Synetica enLink

Quick Start Guide

enLink Zone Plus

Wireless environmental sensor

- LoRa long range wireless
- Battery or externally powered
- Built in sensors for:

  - Temperature (°C)
  - Carbon Dioxide (CO_2)*
  - Barometric Pressure (Pa) *
  - Volatile Organic Compounds (VOC's) *
  - Humidity (%RH)
  - Presence (PIR)*
  - Light level (lux) *
  - Sound (dBA)*

Temperature | Humidity | Light level | VOC's | CO_2 | Pressure | Motion | Sound

enLink Zone Plus accurately measures multiple environmental parameters including room temperature, humidity, CO_2, VOC's, light level, pressure and sound level*.

Volatile Organic Compounds (VOC's) from paints (such as formaldehyde), lacquers, paint strippers, cleaning supplies, furnishings, office equipment, glues, adhesives and alcohol can be detected and reported down to the ppm range.

Readings are transmitted to the cloud using long range LoRa wireless, where the data can be displayed and analysed.

The unit can be either externally or battery powered for maximum flexibility.

A built in USB port allows all parameters including air quality data, wireless signal strength and wireless network configuration to be viewed and set using simple menus via any USB enabled host such as a PC or Mac.

Features

- Multiple sensor options*
- LoRa long range wireless
- Frequency Range 863-870MHz*
- Frequency Range 902-928MHz*
- Up to +18dBm Tx Power
- Built in USB port for power and configuration
- Battery or externally powered
- CE and FCC Compliant
- RoHS compliant
- Made in the UK

*Model dependent, see Selection Guide section

Introduction

LoRa devices can be configured using OTAA (Over-the-Air-Activation) or ABP (Activation-by-Personalisation).

OTAA is the most secure way to connect a device to the LoRa network. In OTAA, the device performs a Join-procedure with the network, during which a dynamic DevAddr (device address) is assigned and security keys are negotiated with the device.

ABP allows you to set the DevAddr as well as the security keys in the module. This is simpler than OTAA as there is no Join procedure, however, it is less secure than OTAA.

This guide will illustrate using OTAA as it is the most secure and flexible method.

The OTAA configuration requires the following parameters to be correctly set:

- DevEUI: End-device Identifier. It is unique for every device and is set at device manufacture.
- AppEUI: Application Identifier. Used to identify the end application.
- AppKey: Application key. Used to create the session keys.

For many applications Synetica can supply enLink Zone Plus units with the above parameters pre-configured, so providing the LoRa gateway has the matching keys the join process will happen automatically once the Zone Plus unit is in wireless range and switched on.

The DevEUI is always set at device manufacture and is unique. The device AppEUI and AppKey can easily be set via the USB connection if required and the process is detailed later in this document.

To get started with enLink Zone Plus wireless sensor, follow these steps:

1. Setup using Multitech Conduit® AEP

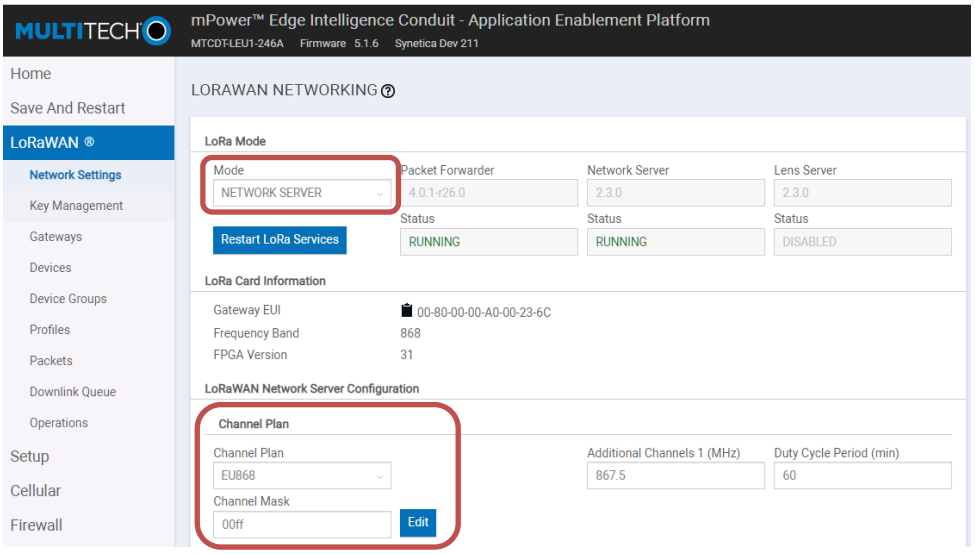
MultiTech's Conduit is a leading configurable, manageable, and scalable LoRa gateway and can be quickly and easily configured to create a LoRaWAN network with enLink LoRa devices.

