Solar Watts Optimisation

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INTRODUCTION

When I had my photovoltaic solar panels installed, I received the usual recommendations from the installer "If you are used to running your appliances at night when the rates are cheaper, you need to run your appliances during the day and take advantage of free electricity". That seemed rather obvious, but we have to remember that installers are supposed to be experts in installing solar panels, and not necessarily experts on using them.

As time passed, I noticed that there are many moments during the day when my panels were producing a lot of watts, and not so much at other times (passing clouds, rain …). I saw that my appliances were running (dish washer, washing machine, hot water heater) when my panels were not producing enough watts (I was therefore drawing electricity from the grid), and then an hour later bright sunshine would be available for many hours. I wondered, "It would be wonderful if I had a way to allow my appliances to run only when there was enough solar power for it to be free".

I searched for a piece of software that would allow just that, but I didn't find any. There are a few rudimentary services out there, which do make it possible to control only a few appliances, but these services are linked to the Internet, and these systems, remotely, "decide" to turn your hot water tank on or off based solely on the weather forecast for the day for your postcode! So these systems do not allow for precise control, and in any case they do not work if you are cut off from the Internet.

Since I could not find any software, and as I am a home automation enthusiast and know how to write computer programs, I decided to create the software myself. And that's how SWOpti came about.

Here is a more concrete example to illustrate just to what extent it is possible to save money. I have a 200-litre hot water tank. If no more hot water is available in the morning because several people have taken a shower (I have a large family!) it could take 3 hours for the tank to fully heat up again. When operating, the appliance consumes 2,500 watts. At the time I'm writing this, the basic electricity rate in France is 0.20 € per kWh. A kilowatt-hour represents the use of a vacuum cleaner (which consumes 1000 watts) for one hour. So using your vacuum cleaner for one hour costs 0.20 €. With the hot water heater, 2,500 watts multiplied by 0.20 € therefore equals 0.50 € for one hour of heating. Let's suppose that your hot water tank turns on at 10 a.m., but between 10 a.m. and 11 a.m. your solar panels are not producing enough watts to operate your tank; you will then have to pay your electricity provider 0.50 €. But between 11 a.m. and 1 p.m. (and for most of the rest of the day!) there's a lot of sunshine, so you don't have to pay anything for those two hours of heating. If this scenario were to repeat itself day after day, in a month you will have paid 0.50 € x 30 days = 15 euros needlessly to your electricity provider, and that represents 180 euros a year! If "unfortunately" your contract grants you a cheaper

rate at night and a higher rate during the day, you'll be heating your water during the day at the high rate at 0.22 € / kWh which will cost 0.55 € a day, 16.50 euros a month, or 198 euros for the year. And if you really aren't the lucky type, because your tank used solar energy for only one hour and the other two hours your electricity provider supplied you from the grid, that would cost 1.10 euros a day, 33 euros a month, or 396 euros a year. And all that is just an example for a single appliance: you can imagine the savings that are possible if all your appliances that consume a lot of power were controlled to operate only when the electricity was free.

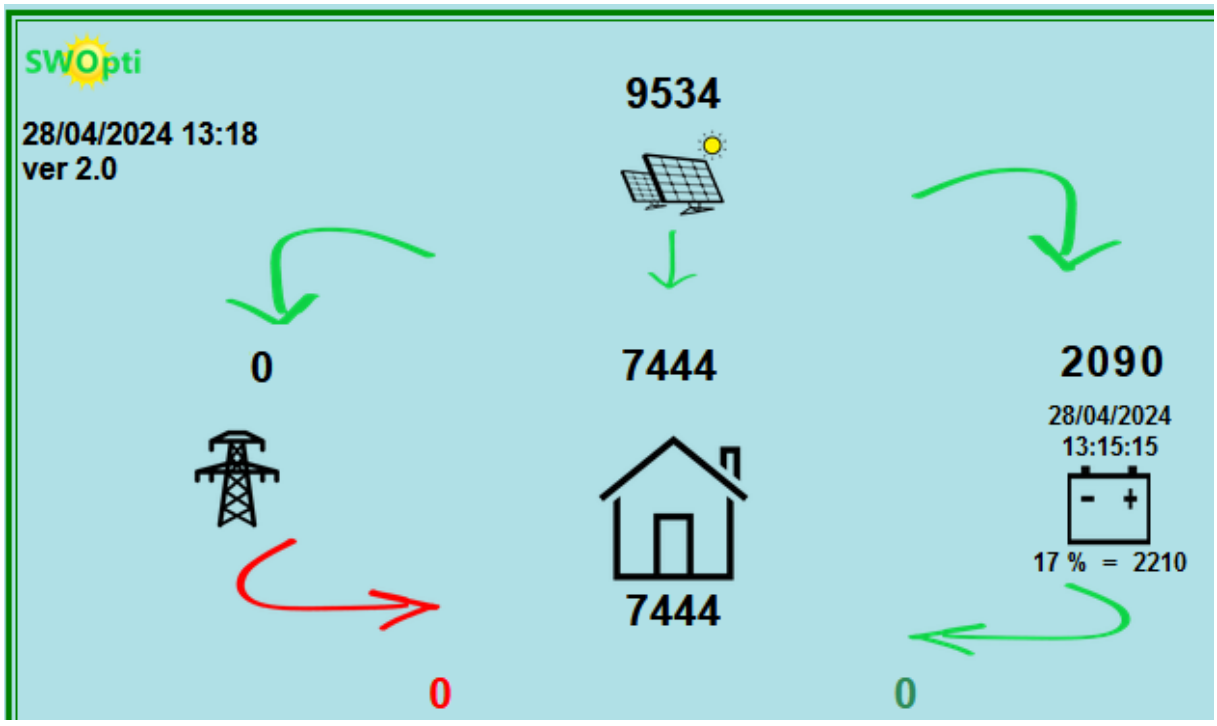
And SWOpti does even more: if SWOpti sees that you are drawing power from the grid, it will try to turn off appliances (= immediate savings) while waiting for free electricity to become available again to turn appliances back on.

