF communication. The WMI can be installed on a pole with cable ties, or within a pole top box on a DIN rail. When installed in an unobstructed environment a distance of up to 100 metres, line of sight, can be achieved between the two devices.

Once positioned, the communication cables from the WMI are connected onto the meter terminals 12 and 13, by pushing back the orange clips. The terminals are not polarity sensitive (*See 6.2 Installation and wiring)*.

Installing the Wireless User Interface Unit (wUIU)

Important
The wUIU can be used with the (09) series meters, as well as wireless-enabled (05) or (08) generation meters.

1. Place the wall mount bracket against the wall, ensuring that the unit is level (*Figure 4-1*).
2. Mark and drill 6mm holes for the two mounting holes and insert the wall plugs. Insert and tighten all screws, ensuring that the unit is securely fastened in position and that the unit is not twisted or distorted.
3. Insert the batteries into the back of the wUIU and secure the cover with the supplied screws (*Figure 4-2*).
4. Slide and clip the unit onto the base (*Figure 4-3*).

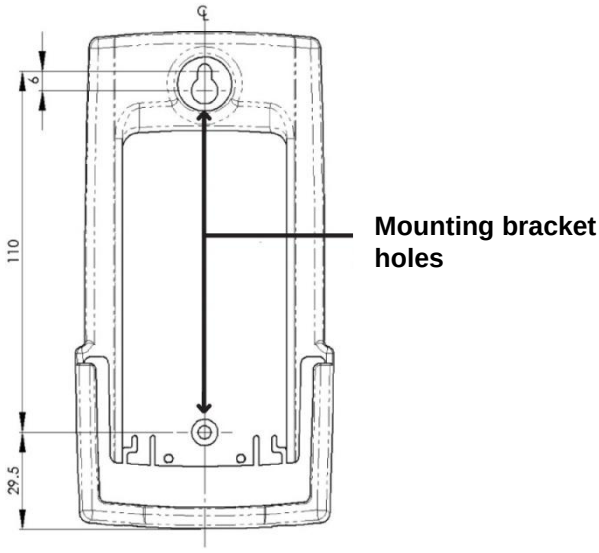


Figure 4-1: wUIU Base view

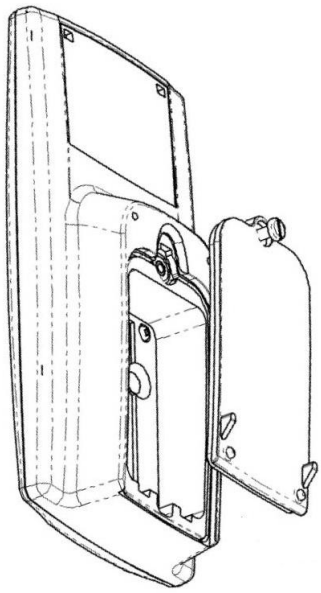


Figure 4-2: Insert batteries

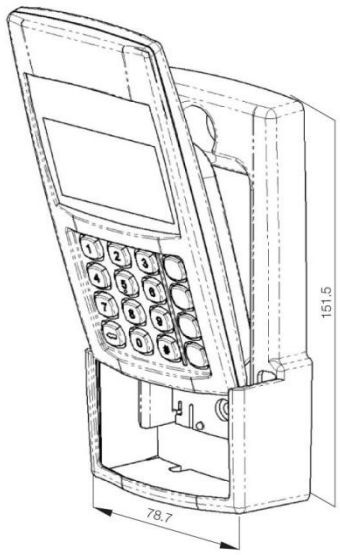
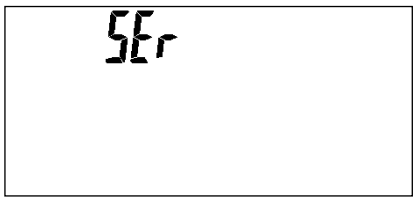


Figure 4-3: Slide wUIU into bracket

Pairing the wireless user interface unit (wUIU) to a meter

Pairing the wUIU with a meter



A new wUIU (previously unpaired) will show the following display, once powered.

Enter the 11 digit meter serial number. The numbers will scroll across the display as the digits are entered. When the serial number has been entered, the wUIU starts communication.

If the pairing with the meter is successful, the following will be displayed, the meter will then return to its default screen.

This display indicates the pairing was not successful; this may be due to a range problem or a loss of power.

Re-pairing the wUIU with a meter

Initiate a new pairing by entering *#036#*. You will see the following display.

Enter the 11 digit meter serial number. As you enter the digits, the display will scroll to the left. When all digits have been entered, the wUIU starts communications.

If the pairing with the meter is successful, the following will be displayed, the meter will then return to its default screen.

If the pairing with the meter is unsuccessful, or the incorrect serial number is entered, the connection process will fail and abort.

Checking the wUIU signal

To check the RF signal strength, enter the short code *#075#*. This will display the signal strength for 30 seconds. To abort the command, hold down the backspace or hash key for three seconds.

The signal strength is displayed on the bar graph. This shows signal strength of 80%.

Installing and pairing the wUIU to a wireless extender (WEX)

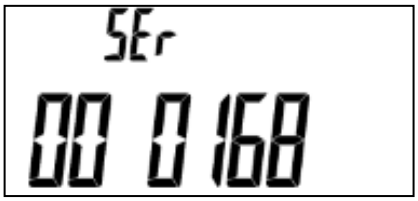
In some installations, it may be necessary to increase the signal between the wUIU and the meter. This is achieved by installing a Wireless Extender (WEX) between the meter and the wUIU, to ensure consistent communication between the devices.

It is recommended that the distance between the WEX and the meter should not exceed 20 metres. The WEX can be mounted on an exterior wall or light pole; and the device is powered via the mains source (220-240V).

Once connected, the WEX can increase the signal to the wUIU to some 200 metres line of sight. Following installation, it is necessary to pair the WEX:

Previously unpaired wUIU

A previously unpaired wUIU will show the following display, once powered.

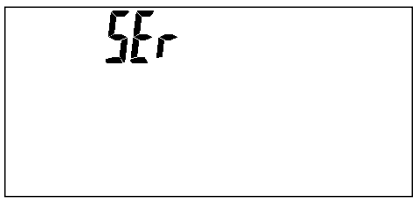


Enter the serial number of the WEX. As you enter the digits, the display will scroll to the left.

When all 11 digits of the WEX serial number have been entered, you will again see the following display.

Enter the 11 digit meter serial number. As you enter the digits, the display will scroll to the left. When all digits have been entered, the WEX starts communications.

If the pairing with the WEX is successful, the following will be displayed.



If the pairing with the WEX is unsuccessful, the following will be displayed. Check and confirm the WEX serial number.

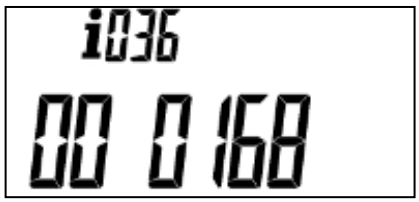
Immediately after the successful pairing, this display will be momentarily viewed.

If the pairing with the meter is successful, the following will be displayed, the meter will then return to its default screen.

The following screen indicates the pairing was not successful; this may be due to a range problem or a loss of power.

Previously paired wUIU

If the wUIU is already paired, it is necessary to pair the device again with the WEX, enter *#036#*.



Enter the serial number of the WEX. As you enter the digits, the display will scroll to the left.

When all 11 digits of the WEX serial number have been entered, you will again see the following display.

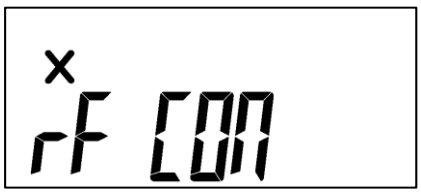
Enter the 11 digit meter serial number. As you enter the digits, the display will scroll to the left. When all digits have been entered, the WEX starts communications.

If the pairing with the WEX is successful, the following will be displayed.

If the pairing with the WEX is unsuccessful, the following will be displayed. Check and confirm the WEX serial number.

Immediately after the successful pairing, this display will be momentarily viewed.

If the pairing with the meter is successful, the following will be displayed, the meter will then return to its default screen.



The following screen indicates the pairing was not successful; this may be due to a range problem or a loss of power.

Testing the meter installation and sealing the device

To test the installation:

1. Ensure that the UIU is installed and connected correctly.
2. Apply power to the meter by closing the upstream breaker.
3. Check that the UIU is displaying the available credit in kWh. If a zero balance is displayed, a credit token needs to be purchased.
4. Turn on an appliance or light on the consumer's premises, to ensure that the consumer has electricity. In some cases, meter commissioning may be required. For more information, see the *Commissioning the meter* section.
5. Enter #*100*# on the UIU keypad.
6. Compare the meter number displayed to the serial number printed on the meter label and card, to confirm that the numbers match.
7. If the meter is working correctly, hand over the meter card and user guide to the consumer.
8. If the meter is not working correctly, see the *Troubleshooting* section for guidance.

Commissioning the meter

Important

- If the meter is un-commissioned, the consumer's electricity supply remains disconnected, regardless of the credit state of the meter.
- The commissioning token number is **1275 4194 1448 6450 5970** and is not meter specific. This means that it can be used in all Conlog STS meters.
- Alternatively, you can use the short code *#043#*.

The decision to configure a meter with commissioning or not, is made when the meter order is placed and the meter manufactured at Conlog.

The benefit of an un-commissioned meter is that you can conclude the installation and apply the incoming electricity supply, without the meter going into a tamper state. This means you do not need to carry meter specific tamper tokens, and won't experience unnecessary delays in concluding an installation.

After you have verified the installation, as described in the *Testing the meter installation and sealing the device* section, enter the commissioning token or short code on the meter's UIU keypad. Once this is entered, tamper detection is active and the consumer’s electricity supply is connected.

If the meter is in a tamper state, the commissioning process is not accepted.

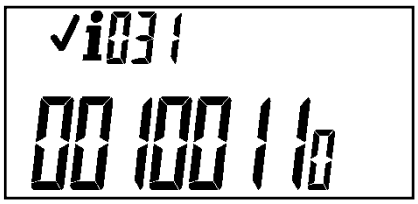
Checking if the meter is commissioned and viewing the tamper state

Short code: *#031#*

If the meter is supplied in a commissioned state, it will detect tamper as soon as the electricity supply is connected. If it is supplied in an un-commissioned state, it will not detect tamper until the meter is commissioned.

To determine if the meter is in a commissioned or un-commissioned state:

Enter *#031#* on the UIU keypad.



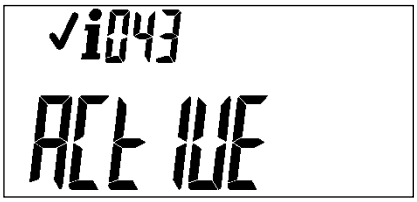
Meter has been commissioned.

Meter has not been commissioned.

Entering the commissioning short code

To commission the meter:

Enter the commissioning code #043# on the UIU keypad.



Commissioning token accepted.

Commissioning token not accepted.

A rejected short code or token occurs if the meter is configured to detect tamper and by executing the command entered, the meter enters tamper. This occurs if the terminal cover is not installed correctly. You must rectify the installation before the meter will accept the token.

