

BEC23(09)

Technical manual

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Table of contents

BEC23(09) product overview	4
BEC 23(09) PL/T	6
BEC 23(09) PE /T	6
What the LEDs mean.....	7
LCD interface	7
Virtual token carrier (VTC)	9
Direct probe port (type A)	9
Product specifications	10
Installing the meter.....	12
Testing the meter installation and sealing the device	14
Commissioning the meter	15
Checking if the meter is commissioned.....	15
Entering the commissioning short code	16
Features and functionality of the meter	17
Power measurement	17
Reactive power measurement	17
Power factor measurement.....	17
Renewable energy measurement	17
Under and over voltage measurement	17
Current measurement.....	17
Temperature measurement	17
Nominal voltage setting	17
Accuracy class	17
Meter protection.....	18
Power overload.....	18
Current overload.....	18
Thermal overload.....	18
Under and over voltage	18
Line / load reversal	19
Extreme current overload	19
Delayed reconnection	19
Tamper.....	19
Tamper status.....	20
Tamper switch state.....	21
Number of tamper events	21
Accounting configuration	25
Pre-paid and post-paid mode.....	25
Region configuration.....	26
Administrator mode	27
Consumption restriction	27
Negative credit.....	28
Clear credit	28

Maximum positive credit available	28
Maximum negative credit available	28
Accessing information through short codes.....	29
Entering a short code	29
Viewing the meter's serial number	30
Viewing region configuration.....	30
Normal credit operating region.....	30
Low credit operating region.....	31
Emergency credit operating region	33
Life line credit operating region	34
Viewing consumption information	36
Meter total to date (MTTD) and user total to date (UTTD).....	36
Total user consumption	36
Total credit entered.....	37
Consumption counter.....	37
Estimated average daily and 30 day consumption	37
Last hour, last 24 hours and last 30 days consumption.....	38
Time remaining to zero kWh credit	39
Viewing STS token information	40
Last ten meter specific tokens entered	40
Last five credit tokens entered	41
Token entry lockout	41
Troubleshooting	42
Disconnection of supply.....	45
Automatic disconnection.....	45
Reason for last disconnect.....	46
Manual disconnection options.....	47
Reconnection of supply	48
Token errors.....	50
STS token result.....	55
Short codes index	56
Standard definition items	58
Manual configuration items.....	60
Status and measure items	62
Factory configurable items.....	65
Operational statistics	68
STS tokens.....	100
Meter error codes	100
STS class one tokens (non-meter specific).....	103
STS class two tokens (meter specific)	108
Industrial standards	109
Company overview	116
Contact information	117

BEC23(09) product overview

The BEC23(09) is a single-phase, STS compliant prepayment electricity meter, with an integrated keypad and large LCD for easy reading. The meter has a common wall base, which can be installed prior to the meter installation. The wall base also allows for removal of the meter for maintenance purposes without having to disconnect the supply. There are different versions available in the BEC23 range, each catering to a specific requirement.

The device is also termed a “combo” meter, meaning a combined unit that is made up of the metering circuitry along with the keypad. The entire unit is installed within the consumer’s premises.

In addition the meter provides a number of innovations, for example, being able to operate as a smart prepayment meter or a post-payment meter. The device has over 50 programmable functions, to provide a high level of customisation for each utility.



Figure 1: The BEC23(09)

Item	Measurement control unit (MCU) or meter
Mounting	Common wall base
Installation	Inside the consumer’s premises

Overview of the BEC23(09) range



BEC23PL

The BEC23PL is an STS single phase prepayment meter with an integrated keypad and a common base. The unit has an internal latch (rated to 100A), which is used to connect/disconnect the consumers' supply.



BEC23PLT

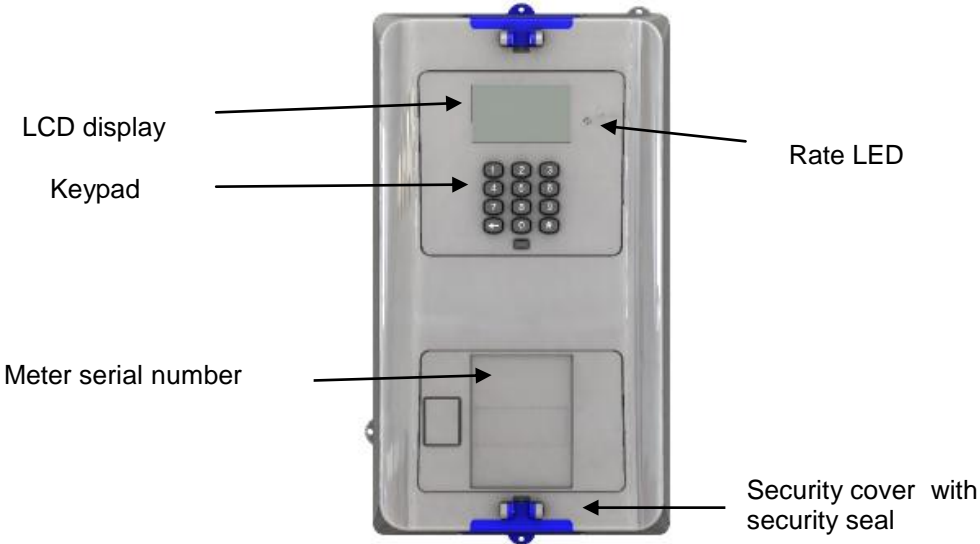
The BEC23PLT serves the same function as the BEC23PL; in addition the unit is equipped with a tamper switch to detect tampering of the meter.



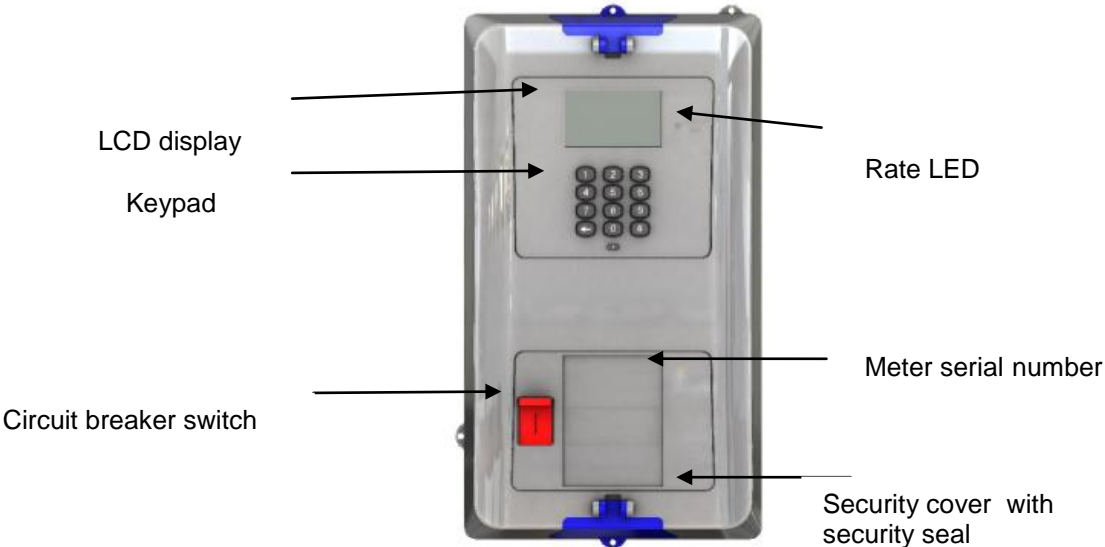
BEC23PE

The BEC23PE is an STS single-phase prepayment electricity meter with an integrated keypad. The unit has a built in earth leakage circuit breaker (rated to 20A). The earth leakage serves to protect the meter as well as the consumer premises.

BEC 23(09) PL/T



BEC 23(09) PE



What the LEDs mean

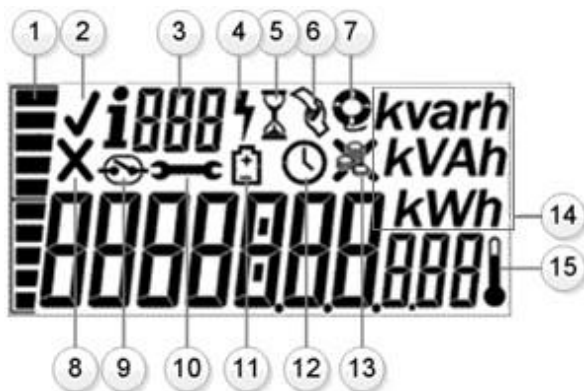
Rate LED (red)

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.
- Together with the hand held interrogator kit, the LED can be used to extract information from the meter.

LCD interface

The meter 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 item
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. N / A
14. Units of measurement
15. N / A

Disconnection device

Latch type meter (BEC23PL)

Note

The disconnection device is not designed as an over-current protection device and must not be used to interrupt fault currents.

This meter uses a 100 A, 3 kA single pole load switch as the disconnection device on a single-phase meter. This device disconnects the consumer's supply when the credit expires or the load limit is exceeded.

When the supply is interrupted due to an overload limit being exceeded it remains open for approximately 30 seconds and then closes. If the overload is still present it opens again. After five consecutive 30-second reconnection attempts, the disconnection device will remain open for 30 minutes. This pattern is repeated indefinitely until the overload is removed.

Earth Leakage type meter (BEC23PE)

Note

This type of meter does not require a ready board or distribution board. The output from the meter can be connected directly to a plug socket.

The meter uses one 20A, 3 kA double pole circuit breaker as the disconnection device on a single-phase meter. The circuit breaker disconnects the consumer when the credit expires, the load limit is exceeded or there is a fault current detected. When the circuit breaker trips due to the load limit being exceeded (overload), you will not be able to reset the breaker until the overload is removed. If it trips due to a fault current, a qualified electrician should be called in to investigate the reason why it is tripping.

Virtual token carrier (VTC)

The BEC23(09) meter supports the following 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.

Product specifications

Voltage ratings

Nominal voltage (-20% +15%) 220 - 240 V AC

Supply frequency ($\pm 5\%$) 50 Hz

Current ratings

Base current (I_b) 5 A

Maximum current (I_{max}) 80 A PL/T
20 A PE

Minimum starting current
Class 1 20 mA
Class 2 25 mA

Utilisation category UC2

Minimum start up (230V) 130 V

Minimum operating (230V) 120 V AC

Nominal power consumption

1.31 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 current Extreme over

Current overload Line / load reversal

Over / under voltage

Delayed reconnection

Environmental

Operating temperature -10°C to +55°C

Storage temperature -25°C to +70°C

Humidity 95% non-condensing

IP rating BEC 23 PL/T - IP 54
BEC 23 PE/PD - IP 51

RF immunity 30 V/m

Status indicators

Rate LED (1,000 pulses / kWh)

Installation

Footprint Wall base

Insulation class Double insulation

Terminals

	Live	Neutral
Type	Busbars	busbars
Size	25mm ²	25mm ²

Interrogation

Type MC171 Direct probe

Security

Security seals

Tamper detection

Packaging

	Wall base	Meter	Meter and wall base
Units per carton	10	5	5
Carton weight (including box)	4.2 kg		

For further packaging information, please contact Conlog.

Installing the meter



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

Cabling specification	
Cable	Size
Live wire	25mm ²
Neutral wire	25mm ²

Tools and accessories for mounting
1 x 6mm insulated terminal screwdriver
1 x insulated side cutters
1 x electric drill
1 x masonry drill bit – 6mm
Rawl plugs and screws

Installing the wall base

1. Position the meter between 1.3 and 1.5m above floor level, away from taps and not directly above the stove or sink (minimum distance-one meter).
2. Position and tape the template (pictured below) to the wall.
3. Drill holes through the template, deep enough to accommodate wall plugs.
4. Drill holes in wall base for cables / glands.
5. Fit the wall plugs and screw the wall base to the wall. Avoid over tightening as this can damage the wall base.

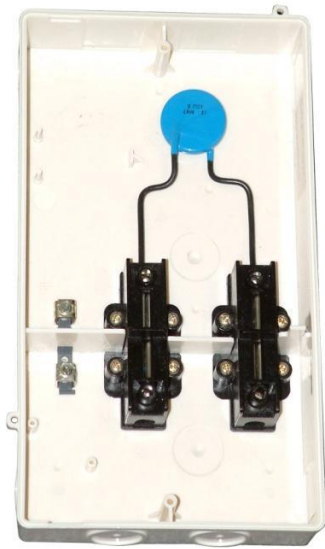


Figure 2: Wall base



Figure 2-1: Template

Wiring the wall base

1. Wire the wall base using cable glands appropriate for the installation.
2. Connect the incoming supply to the top set of terminals (above the horizontal partition).
3. Connect the live wire to L line and the neutral wire to N line.
4. Connect the earth wire to the earth terminal.
5. Connect all outgoing wires to the bottom set of terminals. Live to L load, neutral to N load earth to the earth terminal.
6. The outgoing wires from the wall base should be connected to a ready board/distribution board, if the earth leakage type meter is not being used.

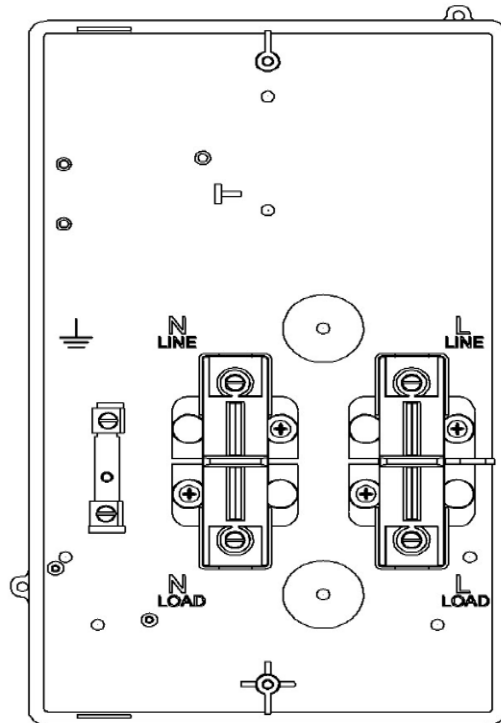


Figure : Terminal layout

Testing the meter installation and sealing the device

To test the installation:

1. Plug the meter into the wall base by positioning the top of the meter first, hold the top in position and snap the bottom of the meter into place.
2. Screw the active unit onto the base with the screws provided
3. Apply power to the meter by closing the upstream breaker.
4. Check that the meter is displaying the available credit in kWh. If a zero balance is displayed, a credit token needs to be purchased.
5. Turn on an appliance or light in 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.
6. Enter #100# on the keypad, to display the meter serial number.
7. Compare the meter number displayed, to the serial number printed on the meter label and supplied meter card, to confirm that the numbers match.
8. If the meter is working correctly, hand over the meter card and user guide to the consumer.
9. 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 the commissioning function is made when the order is placed and the meter is 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 via the 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.