To enable LoRa devices to connect to the Conduit the **AppEUI** and **AppKey** must be changed to match those of the enLink devices.

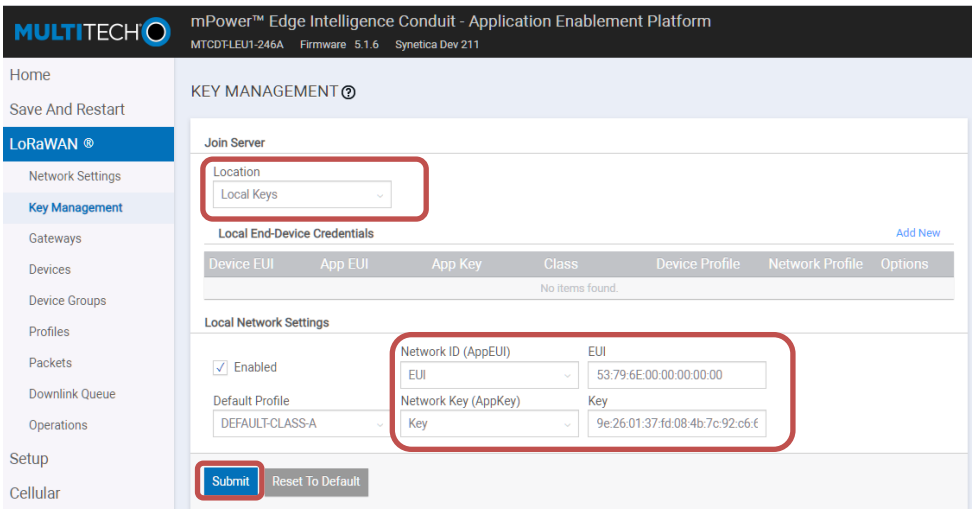
For Multitech Conduit units running V5.1.6, follow the process below. Detailed instructions can be found on the Multitech Web Site (www.multitech.net).

Logon to the Conduit and select **LoRaWAN** -> **Network Settings**

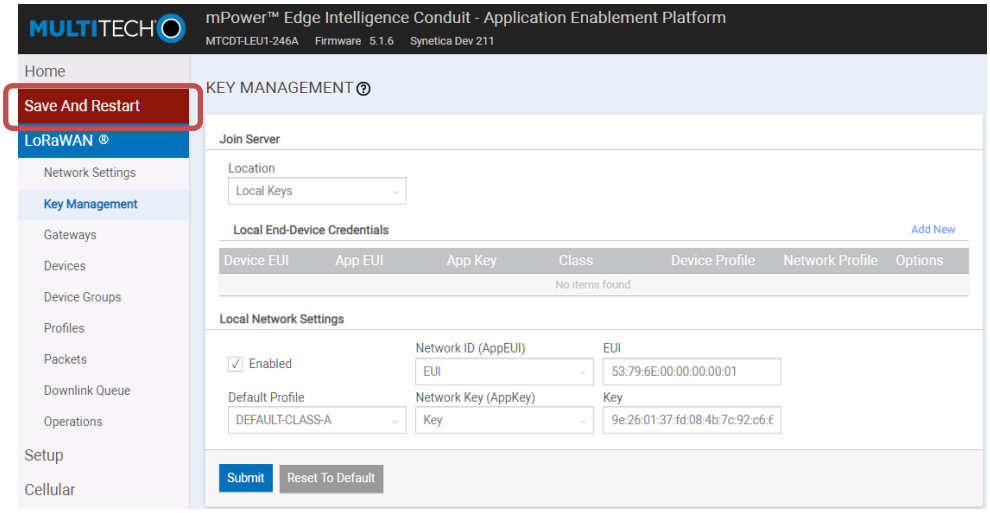
Set the **Mode** to **Network Server**, then set the **Channel Plan** required and set the **Mask** to **00FF** as shown below.