OPERATING PRINCIPLE

SWOpti works with sensors that are literally placed around wires in your electrical cabinet. This means that the system is non-invasive; simply find the right wires and position the sensors around the wires. Every 5 seconds, these sensors measure:

- the watts that your panels (or wind turbines) are producing
- the watts that your home is currently consuming
- the watts that are coming from the panels
- the watts that the panels are exporting to the grid
- the watts that your energy supplier is sending to you.

The watts that the panels are sending to your battery and the watts that the battery is sending to your home are also measured, if your installation has a battery. The screenshot below is from SWOpti's main control screen and allows you to monitor all these figures in real time.



Before the installation of SWOpti, you compiled a list of the appliances to control/monitor, and you gave a priority to your appliances; in my home for example, the electric car charger has priority, followed by the two hot water tanks (I mentioned that I have a big family, but also a big house), then the household appliances and finally the electric radiators. And for each appliance, SWOpti has to know the number of watts that the appliance needs to operate. Each appliance has a small module that

SWOpti uses to turn it on and off. Once all of this is in place, SWOpti takes care of everything. The possibilities are explained in the two paragraphs below, where examples in watts are provided in parentheses.

We've got juice 😊

Once a minute, SWOpti takes a look at the number of watts the panels are producing (7000), and how many watts your home is consuming (2000). If there is excess production (5000), SWOpti starts at the top of the list of your appliances, and analyses the question "what appliances can I turn on with my 5000 watts available?" According to the number of watts available, and according to the order of priority of the appliances and how many watts are needed for each appliance, SWOpti will turn on what it can. Sometimes an appliance on the list is already turned on. You must also consider that the order of priority is relative, in that if you have 2800 watts available, although the electric car charger has the highest priority, it will not be turned on because it needs 3000 watts. Even though the hot water tank has a lower priority, it will be turned on because it only needs 2500 watts. Perhaps a little later there will be more sun, therefore enough to turn on the car charger, or at some given time the hot water tank will stop consuming power because the water is hot and therefore these watts will "return" to the system and SWOpti will be able to "assign" them to the car charger.

We don't have enough juice ☹

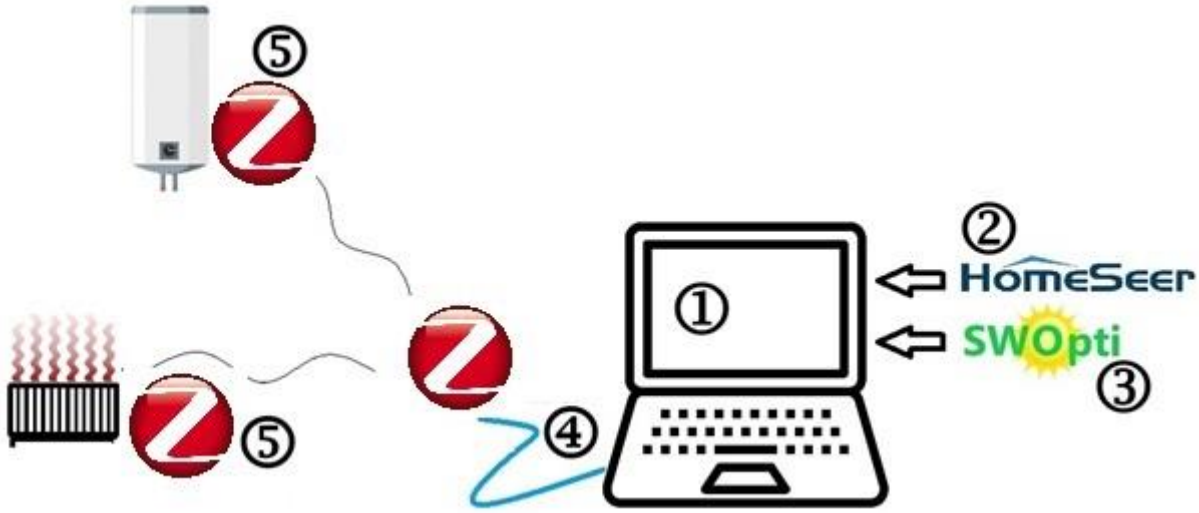
Unfortunately, there will be moments when solar panel production will not be able to meet the needs of your home, and you will therefore be forced to draw power from the grid. SWOpti will try to reduce this as much as possible, by doing the opposite of what it did when there was excess power: SWOpti will note how many watts your home is drawing from the grid and will start at the bottom of your list of appliances, therefore with the appliances that have the lowest priority, so as to turn them off. In my home, these are the electric radiators, and among these radiators, the one in the hall has the lowest priority. This will make it possible to reduce power consumption from the grid, and even eliminate it. Example: You are producing 5500 watts and your home is consuming 4900 watts, and in these 4900 watts we have a hot water tank that is consuming 2000 watts. Your two daughters, simultaneously, each turn on a hairdryer that consumes 1250 watts (therefore 2500 watts more). The 4900 watts that you were already consuming, plus the 2500 watts = 7400 watts. With your production of 5500 watts, you are missing 1900 watts. These 1900 watts will have to be drawn from the grid. SWOpti will detect this consumption and will turn off an appliance, probably the hot water tank, thus reducing your consumption to 5400 watts (and therefore you will no longer need power from the grid). If the other