Features of the meter

Power measurement

The BEC44(09) meter uses a direct connection shunt measurement type. The power measurement is calculated every five seconds.

Reactive power measurement

The reactive power measurement is an estimate only and is derived from the difference between the apparent and average power.

Power factor measurement

The power factor measurement is an estimate only and is derived by dividing the average power by the apparent power.

Renewable energy measurement

This setting enables a utility to limit the consumption of individuals, or groups of individuals, to a set amount of electricity per day. The consumption is measured in 1 Wh increments.

Under and over voltage measurement

This setting is a trip threshold that suspends electricity supply when an under or over voltage condition exists. The supply is suspended until the voltage conditions return to normal. The trip threshold can be configured for both under and over voltage supply conditions. The average voltage is calculated every five seconds.

Current measurement

Current measurement is calculated every 5 seconds and is derived from the average power and the average voltage, and is used for the over current trip evaluation.

Temperature measurement

The average temperature is calculated every 5 seconds from the samples accumulated, and is used for the over temperature trip evaluations.

Nominal voltage setting

This is used to determine the over current threshold.

Accuracy class

The BEC44(09) meter is a standard class 1 metering device but can be calibrated for class 2, if required.

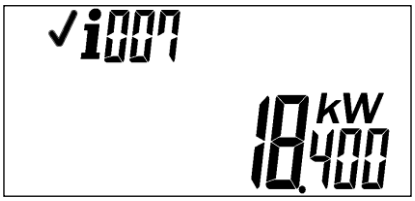
Meter protection

The BEC44(09) meter incorporates a 100 A latching relay to connect and disconnect the consumer supply, whilst safeguarding the meter.

Power overload

Short code: *#007#*

If the instantaneous power measured by the meter is higher that the power load limit setting, the meter disconnects the consumer's supply. The trip limit can be changed through the use of a meter specific token from a vending unit

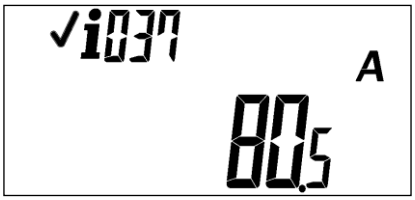


The power load limit is displayed in kW.

Current overload

Short code: *#037#*

If the electrical current measured by the meter is higher than the maximum current limit, the meter disconnects the consumer's supply.



The current overload trip limit is displayed in amperes (A).

Thermal overload

The meter has thermal overload protection, where the meter disconnects if the internal temperature exceeds 75°C. The meter automatically reconnects at 70°C.

Under and over voltage

Short code: *#035#*

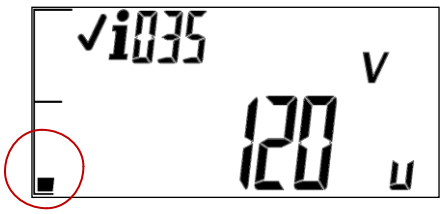
This short code displays the under and over voltage limits.

- **Under voltage**
  If the average supply voltage measured by the meter is less than the minimum voltage limit, the meter disconnects the consumer's supply. The electricity supply remains disconnected until the voltage rises above this limit.

  You can configure the minimum voltage trip limit and disable this feature by setting the limit to 0 VAC.

- **Over voltage**
  If the average supply voltage measured by the meter is higher than the maximum voltage limit, the meter disconnects the consumer's supply. The electricity supply remains disconnected until the voltage drops below this limit.

  The default maximum voltage trip limit is configurable. You can disable this feature by setting the limit to the maximum value, for example, 420 V AC.



Menu item 1 (indicated by the bar graph) displays the under voltage trip limit.

Menu item 2 (indicated by the bar graph) displays the over voltage trip limit.

Line / load reversal

If the meter measures negative power flowing from the load to the supply, this indicates that the wiring for the line and load connection is swapped, and the meter disconnects the consumer's supply.

As the meter is powered from the load side, if the disconnect device opens, the power is removed from the meter. The meter only reconnects once the cable connection is rectified.

This feature is configured in production.

Extreme current overload

In extreme short term current overload conditions, the consumer's supply is not disconnected. This is to protect the disconnect device.

Delayed reconnection

If there is a loss of electricity supply, the disconnection device trips and only reconnects after a random period of time, once the supply is restored.

The time delay before reconnection is configured in production, in one second increments, and the maximum reconnect period is 255 seconds (4.25 minutes).

The default setting is 20 seconds, but this option can be disabled in production. If disabled, the disconnect device will not trip when electricity supply is removed.

Tamper

The BEC44(09) meter has optional tamper protection, that is configured in production.

If the tamper feature is enabled, any attempt to tamper with the meter can result in the consumer's supply being disconnected, if so configured. The supply is only reconnected when a STS clear tamper token is entered into the meter. The STS tamper token is meter specific.

When enabled, tamper is only active once the meter is commissioned. For information on commissioning the meter, see the *Commissioning the meter* section.

> **Important**
> The meter will not accept a clear tamper token if the terminal cover is not installed correctly, or a tamper condition exists and is not removed. All meter tamper settings are configured at the time of production.

The meter supports two primary modes for tamper detection:

- Standard tamper: activates a tamper condition when the meter is powered.
- No power tamper: the meter will detect a tamper condition, even in the absence of an AC supply. The meter is shipped in a decommissioned state to facilitate installation. In this mode, the tamper feature is disabled to allow the installer to fit and remove the terminal cover, without the unit going into tamper.

  Once installation is complete, the installer commissions the meter. The no-power tamper feature is active and any subsequent removal of the terminal cover, with or without the AC supply, will result in the meter registering a tamper condition.

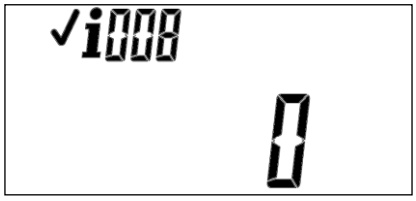
Other configuration options:

- Do not display tamper status: if selected, the meter does not display the tamper icons when an active tamper condition is detected.
- Do not trip on tamper: if selected, the meter will record the tamper event but will not disconnect the supply.

Tamper status

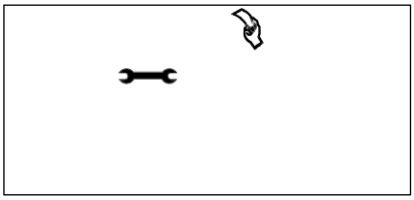
Short code: *#008#*

This indicates if the meter has registered a tamper condition.



A "0" indicates the meter has not been tampered with.

A “1” indicates the meter has been tampered with.



If the meter is configured to display tamper, as is highly recommended, the following indicates the meter has been tampered.

Tamper switch state

Short code: *#082#*

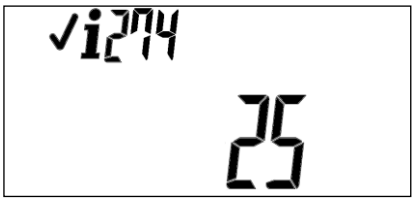
If tamper is enabled on the meter, the state of the tamper switch indicates if the meter has an active tamper condition or not.

- 0 indicates the tamper switch is closed and no tamper condition exists.
- 1 indicates the tamper switch is open, and a potential tamper condition exists.

Number of tamper events

Short code: *#274#*

The number of tamper events are recorded on the meter, from the time the meter is commissioned.



Display indicates the number of tamper events.

Accounting configuration

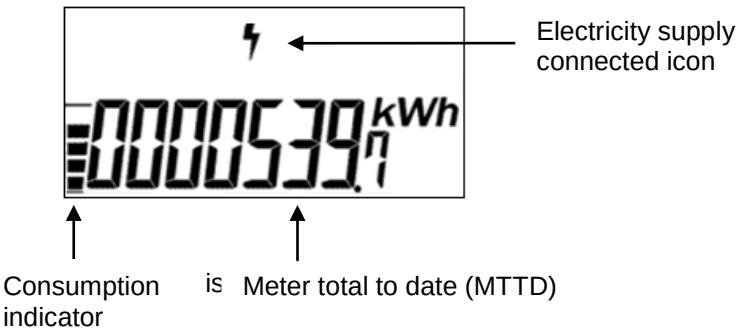
Pre-paid and post-paid mode

The BEC44(09) meter is configured to operate as either a pre-paid or post-paid meter. In the pre-paid configuration, all accounting functionality is as per standard pre-paid requirements. The BEC44(09) meter is configured as a pre-paid meter by default.

In the post-paid configuration, the meter operates in credit mode and the consumer is billed in arrears for electricity consumed. No pre-paid accounting functionality is performed. Further, in post-paid mode, the default UIU display shows the Meter Total to Date (MTTD), which is the total energy dispensed by the meter.

Credit features, such as a credit token or clear credit token, are not supported in post-paid mode. However, all other STS functions are available.

The following shows a typical post-paid mode display:



1. A meter with a MTTD of 539.7 kWh.
2. The consumer's electricity supply is connected - the electricity supply icon is on permanently.
3. The current electricity consumption is approximately 40% of the maximum load available to this consumer.

Switching between pre-paid and post-paid modes

To switch between post-paid and pre-paid modes a meter specific STS token is required. When the switch is implemented a copy of the Meter Total to Date (MTTD) register is stored.

> **Note**
> When switching between pre-paid and post-paid modes, any previous pre-paid credit remaining in the consumer's credit register is immediately available. Any other configuration for consumption limiting, administrative settings and pre-payment settings, are reinstated. Due to this, it is recommended that a consumer's available credit is cleared before switching from pre-payment to post-payment mode.

Region configuration

The meter supports four distinct credit regions or operating modes. These are:

- Normal
- Low
- Emergency
- Life line

Each region has its own set of configurable parameters:

- A credit threshold value that defines when the current operating region moves to the next region. The transition to a lower region occurs when the credit is lower than, or equal to, the set threshold. Upward transition occurs when the credit is greater than the threshold. The thresholds are configurable in kWh increments.
- Trip on transition from one region to a lower region.
- A load limit, configurable in Watts. This is used to apply punitive load restrictions, if required.
- Activate or deactivate a particular region.

Important

- The emergency credit threshold is always 0 kWh. This means the transition between low credit and emergency credit is always set to zero kWh.
- The normal credit region is always active. You cannot deactivate this region.