Note

If the meter is commissioned and tamper is enabled, however the wall base is fitted incorrectly, the meter will go into tamper mode.

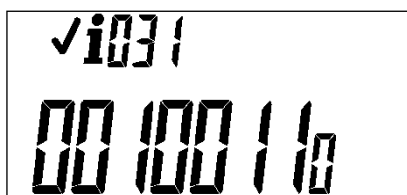
Checking if the meter is commissioned

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 keypad.



Meter has been commissioned.
Third digit from left = 1

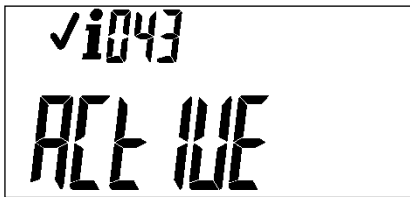


Meter has not been commissioned.
Third digit from left = 0

Entering the commissioning short code

To commission the meter:

Enter the commissioning code #043# on the 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 and functionality of the meter

Power measurement

The BEC23(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 (for PL/T versions)

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.

Nominal voltage setting

This is used to determine the over current threshold.

Accuracy class

The BEC23(09) meter is a standard class 1 metering device but can be calibrated for class 2, if required.

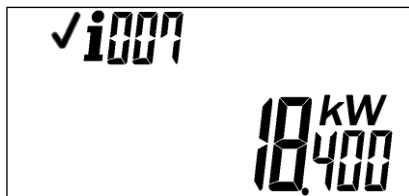
Meter protection

The BEC23(09) meter incorporates a 100A (configured for maximum 80A) 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 than 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.

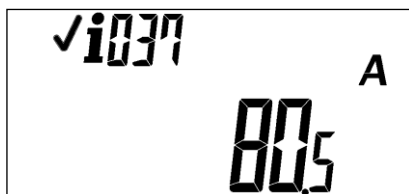


The power load limit is displayed in kW.

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).

Under and over voltage (for PL /T versions)

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.

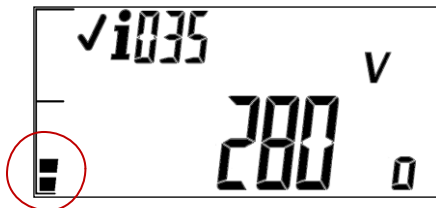
- **Over voltage**

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 VAC.



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, it 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 suspended and the consumer will not receive electricity. 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 the electricity supply is removed.


Tamper

The BEC23(09) meter has optional tamper protection, that is configured in production.

The meter supports a standard tamper feature : activates a tamper condition when the meter is powered.

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 clear 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 meter is not inserted properly into the wall base. All meter tamper settings are configured at the time of production.

Once installation is complete, the installer commissions the meter.

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#

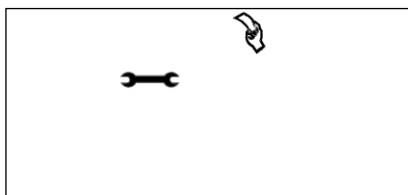
This indicates if the meter has registered a tamper condition.



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#

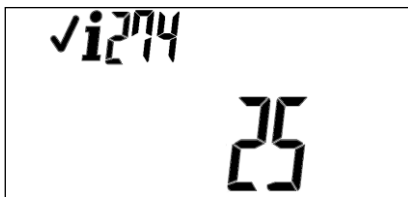
If tamper is enabled on the meter, the state of the tamper switch indicates whether the terminal cover is fitted correctly or not.

- “0” indicates the terminal cover is fitted correctly.
- “1” indicates the terminal cover is not fitted correctly; therefore 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.

Bar indicator

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

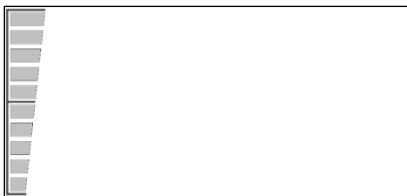
- **Consumption**

The consumption indicator (bar graph) shows the current instantaneous power in kW as a percentage of the maximum allowable power limit configured in the meter. Each segment represents 10% of the maximum power limit with 10 segments in all. For example, if the load limit is set to 16.4kW, then each segment represents 1.6kW.



- **Abnormal trip**

The consumption indicator is also used to indicate an abnormal trip condition. This is indicated by flashing all segments of the consumption indicator.



The following are supported abnormal trip conditions.

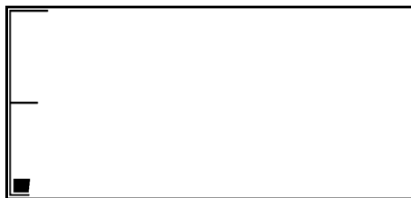
- Power overload – The power measured is above the configurable maximum power load limit threshold. This included any load restrictions that may occur.
- Current overload – The current measured is above the configurable maximum current limit threshold.
- Power unbalance – The power measured between any two phases of a three phase meter is
- Over voltage – The voltage measured is above the configurable maximum voltage limit threshold.

- Under voltage – The voltage measured is below the configurable minimum voltage limit threshold.
- Line / load reversal – The line and load side of the meter has been reverse wired and negative energy is being measured.
- Over consumption – The consumption measured is greater than the configurable consumption restriction threshold.
- Earth leakage – The measured earth leakage current is greater than the trip point.

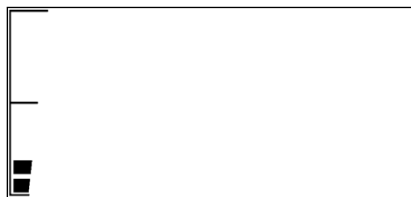
- **Menu item**

When you are viewing 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.

The first segment signifies the first menu register; the second segment signifies the second menu register and so on. If only one register is to be displayed then no menu index need be displayed.



First register in a multi-register display



Second register in a multi-register display

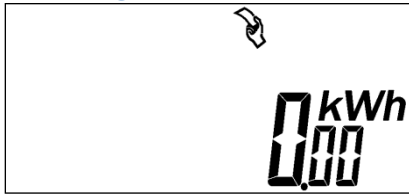
Prepayment meters

The credit remaining is the default display for a prepaid meter. The resolution is in 10Wh's.

Remaining credit – positive



Remaining credit - Zero

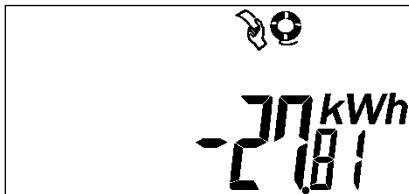


When the credit reaches zero or the emergency credit threshold the hand icon must remain on and the credit value must flash. This includes operation in the life line credit region.

Remaining credit - negative



The remaining credit register should never be a negative value unless emergency credit and lifeline modes are enabled. If emergency or life line credit modes are disabled then the spanner icon must be displayed indicating that technical assistance is required and the hand icon must be on indicating that a credit token is required as shown in the display above. In cases where the display of negative credit has been disabled, the display must show 0.00kWh and the spanner icon must remain off. The hand icon must always be on to indicate that a credit token is required.



If emergency or life line credit modes are enabled then the display must show a negative credit balance irrespective of the negative credit display configuration and the spanner icon must not be displayed. The hand icon must be on to indicate that a credit token is required and the life buoy icon must be displayed to indicate in which credit region the meter is operating.

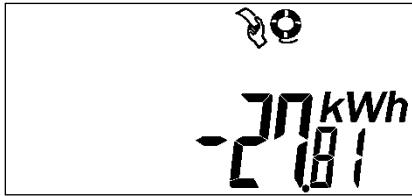
Low credit warning



When the remaining credit reaches a programmable low credit threshold the hand icon will flash, warning the user that a credit token is required. The remaining credit value should also flash and continue to flash until sufficient credit is entered into the meter such that it is greater than the configured low credit warning threshold.

Emergency credit mode

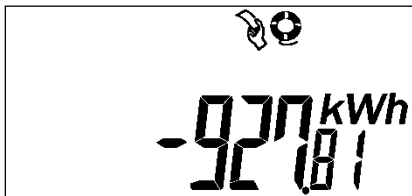
When the remaining credit reaches a programmable emergency credit threshold the life buoy icon must flash indicating that the consumer is operating on emergency credit. The hand icon will also be on as the meter has reached zero credit.



In emergency mode the display of negative credit is always enabled irrespective of the configuration setting of the meter .In these modes however the spinner icon will remain off.

Lifeline credit mode

When the remaining credit reaches a programmable life line credit threshold the life buoy icon must be permanently on indicating that the consumer is operating on life line credit. The hand icon will also be on as the meter has reached zero credit.



In lifeline mode the display of negative credit is always enabled irrespective of the configuration setting of the. In these modes however the spinner icon will remain off.

Accounting configuration

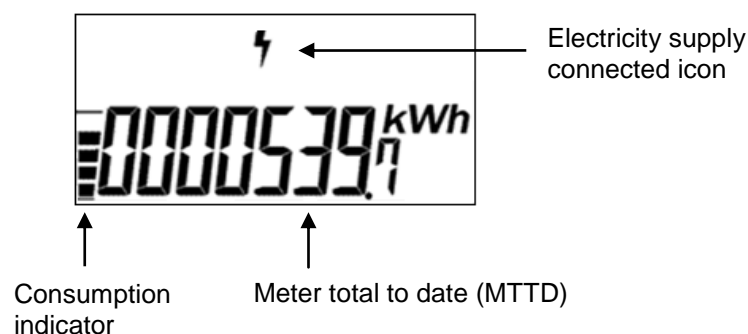
Pre-paid and post-paid mode

The BEC23(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 BEC23(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 user interface 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:



The information displayed indicates:

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 prepayment settings, are reinstated. Due to this, it is recommended that a consumer's available credit is cleared before switching from prepayment 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.

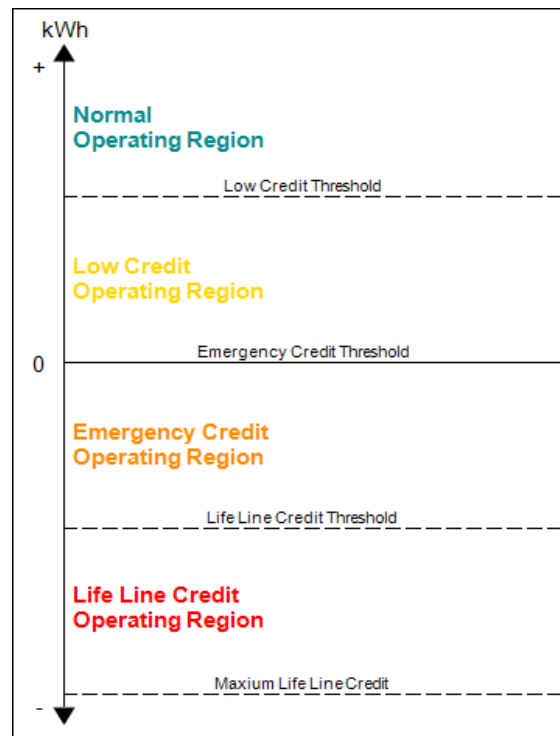


Figure 2: Varying credit operating regions

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.

Clear credit

The clear credit function is a meter specific token, which must be generated at a vending unit. This function clears all credit currently in the meter; a typical application would be for use in rental properties where a tenancy change may occur.

This function is only available for prepayment meters, not post-pay meters.

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 information on the meter, short codes are used. Short codes enable the user 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#.

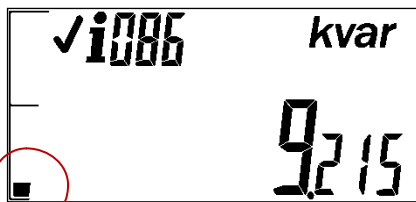
When you enter a short code you do not need to include the preceding zeros. For example, instead of entering #084# or #003#, you can use #84# and #3#.

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.

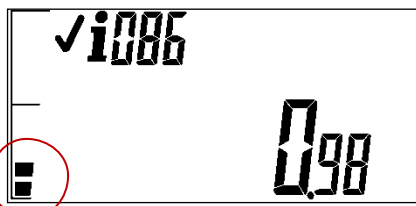
To return to the default display when you are viewing additional information, press the backspace key.

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* section.

Entering a short code

To enter a short code:

1. Press # on the user interface 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.

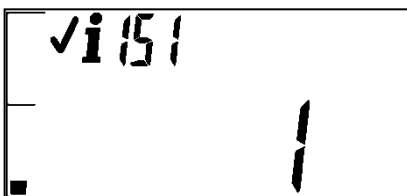
Note

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

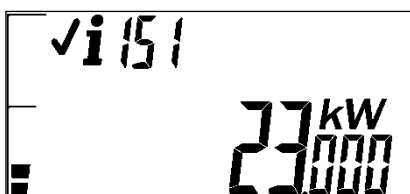
Normal credit operating region

Short code: #151#

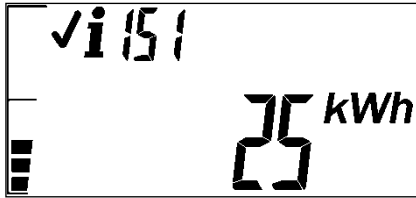
When the credit is greater than the low credit threshold, the meter is operating in the normal credit region. This region is always permitted and applies the standard maximum load limit, as defined in IEC62055-41. This region can be configured to trip when the credit reaches the low credit threshold. 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.



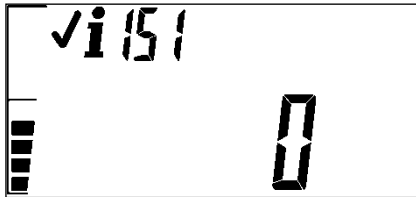
Menu item 1 displays the normal credit operating region is enabled.



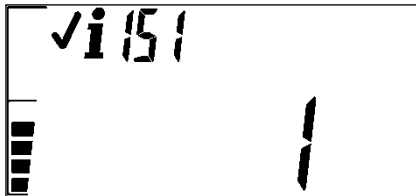
Menu item 2 displays the load restriction value in watts.



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.