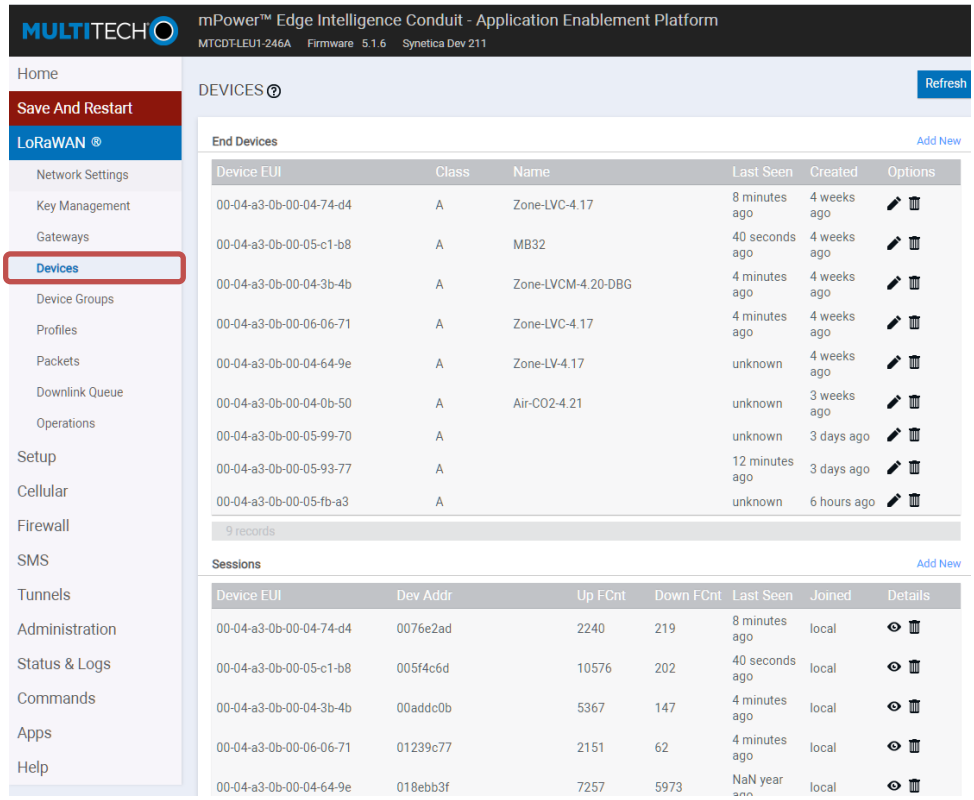
Next, select the **Key Management** tab and set the **AppEUI** and **AppKey**. Ensure that these match the enLink devices you want to join the LoRa network.



Once the keys are set, select **Submit**. The Conduit will prompt to **Save and Restart**. The settings will not take effect until the Conduit has restarted. Once the unit has restarted you are ready to join enLink devices to the network.

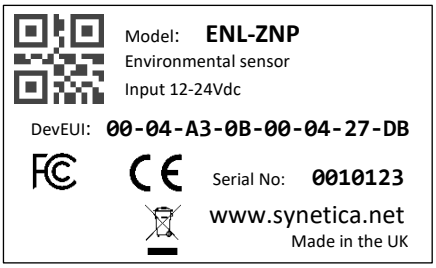


The Conduit gateway is now ready to receive devices onto the network. On the Conduit, select **LoRaWAN** -> **Devices** as shown below. This screen shows details of devices which have joined the network, when they joined and when the last message was received from them. As you add devices to the network, this is where they will appear.



2. Join enLink devices to the LoRa network

enLink devices in wireless range and with the correct AppEUI and AppKey settings set will automatically join the LoRa network when they are first powered up.



enLink Zone Plus Label

The unique **DevEUI** is printed on all enLink devices and is also present in the QR code. The **DevEUI** can be used to identify the device once joined to the network.

To power the device ON, remove the rear cover of the enLink Zone Plus by inserting a small screwdriver blade into the slots on the bottom of the unit as shown below.

Cover Removal

Locate the power switch and using small screwdriver gently slide the power switch towards the BATT position marked on the unit as shown, or apply external power (12V-24V DC) to the unit and slide the power switch to EXT.