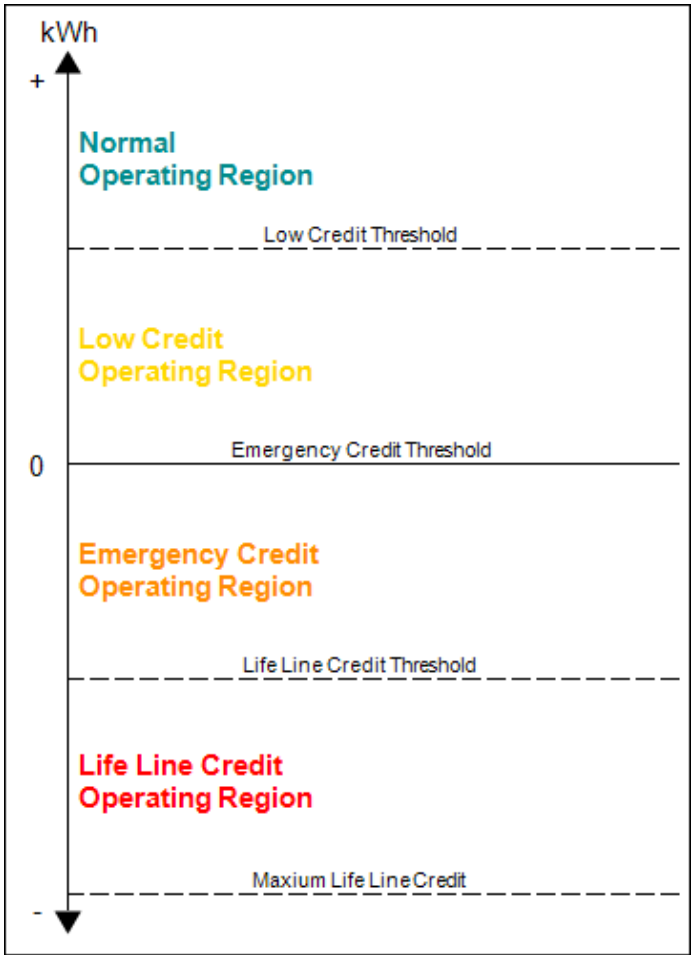


Figure 4: Varying credit operating regions

Administrator mode

This enables the issuing of a daily free basic electricity allowance to consumers, such as a grant, free basic electricity and poverty tariff.

In this case, consumption is deducted from the free allowance, before it is deducted from the consumer's credit. If the consumer uses more than the available allowance, then the consumption is deducted from their available credit.

When the free allowance and the consumer's credit are depleted, the consumer's supply is disconnected. With no credit available in the meter, the free allowance must accumulate to at least 10 Wh before the supply is reconnected.

The allowance is configurable in watts with a maximum of 32,535 W in a 24-hour period.

Consumption restriction

Consumption restriction limits the amount of energy consumed. The meter supports consumption restriction functionality specifically for the management of load in a renewable energy grid. The consumption limit is imposed on a consumer based on an average usage over 24-hours.

The consumption allowance is accumulated, if not consumed, until it reaches the maximum limit permitted in a 24 hour period. As the user consumes electricity the allowance is depleted. If the levels of consumption exceed the allowance, the consumers supply is disconnected. The load is not reconnected until the allowance accumulates to a positive balance.
The allowance must recover to at least 10 Wh before the load is reconnected, to protect the consumer's appliances in the event of repeated trips.

Negative credit

Negative credit display is only valid in the emergency and life line credit operating modes. Although the display of a negative credit balance is configurable, the meter always displays this when configured to permit operation in either emergency or life line credit regions.

Maximum positive credit available

The maximum positive credit value the meter can store is +9,999,999,999 Wh.

Maximum negative credit available

The maximum negative credit value the meter can store is -999,999,999 Wh. When this value is reached, no further deduction of credit is possible.

Accessing information through short codes

To access data on the meter, you use short codes. These enable you to extract information from the meter, without using specialised equipment.

The short codes are a sequence of three numeric digits, bound by two hash commands that you enter on the meter using the keypad, example, *#003#*.

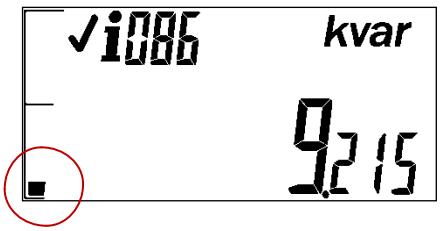
When you enter a short code you do not need to include the preceding zeros. For example, instead of entering *#084#* or *#003#*, you can use *#84#* and *#3#*.

When a short code returns more than a single item of information, you can scroll to view more information using the hash (#) key. When you scroll, the segments of the bar indicator represent the menu item you are viewing. So, one segment in the bar indicates menu item 1, two segments in the bar indicate menu item 2 and so on.

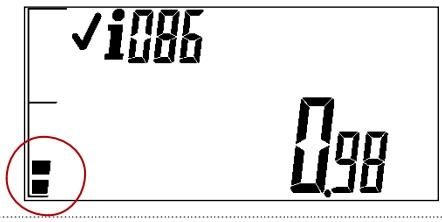
To return to the default display when you are viewing additional information, press the backspace key.

Example

This example shows reactive power and power factor information. You view this information by entering *#086#*.



Menu item 1 displays reactive power. As shown in this image, the bar indicator has one segment displayed, indicating menu item 1.



Menu item 2 displays the power factor. As shown in this image, the bar indicator has two segments, indicating menu item 2.

For a quick reference of all short codes, see the *Short codes index*..

Entering a short code

To enter a short code:

1. Press # on the keypad.
2. Enter the required short code.
3. Press #, the requested information is displayed.
4. Press # to scroll through the information displayed, when a short code returns more than a single item of information. The segments of the bar indicator represent the menu item you are viewing.

Viewing the meter's serial number

Short code: #100#

The serial number displayed should match the serial number printed on the barcode label and the meter card.

The meter serial number will scroll from right to left.

Viewing region configuration

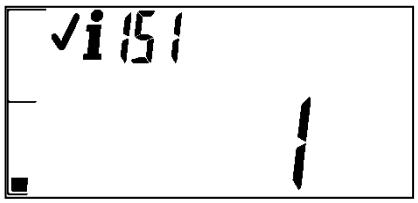
For information about region configuration, see the *Region configuration* section.

Note
A meter operating in post-paid mode rejects these short codes.

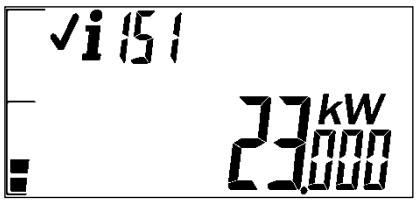
Normal credit operating region

Short code: *#151#*

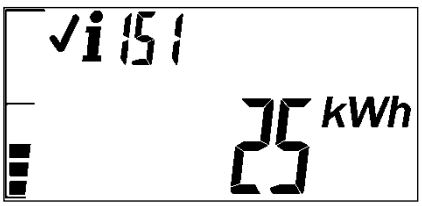
When the credit is greater than the low credit threshold, the meter is operating in the normal credit region. This region is always permitted and applies the standard maximum load limit, as defined in IEC62055-41. This region can be configured to trip when the credit reaches the low credit threshold. The default configuration is not to trip at the low credit threshold. Should the display indicate a zero then the normal credit operating region has been disabled, however by default this is always enabled.



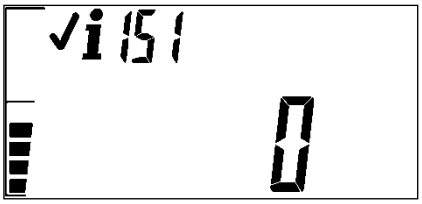
Menu item 1 displays the normal credit operating region is enabled.



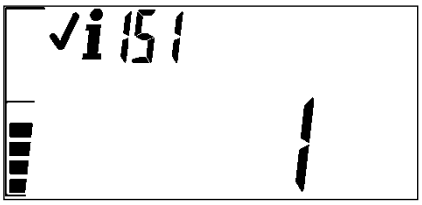
Menu item 2 displays the load restriction value in watts.



Menu item 3 displays the value of the next credit region threshold.



Menu item 4 displays the option to trip at the next credit threshold is disabled.



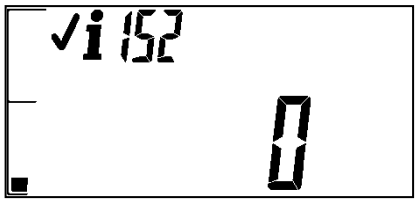
Menu item 4 displays the option to trip at the next credit threshold is enabled.

Low credit operating region

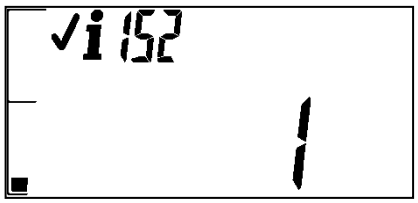
Short code: *#152#*

When the credit is greater than the emergency credit threshold (always 0 kWh) but less than or equal to the low credit threshold, the meter is operating in the low credit region. When the meter is configured to not permit operation in this region, the meter trips and remains tripped until sufficient credit is inserted.

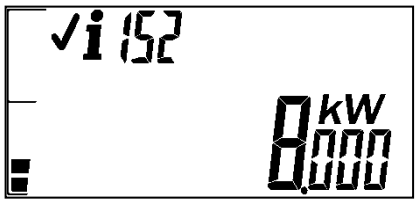
You can configure a load limit independent of the standard maximum load limit as defined in IEC62055-41, so that a punitive load restriction can be imposed when operating in this region.



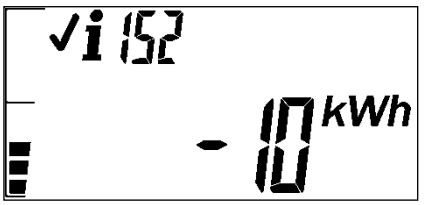
Menu item 1 displays that the low credit operating region is disabled.



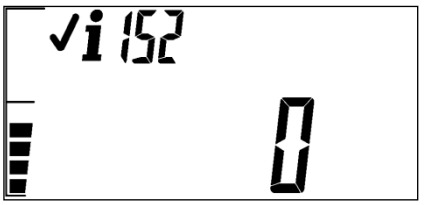
Menu item 1 displays that the low credit operating region is enabled.



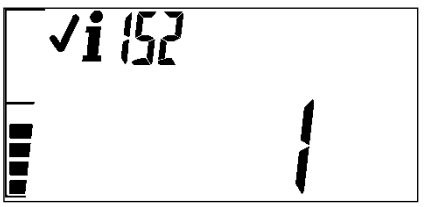
Menu item 2 displays the load restriction value in watts.



Menu item 3 displays the value of the next credit region threshold.



Menu item 4 displays that the option to trip at the next credit threshold is disabled.



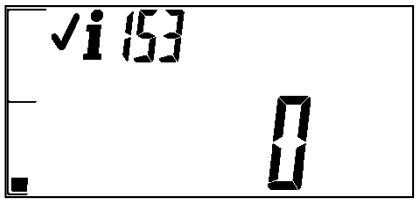
Menu item 4 displays that the option to trip at the next credit threshold is enabled.

Emergency credit operating region

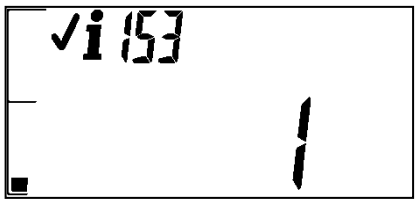
Short code: *#153#*

When the credit is greater than the life line credit threshold, but less than or equal to the emergency credit threshold (always 0 kWh), the meter is operating in the emergency credit region. When the meter is configured to not permit operation in this region, the meter trips and remains tripped until sufficient credit is inserted.