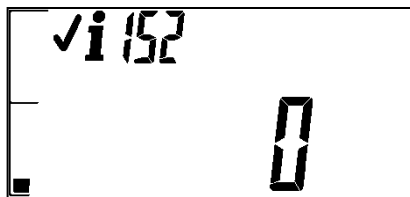
Menu item 4 displays the option to trip at the next credit threshold is enabled.

Low credit operating region

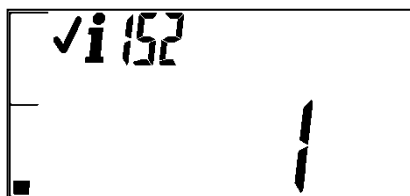
Short code: #152#

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.

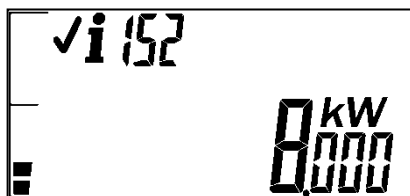
You can configure a load limit independent of the standard maximum load limit as defined in IEC62055-41, so that a punitive load restriction can be imposed when operating in this region.



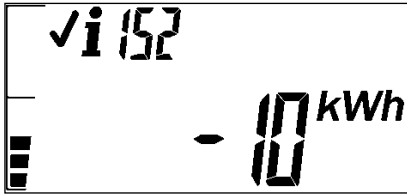
Menu item 1 displays that the low credit operating region is disabled.



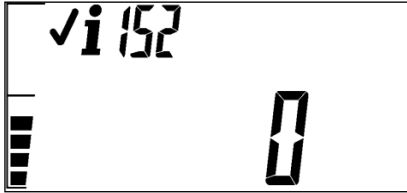
Menu item 1 displays that the low credit operating region is enabled.



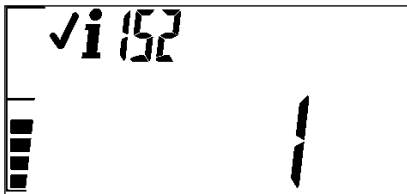
Menu item 2 displays the load restriction value in watts.



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.

Low credit warning



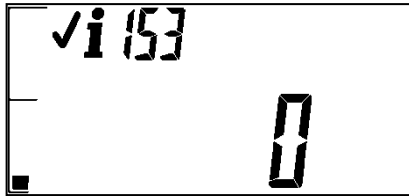
When the remaining credit reaches a programmable low credit threshold the hand icon will flash, warning the user that a credit token is required. The remaining credit value should also flash and continue to flash until sufficient credit is entered into the meter such that it is greater than the configured low credit warning threshold.

Emergency credit operating region

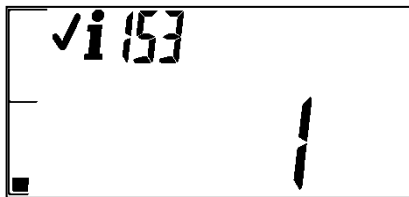
Short code: #153#

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.

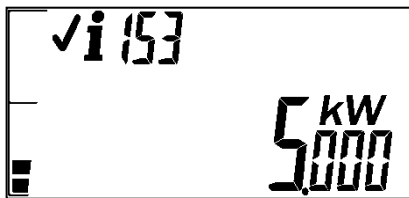
You can configure a load limit independent of the standard maximum load limit as defined in IEC62055-41, so that a punitive load restriction can be imposed when operating in this region.



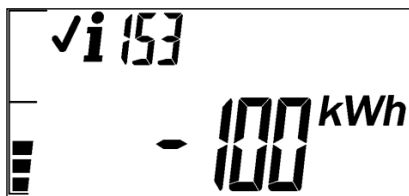
Menu item 1 displays that the emergency credit operating region is disabled.



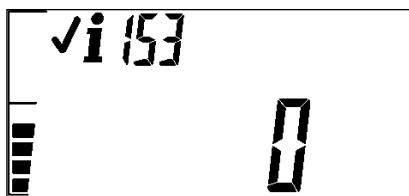
Menu item 1 displays that the emergency credit operating region is enabled.



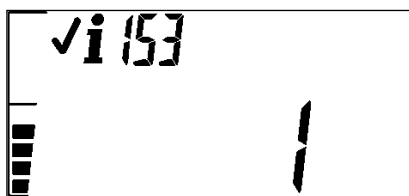
Menu item 2 displays the load restriction value in watts.



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

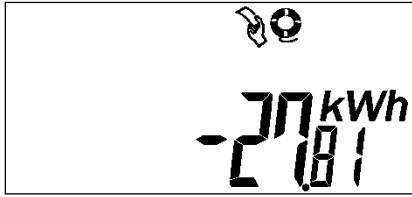


Menu item 4 displays that the option to trip at the next credit threshold is disabled.



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

When the remaining credit reaches a programmable emergency credit threshold the life buoy icon must flash indicating that the consumer is operating on emergency credit. The hand icon will also be on as the meter has reached zero credit.



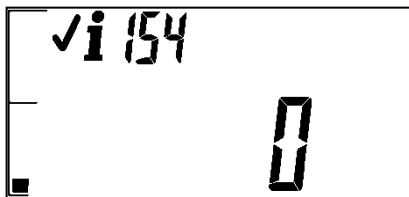
In emergency mode the display of negative credit is always enabled irrespective of the configuration setting of the meter. In these modes however the spanner icon will remain off.

Life line credit operating region

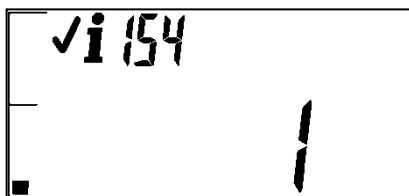
Short code: #154#

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.

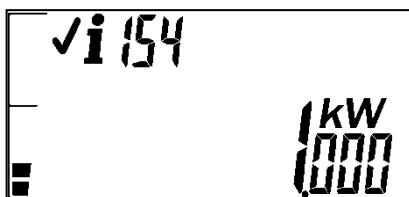
You can configure a load limit independent of the standard maximum load limit as defined in IEC62055-41, so that a punitive load restriction can be imposed when operating in this region.



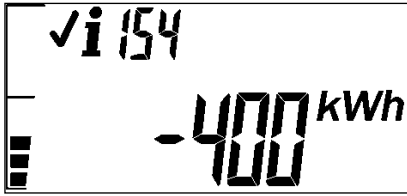
Menu item 1 displays that the life line credit operating region is disabled.



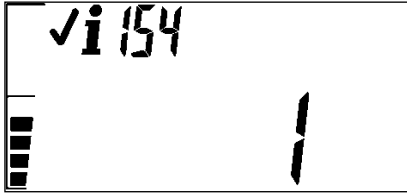
Menu item 1 displays that the life line credit operating region is enabled.



Menu item 2 displays the load restriction value in watts.

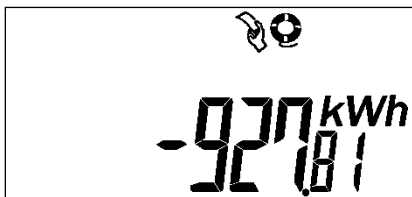


Menu item 3 displays the value of the credit region threshold.



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

When the remaining credit reaches a programmable life line credit threshold the life buoy icon must be permanently on indicating that the consumer is operating on life line credit. The hand icon will also be on as the meter has reached zero credit.



In lifeline mode the display of negative credit is always enabled irrespective of the configuration setting of the meter . In these modes however the spanner icon will remain off.

Viewing consumption information

The BEC23(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)

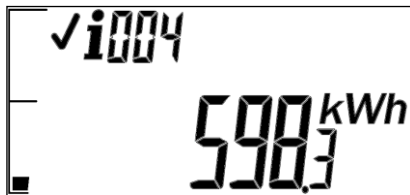
Short code: #004#

MTTD

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

UTTD

This is 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 customers to view their consumption.

- Enter #087# on the keypad to view the consumption since the counter was last reset.
- Enter #044# to reset the counter to zero.

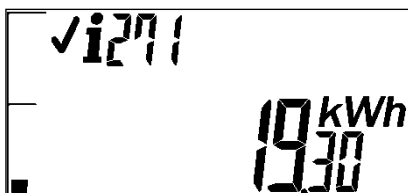
Estimated average daily and 30 day consumption

Short code: #271#

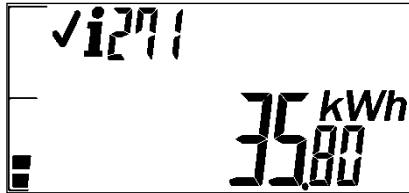
- **Estimated average daily consumption**
An approximate calculation of the consumption for the next 24-hour period. It is based on the average consumption over the last seven days of active consumption.
- **Estimated average 30 day consumption (monthly)**
An approximate calculation of the consumption for the next 30 day period. It is based on the average consumption over the last seven days of active measurement.

Note

The meter requires a full seven 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 daily consumption.

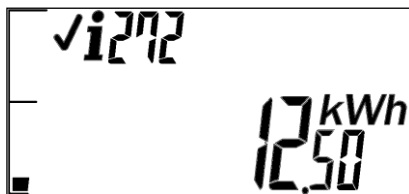


Menu item 2 displays the estimated average 30 days consumption.

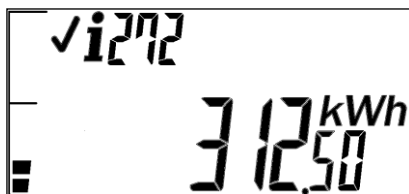
Last hour, last 24 hours and last 30 days consumption

Short code: #272

- **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 the depletion of credit.

- **Actual time remaining**

This is 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**

This is 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, i.e. 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 BEC23(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#

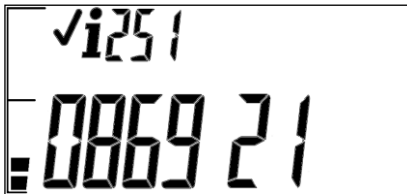
You can view a history of the last ten meter specific tokens entered, including the Conlog meter service tokens, via short codes.

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.



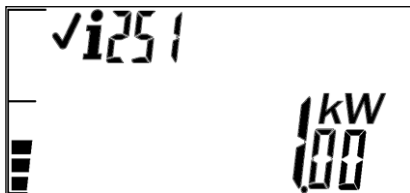
Menu item 1 displays the token class and sub class.



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 codes: #200# to #209#

The history of the last five tokens entered, including their token ID and value, can be viewed through short codes.

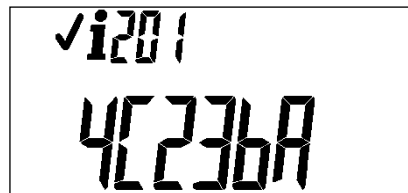
The short codes show the token history sequentially. So, code #200# displays the value of the most recent token entered, #201# the token ID of the most recent token entered, #202# the value of the second most recent token entered, #203# the ID of the second most recent token entered, and so on, up to #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 USB-type port is still fully operational.

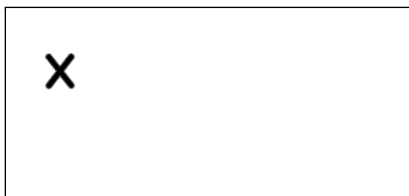
Icons

General

Cross / Tick: Token or short code accept / reject

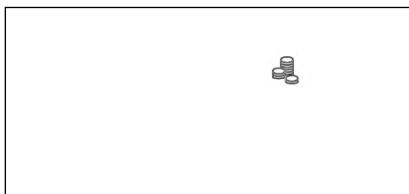


This icon is used to indicate the successful processing of a token or short code entered into the meter.



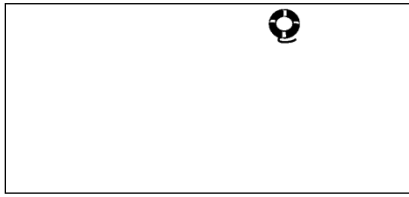
This icon is used to indicate the rejection of a token or short code entered into the meter.

Money: Currency units



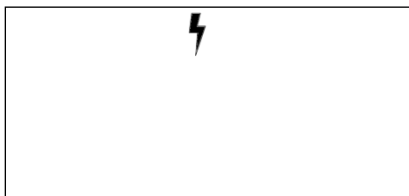
This icon is used to indicate a meter operating in currency units. For meters that do not support currency units this icon must remain off.

Life Buoy: Emergency and life line operational modes



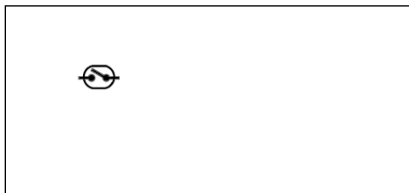
This icon is used to indicate if the meter is operating in either emergency or life line mode. Flashing signifies that emergency credit mode is active and permanently on indicates that life line mode is active.

Lightning bolt: Latch status



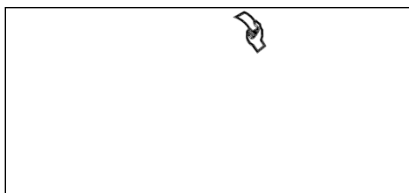
This icon is used to indicate the latch status. Permanently on signifies that the latch is connected and flashing indicates that the latch is disconnected.

Contact: Manual reconnect



This icon is used to indicate to the user that manual intervention is required to close the disconnect device. Manual intervention is required.

Hand / token: Enter token



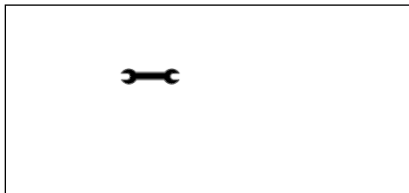
This icon is used to indicate that a token is required. Permanently on signifies that a token is required immediately before normal operation can continue (i.e.: credit token, clear tamper token etc). In terms of credit this applies to an available credit value of 0kWh or less. Flashing indicates that the consumer's credit has reached the programmable low credit threshold limit and a credit token will be required.

Information: Information function



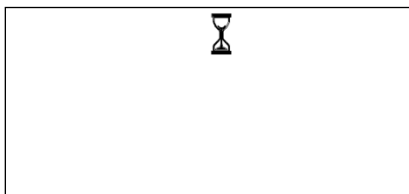
This icon is used to indicate that information is being requested by the user (i.e.: Short codes).

Spanner: Technical assistance required



This icon is used to indicate that a problem has occurred which requires technical assistance.

Hourglass: System busy



This icon is used to indicate that the system is busy with an internal process. Permanently on indicates that the system is busy and during this time the keypad will be disabled.

Clock: Timed load reduction



This icon is used to indicate that a load reduction, either scheduled or critical, is in effect. If the icon is on then a scheduled load reduction has been initiated. If flashing then a critical load reduction has been initiated.