items have not changed (your production, consumption elsewhere in your home, etc.), SWOpti will turn the hot water tank back on when the hairdryers have been turned off.

Wait a minute, that means an appliance with low priority could perhaps never be turned on?

To overcome this problem, SWOpti is configured with a "delta" temperature system and a "catch-up" time that can be configured for each radiator. First you decide the desired temperature (the temperature setting), which can be adjusted to the nearest half-hour, and day by day, for each room. The delta temperature is set to 3°C, but you can change it. The catch-up time is set to 45 minutes and it too can also be changed. If you have set a temperature of 19° in a room and the temperature falls to 18°, SWOpti will turn on the radiator in question. But shortly afterwards, SWOpti could turn off the radiator in order to avoid drawing power from the grid. If ever the temperature drops to lower than the delta temperature, here 19° - 3° = 16°, SWOpti will turn on the radiator by programming an *Immediate Timed Override On* for 45 minutes (the default "catch up" time).

SYSTEM COMPONENTS



1) **A Windows-compatible PC**. This is a low-power mini PC. This computer does not necessarily have to be powerful, but it needs to be used only for SWOpti, and so that SWOpti can do its job, it must be on permanently. This mini PC is provided by SWOpti.
2) **HomeSeer**. This is the home automation software that SWOpti "runs on".
3) **The SWOpti software** itself
4) **A Zigbee controller***. This is often connected via a USB port. The controller sends the On/off commands to the appliances, and the controller receives management information from the latter (in particular, the quantity of watts that the appliances are consuming)
5) **A Zigbee module*** for each appliance that you want to control or monitor. These modules are generally of three types, according to the appliance to control/monitor.

* The Zigbee communication protocol was chosen for SWOpti because it works with simple radio waves which are not harmful to humans. The controller does not simply send the on/off orders to the modules; the modules also "respond" to the controller, confirming that they have indeed received the orders, and indicate the watts currently consumed, etc. Communication is therefore not in one direction; it is bidirectional. This increases the safety and reliability of the communications.

The Zigbee PROTOCOL IN SWOpti COMMUNICATIONS

Each appliance that you wish to control/monitor has to have a Zigbee module. From its Zigbee controller, SWOpti sends a command to the Zigbee module telling it to cut off the power or to turn it back on. Indeed, there is an absolute condition for this to work correctly: the appliance to be controlled must be able to resume operating all by itself when the power comes back on after a power cutoff. Concretely, this means that when the power goes out during thunderstorm for example, your lights, hot water tank, etc. will of course stop operating. When the power comes back on, the hot water tank and the lights that were on when the power went off will now continue to operate, without any human intervention. I have a dishwasher and a washing machine that, when power returns after a cutoff, resume operating by themselves and continue their cycles, as if there had not been any loss of power. It is this type of appliance that SWOpti can control. Unfortunately, this is not the case for my clothes dryer. When the power comes back on, the dryer does not resume operating by itself. Someone has to push the "Start" button in order for it to continue its work. SWOpti cannot control this type of appliance.

That said, if SWOpti cannot control a device such as my dryer, it can at least monitor it. That means that you can see the number of watts that the appliance in question is drawing from your installation. This is useful for appliances that cannot be controlled (such as my dryer) and also for appliances that you do not want to control, such as an oven. You wouldn't want SWOpti to decide to cut off the power to your oven simply because there isn't enough power to run it without having recourse to the grid. This appliance will therefore be seen by SWOpti as a "monitoring only" appliance.

Note that an appliance that does not work after a power cutoff can even so be controlled by SWOpti if it has a "dry contact".

The Zigbee modules to be installed for each appliance are generally of three types, according to the device to be controlled/monitored:

- The first is a module that is installed behind an electric radiator (if the radiator is not plugged directly into a wall socket.
- The second type of module is intended to control a hot water tank or an electric vehicle charger. It can be installed where your cables arrive at the hot water tank, or in your electrical cabinet, starting from the circuit breaker of the appliance in question.
- The third type of module is reserved for any type of appliance that you plug into the wall socket (such as most washing machines, dishwashers, a fan that heats or cools, etc.). The module is plugged into the wall socket and the plug of the device is plugged into the module.