Switch to the BATT position

Once powered ON, the enLink device will send a Join request message to the Conduit. The Status LED will blink RED as shown below whilst the Join process is taking place. Depending on factors such as signal strength, RF interference etc the Join process may take several seconds to complete.

Blinking Red LED – Attempting Join

When the device has successfully joined the network the Mode LED will blink GREEN for several seconds to show that the Join has been completed. The LED's will then switch off to conserve the batteries.

Devices which have Joined the network appear in the Conduit **LoRaWAN** - > **Devices** menu as shown previously.

3. Setting / changing the enLink LoRa keys

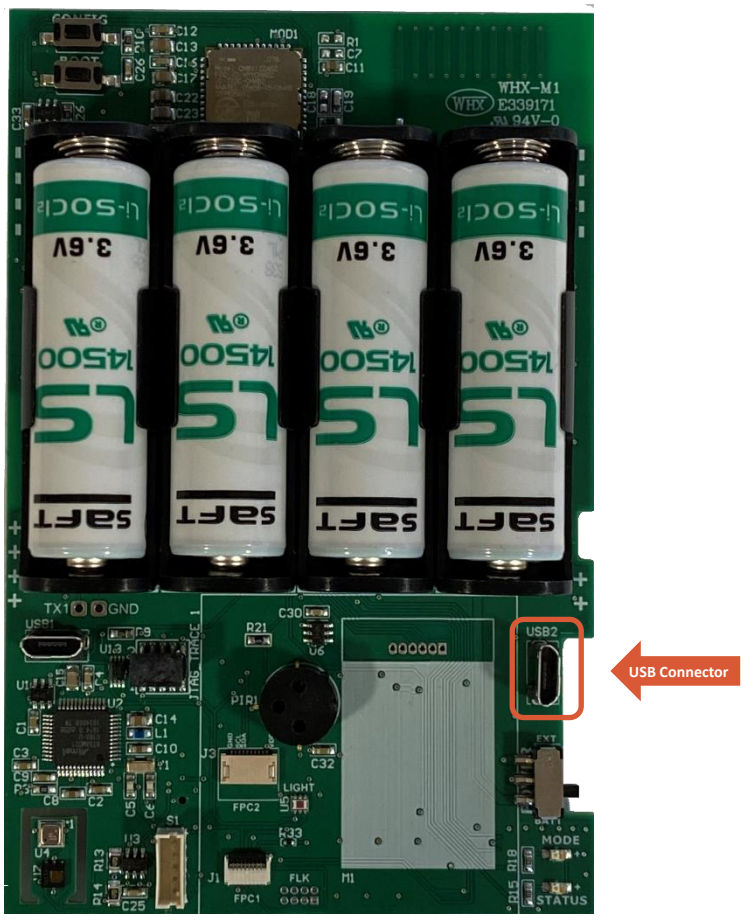
For many applications, Synetica can supply enLink Zone Plus units with the LoRa **AppEUI** and **AppKey** parameters pre-configured to your requirements, whereby if the LoRa gateway has matching keys the join process will happen automatically once the Zone Plus unit is in wireless range and switched on.

The DevEUI is always set at device manufacture and is unique. The device **AppEUI** and **AppKey** can easily be set via the USB connection as detailed below.

Remove the enLink Zone Plus board from its enclosure as shown previously. Take care when removing the board from the front part of the enclosure and only use the slots provided at the bottom of the board to gently lift the board up and out of the enclosure.

Connect a micro USB cable to the enLink unit.

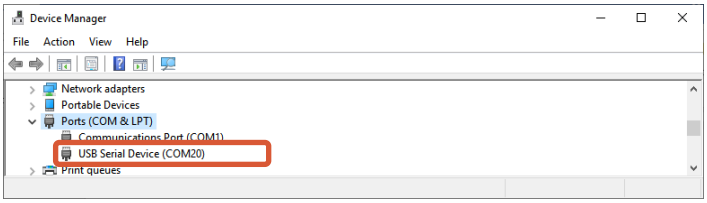
There are two USB connectors on the enLink Zone Plus, so be sure to connect to the correct USB port as shown in the image below.