Troubleshooting

Disconnection of supply

Automatic disconnection

The BEC23(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
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



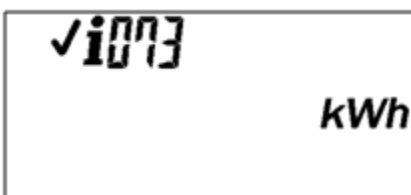
Over voltage



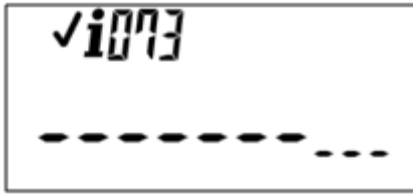
Under voltage



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.

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 is done using one of the following methods:

- Immediate reconnection.
- Timed reconnection.

Further, the supply can be reconnected via:

- Manual reconnection (consumer initiated reconnection).
- Automatic reconnection.

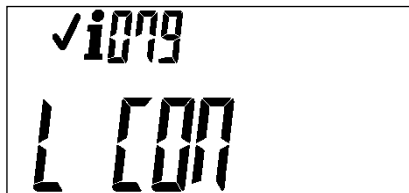
Consumer initiated reconnection

Short code: #079#

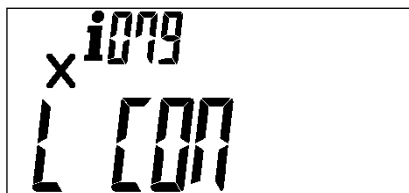
This short code is used to reconnect a consumer's supply, where manual reconnection is required. Consumers can also hold down the # key for three seconds.



Manual reconnection is required.



Manual reconnection has been performed.



Manual reconnection has not been performed.

NOTE: This short code is rejected for meters that are not able to reconnect the supply (i.e. meters with breakers).

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 be 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
- Over voltage
- Under voltage
- Line / load reversal
- Consumption restriction


Token errors


Display
 The display shows an 'X' above the word 'OPEN' in a stylized, segmented font.
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
<i>Commissioning:</i> install terminal cover and repeat the commissioning procedure. <i>Tamper:</i> install the tamper cover correctly and re-enter the clear tamper token.

Display
 The display shows an 'X' above a series of 'A's in a stylized, segmented font.
Description
Invalid token This occurs when authentication of a token fails.
Reason
One of the following reasons could be why the token is invalid: <ul style="list-style-type: none">• 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.

<ul style="list-style-type: none"> • 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
<ol style="list-style-type: none"> 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
<p>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.</p>
Reason
<p>The token entered is incorrect or invalid.</p>
To resolve
<p>The remaining lockout time is displayed. Once this time is complete, enter a valid token.</p>

Display

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

Display

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

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.

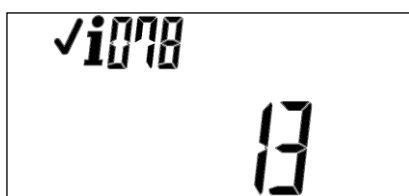
Display

Description
<p>Expired meter decoder key This occurs when the meter decoder key has expired.</p>
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
<p>Credit token with a DDTK key This occurs when the credit token entered is encrypted under a default key (DDTK).</p>

Display

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

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 using a default key type
13	CRC error: The data contained in the token cannot be verified and may be corrupted
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

DSP 34-1635 REV 0A three digit short codes

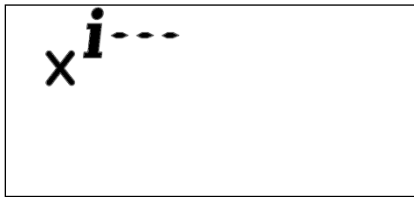
Standard defined items

The numeric digits at the top of the LCD will be used to indicate the test number specified in DSP 34-1635. The information icon must be displayed to indicate that information has been requested. The short codes are initiated as follows:

Hash key (#) (Short code) Hash key (#).

If fewer than 3 numeric digits are entered as a short code it must be formatted to 3 digits, left padded with zeros.

Non-supported short codes



When a short code is entered that is not supported the numeric digits at the top of the display must show dashes and the reject icon must be turned on. The default display must remain active.

Short codes index

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

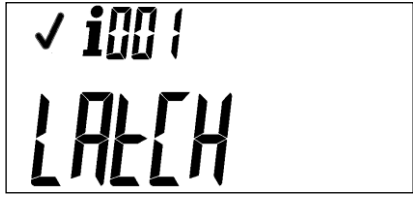
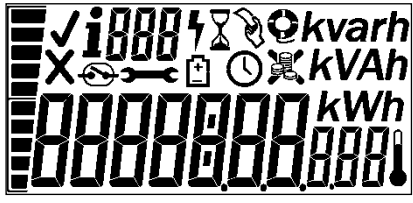
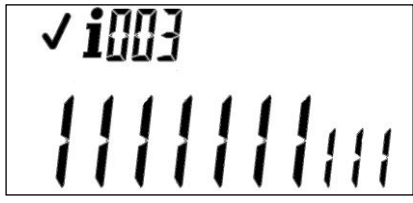
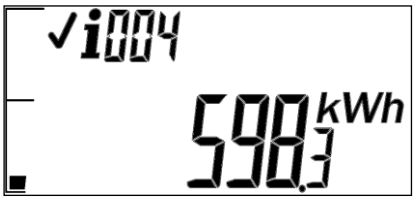

For information on how to use short codes, see the *Accessing information on the meter using short codes* section.


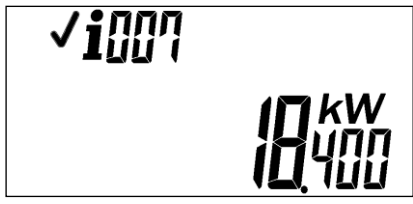
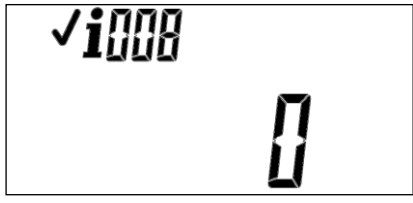



Standard definition items

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 UTDD	
005	Key revision and key type (STS4)	


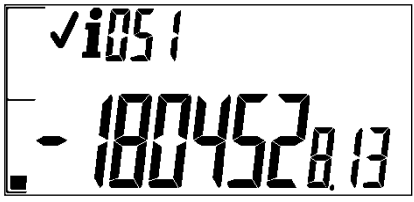
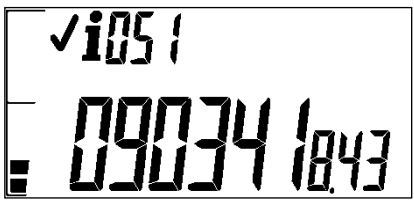
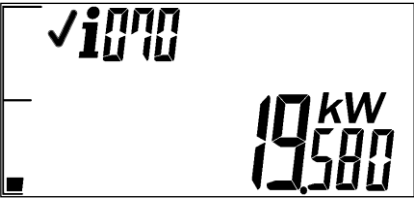
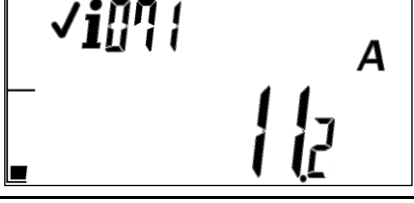
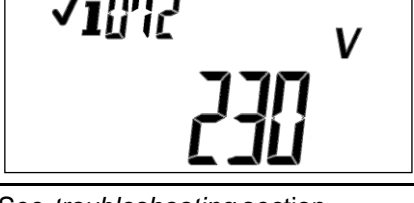
Short code	Description	Display
006	Tariff index (STS5)	
007	Maximum power limit (STS7)	
008	<p>Tamper status (STS8)</p> <p>A '0' indicates the meter is not in a tamper state</p> <p>A '1' indicates the meter is in a tamper state</p> <p>To perform these functions, tamper detection must be enabled on the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

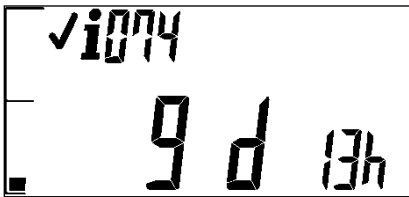

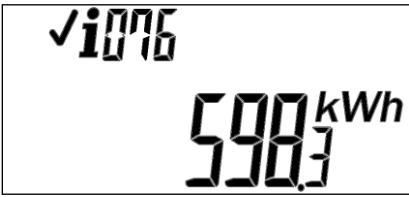



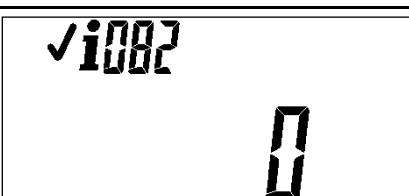

Manual configuration items

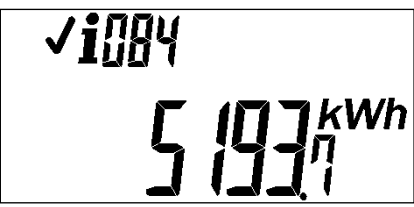
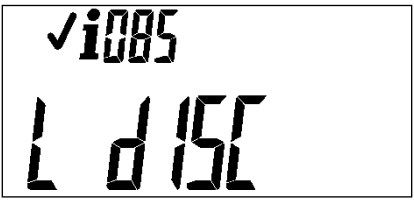
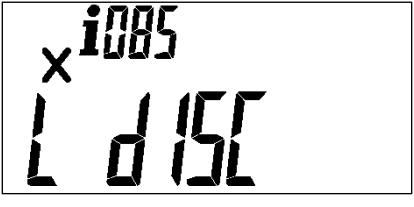
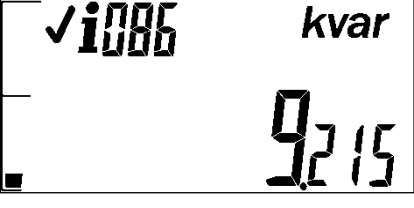
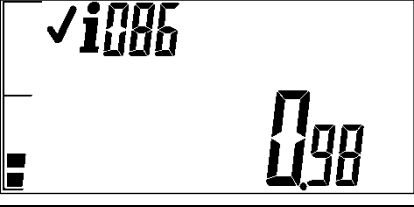
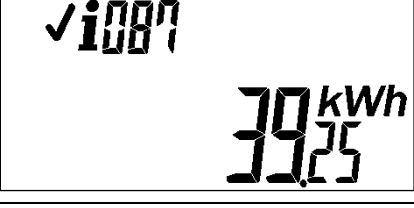
Short code	Description	Display
030	Display the supply group code	
031	Display the status register to determine if the meter is commissioned, un-commissioned, or in a tamper state	
032	View the meter's low credit warning limit	
033	View the meter's thermal trip limit. This is displayed as an ADC reference 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
037	View the meter's current trip limit. This is displayed in amperes	
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	
042	View the MCU's nominal voltage	
043	Commission the meter	
044	Reset the consumption counter	
047	View the available consumption	
048	Reserved	Not applicable
049	Reserved	Not applicable

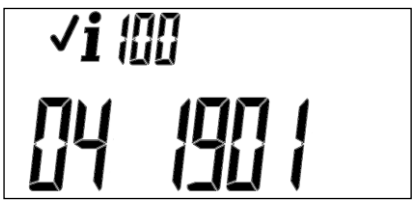
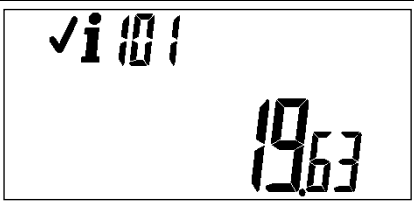
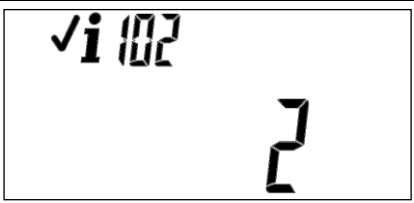

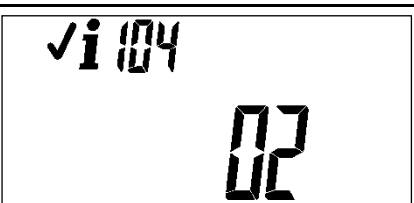
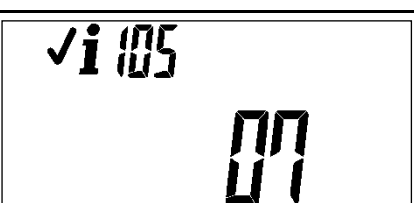
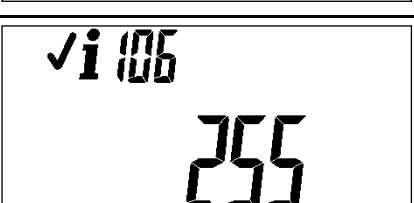
Status and measure items

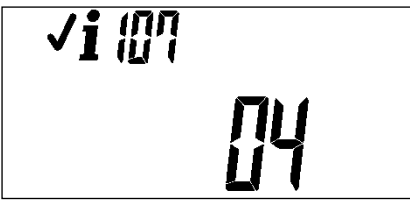
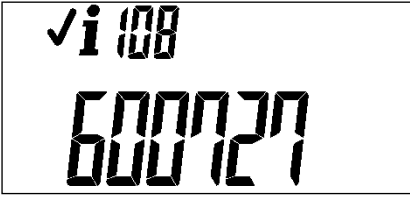
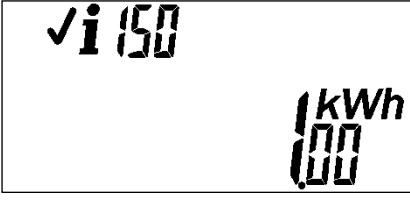
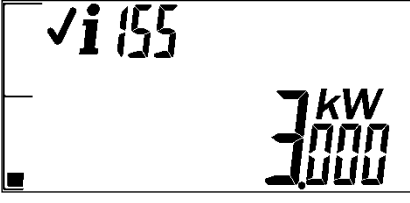
Short code	Description	Display
050	View the instantaneous power (STS09)	
051	View the meter's GPS co-ordinates The first menu displays the longitude, degrees, minutes, seconds and decimal fraction seconds The second menu displays the latitude, degrees, minutes, seconds and decimal fraction seconds	 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