SWOpti sends the commands to turn an appliance on/off to the Zigbee controller, and it is the controller that in the end sends the command to the appliance to be controlled. Ideally, the Zigbee controller should be installed in your home at a location where it can communicate with all the Zigbee modules. This means, in general, in the centre of your home, with respect to where your appliances are located. There are two types of Zigbee controllers. The first looks like a USB key and is plugged directly into the SWOpti Box. This means that as the controller should be in the middle of your installation, the SWOpti Box too. Another solution is to use a "Z-Net" controller. A Z-Net can be placed anywhere in your home; it will connect to SWOpti via the Wifi network or, better yet, your Ethernet (wired) network. Another good thing to note is that Zigbee modules know how to operate as "relays" for the other modules. This means that your controller can be installed in a room, your hot water tank in the next room and your washing machine even further away. The controller sends a command intended for your washing

machine, but the module in the hot water tank will take it and will "forward" the command, to the washing machine. And finally, there are specialised Zigbee modules that do nothing but take the Zigbee signal (which may already be at the maximum distance from the controller), amplify it and send it further on, like those "Wifi extenders" that can expand your Wifi network.

A LITTLE VOCABULARY …

SWOpti has a main control screen that itself gives access to other screens. You can manage SWOpti from a PC, tablet or mobile phone, as long as the device has an internet browser. Before taking a more detailed look at the main screen, let's get familiar with the terms that one encounters when using SWOpti.

MODES

NORMAL. This is the default mode for an appliance. In *Normal* mode, SWOpti analyses the watts available and decides to turn appliances on or off, based on the number of watts the appliance uses and where it falls on the priority list. The symbol is green, representing the ability to save money in this mode. The two arrows form a circle symbolising the switching between "on" and "off", according to the watts available.

OVERRIDE OFF. For one reason or another, you may want a device to stay off until you decide otherwise. The *Override Off* mode is used for this. For example, you have given a higher priority to your vehicle charger than to your hot water tank. But, exceptionally, you want to give priority to the hot water tank. You can put the charger in *Override Off*, which would give SWOpti the possibility to allocate the available watts to the hot water tank. An appliance in *Override Off* mode will remain off until you select another mode. The black colour indicates an absence of power; the appliance is therefore turned off.

IMMEDIATE TIMED OVERRIDE OFF. The *Immediate Timed Override Off* mode is similar to the *Override Off* mode. The difference is that you indicate the number of minutes that the device is to remain off. When the minutes have elapsed, the appliance returns to *Normal* mode. The black colour indicates the appliance is off, and the small stopwatch reminds you that this is a timed override off.

DEFERRED TIMED OVERRIDE OFF. The *Deferred Timed Override Off* mode is very close to *Immediate Timed Override Off*. The difference is that you indicate at what time of the day or night you want the timed override off to begin. This is useful for programming an appliance to be off starting at 5am for one hour for example. The icon is black to indicate an *Override Off*, the stopwatch reminds you that this is a timed override off, and the clock indicates that the override off starts at a

precise time. *Deferred Timed Override Off* mode can be activated or deactivated per day of the week (the days in capital letters in the day bar are the days when this mode is active, and the mode is deactivated for the days that are displayed in small letters). Click on the day of the week to switch between activated/deactivated.

MONITORING ONLY. This is the mode for appliances that you cannot control (such as a dryer that does not continue operating by itself after a power cutoff) or that you do not want to control (such as an oven). The magnifying glass indicates that this appliance is monitored only and that it cannot be controlled.

OVERRIDE ON. This is the opposite of *Override Off*. *Override On* mode is used to force an appliance to remain on. Imagine a few friends call you in the afternoon to tell you they are coming to your home to party and that they will probably be staying the night. You can put your hot water tank into *Override On* mode to make sure that there is enough hot water this evening. An appliance in *Override On* mode will remain on until you select another mode.

IMMEDIATE TIMED OVERRIDE ON. *Immediate Timed Override On* mode is similar to *Override On*. The difference is that you indicate the number of minutes that the device is to remain on. When the minutes have elapsed, the appliance returns to *Normal* mode. The yellow colour indicates that the appliance is on, and the small stopwatch reminds you that this is a timed override on.

DEFERRED TIMED OVERRIDE ON. *Deferred Timed Override On* mode is very close to *Immediate Timed Override On*. The difference is that you indicate at what time of the day or night you want the timed override on to begin. This is useful for example to programme your hot water tank to turn on at 5am for one hour. The icon is yellow to indicate an *Override On*, the stopwatch indicates that this is a timed operation, and the clock reminds you that the override on starts at a precise time. *Deferred Timed Override On* mode can be activated or deactivated per day of the week (the days in capital letters in the day bar are the days when this mode is active, and the mode is deactivated for the days that are displayed in small letters). Click on the day of the week to switch between activated/deactivated.

GUARANTEED OPERATING TIME. The *Guaranteed Operating Time* mode is useful to set the number of hours or minutes that an appliance must operate per day. Example: a pool filter pump that must operate five hours a day, but not necessarily five hours non-stop. SWOpti will turn on

the pump only when you have enough electricity to operate it free of charge. This mode can be activated/deactivated independently for each day of the week.

This icon indicates that the *Guaranteed Operating Time* mode is activated.

N/A. SWOpti can control/monitor up to 36 appliances. On the control screen, the appliances beyond the number of appliances that you actually have are displayed with this icon. The green electric cord with its "?" indicates a location on the screen for a future appliance.