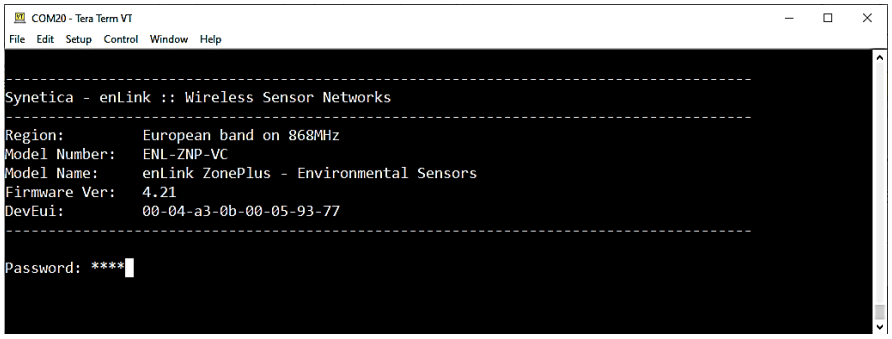
The device will attach to a COM port on your PC.

Using a terminal program (e.g. Teraterm https://ttssh2.osdn.jp/) connect to the COM port used by the enLink device.

To verify which COM port is being used, check the Windows™ Device Manager (In Windows - Click the **Start** button, type **device manager** into the search box and tap **Device Manager** on the menu.) Expand the **Ports (Com & LPT)** menu as shown below.

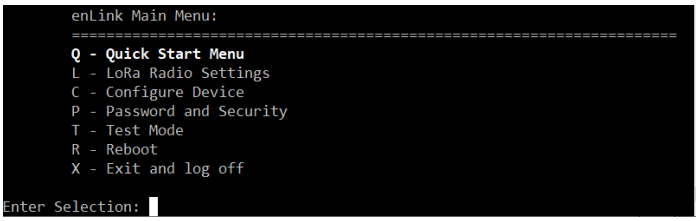


In your terminal program press the **Enter** key. An enLink summary screen will appear as shown below. The default password is the last four digits of the displayed **DevEUI**, in the screen below this is 9377.



enLink logon screen

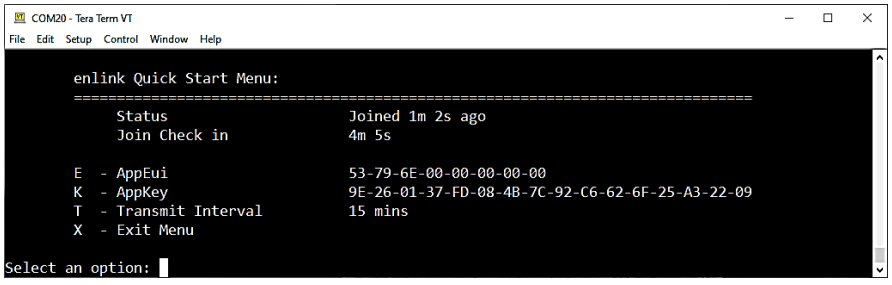
The screen below will show with the enLink Main Menu options. Enter **Q** to enter the **Quick Start Menu**.



enLink Main Menu

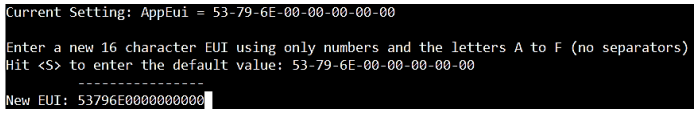
The **Quick Start Menu** contains only the parameters that normally need to be configured to setup the device and join the LoRa network.

From the **Quick Start Menu** you can change the **AppEUI** and **AppKey**.



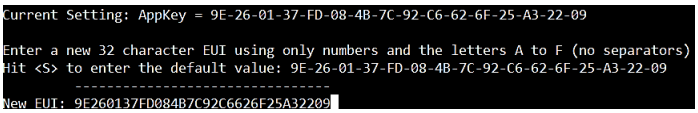
Quick Start Settings Menu

From the **Quick Start Settings Menu**, access the **AppEUI** setting by entering **E**. Enter the 16 character **AppEUI** using numbers and letters a to f. Do not include spaces or any other characters. Pressing **S** will enter the default **AppEUI** which you can then edit. Press **Enter** when the key is correctly entered to return to the **Quick Start Settings Menu**.