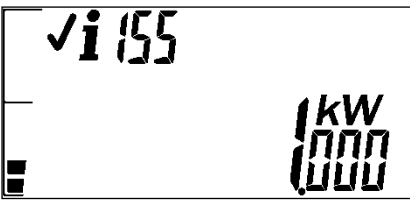
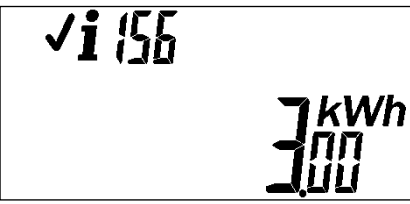
Short code	Description	Display
074	<p>View the time remaining until 0 kWh credit Can be displayed in hours and days</p> <p>The first menu indicates the time remaining till zero credit based on the current (instantaneous) consumption.</p> <p>The first menu indicates the time remaining till zero credit based on the average consumption over a 24 hour period.</p>	 
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 <i>trouble shooting section</i>	
079	Manually reconnect a consumer's supply	
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


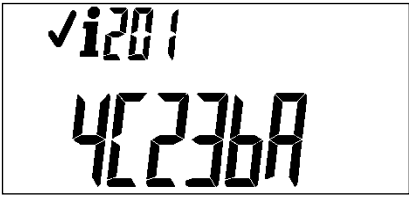

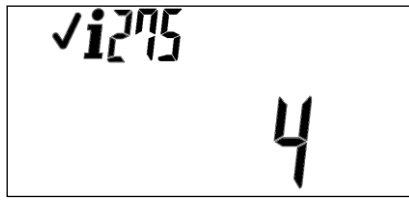

Factory configurable items

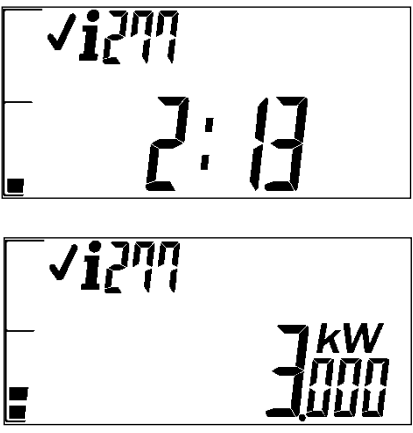
Short code	Description	Display
100	View the meter's serial number	
101	View the software version of the meter (STS10)	
102	View the primary VTC protocol map version	
103	View the primary VTC table ID (FOIN)	
104	View the primary token carrier	
105	View the primary encryption algorithm	
106	View the key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

Short code	Description	Display
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 <i>normal credit operating region</i> section
152	View information for the low credit operating region configuration (applicable to prepaid meters only)	See <i>low credit operating region</i> section
153	View information for the emergency credit operating region configuration (applicable to prepaid meters only)	See <i>emergency credit operating region</i> section
154	View information for the life line credit operating region configuration (applicable to prepaid meters only)	See <i>life line credit operating region</i> section
155	View the load management limits The first menu displays the scheduled load management restriction The second menu displays the critical load management restriction (applicable to wireless meters only)	

Short code	Description	Display
		
156	<p>View the administrator mode per hour allocation</p> <p>The display indicates the daily free basic electricity allocated in administration mode. (applicable to prepaid meters only)</p>	
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 <i>Last 10 meter specific tokens entered</i> section.
261 – 270	Reserved	N/A
271	View the estimated average daily and monthly consumption	See the <i>Estimated Average Daily and 30 Day Consumption</i> section.
272	View the consumption for the last 1 hour, 24 hours or 30 days	See the <i>Last Hour, Last 24-Hours and Last 30 Days Consumption</i> section.
273	View the number of supply interruption events	
274	View the number of meter tamper events	See the <i>Number of tamper events</i> 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

Short code – Detailed explanation

#000#: Dispenser test (STS0)

Perform tests 001 – 010

NOTE: The hash key can be used to advance to the next test without having to wait for the standard display time.

#001#: Load switch test (STS1)

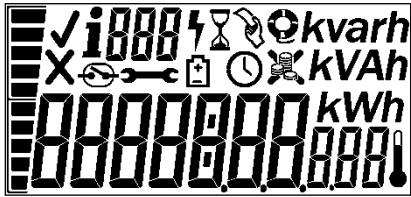


This test must be carried out only if the latch is currently in the closed position. If the latch is in the open position then the following display must be shown indicating that the short code has been successfully processed but the meter is not allowed to toggle the latch.



The status of the latch prior to the test must be restored once the test is completed.

#002#: Display test (STS2)



All segments of the LCD are to be turned on.

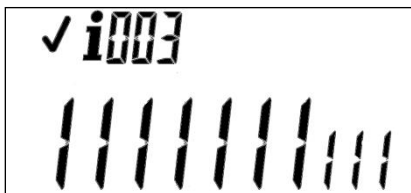
For the duration of the test the UIU rate LED must flash.

#003#: Input device test (STS6)

There initial display will be blank thereafter each key pressed on the keypad must be echoed to the display.



For numbers 0-9 the display will be filled with the value of the key pressed as shown below.



Pressing of the hash key must be displayed as shown below.



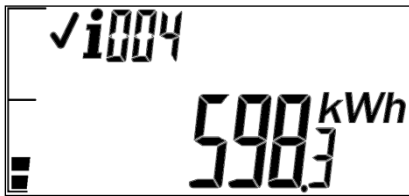
Pressing the back space key will terminate the test and revert to the default display.

#004#: Accumulated energy consumed (STS3)

This is the MTTD and UTDD. The bargraph segments must be used to indicate which menu item is currently being displayed. Pressing the hash key will scroll through the registers.



Index 1 is the MTTD register.



Index 2 is the UTDD register.

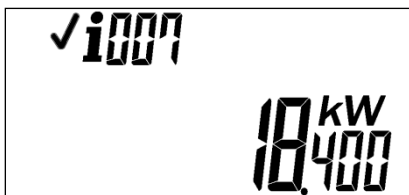
#005#: Key revision and key type (STS4)



#006#: Tariff index (STS5)



#007#: Maximum power limit (STS7)



#008#: Tamper status (STS8)

The tamper status must be displayed even if the meter has been configured not to display the tamper status.

If the meter is not configured as a tamper meter then the short code rejected message must be displayed.

If the meter is not configured as a tamper meter then this test must be skipped if part of short code test 000 or a non-supported short code message must be displayed of this test is invoked as short code test 008.



A '0' indicates that the meter is not in a tampered state.



A '1' indicates that the meter is in a tampered state.

#009#: Available credit



If the available credit balance is negative and the meter is configured not to display negative values then the display must show 0.00kWh as shown below. However if the meter is operating in the emergency or life line credit regions then a negative credit balance must always be displayed.



NOTE: A meter operating in post paid mode will always reject this short code.

011-029: STS reserved

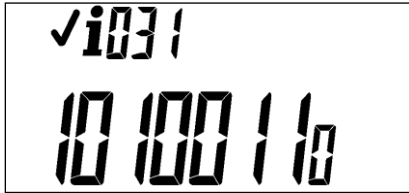
Manual configuration items

#030#: Supply group code



If a key change has been processed by the meter after leaving the factory the SGC will be cleared and as such must display all zeros as shown above.

#031#: Meter status register



This is a binary representation of the status register.

#032#: Low credit warning threshold

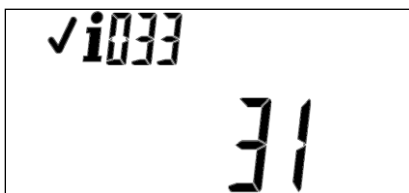


This is the level at which the meter will enter a low credit warning event.

NOTE: A meter operating in post paid mode will always reject this short code.

#033#: Temperature trip threshold

This is the level at which the meter will enter a thermal trip event. It is the ADC reference value and not the actual temperature in °C.



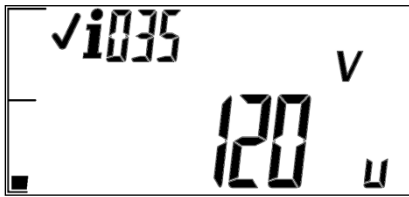
NOTE: for meters that do not measure temperature, this short code should be rejected.

#034#: Remaining reconnection time



This shows the time remaining before an attempted reconnection of the latch. It relates to all reconnect waiting periods such as a random reconnect period and timers associated with automatic reconnection algorithms. The format is hh:mm.ss.

#035#: Under / over voltage trip thresholds

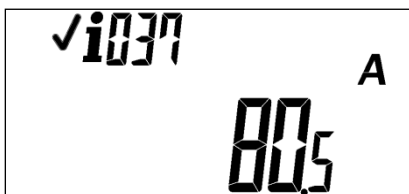


This is the level at which the meter will enter an under voltage trip event.



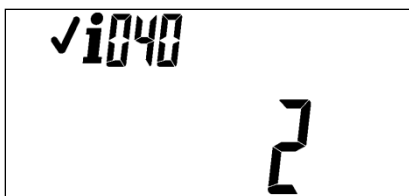
This is the level at which the meter will enter an over voltage trip event.

#037#: Maximum current trip threshold



This is the level at which the meter will enter an over current trip event.

#040# Primary VTC protocol version



The VTC version number references the version of the VTC interface specification that the product supports as stated in DSP 34-1635. It has a range of 2 – 255.

#042#: MCU Nominal Voltage



This displays the nominal voltage of the meter.

#043#: Commission meter

This short code provides the same functionality as the commissioning token .



The above display indicates a successful commissioning process.



If the meter detects that the tamper switch is still indicating a tamper condition this process must be rejected and the UIU must reflect the display shown above.

#044#: Reset consumption counter



This allows the user to reset the consumption counter.

#045#: Load appliance device pairing

This short code is used to pair a load appliance device to a specific MCU.

Once the short code is entered a switch grouping must be selected by pressing keys 0, 1, 2, 3, 4 or 5 followed by the hash key. The group selected will be shown on the display.



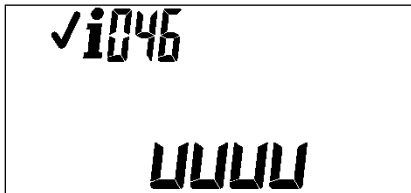
NOTE: A successful short code process will always be displayed as there is no feedback from the load appliance device to confirm that pairing was successful.

#046#: Set load appliance device state

This short code is used to allow a consumer to change the state of load appliance devices. Each load appliance device is assigned a group during the pairing process. The user may toggle the state of all load appliance devices assigned to a specific group.

Once the short code is entered the display will show the current state of the load device groups (groups 1 to 4). To toggle the state of a group the consumer must press 1, 2, 3 or 4 on the keypad. Pressing the hash key will commit the required change.

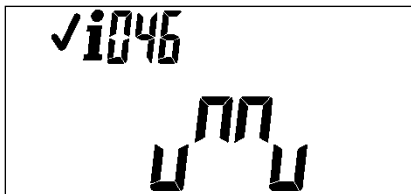
NOTE: Group 5 is assigned to a load appliance device that is under Utility control and therefore cannot be switched by the consumer.



This display shows all load appliance device groups in the off state. Group 1 is shown on the far left with groups 2, 3 and 4 following in sequence.



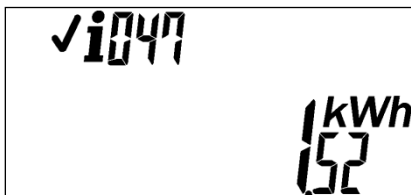
This display shows all load appliance device groups in the on state.

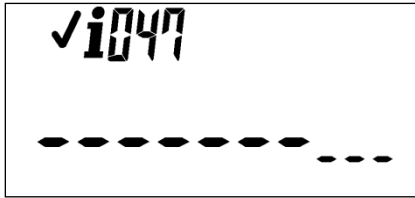


This display shows load appliance device groups 1 and 4 in the off state and groups 2 and 3 in the on state.

#047#: Available Consumption

This short code is used to indicate the remaining consumption available when consumption restrictions are applied.





If consumption restriction is not enabled then the above display must be shown.

#048#: Reserved



The use of this function is restricted and will not be detailed here.

#049#: Reserved



The use of this function is restricted and will not be detailed here.

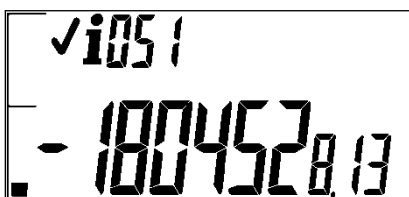
Status measured items

#050#: Instantaneous power (STS9)

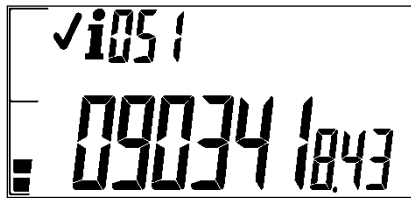


#051#: GPS coordinates

The GPS coordinates reference the geographical position of the installed meter. The coordinates are displayed on two screens.



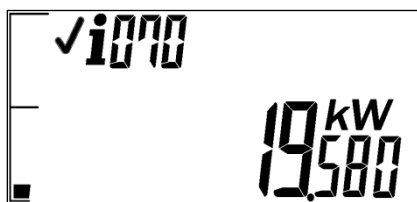
The first menu displays the longitude, degrees, minutes, seconds and decimal fraction seconds.



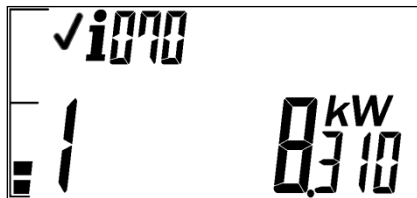
The second menu displays the latitude, degrees, minutes, seconds and decimal fraction seconds.

#052#-#069#: STS reserved

#070#: Power consumption per phase



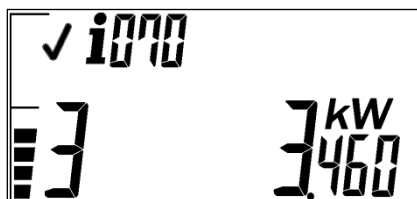
The initial display will display the total average power consumption for all three phases of a three phase meter. For single phase meters this is simply the average power and no menu index must be displayed.



Pressing the hash key will display the average power consumption on phase 1 of a three phase meters. This menu will not be supported by single phase meters.



Pressing the hash key will display the average power consumption on phase 2 of a three phase meters. This menu will not be supported by single phase meters.



Pressing the hash key will display the average power consumption on phase 3 of a three phase meters. This menu will not be supported by single phase meters.