REVERSE OVERRIDE END. When you have programmed a *Timed Override On* or a *Timed Override Off*, SWOpti systematically returns to *Normal* mode when the minutes have elapsed. This means that after the *Timed Override On* or *Timed Override Off*, it is the presence or absence of available watts that will determine whether the appliance is turned on or off. However, at the end of a *Timed Override On*, you may want the appliance to be turned off or, at the end of a *Timed Override Off*, you may want the appliance to be tuned on. The *Reverse Override End* allows for this.

NORMAL OVERRIDE END. Contrary to *Reverse Override End*, the appliance, when it comes out of a *Timed Override On*, will remain on. If the appliance is coming out of a *Timed Override Off,* it will remain off.

HEATING ON. When this *Heating* icon is displayed, SWOpti will turn your electric radiators on or off according to the temperature settings in effect for each room. In other words, SWOpti is managing the heating.

HEATING OFF. When this *Heating* icon is displayed (with an "X" on the flame), SWOpti is not managing the heating. All the radiators are put into *Override Off* mode. This is normally the case in the summer and, for example, if you go on holiday in the winter and you do not want to heat your home while you are away.

CONFIGURATION SCREEN. Click on this icon to go to the Configuration screen.

TEMPERATURE SETTINGS. This icon takes you to the screen where you can modify the temperature settings for the appliances in question. These temperature settings can be

applied for appliances that heat (an electric radiator in general) or for appliances that cool (a fan …). You can also modify the delta temperature and the "catch-up" time (see the section on "SWOpti and heating ").

APPLIANCE TYPES

SWOpti manages 5 types, or categories, of appliances:

- Appliances that heat the home. A minimum temperature must be maintained. These are primarily electric radiators or electric fans that heat.

- Appliances that cool the home. A maximum temperature must not be exceeded. These are fans that move the air to lower the temperature or air conditioning systems.

- Any other appliance that is not part of the first two categories and that can be controlled to be turned on/off according to the availability of watts: washing machine, dishwasher, electric vehicle charger, hot water tank, clothes dryer …

- Appliances that cannot be controlled (because they do not continue working on their own after a power cutoff) or that you do not want to control (such as an oven). These are referred to as "monitoring only" appliances.

- The MNR category (Mini Night Reserve). More details on this special category are provided in the "Storage" section of this manual.

STORAGE, AND THE CREATION OF MNR

As the sun doesn't shine at night, you can use batteries to store energy during the day in order to use it at night. The idea is to be able to meet the "background" needs in electricity of your home as much as possible. The "background" is the quantity of electricity that your house uses when "nothing is turned on". "Nothing turned on" really means that no "major appliance" is turned on. Excluding electric radiators if you have them, the background electricity is the refrigerator, freezer, radio alarm clock, internet box, SWOpti box, mobile telephone chargers … You could say it is the electricity used by your house when you are not even home or when you are sleeping at night.

A battery directly linked to your photovoltaic panels will allow you to store your surplus production so as to use it at night or when there isn't a lot of sunshine, but these batteries are still quite expensive. There is an intermediate solution to store electricity for use at night and reduce the dependency on your electricity provider. This solution has been optimised so that SWOpti can draw a maximum number of benefits from it. This entails using a so-called "backup" or UPS (Uninterruptible Power Supply) battery. This is the type of battery that, when a power outage occurs, will allow you to save your work on your computer and shut down the computer "correctly". The time that you have to turn off these appliances powered by the battery depends on the power consumed by these appliances and the capacity of the battery (and to what extent the battery is charged when the power outage occurs). Instead of spending thousands of euros for "official" solar batteries, you can use a "backup" battery that could cost less than 100 euros, but you should plan on spending a few hundred euros. Once again, that depends on the power of the appliances that you want to connect to the battery.

Here are two examples. In the parents' bedroom, you have two bedside lamps (10 watts each), two telephone chargers (15 watts each), a radio alarm clock with projection of the time on the ceiling (15 watts), a "bug zapper" with a soft blue light (15 watts). Although the bedside lamps and the telephone chargers will not be constantly in use all night long, let's suppose that they are. That makes a total of 80 watts. If we simplify things by saying that from 9pm to 9am is the period after sunset and before sunrise, that is 12 hours. 80 watts x 12h = 960 watts (therefore 0.20 euros, before the increase in rates scheduled for 2024). If you have no means of storing the electricity produced free of charge during the day, it is certain that every little watt you use at night will have to be paid for. In this example, this would amount to 73 euros a year. If you use a MNR with SWOpti, you can find a 1000 watt battery for about 100 euros. It would then take a little more than one year to recoup the investment.

The second example is a response to a question that I am frequently asked: "To save electricity, can I safely turn off my freezer a few hours a night or even the entire night?" A quick search on the Internet provides a response to these two questions. From a sanitary standpoint, the answer is Yes… a freezer can in general remain without electricity for 24h, as long as you do not open the door! From an electricity savings standpoint, the answer is not as clear. It is obvious that you will save electricity when the appliance is off, but the freezer will use as much electricity (and even more) to return to the state that it was in before the power was cut off than if there was no power cutoff at all. But this answer is to be nuanced according to whether or not you have solar panels. A person without solar panels would certainly lose money, as they would spend more given that the freezer consumes more during the day to offset what was saved at night. But, if you have solar panels, this isn't a problem because this "extra" electricity to "catch up" is free. Also keep in mind that this system would not work from a sanitary standpoint if you put a lot of food into the freezer just before the programmed power cutoff occurs.