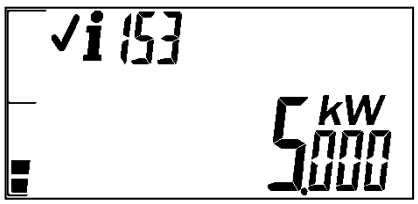
You can configure a load limit independent of the standard maximum load limit as defined in IEC62055-41, so that a punitive load restriction can be imposed when operating in this region.



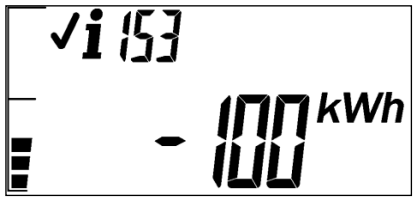
Menu item 1 displays that the emergency credit operating region is disabled.



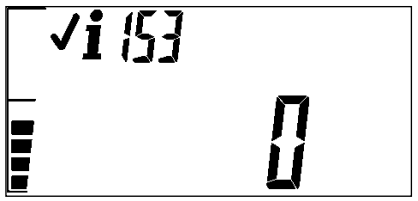
Menu item 1 displays that the emergency credit operating region is enabled.



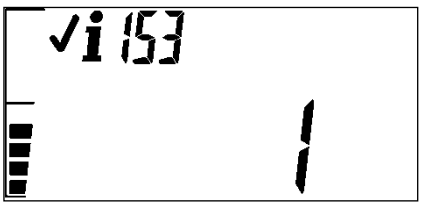
Menu item 2 displays the load restriction value in watts.



Menu item 3 displays the value of the next credit region threshold.



Menu item 4 displays that the option to trip at the next credit threshold is disabled.



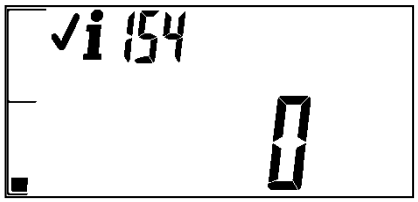
Menu item 4 displays that the option to trip at the next credit threshold is enabled.

Life line credit operating region

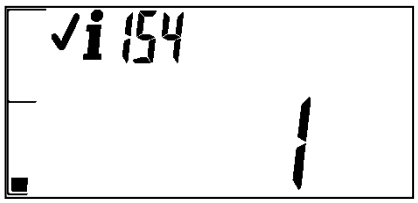
Short code: *#154#*

When the credit is greater than the maximum life line credit threshold, but less than or equal to the life line credit threshold, the meter is operating in the life line credit region. When the meter is configured to not permit operation in this region, or if permitted but the credit reaches the maximum life line threshold, the meter trips and remains tripped until sufficient credit is inserted.

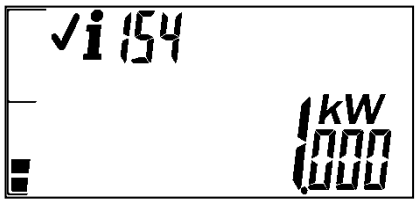
You can configure a load limit independent of the standard maximum load limit as defined in IEC62055-41, so that a punitive load restriction can be imposed when operating in this region.



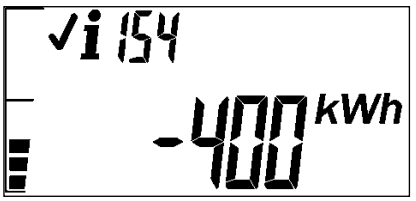
Menu item 1 displays that the life line credit operating region is disabled.



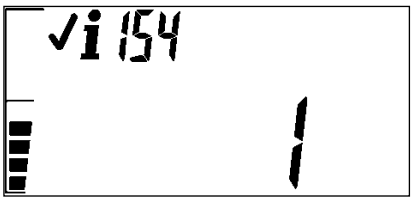
Menu item 1 displays that the life line credit operating region is enabled.



Menu item 2 displays the load restriction value in watts.



Menu item 3 displays the value of the credit region threshold.



Menu item 4 displays that the option to trip at the credit threshold is enabled.

Viewing consumption information

The BEC44(09) meter provides historical and predictive views of consumption, based on the historical data.

You can access this information using short codes.

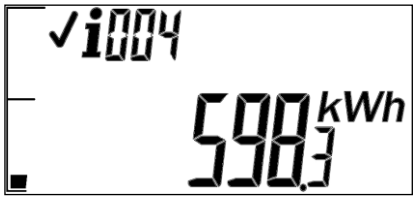
Meter total to date (MTTD) and user total to date (UTTD)

Short code: *#004#*

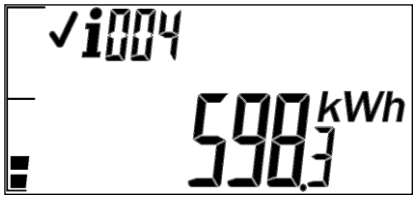
This short code displays the meter total to date (MTTD) and the user total to date (UTTD).

MTTD
The total measured consumption for the life of the meter. It is calculated in 1 Wh increments and the value cannot be cleared.

UTTD
The total measured consumption for the consumer. This value is cleared during a clear credit process (tenancy change), and a pre-paid or post-paid mode change.



Menu item 1 displays the MTTD.

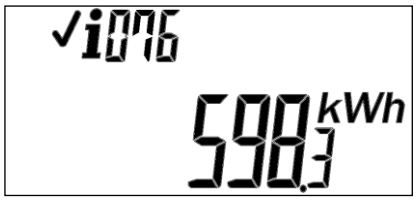


Menu item 2 displays the UTTD.

Total user consumption

Short code: #076#

The total user consumption is the consumption of electricity by the customer, in kWh, since the last clear credit token was entered.

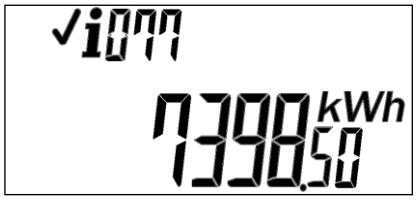


The example indicates a total consumption of 598 kWh.

Total credit entered

Short code: #077#

The total credit entered is the total user credit entered into the meter since the last clear credit token was entered.



The example indicates the total credit entered is 7398.50 kWh.

Consumption counter

Short code: *#087#*

This function is used by consumers to view their consumption.

1. Enter *#087#* on the UIU keypad to view the consumption since the counter was last reset.
2. Enter *#044#* to reset the counter to zero.

Estimated average daily and 30 day consumption

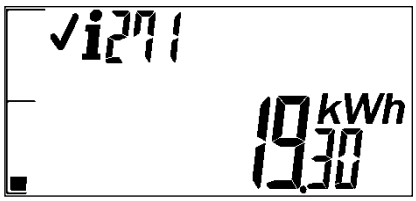
Short code: #271#

This short code displays the estimated average daily and the estimated average 30 day consumption.

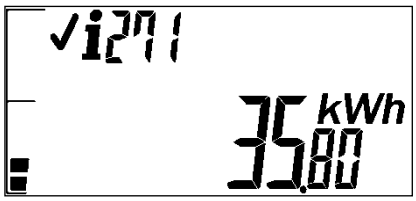
- **Estimated average daily consumption**
  An approximate calculation of the consumption for the next 24 hour period. It is based on the average consumption over the last seven days of active consumption.

- **Estimated average 30 day consumption (monthly)**
  An approximate calculation of the consumption for the next 30 day period. It is based on the average consumption over the last 7 days of active measurement.

Note
The meter requires a full 7 days of consumption to provide a more accurate estimate of the average daily consumption, and a full 30 days to show a more accurate average monthly consumption.



Menu item 1 displays the estimated average days consumption.



Menu item 2 displays the estimated average 30 daily consumption.

Last hour, last 24 hours and last 30 days consumption

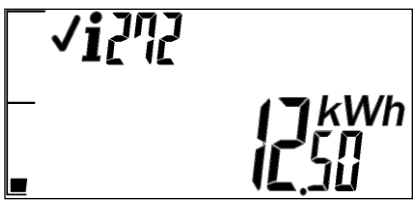
Short code: *#272#*

This short code displays the last hour, last 24 hours and the last 30 days actual consumption.

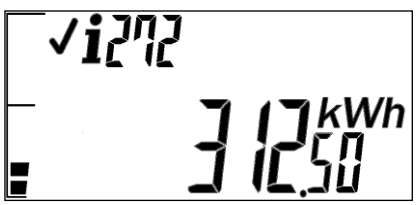
- **Last hour consumption**
  The total consumption measured in the last hour.

- **Last 24 hour consumption**
  The total consumption measured in the last 24 hours.

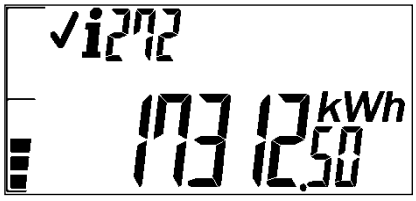
- **Last 30 days consumption**
  The total consumption measured in the last 30 days.



Menu item 1 displays the last hour's total consumption.



Menu item 2 displays the last 24 hours total consumption.



Menu item 3 displays the last 30 days total consumption.

Time remaining to zero kWh Credit

Short code: *#074#*

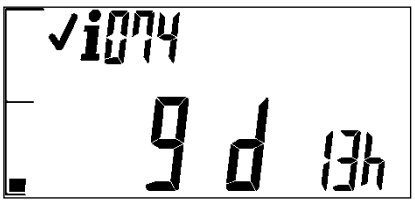
This short code displays the actual and estimated time, in days and hours, until a consumer's supply is disconnected due to depletion of credit.

- **Actual time remaining**
  The actual time remaining until credit depletion, based on the consumer's current rate of consumption.

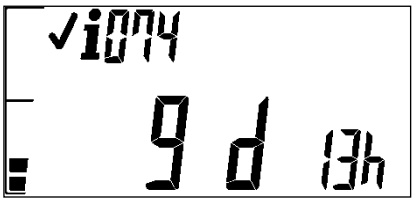
  The time value is displayed as days, hours or both, depending on the amount of time that is remaining until credit depletion.

- **Estimated time remaining**
  The estimated time remaining until credit depletion, based on the consumer's average rate of consumption over the previous 24 hours.

  The time value is displayed as days, hours or both, depending on the amount of time that is remaining until credit depletion.



Menu item 1 indicates a time remaining of nine days and 13 hours based on the current (instantaneous) consumption.



Menu item 2 indicates a time remaining of nine days and 13 hours based on the average consumption over a 24 hour period.

Note

- This is only applicable to credit regions that operate in a positive credit balance, so normal and low credit operating regions. For information on verifying what region the meter is configured for, see the *Viewing region configuration* section.

- The meter displays a maximum time of 2,730 days.

Viewing STS token information

The BEC44(09) meter provides historical information about STS tokens. You can access this information using short codes.

Last ten meter specific tokens entered

Short code: *#251#* to *#260#*

You can view a history of the last 10 meter specific tokens, including the meter specific Conlog service tokens, entered into the meter by entering short codes.

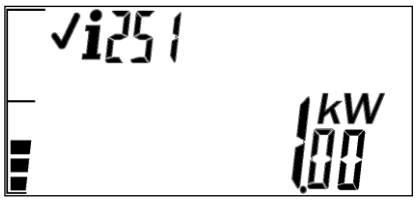
The history includes the 20-digit token number, the token class, sub class and value of the token, as applicable.