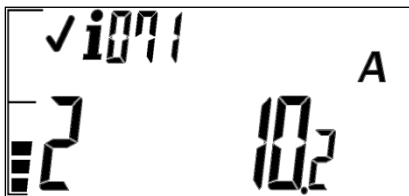
#071#: Current consumption per phase



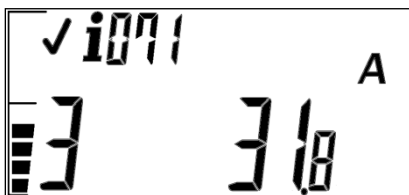
The initial display will display the total average current consumption for all three phases of a three phase meter. For single phase meters this is simply the average current and no menu index must be displayed.



Pressing the hash key will display the average current consumption on phase 1 of a three phase meters. This menu will not be supported by single phase meters.



Pressing the hash key will display the average current consumption on phase 2 of a three phase meters. This menu will not be supported by single phase meters.



Pressing the hash key will display the average current consumption on phase 3 of a three phase meters. This menu will not be supported by single phase meters.

#072#: Average voltage per phase



The above display applies to a single phase meter only and shows the average voltage measured.



For three phase meters the initial display will show the average voltage measured on phase 1.



Pressing the hash key will display the average voltage measured on phase 2 of a three phase meters.



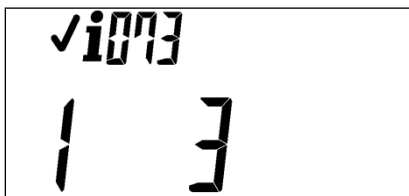
Pressing the hash key will display the average voltage measured on phase 3 of a three phase meters.

#073#: Reason for last disconnect

This short code will display the last abnormal trip event that caused the consumers load to be disconnected. The trip events are displayed below. Other trip events such as zero credit and tamper are not included as these are displayed as part of the default display.

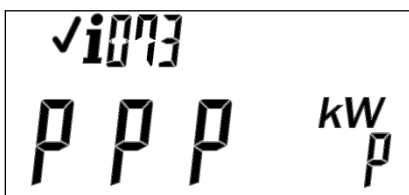
In the displays that follow 'P' 'P' 'P' 'n' indicate the phases on which the trip event occurred. This is true for three phase meters only.

The following indicates a trip event on phases 1 and 3.



For single phase meters no reference to phases will be displayed.

Power overload



Current overload



Power unbalance



Over voltage



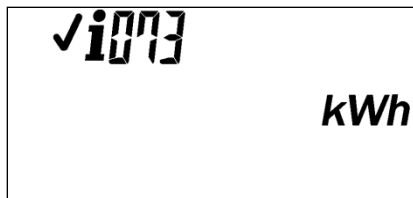
Under voltage



Line / load reversal



Over Consumption

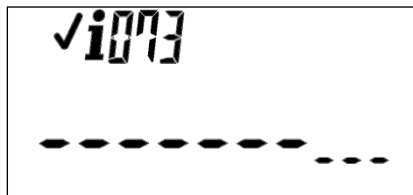


Over consumption will occur when the meter runs out of allocated consumption.

Earth Leakage Trip



No abnormal trip registered



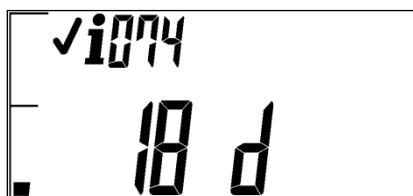
#074#: Time remaining till zero credit

The time remaining till zero credit indicates how much time is remaining until the consumers credit is depleted and will be represented as follows:

- The time remaining based on current consumption and
- The time remaining based on the average consumption over a 24 hour period.

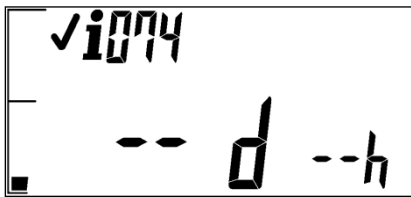
Both displays will be expressed in days and hours as follows:

- If the time remaining is greater than 10 days then the remaining time will be displayed in days.
- If the time remaining is greater than 1 day but less than 10 days then the remaining time will be displayed in days and hours.
- If the time remaining is less than 1 day then the remaining time will be displayed in hours.

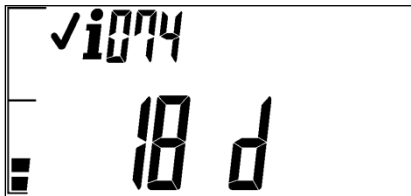




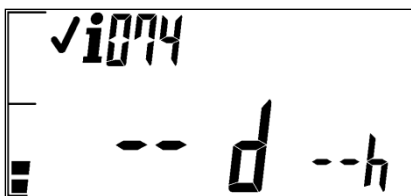
The graphics above are examples of the time remaining till zero credit based on the current (instantaneous) consumption.



If no consumption is measured then the time remaining must be displayed as shown above.



The graphics above are examples of the time remaining till zero credit based on the average consumption over a 24 hour period.



If a full 24 hour period has not elapsed or if the meter is operating in arrears i.e.: emergency or life line the time till zero credit must be displayed as shown above.

NOTE: A meter operating in post paid mode will always reject this short code.

#075#: RF signal strength



#076#: User total consumption to date

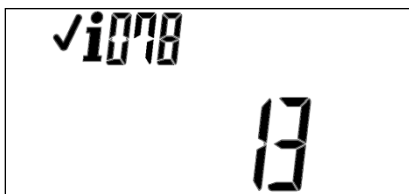


#077#: Total credit entered



NOTE: A meter operating in post paid mode will always reject this short code.

#078# STS Token result



The display shows the decimal value held in the Token status register as defined in IEC62055-52 clause 6.8.3.7. An extract of the status register values is shown below.

Value	Context
0	Reserved for future assignment
1	Accept
2	1stKCT

3	2ndKCT
4	OverflowError
5	KeyTypeError
6	FormatError
7	RangeError
8	FunctionError
9	OldError
10	UsedError
11	KeyExpiredError
12	DDTKError
13	CRCErrror
14	MfrCodeError
15	TokenLockoutStatus
16	TokenStatusNotReady
17 – 255	Reserved for future assignment

#079#: Manual reconnect



The screen above indicates that a manual reconnection has been performed.



The meter must only accept a manual reconnect instruction if the cause for the disconnection is configured for manual reconnection. If the trip event is not configured for manual reconnection then the meter must reject the manual reconnection attempt as shown on the screen above. If the meter has been remotely disconnected manual reconnection must be rejected irrespective of the trip event that may have occurred.

This function can also be performed by pressing the hash key.

NOTE: This short code is rejected for meters that are not able to reconnect the supply (i.e. meters with breakers).

#082#: Display tamper switch status

The physical state of the tamper switch must be displayed even if the meter has been configured not to display the tamper status.

If the meter is not configured as a tamper meter then the short code must be rejected.



A '0' indicates that the tamper switch is closed (i.e.: the meter is not in a tampered state).

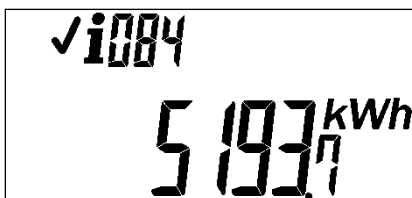


A '1' indicates that the tamper switch is open (i.e.: the meter is in a tampered state)

#083#: Not used (reserved)

#084#: Last post paid / prepaid tenancy change MTTD register

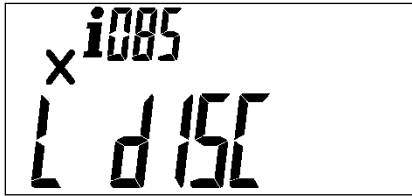
The following displays the MTTD register that has been backed up after a successful mode change



#085#: Manual disconnect

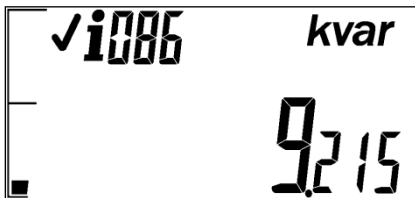


The screen indicates that the manual disconnection has been performed.

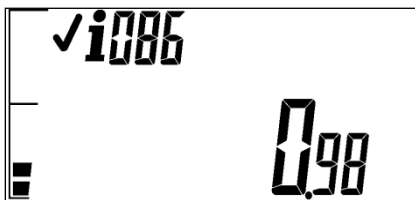


If for any reason disconnection of the latch is not allowed, i.e.: in an extreme over current condition or if the meter is not configured for manual disconnection, manual disconnection must be rejected as shown in the screen above.

#086#: Reactive power and Power factor



The first menu displays the reactive power. This is an approximate value only and does not adhere to the same class specification as active power measurement.



The second menu displays the power factor. This is an approximate value only.

#087#: Display consumption counter



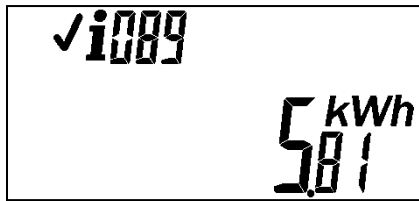
#088#: Currently active load limit value



This displays the currently active load limit.

#089#: Available administrator mode credit

The following displays the amount of administrator mode credit (FBE) available.



#090# Average Earth Leakage Current

The following displays the average earth leakage current.



NOTE: The short code is to be rejected on non earth leakage meters.
#091#-#099#: Not used

Manufacturing configuration

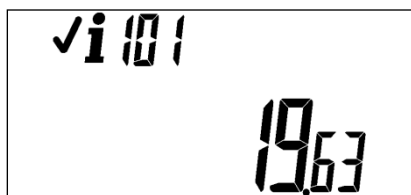
#100#: Meter number



The meter serial number will scroll from right to left and displayed in the following format.

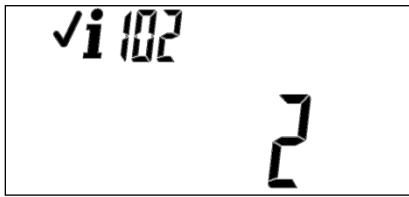
Serial Number Format: 04 1901 3121 8

#101#: Meter firmware version (STS10)



This is the software version of the MCU.

#102#: Primary VTC protocol version



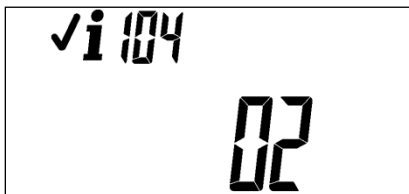
The VTC mapping number references the VTC map version as stated in DSP 34-1635. It has a range of 2 – 255.

#103#: Primary VTC table ID (FOIN)



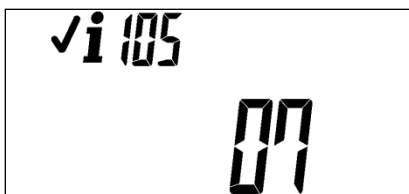
The following displays the FOIN as allocated by the STS Association in the companion specification for the RegisterTable instance that is implemented.

#104#: Primary token carrier type



This displays the primary token carrier type of the meter.

#105#: Primary encryption algorithm



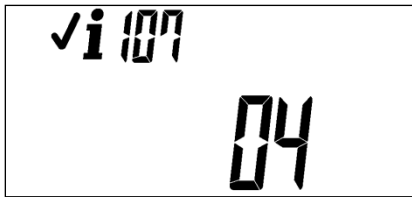
This is the primary encryption algorithm as defined in IEC62055-41.

#106#: Key expiry number



This displays the key expiry number configured in the meter.

#107#: Manufacturer code



This is the manufacturer code as allocated by the STS association

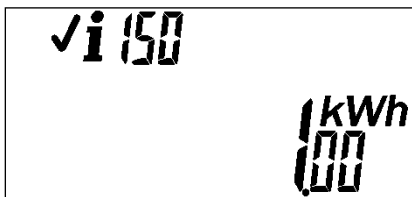
#108#: IIN (Issuer identification number)



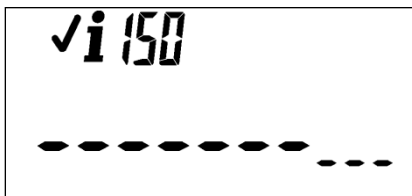
This is the issuer identification number (IIN) as defined in IEC62055-41.

#109#-#149#: STS reserved

#150#: Daily consumption restriction

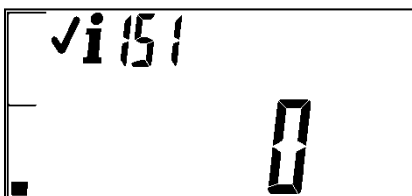


This is the allocated consumption per 24 hours.

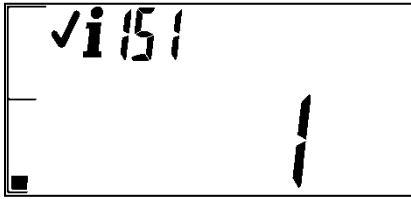


If consumption restriction is not enabled then the above display must be shown.

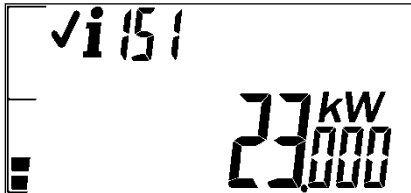
#151#: Normal credit region configuration



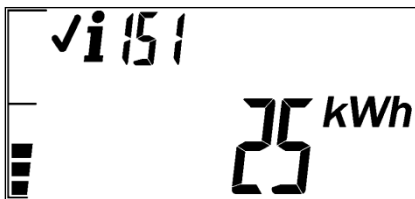
Credit region disabled



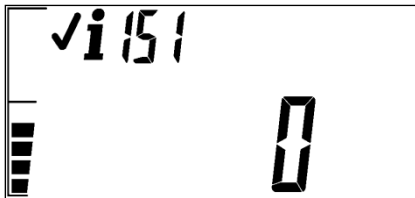
Credit region enabled



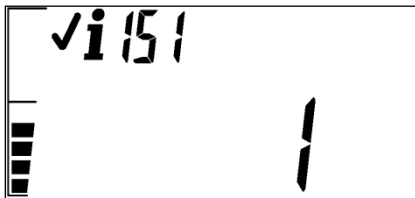
Load restriction value in watts



Next credit region threshold



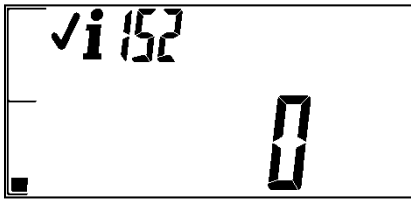
Trip at the next credit region threshold disabled



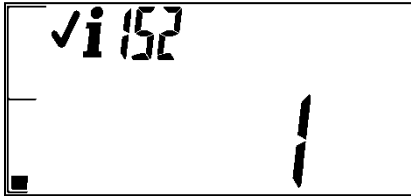
Trip at the next credit region threshold enabled

NOTE: A meter operating in post paid mode will always reject this short code.