To overcome this sanitary problem … use a MNR with SWOpti! The operating cycle of my freezer is 100 watts for 20 minutes, then 2 or 3 watts for 40 minutes. If we ignore the few watts consumed for 40 minutes, this means that in reality, the freezer consumes 100 watts in three hours (because it is consuming 100 watts only a third of each hour). If we retain the same scenario of a power cutoff for 12 hours (that is 4 periods of 3 hours at 100 watts per period of 3 hours), you would need a battery that could supply 400 watts. Without a battery at all, you would pay 0.08 euros every night. That isn't much, but that does represent almost 30 euros a year, and it doesn't include the 2 or 3 watts per period of 40 minutes that we have excluded.

When you have an MNR, SWOpti "turns on" the battery at sunrise. This makes it possible to supply the load (here, the freezer) and also charge the MNR free of charge with the sun. At sunset, SWOpti "turns off" the power supply to the battery, which is interpreted by the battery as if there has been a power outage. The freezer will therefore be powered by the free electricity stored in the battery. No sanitary problem because the freezer in the end is always powered.

There is also another non-negligible advantage. We are not using the MNR as a "backup" battery because we are actually using it by force every night. But if there were a genuine power outage, the MNR would take over and continue powering the appliances connected to it.

If needed, you can program an *Override On* for an MNR. This means that when the sun sets, SWOpti will not deprive the battery of power; power from the house will continue to supply the battery and therefore the appliances connected to it.

THE MAIN CONTROL SCREEN

Here is an example of the main control screen:

First of all, note that if you hover your mouse pointer on certain elements of the screen, a small info bubble will pop up to provide you with information on this part of the screen (if your browser is compatible with this feature).

The upper lefthand corner shows the status of your installation. You'll find the date and time and the version of SWOpti that you have. The figures for the watts are in real time and are updated every 5 seconds. In this example, we see that the panels are producing 3793 watts. Of these 3793 watts, the house needs 3768 watts, and the extra 25 watts are being sent to the battery. If you do not have a battery (or if your battery is fully charged), the 25 watts would be sent to the grid and you would be paid for these watts if you have the appropriate contract for that. We can see that the red 0 indicates what your home is drawing from the grid. Regarding the battery, it is 10% charged and contains 1300 watts. Although the watts are updated every 5 seconds, the state of charge and the number of watts in the battery are updated every 5 minutes, and with the condition that your battery is "interrogable". If you have a three-phase installation, for each measurement of watts, the detail per phase is displayed.

The portion of the screen on the righthand side provides information of the current status of each of the appliances that are controlled/monitored. They are listed by order of priority. For each appliance, we have its name displayed on the button, on the left an icon indicating whether the appliance is currently on or off, and on the right an icon that indicates the mode of the appliance. Under the button, on the left, we have the watts that the appliance is currently consuming and on the right, the number

of minutes remaining with a "+" (if a *Timed Override On* is in progress) or a "-" (if a *Timed Override Off* is in progress). If you have a three-phase installation, centred between these two figures, you will find a letter (A, B or C) indicating on which phase this appliance is operating.

Let's take a closer look at the icon on the left, which indicates whether the appliance is on or off. It must be made clear that in SWOpti terms, "on" means that SWOpti is authorising the appliance to consume watts. That does not mean that the appliance is consuming watts. For example, appliance no. 4, the "Lave-vaisselle" (Dish Washer) is turned on (it is receiving power) but it is consuming 0 watts because the dish washer isn't being used. This could also be the case for a hot water tank that is on, but isn't consuming any power because the water is hot. Appliances in "Monitoring Only" mode, indicated by the magnifying glass icon on the right, are always turned on, as SWOpti does not control them.

In the middle of the lefthand side of the screen, on a grey background, you have on the left the maximum number of watts that your panels have produced since midnight up until now and the time that took place, and on the right the maximum number of watts that you have drawn from the grid since midnight up until now. In the middle, you will find an indication with the date and time of the latest action that SWOpti has performed.

On a yellow background, you will find information about the sun: the time of sunrise, solar noon (the time of day when the sun is at its culmination point) and the time of sunset.

The screen section with a light green background indicates which appliance is currently selected for control, and just below are the buttons that you can use to control the selected appliance.

The icons on the last line of the screen will be explained further on in this document.

HOW TO CONTROL AN APPLIANCE WITH THE CONTROL SCREEN

Normally, SWOpti is entirely automatic and will turn on/off your appliances according to the electricity available. But you can also control the appliances yourself by using this control screen.
In the righthand part of the screen, press the button with the name of the appliance that you want to control. In a few seconds, in the lefthand part of the screen, you will see the name of the appliance that you have just selected. Under the name, the icon on the left which indicates whether the appliance is on/off and the icon on the right which indicates the current mode will be updated. These icons are simply indicators that reflect the same icons on the righthand part of the screen for the appliance.