The short codes show token history sequentially. So, code *#251#* displays the most recent token entered, *#252#* the second most recent, *#253#* the third most recent, and so on, up to *#260#* for the tenth most recent token entered into the meter.

Menu item 1 displays the token class and sub class.

Menu item 2 displays the actual 20 digit token (scrolling from right to left) in five groups of 4 digits.

The full token shown in the display is 0869 2155 0673 4928 1121.



Menu item 3 displays the transaction amount or token value.

This display will only apply to tokens that contain a transfer amount, such as a credit token or load limit.

Last five credit tokens entered

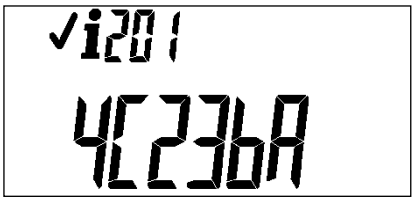
Short code: *#200#* to *#209#*

You can view a history of the last 5 credit tokens entered into the meter, by entering short codes. The history includes the token ID and value.

The short codes show token history sequentially. So, code *#200#* displays the value of the most recent token entered, *#201#* the token ID of the most recent token entered, *#202#* the value of the second most recent token entered, *#203#* the ID of the second most recent token entered, and so on, up to *#209#* for the ID of the fifth most recent token entered into the meter.

Note
A meter operating in post-paid mode rejects these short codes. If there is no information available, the display indicates "_ _ _ _".

Value of the most recent token entered.



Token ID of the most recent credit token entered.

Token entry lockout

The meter has a token lockout function, where if a VTC interface is used to enter tokens, and a token is entered incorrectly or is not valid, the meter automatically locks out for a period of time. During this time, you cannot enter any tokens into the meter using the same VTC interface. This provides security against fraud and token flooding.

The lockout period increases with each successive incorrect token entry attempt. For example, after entering an incorrect token ten times, the lockout period is 70 seconds.

This function only applies to VTC interfaces and not tokens entered via the keypad. This function applies singularly to a specific port. For example, if the flags port receives an incorrect token, the lockout only occurs on that port, and the e-USB-type port is still fully operational.

Troubleshooting

Disconnection of supply

Automatic disconnection

The BEC44(09) meter automatically disconnects the consumer's supply in the event of a trip. The meter supports 12 individual trip events that are registered and saved when the meter trips.

Trip event type	Reconnection type
Credit trip	Automatic reconnection by entering a new credit token.
Tamper	Automatic reconnection by entering a clear tamper token.
Thermal overload	Manual or automatic reconnection, depending on the configuration set at the time of production.
Current overload	Manual or automatic reconnection, depending on the configuration set at the time of production.
Power overload	Manual or automatic reconnection, depending on the configuration set at the time of production.
Credit load trip	Manual or automatic reconnection, depending on the configuration set at the time of production.
Scheduled load restriction overload	Manual or automatic reconnection, depending on the configuration set at the time of production.
Critical load restriction overload	Manual or automatic reconnection, depending on the configuration set at the time of production.
Under voltage	Manual or automatic reconnection, depending on the configuration set at the time of production.
Over voltage	Manual or automatic reconnection, depending on the configuration set at the time of production.
Line / load reversal	Manual or automatic reconnection, depending on the configuration set at the time of production.
Consumption overload	Manual or automatic reconnection, depending on the configuration set at the time of production.

If more than one trip event is detected, only the trip event with the highest priority is recorded. For more information on these trip events, see the *Meter protection* section.

Reason for last disconnect

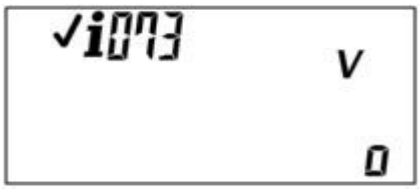
Short code: #073#

This short code will display the last abnormal trip event that caused the consumer's load to be disconnected.

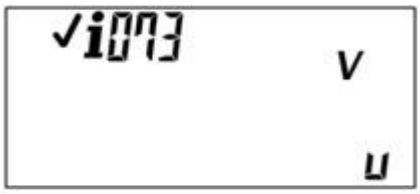
Power overload

Current overload

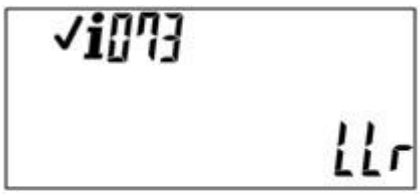
Thermal overload



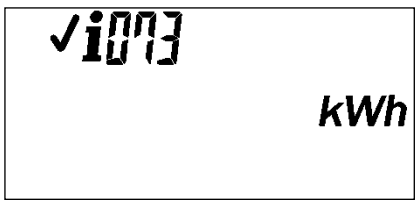
Over voltage



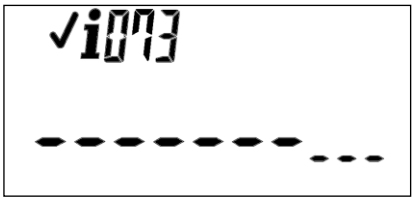
Under voltage



Line/Load reversal



The meter has run out of allocated consumption (over consumption)



No abnormal trip registered

Manual disconnection options

There are two methods of manual disconnection:

- Remote disconnection (only applicable to wireless meters).
- Consumer initiated disconnection

Remote disconnection

A utility can remotely disconnect a consumer's supply, if the BEC44(09) has a Wireless Meter Interface (WMI) installed. The WMI enables two-way communication with the metering device. Remote disconnection is performed using a Conlog service token that is meter specific. A meter specific reconnect token is required to reconnect the supply.

The reconnection method, manual or automatic, is configured at the time of production. For safety reasons, we recommend that manual reconnection is configured. If configured for manual reconnection, a meter specific token is required, which must then be confirmed by the consumer (by pressing *#079#* or the # key for three seconds) to affect the supply.

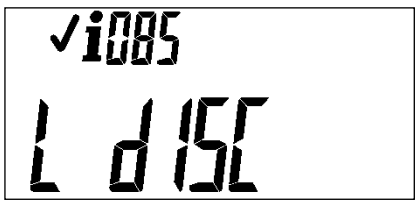
Consumer initiated disconnection

Short code: *#085#*

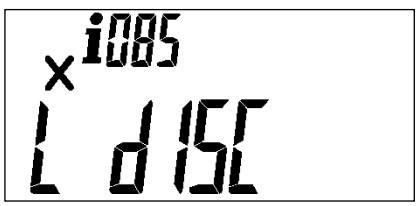
> **Important**
> This feature must not be used as a safety feature to isolate the supply from the load side. You must use downstream breakers for this purpose.

A consumer can manually disconnect the electricity supply using this function, if this option is configured at the time of production.

If disconnection of the latch is not permitted, manual disconnection is rejected. For example, manual disconnection is not permitted in an extreme over current condition.



Manual disconnection has been performed.



Manual disconnection is not permitted.

Reconnection of supply

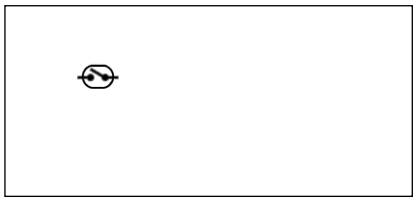
Reconnection of the consumer’s supply functions using one of the following methods:

- Immediate reconnection
- Timed reconnection

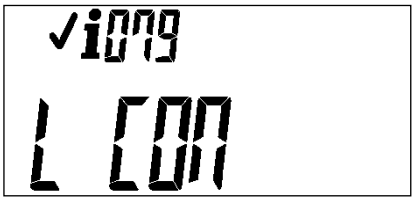
Consumer initiated reconnection

Short code: *#079#*

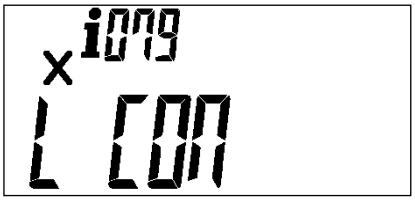
This short code is used to reconnect a consumer's supply, where manual reconnection is required. Consumers can also hold down the # key for three seconds.



Manual reconnection is required.



Manual reconnection has been performed.



Manual reconnection has not been performed.

Automatic reconnection

This follows a reconnection algorithm where the consumer's supply is only reconnected 30 seconds after a trip event occurs. If the trip event still exists, the consumer's supply is disconnected for a further 30 seconds. Only five reconnection attempts are permitted before a 30 minute lockout is imposed.

If a trip condition exists, the five 30 second reconnection attempts followed by the 30 minute lockout cycle, repeats indefinitely.

You can configure the reconnection for each trip event type to either manual or automatic, but reconnection does not occur until the lockout time has elapsed.

Timed reconnection occurs with the following trip conditions:

- Power overload
- Current overload
- Thermal overload
- Over voltage
- Under voltage
- Line / load reversal
- Consumption restriction

Token errors

Display

Description
Terminal cover open This occurs when the terminal cover is not fitted correctly.
Reason
This may be due to the incorrect installation of the terminal cover during meter commissioning, or when entering a clear tamper token.
To resolve
Commissioning: install terminal cover and repeat the commissioning procedure. *Tamper*: install the tamper cover correctly and re-enter the clear tamper token.

Display

Description
Invalid token This occurs when authentication of a token fails.
Reason
One of the following reasons could be why the token is invalid: • The meter serial number on the token doesn't match the physical meter number on the meter. • The tariff index on the token is not the same as the tariff index programmed into the meter.

- The supply group code that the token was made on differs to the supply group code in the meter.
- The key revision number of the token differs to the key revision number as programmed into the meter.
- The token was entered into the meter incorrectly.

To resolve

1. Check the printout of the token.
2. If necessary, run the STS0 meter test token **5649 3153 7254 5031 3471** (or the short code *#000#*) to compare the parameters of the meter, or run a specific item in the test.
3. Run *#030#* for the supply group code (SGC).
4. Run #006# for the tariff index.
5. All the information should be validated to determine why the token didn't work.

Display

Description

Token entry lockout active
This occurs when a token is entered incorrectly or is not valid, and the meter automatically locks out for a period of time.

Reason

The token entered is incorrect or invalid.

To resolve

The remaining lockout time is displayed. Once this time is complete, enter a valid token.

Display

Description
Duplicate or used token This occurs when a token has the same ID as a token already entered.
Reason
A token with the same token ID is already loaded on the meter.
To resolve
Enter a valid token. You can discard this token as it is not valid.

Display

Description
Meter full This occurs when the credit loaded from a token takes the credit balance over the maximum amount permitted for the meter.
Reason
The meter cannot accept more credit than the maximum credit limit.
To resolve
The credit associated with the token is not loaded onto the meter. You can use the token at another time.

Display

Description
Expired token This occurs when a token has an ID older than the oldest token loaded on the meter.
Reason
This token has expired and is too old to be loaded on the meter.
To resolve
Enter a valid token. You can discard this token as it is not valid.

Display

Description
Token processing failed This occurs when the token is accepted by the meter but cannot be processed.