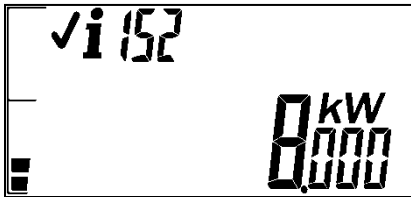
#152#: Low credit region configuration



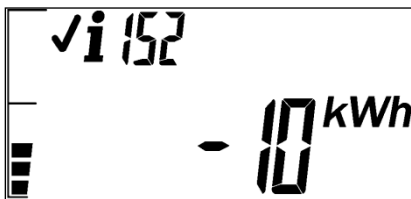
Credit region disabled



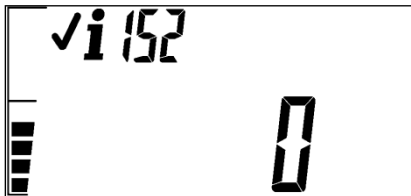
Credit region enabled



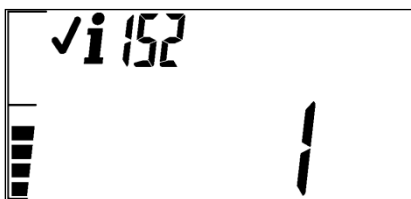
Load restriction value in watts



Next credit region threshold



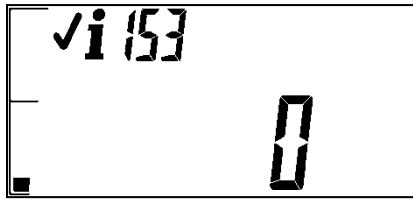
Trip at the next credit region threshold disabled



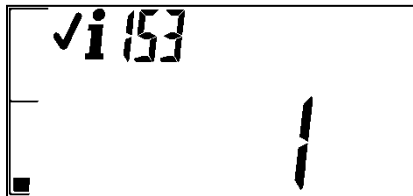
Trip at the next credit region threshold enabled

NOTE: A meter operating in post paid mode will always reject this short code.

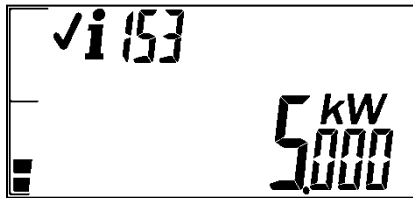
#153#: Emergency credit region configuration



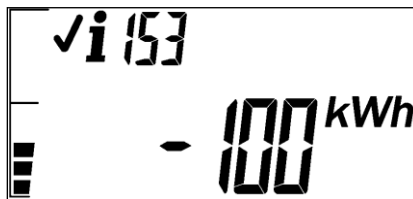
Credit region disabled



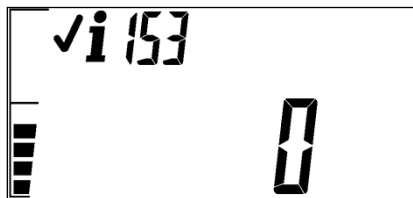
Credit region enabled



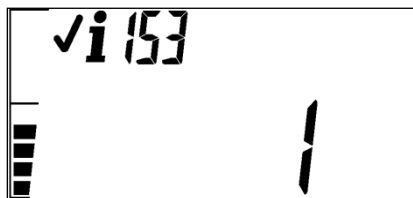
Load restriction value in watts



Next credit region threshold



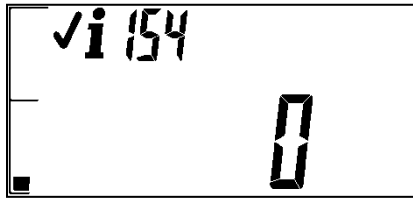
Trip at the next credit region threshold disabled



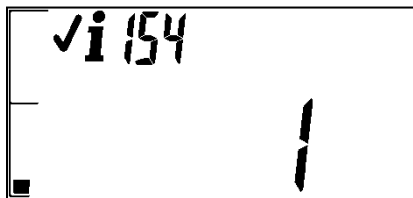
Trip at the next credit region threshold enabled

NOTE: A meter operating in post paid mode will always reject this short code.

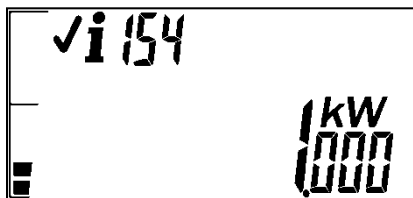
#154#: Life line credit region configuration



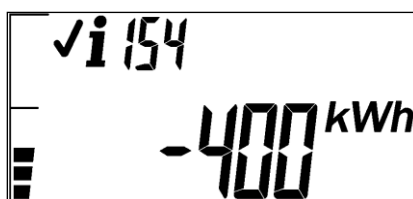
Credit region enabled



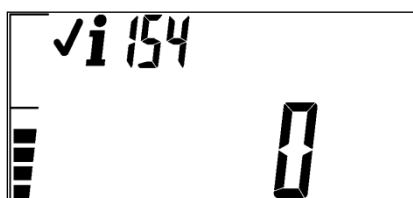
Credit region disabled



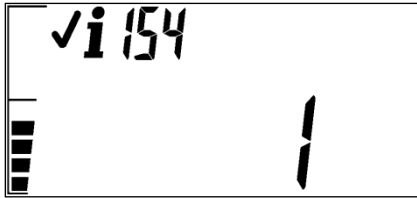
Load restriction value in watts



Next credit region threshold



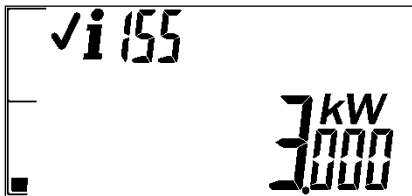
Trip at the next credit region disabled



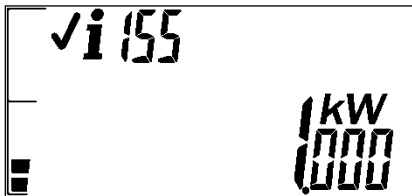
Trip at the next credit region enabled

NOTE: A meter operating in post paid mode will always reject this short code.

#155#: Load management restriction settings

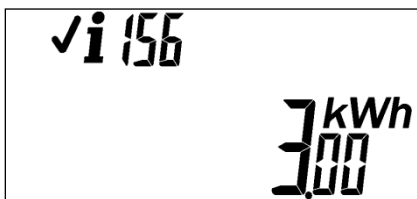


The first menu index displays the scheduled load management restriction in kW's

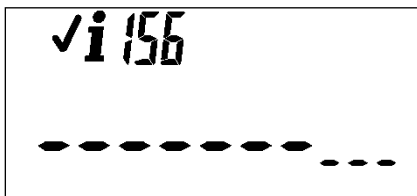


The second menu index displays the critical load management restriction in kW's

#156#: Administrator mode daily allocation



This displays the daily free basic electricity allocated in administration mode.



If administration mode is not enabled then the above display must be shown.

NOTE: A meter operating in post paid mode will always reject this short code.

#157#-#199#: Not used

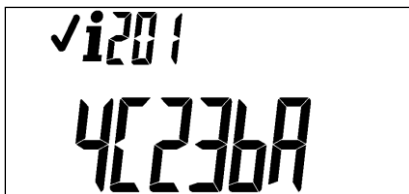
Operational statistics

#200#: Value of last credit token entered



NOTE: A meter operating in post paid mode will always reject this short code.

#201#: ID of last credit token entered



This display shows the hexadecimal representation of the token identifier (TID) of the last credit token entered into the meter.

NOTE: A meter operating in post paid mode will always reject this short code.

#202#: Value of 2nd last credit token entered

#203#: ID of 2nd last credit token entered

#204#: Value of 3rd last credit token entered

#205#: ID of 3rd last credit token entered

#206#: Value of 4th last credit token entered

#207#: ID of 4th last credit token entered

#208#: Value of 5th last credit token entered

#209#: ID of 5th last credit token entered

#210#-248#: Value of 6th last (to 25th) credit token entered

Not implemented.

#211#-#249#: ID of 6th last (to 25th) credit token entered

Not implemented.

#251#: Most recent token (Class, subclass, 20 digits, value)

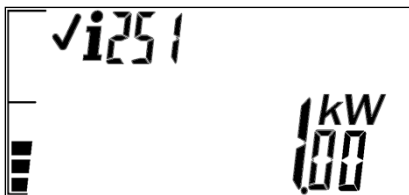


This short code will display the class, sub-class, token and token value of the last meter specific token entered into the meter.

The initial display after the short code is initiated shows the token class and sub class.



Pressing the hash key will then display the actual 20 digit token scrolling from right to left in five groups of 4 digits. The full token shown in the displays above is 0869 2155 0673 4928 1121.



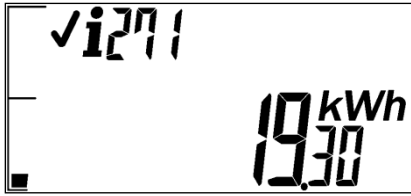
Pressing the hash key will then display the value or transaction amount contained within the token. This display will only apply to tokens that contain a transfer amount.

#261#-#270#: Not used

#271#: Estimated average daily and 30 day consumption

This short code will display the estimated average daily and 30 day consumption buffers.

Each menu is indexed and the hash key is used to move through the registers.



The first element shows the estimated average daily consumption.



The second element shows the estimated average 30 day consumption.

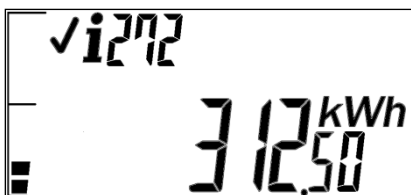
#272#: Last hour, 24 hour and 30 day consumption totals

This short code will display the last hour, 24 hour and 30 day consumption buffers.

Each menu is indexed and the hash key is used to move through the registers.



The first element shows the last hours total consumption.



The second element shows the last 24 hours total consumption.

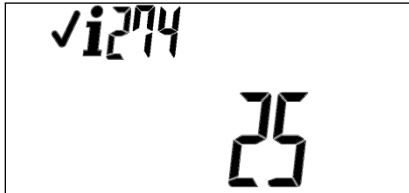


The third element shows the last 30 days total consumption.

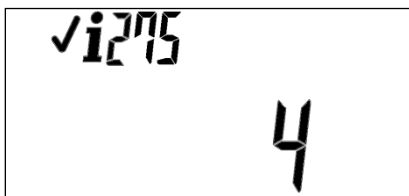
#273#: Number of supply interruptions



#274#: Number of tamper detections



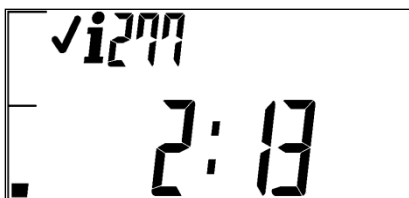
#275#: Lost communications counter



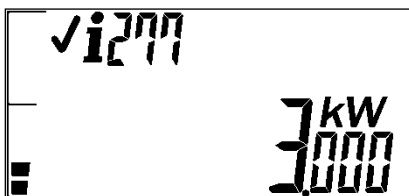
#276#: Eeprom memory data dump



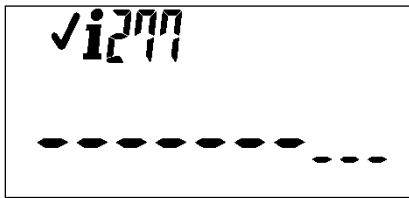
#277#: Active load restriction duration and value



The first menu index displays the time remaining. The maximum is 24 hours in 1 minute increments.



The second menu index displays the active load restriction value in watts



If no load restriction is in force then the above display must be shown.

#278#-#299#: Not used

Water tariff

#300#: Water factor (STS12)

#301#-#399#: STS reserved

Electricity tariffs (e.g.: currency, block and time of use)

#400#: Tariff rate (STS13)

#401#-#499#: Manufacturer specific

#450#-#999#: STS reserved

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
E10	Software error - contact Conlog
E20	Remote disconnection initiated

Error codes

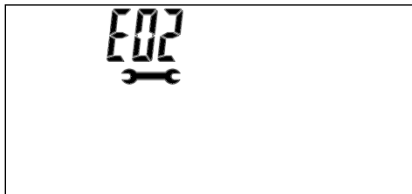
During the display of an error code condition no information may be retrieved from the MCU. Engineering reserved short codes and UIU specific information must still be allowed. Unless otherwise specified, only the error code and spanner icon are to be present on the display.

E01



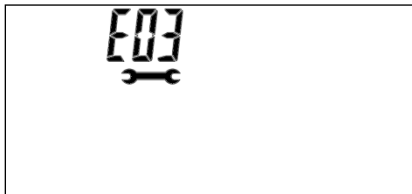
Eeprom is not initialized.

E02



Eeprom is initialized but the meter is not calibrated.

E03



Eeprom corruption has been detected.

E04



No supply voltage is present. This error message should no longer be supported and the meter should operate normally.

E05



Error code is reserved.

E06



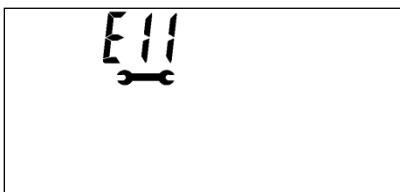
Error code is reserved.

E10



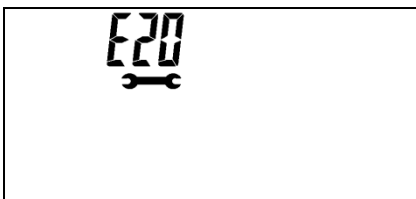
This error indicates that a software error has been detected.

E11



This error indicates that a fault has been detected with the earth leakage measurement circuit.

E20



This error code indicates that a remote disconnection has been initiated in the meter. This display will only be cleared once the meter has received a reconnect token. This error code must behave as an icon such that all other default display items remain visible.

Class 0 Tokens

Credit (kWh)



The credit value contained in the token will be displayed with a resolution of 10Whs although the token value is in 100Wh increments. The last decimal will always be zero.

