Mixergy®

<u>Mixergy System - Frequently Asked Questions</u>

- Electrical requirements
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- Heat pumps

<u>Electrical Requirements</u>

1) **Electrical Installation Requirements**

The Mixergy tank power is fed from one cable (3 core, white, 2.5mm) from the rear of the control box. This is a 3 core cable and provides the power to the control box and any fitted immersions. This cable must be wired to a permanent live feed via a 20A DP spur outlet, and MUST be on its own dedicated 16A circuit on the household consumer board.

There is a second cable (3 core, black, 1.5mm) for sensing when the off-peak circuit in the household (if fitted) comes live. If present this must be wired into the "off-peak" circuit via a 3A fused spur. If there is not off-peak spur in the area of the tank, this cable can be left unconnected and coiled behind the tank.

2) **System Cabling Requirements**

Direct Tank Cabling Requirements: This should be in the installation manual

In-Direct Cabling Requirements: This should be in the installation manual

PV Cabling Requirements: This should be in the installation manual

<u>Tank Operation</u>

The Mixergy tank controls the hot water level and hot water temperature within the tank by measuring the heat a specific points in the tank. With this information the heat source can be switched on, and when the temperature reaches the required temperature (eg. 55deg) the pump is run to bring cooler water from the bottom of the tank to regulate the temperature at the top of the tank. While the heat source is still on, this cooler water is heated at the top and pushes the now heated water down the tank to the require % charge level.

If 100% charge is requested the heat source and pump will run until the bottom temperature reaches the desired temperature (e.g. 55 deg). At this point the heat source is stopped and will only switch back on when the top temperature reduces by either water drawn off, or by natural cooling of the water over 24 hours.

The tank heating schedules and temperature are set via the app, which requires the tank to be connected to a WiFi connection.

1) **Why do we connect to the internet?**

The ability to remotely connect to the Mixergy hot water cylinder with the cloud creates a number of opportunities for the end-user and for enterprise clients such as housing associations.

The Mixergy platform when connected can:

i. Give access to the system through the Mixergy App so that users can programme and review system performance
ii. Provide adaptive optimisation of control to minimise cost/energy consumption
iii. Deploy machine learning algorithms to optimise flex response when on a smart tariff
iv. Our server provides diagnostics of any electric heating element failure or reduction in indirect boiler/heat pump operation
v. We are able to monitor the operation of PV systems indirectly through utilisation of any associated PV diverter
vi. We can also include a remotely monitored pressure sensor (+£60/unit) which allows us to remotely inspect the integrity of the expansion vessel

We are able to connect the Mixergy tank to the cloud through a TP Link which allows us to bridge a wi-fi connection and access the internet.

2) What if there is no wi-fi/internet available?

i. If there is no wi-fi present, we can provide connectivity through a GSM modem plug-in. To have standalone GSM connectivity there is an additional +£15 capital cost per cylinder and a £5/annum ongoing connectivity charge.

ii. If the cylinder is being deployed as part of a high-density residential development (tower block, terraced houses etc.) Mixergy can install a communal IoT ready broadband network that we can connect our cylinders too. This network will then become available for tenants to use as their own internet source if they desire, as an alternative to setting up their own internet at home. Mixergy will charge a small fee for any tenant/householder who wishes use the Mixergy network.

3) What if the tank is off-line and the gauge is not used?

The first time the system is powered up, the cylinder goes into a learning mode of operation. For the first week, it heats to 100% and observes how much is being used. Each week thereafter the system adapts its state of charge depending on how much has been used. The tank will continue in this mode of operation.

4) What if there is no connectivity between the gauge and the cylinder?

As soon as the gauge has been interacted with, the system by default enters a comfort mode of operation where it recovers to 100% volume every time it is used like a conventional tank all the time. The system will operate like this until gauge or network connectivity is restored.

5) How does the tank communicate with other home control devices?

If there is some form of external control system that the tank has been developed to work with via its sense cable (Hive/Nest/Alexa etc.), the tank will operate as a slave to that system, topping up whenever the controller asks it to.