Under the days of the week, press the  icon to launch an *Override Off*. The status icons under the name of the appliance will be updated ( on the left indicating that the appliance is off and  on the right indicating that the appliance is in the *Override Off* mode). The appliance will remain off until you select another mode. Press another icon to stop the *Override Off* mode (in particular  to return to *Normal* mode in which SWOpti will then control the appliance).

Press the icon to launch an *Override On*. The status icons under the name of the appliance will be updated (on the left indicating that the appliance is on and on the right indicating that the appliance is in *Override On* mode). The appliance will remain on until you select another mode. Press another icon to stop the *Override On* mode (in particular to  return to *Normal* mode in which SWOpti will then control the appliance). Note that if you place an appliance in *Override On* mode, that does not mean that the appliance will necessarily consume power (a hot water tank will not consume any electricity if the water is already hot).

If you want to turn off an appliance for a certain length of time, configure an *Immediate Timed Override Off*. Each press on [- 1] will increase the override off time by one minute. [- 5] increases the override off time by 5 minutes in one go, and [- 30] 30 minutes. As soon as you press one of these buttons, the appliance is turned off (if it was turned on) and the status icons under the name of the appliance will be updated ( on the left indicating that the appliance is off and  on the right indicating that the appliance is in *Immediate Timed Override Off* mode). In a few seconds, the number of override off minutes that you have configured will be displayed in the righthand part of the screen, prefixed with "-" indicating that this is a *Timed Override Off*. For example, "-10 min" means that the appliance will be off for 10 minutes. In one minute, "-9 min" will be displayed and so on until "0 min" is reached. If you have gone too far in the number of override off minutes, do not use the [+ 1] [+ 5] [+ 30] buttons to

correct the number of minutes. These buttons are reserved for configuring an *Immediate Timed Override On*. To correct the number of minutes, press  to return to *Normal* mode, which will cancel the *Immediate Timed Override Off* and will reset the timer to 0 minutes. Then use the [- 1] [- 5] [+ 30] buttons.

If you want to turn on an appliance for a certain length of time, configure an *Immediate Timed Override On*. Each press on [+ 1] will increase the override on time by one minute. [+ 5] increases the override on time by 5 minutes in one go, and [+ 30] 30 minutes. As soon as you press one of these buttons, the appliance is turned on (if it was turned off) and the status icons under the name of the appliance will be updated (on the left indicating that the appliance is on and  on the right indicating that the appliance is in *Immediate Timed Override Off* mode). In a few seconds, the number of override on minutes that you have configured will be displayed in the righthand part of the screen. For example "+10 min" means that the appliance will be on for 10 minutes. In one minute, "9 min" will be displayed and so on until "0 min" is reached. If you have gone too far in the number of override on minutes, do not use the [- 1] [- 5] [- 30] buttons to correct the number of minutes. These buttons are reserved for configuring an *Immediate Timed Override Off*. To correct the number of  minutes, press to return to *Normal* mode, which will cancel the *Immediate Timed Override On* and will reset the timer to 0 minutes. Then use the [+ 1] [+ 5] [+ 30] buttons.

When the minutes of an *Immediate Timed Override Off* or an *Immediate Timed Override On* have elapsed, SWOpti switches the appliance back to *Normal* mode. So SWOpti will then decide whether to turn the appliance on or off. You may prefer that an appliance be turned on when it comes out of an *Immediate Timed Override Off*, and that it be turned off when it comes out of an *Immediate Timed Override On*. Others prefer that an appliance remain off when coming out of an *Immediate Timed Override Off* and that it remain on when coming out of an *Immediate Timed Override On*. You can indicate your preference by using the icon located between the "minute" buttons. When the  icon is displayed, SWOpti is in "Reverse Override End " mode. The yellow and black arrows indicate a switching between "on" and "off". When this icon is displayed, at the end of an *Immediate Timed Override Off*, the appliance will be turned on, and at the end of an *Immediate Timed Override On*, it will be turned off. The state of the appliance will therefore be "Reversed" at the end of the override. Press this icon to select the other preference, "Normal Override End ". When the  icon is displayed, there will not be any "reversal" of the state at the end of the override. An appliance coming out of an *Immediate Timed Override Off* will remain off and an appliance that was in *Immediate Timed Override On* will remain on. This "Reverse" or ""Normal" preference is a global preference; it cannot be set differently for several appliances with overrides at the same time. That is to say, if you have

several appliances with overrides in effect at the same time, it is the state of this preference that happens to be in effect at the end of the override of an appliance that will be applied. Keep in mind however that, in any case, SWOpti switches the device to *Normal* mode at the end of the override, so your preference for "Reverse" or "Normal" will be applied for a relatively short period of time because, a few minutes later, it will be SWOpti (now in *Normal* mode for this appliance) that will be deciding whether to turn the device on/off.

As mentioned above, the icon  is used to switch to *Normal* mode. Any other mode in effect (*Override Off*, *Override On*, *Timed Override Off* and *Timed Override On* …) will be cancelled and if a *Timed Override Off* or *Timed Override On* was in progress, the minute counter will be reset to zero.