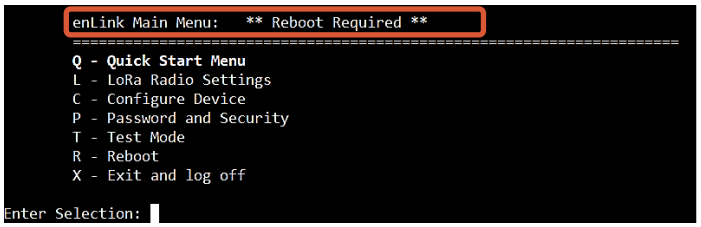
AppEUI setting

From the **Quick Start Settings Menu** access the **AppKey** setting by entering **K**. Enter the 32 character **Appkey** using numbers and letters a to f. Do not include spaces or any other characters. Pressing **S** will enter the default **AppKey** which you can then edit. Press **Enter** when the key is correctly entered to return to the **Quick Start Settings Menu**.



AppKey setting

Press **X** from the **Quick Start Settings Menu** to return to the enLink Main menu.
The header will show **** Reboot Required **** as shown below. The new key settings will not take effect until the enLink device is restarted. Enter **R** to reboot followed by **OK**. The device will restart with the entered **AppEUI** and **AppKey** and attempt to join the LoRa network.

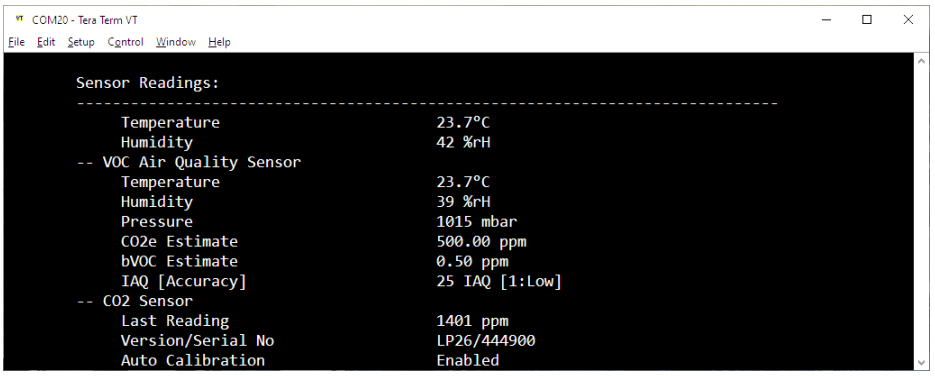


Reboot Required notification

Check the Conduit **LoRaWAN** -> **Devices** menu detailed previously to verify that the enLink device has joined successfully.

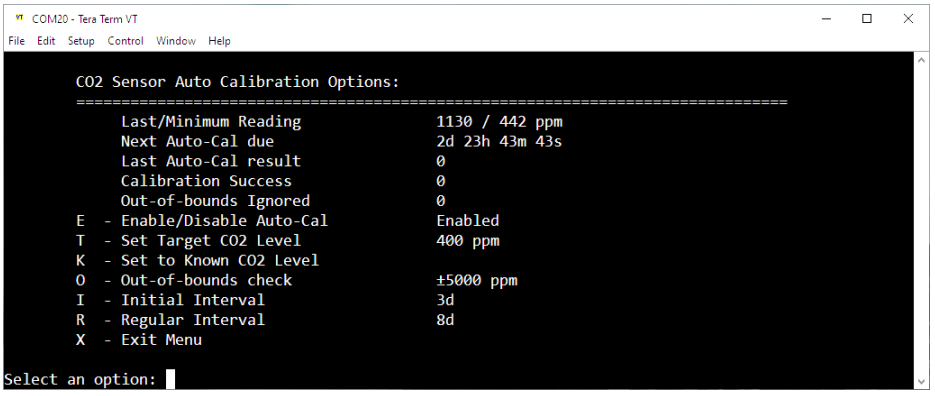
Configuration Menu

The enLink Zone Plus configuration menu allows you to view current sensor readings and also to change various functions of their behaviour such as calibration data. To enter the Configure Device menu press **c** from the main menu. A screen similar to the one below will show. The exact parameters shown will vary according to the Zone Plus model and sensors fitted.



CO_2 Sensor Auto Calibration Configuration

To view and set CO_2 sensor calibration information, enter **c** and the screen below will show.