6) What happens if there is loss of connectivity once hot water has been scheduled?

Whatever schedule was last programmed into the tank over the internet will remain running irrespective of whether there is a loss of connectivity or not.

7) How does the tank behave if connectivity maintained?

Whilst being connected, the tank will run according to the schedule/learn mode preferences of the user (programmed through the Mixergy App or as understood through learning mode). This operating profile is only overwritten if the boost or off setting is selected on the tank's gauge.

8) Where can I download the Mixergy App?

The Mixergy App can be downloaded for free in either the Apple App Store or the Google Play Store for Android devices.

9) Can I access the app through a web browser?

You can access your tank through an online browser on www.Mixergy.io using your Mixergy system login credentials.

10) How do software updates occur?

The App is updated automatically through the App Store.

11) What Happens if there is no WiFi on Install?

If there is no WiFi router available on installation, the tank cannot be registered and will not download any schedule and remain in "Limp" mode.

"Limp" mode will maintain the hot water level between 40 and 60% charge. The gauge will work to allow manual boosting if required. Note that this mode will not be the most effective way to use tank and economy savings will be reduced.

12) TP Link Connection

The TP link creates a "MixBridge" WiFi network from the householders router. The Mixergy tank is continuously looking for this WiFi network to connect to.

The TP link is plugged into a socket near the Home Router, and an ethernet cable is plugged between a router LAN port (often coloured yellow and a set of 4 on the rear of the router), and the TP link. It is important that the TP link buttons are not touched in any way as these are factory set to generate the MixBridge network, and pressing them will result in the network being lost.

13) "MixBridge" WiFi strength

The MixBridge signal strength needs to be enough to reach the tank. This can be checked using a mobile phone to see the WiFi strength on the "available networks" under the WIFI settings on the phone. There should be at least 2 bars on the WiFi signal to ensure good connectivity.

The tank comes with a WiFi dongle found in the side of the control box. This should be removed and plugged into the end of the USB extension lead supplied with the tank and placed somewhere away from the tank (preferably above) and in the rough direction of where the router is in the property. This will ensure a stronger and more reliable connection.

If the WiFi signal is weak then we may suggest using a WiFi repeater to bring the source of the WiFi closer to the tank. This will require plugging in a master repeater into the router, and a slave repeater into a socket nearer the tank. These work by transmitting the broadband connection over the neutral mains wiring in the property. Please connect Mixergy for more advice should you think this is required.

14) Gauge on power up

The gauge is plugged into the side of the control panel where it is labelled "Gauge".

On powering up the tank, the gauge will display random yellow and green images, followed by scrolling up and down blue images.

Once initialisation is complete, if the tank is completely full of cold water the gauge will be blue from top to bottom. If hot water is present the level will be shown on the gauge.

The gauge can be used to boost the water level to any level above its current hot water level. The "I' button makes the gauge brighter for 5 seconds.

The "I/O" button will switch off the whole system – note this will switch off all methods of control and heating so the tank will over time go cold.

15) Connection to the Mixergy Servers

For a mixergy tank to be able to be controlled via the app and a schedule to the set, the tank needs to be registered and connected.

The householder needs to download the Mixergy app to their device. On opening it will ask for a username and password, but below this is a "register' link. Selecting this link will take them to a page where they can enter a username (usually their email address), password, and some key data which will help Mixergy optimise their tank performance.

After registering they will be emailed a verification link which they need to click on before they can proceed.

Once verified they will be able to log into the app and select "Add Tank".

Here they will be asked the enter the mixdevice number on the front of the tank. This is in the format mixdevice-xxxxx-xxxxx-xxxxx-xxxxx-xxxxx. The householder needs to enter the 5 sets of 5 random letters and numbers. This is quite a complex reference but enable us to uniquely identify the tank. It is important that this number is entered CAREFULLY.

Once added the tank will appear on the app and they will then be able to use the features of the app.