Display

Description
Expired meter decoder key This occurs when the meter decoder key has expired.
Reason
The unique meter key has expired and this meter cannot accept tokens.
To resolve
The utility must change the meter key by entering a key change token.

Display

Description
Credit token with a DDTK key This occurs when the credit token entered is encrypted under a default key (DDTK).

Display

Description
Display overrun This occurs when the value displayed is greater than the maximum display area of the screen.

STS token result

Short code: *#078#*

The display indicates a value of 13, which is a CRC error

The STS token result indicates the status of the previous STS token entered into the meter. The result is stored in the token status register. An extract of the status register values is displayed below.

Value	Description of error
0	Reserved for future assignment
1	Accept: The token is accepted
2	1stKCT: The first key change token has been entered
3	2ndKCT: The second key change token has been entered
4	Overflow Error: Acceptance of the token would cause an overflow of register in the meter.
5	Key type error: Indicates that the decoder key is possibly being changed from one key type to another which is in violation of the key change rules
6	Format error: The format of the token does not comply with the required format
7	Range error: The range of the data is outside of the defined range of values
8	Function error: The function has not been implemented/is not supported by the meter application process
9	Old error: Token is expired
10	Used error: Token has already been used (duplicate)
11	Key expired error: Meter key has expired
12	DDTK error: a transfer credit token may not be processed in accordance with the key type rules
13	CRC error: The CRC value in the token is different to the CRC value as calculated from the data in the token
14	Mfr code error: The manufacturer value in the Class 1 token does not match the manufacturer code value for the decoder
15	Token lockout status: Token lockout is active
16	Token status not ready: The processing of the last token entered via a virtual carrier has not been completed
17-255	Reserved for future assignment

Short codes index

Short codes execute commands on the meter to either display information or configure settings.

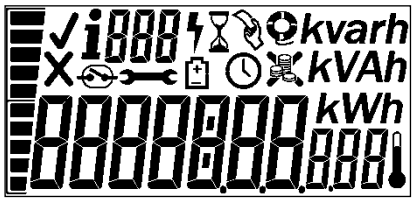
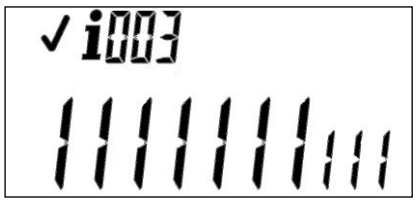
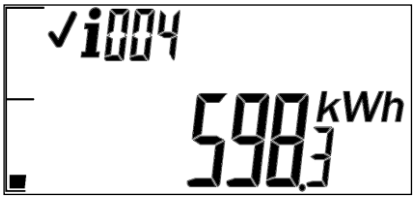
For information on how to use short codes, see the *Accessing information on the meter using short codes* section.

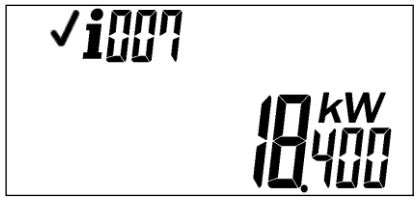
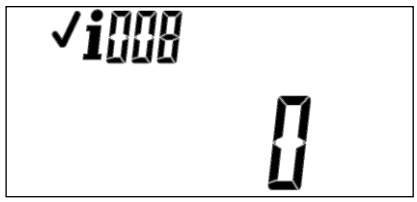
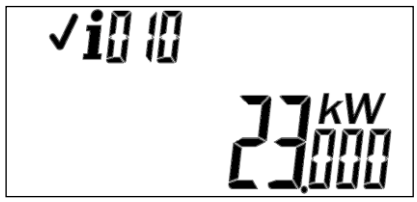
Standard definition items

The STS dispenser test token, is a non meter specific code, used to perform a series of tests on the meter. The test continues to step through the sequence automatically, briefly displaying the data shown for each step.

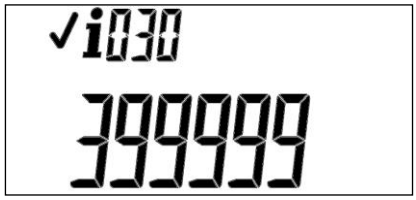
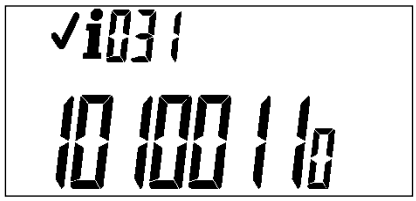
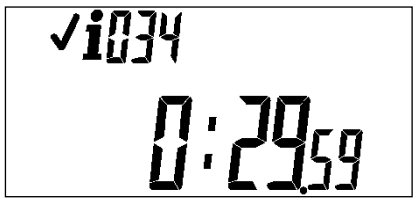
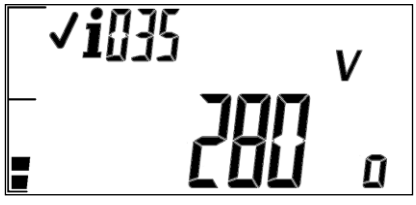
To perform this test, enter the following 20 digit token:
5649 3153 7254 5031 3471

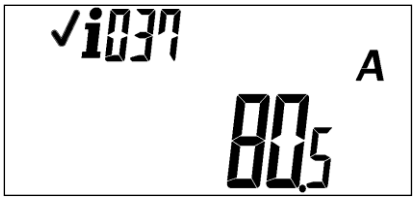
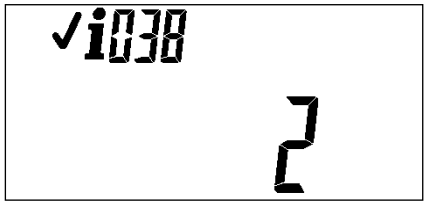
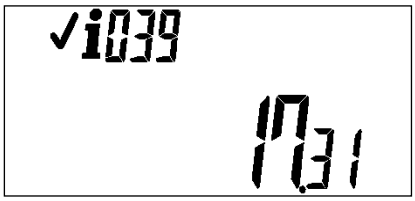
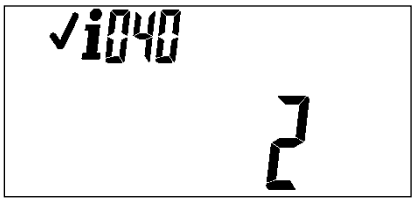
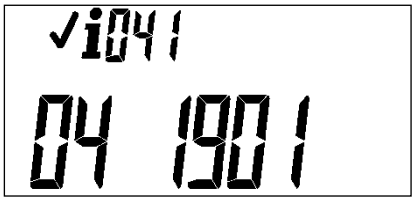
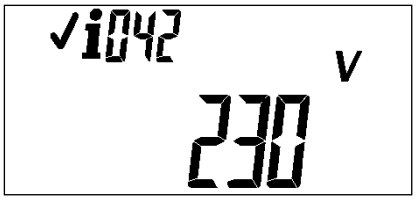
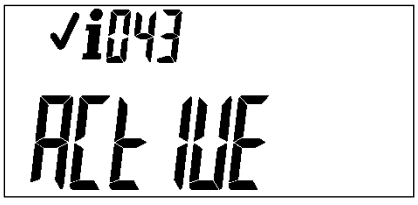
To view a specific item, simply enter the relevant short code i.e. *#006#* to view the tariff index.

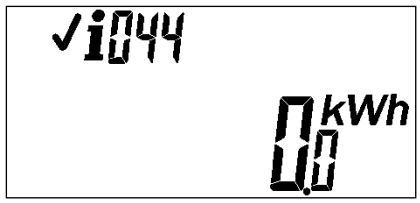
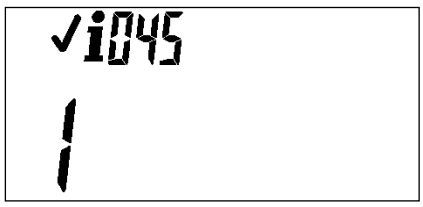
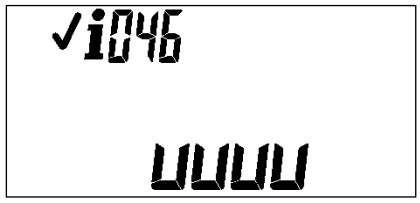
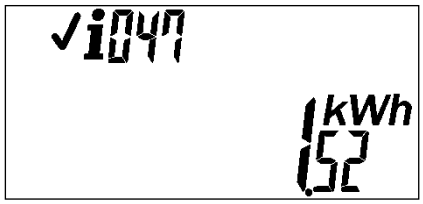
Short code	Description	Display
000	Dispenser test (STS0)	This short code initiates the dispenser test
001	Load switch test (STS1)	
002	Display test (STS2)	
003	Input device test (STS6), pressing 0-9 the display will be filled with the value of the key as shown	
004	Accumulated energy consumption - MTTD (STS3) followed by the UTTD	
005	Key revision and key type (STS4)	

Short code	Description	Display
006	Tariff index (STS5)	
007	Maximum power limit (STS7)	
008	Tamper status (STS8) A ‘0’ indicates the meter is not in a tamper state A ‘1’ indicates the meter is in a tamper state To perform these functions, tamper detection must be enabled on the meter	 
009	Available credit	
010	Phase unbalance (STS11)	
011 - 029	STS Reserved	N/A

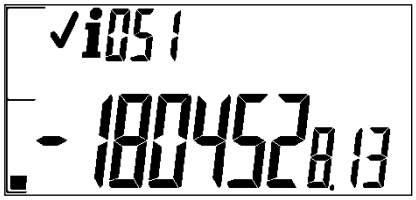
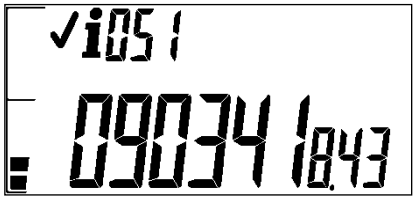
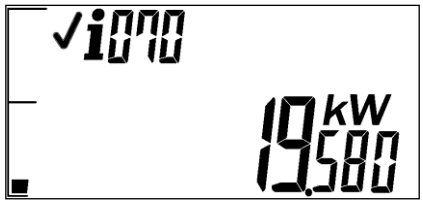
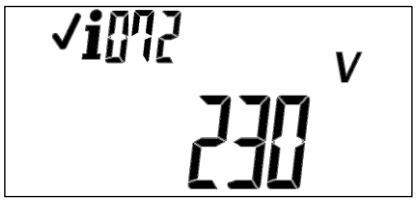
Manual configuration items