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

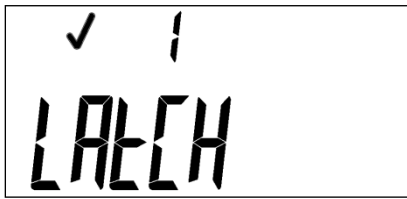
Class 1 tokens

STS0 – Test Token [5649 3153 7254 5031 3471]

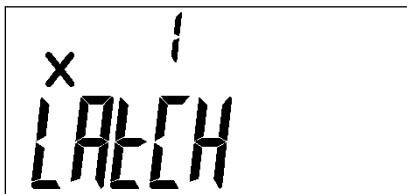
Perform STS test 1 – 11 as defined in sections 0 to 0 in the sequence in which they occur. The STS test number must be displayed in the top numeric digits, however, unlike the short codes the information icon must not be turned on and the test number must not be left padded with zeros.

NOTE: The hash key can be used to advance to the next test without having to wait for the standard display time.

STS1 – Test load switch [0000 0000 0001 5099 7584]

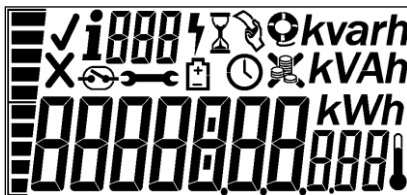


This test must be carried out only if the latch is currently in the closed position. If the latch is in the open position then the following display must be shown indicating that the token has been successfully processed but the meter is not allowed to toggle the latch.



The status of the latch prior to the test must be restored once this test is completed.

STS2 – Test information display devices [0000 0000 0001 6777 4880]

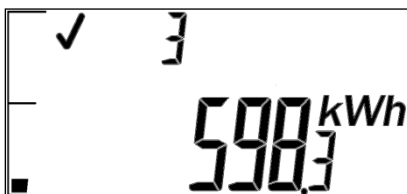


All segments of the LCD must be turned on.

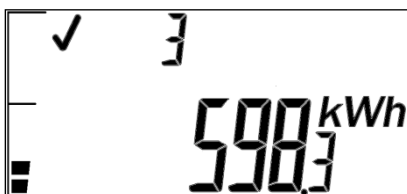
For the duration of the test the UIU rate LED must also be illuminated.

STS3 – Display cumulative kWh energy register totals [0000 0000 0002 0132 8896]

This is the MTTD and UTDD. The bargraph segments must be used to indicate which menu item is currently being displayed. Pressing the hash key will scroll through the registers.

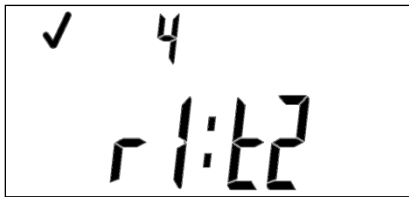


Index 1 is the MTTD.



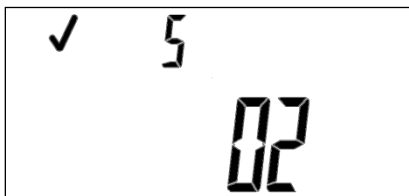
Index 2 is the UTTD.

STS4 – Display KRN [1844 6744 0738 4377 2416]



The key type must be included along with the key revision number.

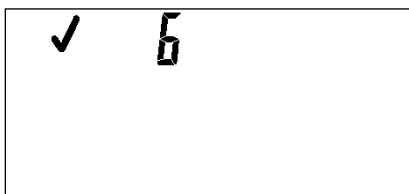
STS5 – Display the TI [3689 3488 1475 5332 2496]



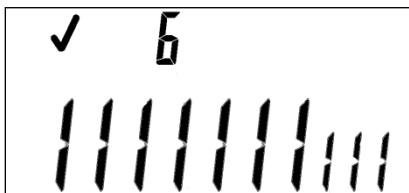
This displays the tariff index setting.

STS6 – Test token reader device [0000 0000 0006 7109 3248]

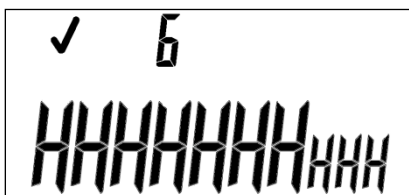
The initial display will be cleared. Each key pressed on the keypad thereafter must be echoed to the display.



For numbers 0-9 the display will be filled with the value of the key pressed as shown below.

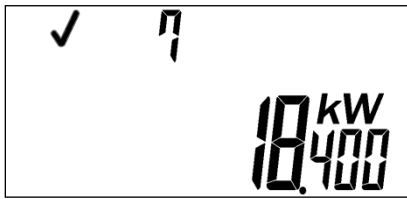


Pressing of the hash key must be displayed as shown below.



Pressing the back space key will terminate the test and revert to the default display.

STS7 – Display maximum power limit [0000 0000 0012 0797 4400]

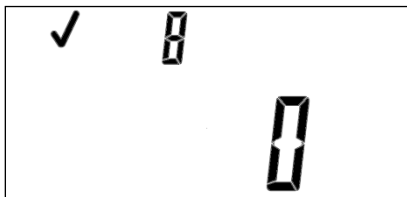


This displays the maximum load limit setting

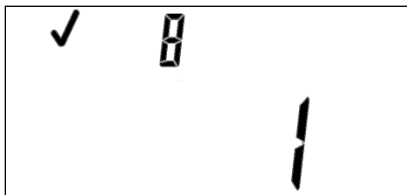
STS8 – Display tamper status [0000 0000 0022 8172 8512]

The tamper status must be displayed even if the meter has been configured not to display the tamper status.

If the meter is not configured as a tamper meter then this test must be skipped, if part of STS0, or a token rejected message must be displayed if the STS8 test token is entered.

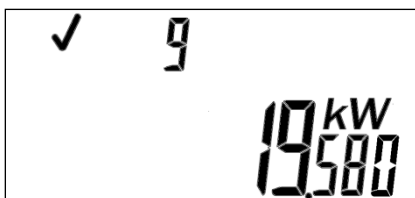


A '0' indicates that the meter is not in a tampered state.



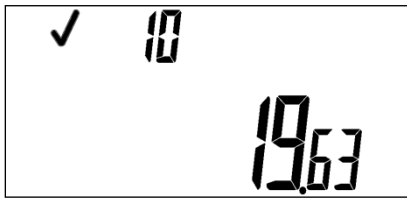
A '1' indicates that the meter is in a tampered state.

STS9 – Display power consumption [0000 0000 0044 2920 8064]



This displays the instantaneous measured power

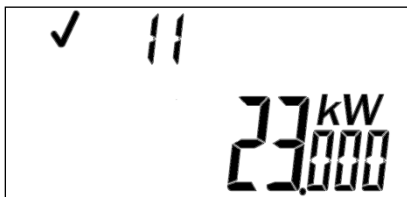
STS10 – Display MCU software version [0000 0000 0087 2419 5840]



This displays the meter software version.

STS11 – Display power unbalance limit [0000 0000 0173 1410 5857]

If the meter does not support phase unbalance then this test must be skipped, if part of STS0, or a token rejected message must be displayed if the STS11 test token is entered



This displays the maximum phase unbalance limit setting

STS12 – Reserved by STS Association

STS13 – Display tariff rate

Not supported

STS14 – STS36 – Reserved by STS Association.

Commissioning token [1275 4194 1448 6450 5970]



This token once accepted sets the commissioned status flag.

If the meter detects that the tamper switch is still indicating a tamper condition this process must be rejected.

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. These are 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**

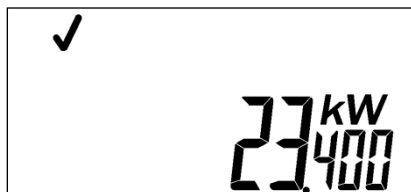
This configuration enables free allocations of electricity, such as grants, free basic electricity and poverty tariffs.

- **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.

Class 2 tokens

Maximum load limit



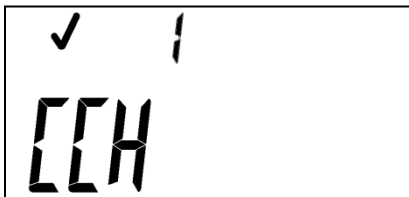
The maximum power limit value contained in the token is in watts.

Clear all / electricity credit

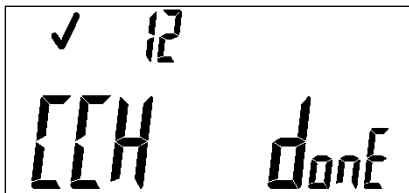


Key change tokens

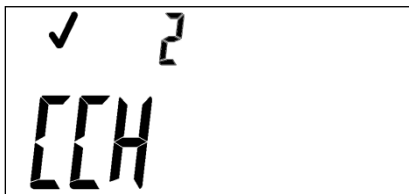
Successful processing of either token in a key change token pair is shown below. The top numeric digits are used to indicate the sequence in which the two tokens of the key change token pair were entered.



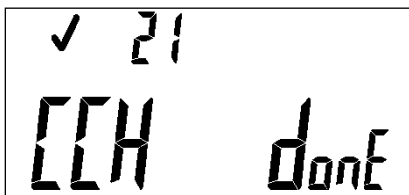
The above screen indicates the successful processing of token 1 as the first token entered of a key change token pair.



The above screen indicates the successful processing of token 2 of a key change token pair with token 1 already successfully processed.

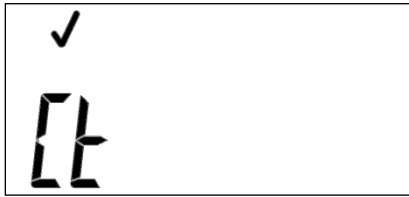


The above screen indicates the successful processing of token 2 as the first token entered of a key change token pair.



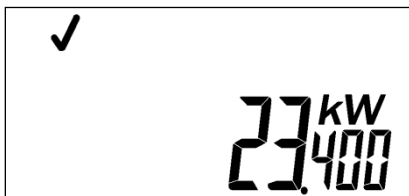
The above screen indicates the successful processing of token 1 of a key change token pair with token 2 already successfully processed.

Clear tamper



If the meter detects that the tamper switch is still indicating a tamper condition this process must be rejected and the UIU must reflect the display shown in section **Error! Reference source not found..**

Maximum phase unbalance



The maximum unbalanced power limit value contained in the token is in watts.

Set meter options register

This token has been removed.

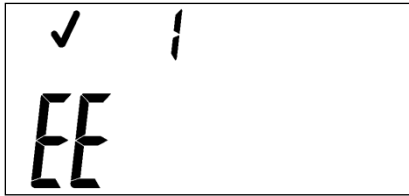
Decommissioning token



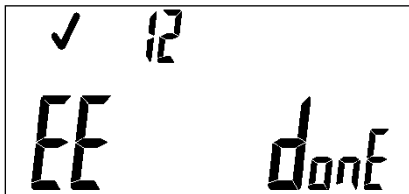
This is a meter specific proprietary token and performs the function of decommissioning a meter. This token once accepted clears the commissioned status flag. The actual token format will be defined during design.

Eeprom bit / byte / word writes

This is a pair of meter specific proprietary tokens that allow data to be written to any Eeprom address that is not protected. The first token contains the address of the data to be written and whether the write is a bit mask, byte or word write. The second token contains the actual data to be written. The actual token formats will be defined during design. The address and data tokens can be entered into the meter in any order.



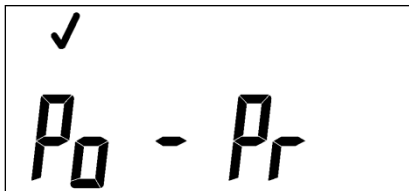
The above graphic shows the acceptance of the first of two eeprom tokens containing either the address and write type (i.e.: bit write etc) or the data to be written.



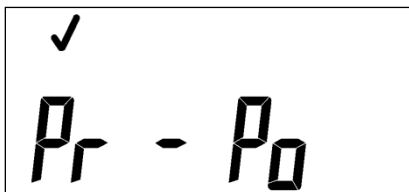
The graphic above shows a successful Eeprom write process with the acceptance of both the Eeprom address and Eeprom data tokens.

Post paid / prepaid

Two meter specific tokens will be used to swap the meter between post paid and prepaid operational modes and visa versa. The actual token format will be defined during design however no post paid to post paid or prepaid to prepaid mode options are to be supported.



The above screen shows an operational mode change from post paid to pre paid.

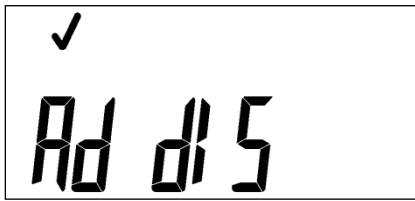


Service configuration



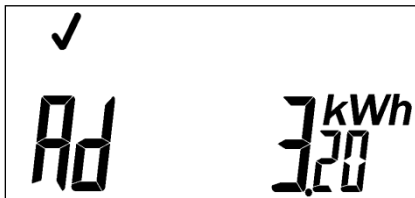
The above screen will only be displayed if this token is entered via the UIU.

Administrator mode disable



The above screen shows that Administrator mode has been disabled.

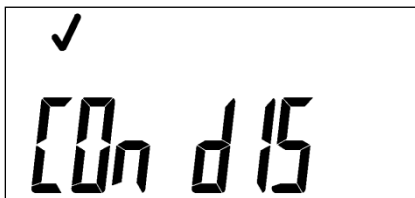
Administrator mode enabled with FBE allocation amount



The above screen shows that Administrator mode has been enabled with a FBE allocation of 3.20kWh in 24 hours.

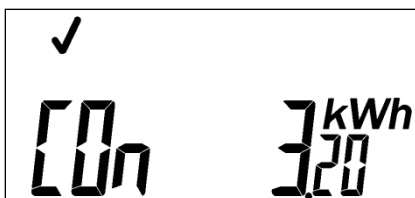
Note: If the FBE allocation amount is set to 0 then the currently configured allocation will be displayed.

Consumption Restriction disable



The above screen shows that consumption restriction has been disabled.

Consumption Restriction enabled with restriction value

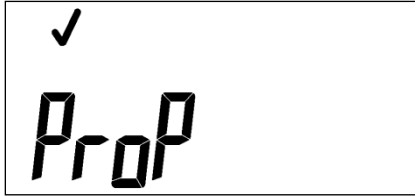


The above screen shows that consumption restriction has been enabled with a restriction value of 3.20kWh in 24 hours.

Note: If the consumption restriction value is set to 0 then the currently configured allocation will be displayed.

Legacy proprietary tokens

All proprietary tokens supported by legacy meters will display the following message once the token has been successfully played.



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 symbology 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.

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