If the householder is not present, the installer can call Mixergy to confirm the server connection to the tank has been made and can request a specific schedule is uploaded to the tank if required. The default schedule is currently heat to 100% charge at 3am every day, without maintaining a minimum charge level which means once the tank volume has been consumed, there will be no further heating until the next 3am, or a manual boost via the gauge.

Tank Not Heating:

For all tanks not heating, first check the App settings on the tank to ensure the correct "Electric", "Indirect" heat setting is selected. If this is incorrect demand will not be made on the required heat source.

1) Direct Tank Not Heating:

Boost the tank using the gauge, carefully check there is 240V at the immersion. If this is not present contact Mixergy for further advice.

Check the thermostat setting of the immersion – Unlike a standard tank, this should be just below maximum (73deg) as the Mixergy tank measures and controls the heating using other sensors and required the stat to be set above 65 degrees.

Ensure the high temp safety stat has not tripped – this will trip at 85deg, or earlier if faulty.

With the power OFF, move the stat until a click is heard at the approximate temperature of the water, and at the same time check the resistance of the immersion. The resistance should switch from 20ohms to infinity if the stat is working and the immersion is not burnt out. Replace the stat/immersion as required if this does not happen.

2) In-Direct Tank Not Heating:

Check the connections to the C 1 2 terminal box on the side of the tank, and ensure these are connected correctly – 1 – Demand for heat, 2-Satisfied. Please refer to the manual for correct wiring.

Check that any programmer/timer is set to 24hours for hot water. The Mixergy tank controls the switching on and off of heat sources in line with the tank schedule requirements, however cannot control upstream control units so these need to be "ON" all the time.

3) Tank Not Heating by PV:

Check there is power going to the PV Immersion (fed via the Solar IBoost or similar). Then follow the instructions for checking Stat settings and Immersion functionality as per a Direct tank.

Heat Pump Interface

1) **If heat-pump is commissioned to supply underfloor heating at 40degC between certain hours, will the Mixergy tank override this and request a higher flow-temp? Will the temperature return to 40degC once the hot water demand signal stops?**

   This depends on the heat pump controller. If the heat pump controller is capable of increasing loop temp when a DHW ON signal is received then the answer is yes. We don't have any sophisticated way of communicating with the heat pump nor do I imagine there is any standardized way to do so. All we can do is tell it whether we want heat or not.

2) **How is it cabled/interfaced?**

   The heat pump we have is interfaced the same way as a boiler. We send a switched live signal to a diverter valve which then sends a switched live signal to the heat pump once the valve has opened. This switched live signal tells the heat pump to turn on.

3) **Will there be any controls logic conflicts e.g. between the Mixergy App controlling the tank and the Mitsubishi controller?**

   It is certainly possible. This is the primary reason why an installation partnership is beneficial as we can specify exactly how the controller needs to be set up. The Mixergy tank can be made to act as a slave to the Mitsubishi controller or vice versa but if they are both attempting to control then there will be issues.

4) **Are there any controls systems that Mixergy cannot interface with?**

   If the system is specifically designed to work with the manufacturer's own tank and relies on digital temperature control and signalling rather than conventional switched live signals and thermostats then we would not be able to interface properly with the heat pump. I don't imagine this will ever be the case but Mitsubishi etc. would know better.

5) **How easy is the system to commission?**

Our tank should be no more difficult or complex than any other tank. The only additional requirement is a network connection, which we would recommend as wired ethernet if the tank is being installed in a new build. (WiFi is still possible if ethernet is too challenging.)

6) **What are the known system performance improvements e.g. 9% efficiency gains through plate heat-exchanger**

We have run two comparative ErP tests with a 180L Gledhill HP tank and our 180L system and shown a 9% improvement in efficiency. This comes from a combination of reduced heat losses and better power utilisation of the heat pump (no part loading).

7) **Do I need to change the internal coil size to match the flow temp of the heat pump?**

Mixergy use an externally mounted plate heat exchange negating a need for an internal coil.
The external plate heat exchanger is sized for a maximum 30kW load, this way we can utilise variable flow temperatures without having to change physical component design.