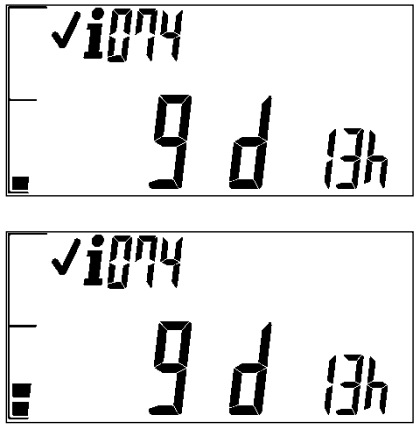
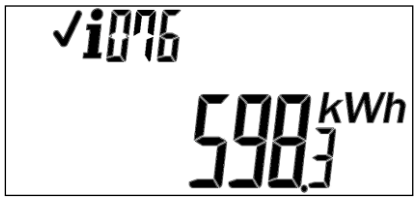
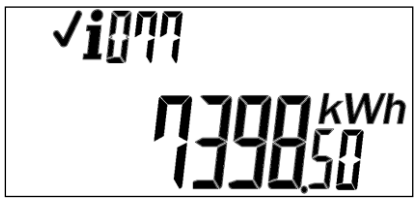
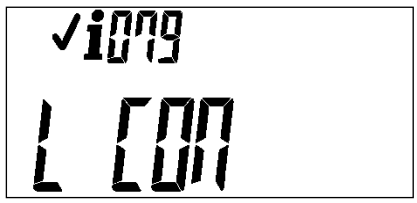
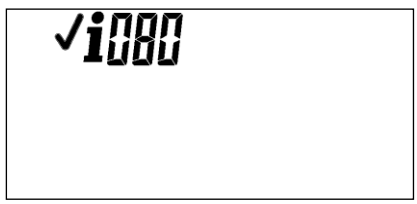
Short code	Description	Display
030	Display the supply group code	
031	Display the status register to determine if the meter is commissioned, un-commissioned, or in a tamper state	
032	View the meter's low credit warning limit	
033	View the meter's thermal trip limit. This is displayed as an ADC reference value	
034	View the meter's remaining reconnection time	
035	View the meter's under or over voltage limits The first menu indicates the under voltage limit The second menu indicates the over voltage limit	 

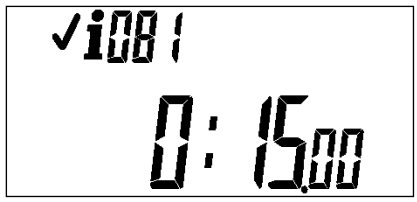
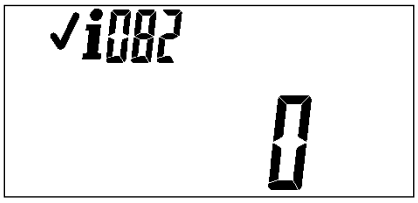
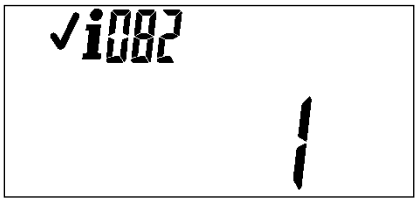
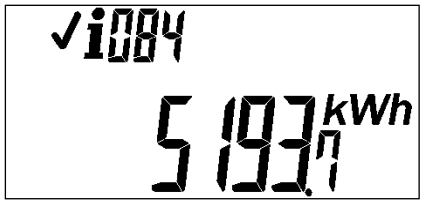
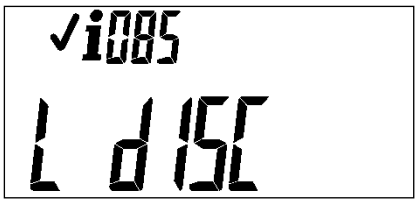
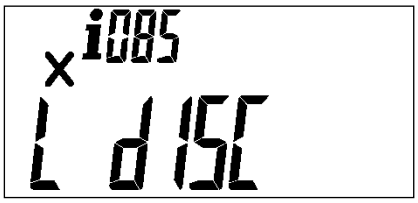
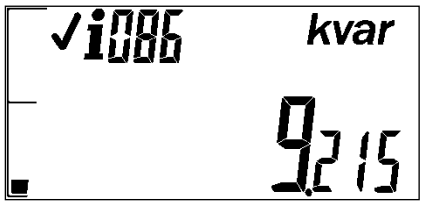
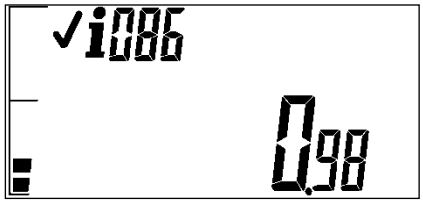
Short code	Description	Display
036	Pair a wireless user interface unit (wUIU) or a wireless extender (WEX) to a wireless meter.	
037	View the meter's current trip limit. This is displayed in amperes	
038	Wireless meter model type (applicable to wireless meters only) 1= BEC44(08) 2= BEC62(08) 3= wBEC44(09) 4= BEC44(09)	
039	View the user interface's firmware version. (applicable to split configuration meters only)	
040	View the primary VTC protocol version 0= reserved 1= legacy meters that do not support the version two or higher map 2= the version for this standard release	
041	View the UIU's paired device's serial number. (applicable to split configuration meters only)	
042	View the MCU's nominal voltage	
043	Commission the meter	

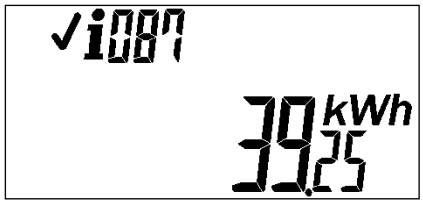
044	Reset the consumption counter	
045	Pair a load appliance device (applicable to wireless meters only)	
046	Set the load appliance device state (applicable to wireless meters only)	
047	View the available consumption	
048	Reserved	Not applicable
049	Reserved	Not applicable

Status and measure items

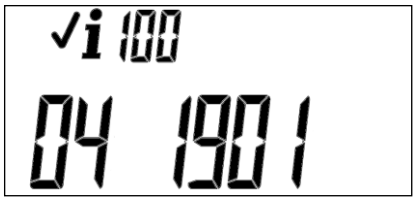
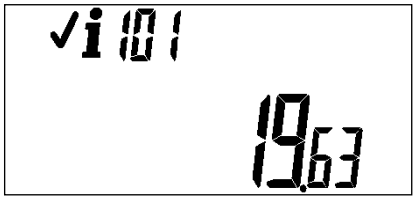
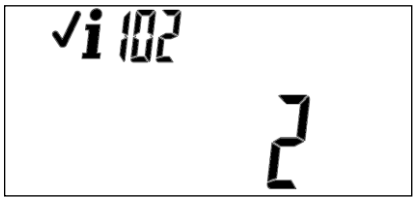
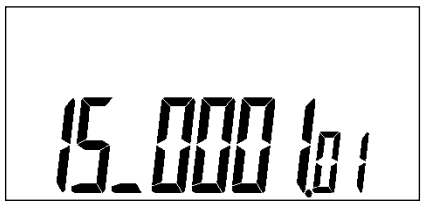
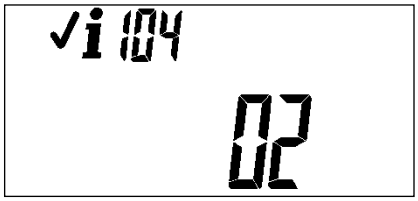
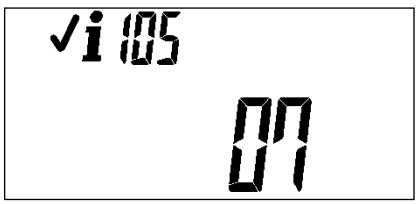
Short code	Description	Display
050	View the instantaneous power (STS09)	
051	View the meter's GPS co-ordinates The first menu displays the longitude, degrees, minutes, seconds and decimal fraction seconds The second menu displays the latitude, degrees, minutes, seconds and decimal fraction seconds	 
052 – 069	Reserved	N/A
070	View the average power consumption. *For three phase meters, pressing the hash key will display the average power consumption per phase*	
071	View the meter's current consumption. *For three phase meters, pressing the hash key will display the current consumption per phase*	
072	View the meter's average voltage per phase *For three phase meters, pressing the hash key will display the average voltage per phase*	
073	View the reason for the last disconnect	See *troubleshooting* section

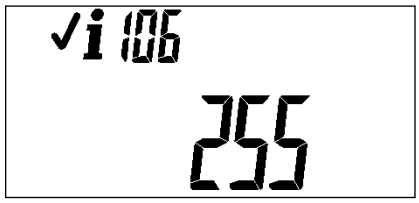
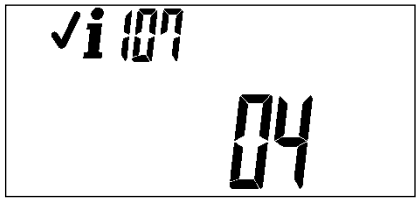
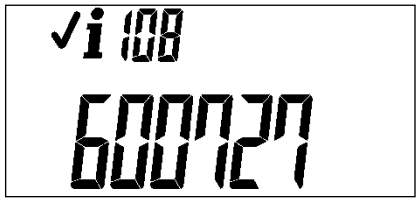
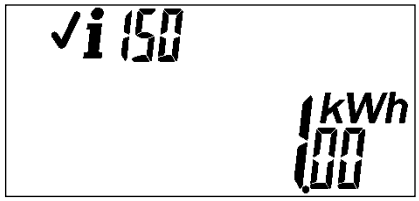
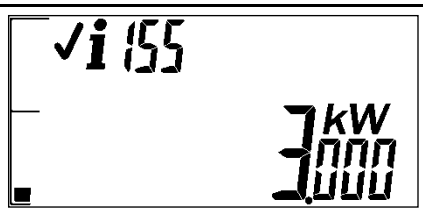
Short code	Description	Display
074	View the time remaining until 0 kWh credit Can be displayed in hours and days The first menu indicates the time remaining till zero credit based on the current (instantaneous) consumption. The first menu indicates the time remaining till zero credit based on the average consumption over a 24 hour period.	
075	View the RF signal strength (applicable to wireless meters only)	
076	View the total consumption to date	
077	View the total user credit entered into the meter	
078	View the STS token result. To view all the token results and their descriptions, refer to the *trouble shooting section*	
079	Manually reconnect a consumer's supply	
080	Reset the UIU (applicable to split configuration meters only)	

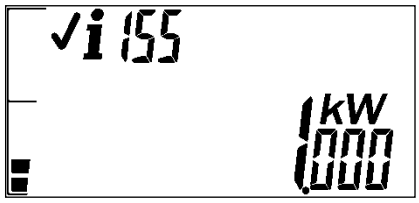
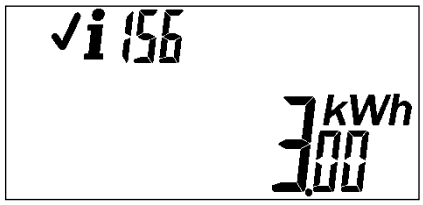
081	View the UIU refresh interval (applicable to split configuration meters only)	
082	View if the terminal cover is fitted correctly for tamper enabled meters. See the tamper section for further information	 
083	Reserved	N/A
084	View the last post-paid / pre-paid tenancy change Meter Total to Date (MTTD) register	
085	Manually disconnect the consumer's supply The tick indicates the manual disconnect was performed and the cross indicates the manual disconnect was not allowed	 
086	View reactive power and power factor information The first menu indicates the reactive power The second menu indicates the power factor	 

087	View the consumer's consumption since the counter was last reset	
088	Current active load limit	N/A
089	Available administrator mode credit	N/A
090 – 099	Reserved	N/A