Please see the table below for information on each menu item.

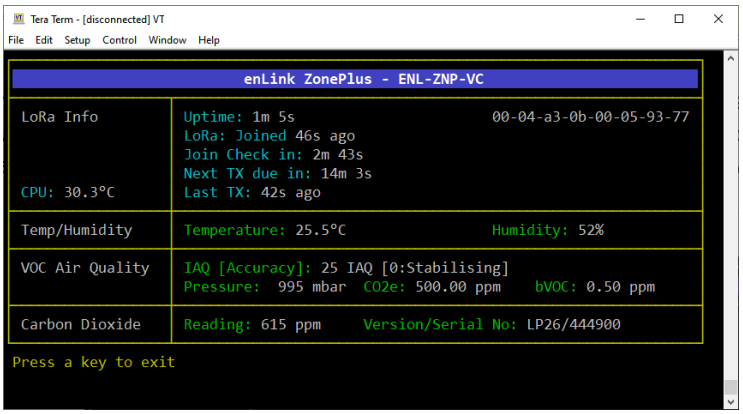
Menu Item	Description / details
Last/Minimum Reading	Shows the last CO_2 value read and the minimum CO_2 value read since the last auto calibration.
Next Auto-Cal due	Shows when the next autocalibration routine will occur
Last Auto-Cal result	Shows the value of the last auto calibration result. Used internally by the sensor.
Calibration Success	This shows the total number of successful auto calibrations since the device was powered up.
Out-of-bounds Ignored	Shows the number of times that auto calibration did not run due to the Out Of Bounds setting.
E - Enable/Disable Auto-Cal	Enables or disables the auto calibration routine.
T - Set Target CO2 Level	This is the known CO_2 corresponding to the minimum value the sensor has read since power-up or last calibration. It is normally 'fresh air' or the lowest level when the building is unoccupied overnight or at weekends. Typically this is 400 ~ 450 ppm.
K - Set to Known CO2 Level	This will re-calibrate the zero point of the sensor to a known gas concentration. The sensor should be placed in this gas concentration and allowed to stabilise. This command runs in the background and will take 8 to 10 seconds to complete. As an example, fresh air is typically around 400 ~ 450 ppm.
O - Out-of-bounds check	The Out-of-bounds value is used to ignore the calibration if the minimum value the sensor has read is not within a sensible range of the target concentration level. So, if the target concentration level is 400, the Out-of-bounds value is ±50 and the minimum reading is 451 (or more), the calibration routine is ignored.
I - Initial Interval	It is possible for the first auto-calibration to take place more quickly than the regular auto-calibration events. This can be useful to stabilise the readings quickly after installation.
R - Regular Interval	This is the standard calibration interval, it is set to 8 days by default to accommodate a week long period where the minimum sensed CO_2 level should have fallen to background levels.

The CO_2 sensor needs to be exposed to fresh, clean air periodically for the auto calibration to be successful. Most occupied areas are unoccupied for some time during a week-long period, typically at night, or at the weekend and therefore the auto calibration runs every 8 days by default. Background CO_2 levels are typically around 400-450 ppm, if the background CO_2 level is known to be a different value then this can be set in the "Set Target CO_2 Level" parameter

If a unit is placed in an area where the CO_2 level may not fall below a certain level, e.g. 450ppm, during the calibration interval then the "Out-of-bounds check" parameter can be set so that the auto calibration routine does not run. As an example, if an area is continuously occupied for a long period and the minimum CO_2 reading does not fall below, say 450ppm, then it is undesirable to run the autocalibration routine based on a target of 400ppm. In this case, if the "Set Target CO2 Level" is set to 400ppm and the "Out-of-bounds check" value is set to +/-50 ppm then the autocalibration routine will not run unless the minimum read value falls below 451ppm in the interval.

Live Menu

enLink Zone Plus incorporates a live data screen which shows all readings and device status for easy data validation. To enter the Live status screen, from the **Main Menu** enter **c** for Configure Device followed by **d** for Live readings display. A screen similar to the one below will show. The sensors will vary according to the enLink Zone Plus model and the installed sensors.



Live Display

Technical Support

For technical assistance, please visit the downloads section of our web site at www.synetica.net or email us at support@synetica.net