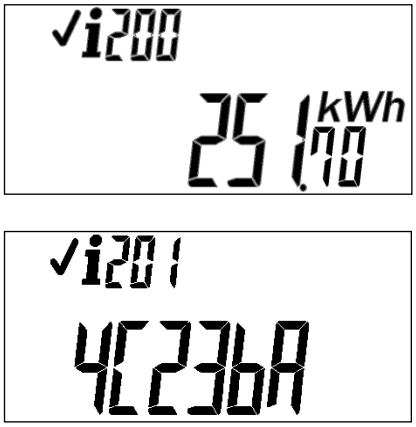
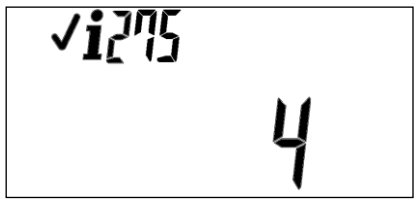
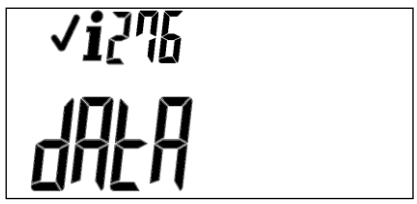
Factory configurable items

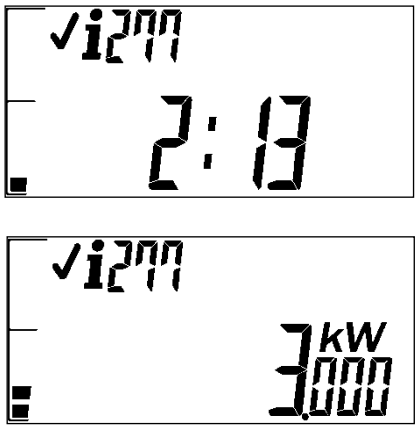
Short code	Description	Display
100	View the meter's serial number	
101	View the software version of the meter (STS10)	
102	View the primary VTC protocol map version	
103	View the primary VTC table ID (FOIN)	
104	View the primary token carrier	
105	View the primary encryption algorithm	

Short code	Description	Display
106	View the key expiry number	
107	View the STS manufacturer number. For Conlog, this is “04”	
108	View the Issuer Identification Number (IIN)	
109 – 149	Reserved	N/A
150	View the daily consumption limit. (applicable to prepaid meters only)	
151	View information for the normal credit operating region configuration (applicable to prepaid meters only)	See *normal credit operating region* section
152	View information for the low credit operating region configuration (applicable to prepaid meters only)	See *low credit operating region* section
153	View information for the emergency credit operating region configuration (applicable to prepaid meters only)	See *emergency credit operating region* section
154	View information for the life line credit operating region configuration (applicable to prepaid meters only)	See *life line credit operating region* section
155	View the load management limits The first menu displays the scheduled load management restriction	

Short code	Description	Display
	The second menu displays the critical load management restriction (applicable to wireless meters only)	
156	View the administrator mode per hour allocation The display indicates the daily free basic electricity allocated in administration mode. (applicable to prepaid meters only)	
157 – 199	Reserved	N/A

Operational statistics

Short code	Description	Display
200 – 209	View the last 5 credit tokens entered (1 – 5) (applicable to prepaid meters only)	
251 – 260	View the last 10 meter specific tokens entered on the meter	See the *Last 10 meter specific tokens entered* section.
261 – 270	Reserved	N/A
271	View the estimated average daily and monthly consumption	See the *Estimated Average Daily and 30 Day Consumption* section.
272	View the consumption for the last 1 hour, 24 hours or 30 days	See the *Last Hour, Last 24-Hours and Last 30 Days Consumption* section.
273	View the number of supply interruption events	
274	View the number of meter tamper events	See the *Number of tamper events* section.
275	View the number of lost communication events (applicable to wireless meters only)	
276	Perform an EEPROM memory data dump	

Short code	Description	Display
277	View the active load limits The first display indicates the time remaining The second display indicates the active load restriction in watts	
278 – 279	Reserved	N/A

STS tokens

Meter error codes

Error code	Description
E01	Meter not initialised - contact Conlog
E02	Meter not calibrated - contact Conlog
E03	Internal error - contact Conlog
E04	No supply voltage present
E05	Reserved for future use
E06	Reserved for future use
E07	Communication error between the meter and UIU
E08	Wireless user interface error - contact Conlog
E09	Incompatibility between the meter and UIU
E10	Software error - contact Conlog
E20	Remote disconnection initiated

STS class one tokens (non-meter specific)

In line with the specification, a number of non-meter specific tokens are required as standard for all STS compliant meters.

The STS information is accessible using Conlog's short codes or by entering the specified 20 digit token.

STS token	Short code	Description
STS0	000	Perform the STS dispenser test
STS1	001	Test the disconnect device of the meter (load switch test)
STS2	002	Display all icons on the LCD display
STS3	004	View the total consumption to date. The cumulative totals are the meter total to date (MTTD) and the user total to date (UTTD)
STS4	005	View the key revision number and key type
STS5	006	View the tariff index
STS6	003	Test the input device (keypad)
STS7	007	Display the maximum power limit setting
STS8	008	View the tamper status of the meter
STS9	050	View the instantaneous power
STS10	101	View the software version of the meter

STS class two tokens (meter specific)

These are meter specific tokens that require encryption and are generated at a vending system; this excludes Conlog meter specific service tokens.

- **Maximum load limit**

  Set the maximum load limit on the meter.

- **Clear credit**

  Clear all existing credit from the meter, such as in the case of a tenancy change.

- **Key change token**

  Change the meter coding parameters, such as the supply group code or tariff index.

- **Clear tamper**

  Remove a tamper event on the meter and reconnect the consumer's supply.

Conlog meter service tokens, in the STS class 2 (meter specific tokens)

- **Commissioning**

  If configured this activates the meter to detect tamper and connect the consumer's load in the process.

- **Decommissioning**

  Enables a meter to be decommissioned prior to it being removed from the field. It disables any further tamper detections and clears the commissioned status.

- **Service configuration**

  This is used to configure specific parameters on the meter, such as credit operating regions, trip configurations, consumption restriction, administrator mode, schedule load reduction, critical load reduction, over and under voltage trip threshold, temperature trip threshold, random reconnect, load management zone and options register configurations.

  This is only available using the wireless field service terminal (wFST) with wireless or wireless-enabled meters.

- **Pre-paid to post-paid / post-paid to pre-paid**

  This changes the operating mode of the meter between pre-paid and post-paid modes.

- **Remote disconnect / reconnect**

  Remotely disconnect or reconnect the meter. This applies to wireless installations only.

- **Activate / deactivate administrator mode**

  This configuration enables free allocations of electricity, such as grants, free basic electricity and poverty tariffs.

- **Activate / deactivate consumption restriction**

  This configuration restricts the amount of energy consumed. The meter supports consumption restriction functionality specifically for the management of load in a renewable energy grid.

Industrial standards

IEC 62051-1	Electricity metering - Glossary of terms
IEC 62052-11	Electricity metering - General requirements, Tests and test conditions - Part 11: Metering equipment
IEC 62053-21	Electricity metering equipment (a.c.) - Part 21: Particular requirements - Static meters for active energy (classes 1 and 2)
IEC 62055-21	Electricity metering - Payment systems - Part 21: Framework for standardisation
IEC 62055-31	Electricity payment metering systems - Part 31: Particular requirements - Static payment meters for active energy (classes 1 & 2)
IEC 62055-41	Electricity metering - Payment systems - Part 41: Standard transfer specification (STS) - Application layer protocol for one-way token carrier systems
IEC 62055-51	Electricity metering - Payment systems - Part 51: Standard transfer specification - Physical layer protocol for one-way numeric and magnetic card token carriers
IEC 62055-52	Electricity metering - Payment systems - Part 52: Standard transfer specification - Physical layer protocol for a two-way virtual token carrier for direct local connection
IEC 62056-21	Electricity metering - Data exchange for meter reading, tariff and load control Part 21: Direct local data exchange
SANS 1524-1	Electricity payment systems - Part 1: Payment meters
SANS 1524-1-1	Electricity payment systems - Part 1-1: Mounting and terminal requirements for payment meters
SANS 1524-1-2	Electricity payment systems - Part 1-2: Specification for surge arresters for the protection of electricity dispensers
SANS 1524-4	Electricity payment systems - Part 4: National prepayment electricity meter cards
SANS 15417	Information technology: Automatic identification and data capture techniques - Code 128 bar code symbol specification
STS 101-1	Interface specification - STS 101-1: Standard transfer specification (STS) - Physical layer mechanical and electrical interface for virtual token carriers
STS 201-15.1.0	Companion specification - STS 201-15.1.0: Standard transfer specification (STS) - Meter function object: Register Table for electricity payment meters
DSP 34-749	Eskom specification: Standard for sealing metering equipment
DSP 34-1527	Eskom specification: Procedure for producing software process assessment documents
DSP 34-1635	Eskom specification: Particular requirements for pre-payment meters
RES/RR/00/11740	Eskom specification: Accelerated Environmental Stress Test for Pre-payment metering Electricity metering equipment - Data exchange for meter reading, tariff and

	load control - Part 21: Direct local data exchange
ISO 9001	Quality Management Systems
ISO 14001	Environmental Management
OHAS 18001	Occupational Health and Safety Management System

Company overview

Since the inception of the South African prepayment industry in the late 1980s, Conlog has been at the forefront of pioneering solutions that meet the needs of utilities worldwide.

The foundation of providing simple yet technologically advanced products, coupled with an ethos of ensuring our customers' success, has resulted in our leadership position.

Products for today and tomorrow

We specialise in providing prepayment solutions for the delivery of electricity services. Our broad product offer encompasses prepayment meters, vending, revenue management, maintenance, support and consultation, as well as a dedicated and accredited training facility for all aspects of prepayment.

This comprehensive and holistic approach enables customers to reap the full benefit of their investment and ensures sustained success, into the future.

Global footprint

Conlog has the world's largest installed base of prepaid meters, spanning more than 20 countries on four continents. Further, over 70 utilities worldwide utilise our solutions and are considered their preferred prepayment provider.

In addition, as a part of the global Schneider Electric group, we have access to a network of offices spanning over 100 countries.

Platform of excellence

In all areas of the business, our goal is for absolute excellence. To this end, the company's manufacturing facilities are independently accredited with ISO 9000 (quality), ISO 14001 (environmental) and OHAS 18001 (health and safety) standards.

All products meet and exceed the highest international standards, such as the International Electrotechnical Commission (IEC) and the South African Bureau of Standards (SABS). In addition, the company operates a variety of internationally endorsed improvement programmes, such as Six Sigma, Kaizan and Lean.

An additional benefit of Conlog is the vertical integration of the organisation, whereby the research and development, engineering, manufacturing, sales and marketing functions are housed within one centralised facility.

Award winning

Conlog is one of the only companies in the world to specialise solely in prepayment. For more than 20 years, we have been consistently providing customers with an unsurpassed depth of experience and knowledge. The company has received a number of accolades through the years including the inaugural Innovation Award for the prepayment industry, has been recognised as the Best Metering Company six times out of eight by the Electricity Supply Industry, and has won the Exporter of the Year award, among many others.

Contact information

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