There is an interesting variant of the *Immediate Timed Override On* and *Immediate Timed Override Off* modes: *Deferred Timed Override On* and *Deferred Timed Override Off* modes. In the *Immediate* modes, the minutes start to count down immediately. With the *Deferred* modes, you can indicate the time of day at which the *Deferred Timed Override On* or *Deferred Timed Override Off* is to start. This could be useful for example to configure your hot water tank to turn on at 5am for 1 hour so that you can have hot water at 6am (and this can be restricted to only certain days of the week). To configure this mode, make sure the appliance in question is indeed selected, then, above the bar with the days of the week, press [-] to increase the time during which the appliance will be off, and [+] to increase the time during which the appliance will be on. Each press of the button increases the time by 15 minutes. Here, if you have gone too far in programming the minutes, you can use the other button to adjust the delay. The currently selected number of minutes will be indicated immediately above the [- - > 0 < - -] button. You indicate the time of day to begin the override with the [0h] and [00] buttons above the display of the minutes. To cancel this mode, press [- - > 0 < - -] to set the minutes to zero. You can indicate which days of the week this programming is to be executed by using the buttons in the bar with the days of the week. "MON" (in capital letters) indicates that the override will be executed on Mondays, and "mon" in small letters indicates that it will not be executed on Mondays. Press the button of the day to switch between capital/small letters. As this is deferred programming, there is no icon to indicate this mode. Indeed, the appliance will remain in *Normal* mode or any other mode until the time of day has arrived to start the *Deferred Timed Override On* or *Deferred Timed Override Off*. When the time has arrived, the icon that indicates the mode of the appliance in the righthand part of the screen (and in the lefthand part of the screen if this appliance is selected) will be:

 to indicate a *Deferred Timed Override Off*. The icon is black to indicate that this is an *Override Off*, the stopwatch reminds you that this *Override Off* is *Timed*, and the clock indicates that this is an override off that begins at a price time (*Deferred*).

 to indicate a *Deferred Timed Override On*. The icon is yellow to indicate that this is an *Override On*, the stopwatch reminds you that this *Override On* is *Timed*, and the clock indicates that this is an override on that begins at a precise time (*Deferred*).

A recently added feature is the *Guaranteed Operating Time* mode. This mode guarantees that an appliance will run for a certain amount of time (a pool filter pump that must run five hours every day, for example). To set up this mode, make sure that the appliance is selected, then, above the day bar, press [+] to increase the number of minutes that the appliance must operate. Each press of the button increases the time by 15 minutes. If you have gone too far, use the other button [-] to adjust the time. The number of minutes for the operating time is indicated immediately above the [- - > 0 < - -] button. As it is not possible to schedule zero minutes or a negative number of minutes for the *Guaranteed Operating Time* mode, this mode will be deactivated automatically if you set the minutes to zero or set a negative number. Note that the scheduled start time displayed below the name of the appliance is of no importance in the *Guaranteed Operating Time* mode and therefore will not be displayed when the *Guaranteed Operating Time* mode is active. This mode will be active for the days of the week displayed in capital letters. To activate the *Guaranteed Operating Time* mode, press the icon above the number of minutes. indicates that this  mode is activated and that it is deactivated.  This icon is in the form of a stopwatch, reminding you that this is a timed mode, but the small black (off) and yellow (on) icons indicate that this is a mode with intermittent operation. Indeed, at sunrise, SWOpti will turn on the appliance and will indicate the number of minutes remaining that the appliance must operate on the right-hand part of the screen. SWOpti will control the appliance as if it were in *Normal* mode (it will be turned on if you have free electricity and turned off if you don't). BUT the remaining minutes will decrease only if the appliance is actually operating. As such, your appliance will get its operating time in, but only at the moments of the day when it is free. Two outcomes are possible with this mode. Either there was enough sun and the appliance was able to get its five hours in. In this case, SWOpti will execute one of the three options that you can configure:

- Turn off the appliance, but switch to Normal mode, which will allow the appliance to continue operating if you have enough solar power. With the appliance selected, type PGUAR=0 in the command field and click on "ABC → XYZ".
- Set up an *Immediate Timed Override Off* for the appliance for a certain number of minutes. With the appliance selected, type PGUAR=n (where n is the number of minutes of stoppage

desired) in the command field and click on "ABC → XYZ". This will turn off the appliance) for the designated number of minutes, which could allow other appliances to benefit from your solar production.

- Turn off the appliance, and leave it off until sunrise the following day. With the appliance selected, type PGUAR=999 in the command field and click on "ABC → XYZ".

Or, at sunset, the appliance was able to function only for three hours for example. In this case, SWOpti will set up an *Immediate Timed Override On* for the two missing hours. If you have a contract that benefits from a lower rate at certain times of the day, SWOpti will of course initiate this *Immediate Timed Override On* when the lower rate is in effect. Note that the *Deferred Timed Override On* and *Deferred Timed Override Off* modes are not compatible with the *Guaranteed Operating Time* mode. If a *Deferred Timed Override On* or *Deferred Timed Override Off* is scheduled and you set up a *Guaranteed Operating Time,* the *Deferred Timed Override On* mode or *Deferred Timed Override Off* mode will be replaced with the *Guaranteed Operating Time* mode.

RENAMING AN APPLIANCE

Under the green bat that indicates the name of the currently selected appliance, there is a bar with four sections. You can rename the currently selected device on the left side of this section; click "ABC --> XYZ" to confirm.

MANAGING APPLIANCES WITH A MINIMUM OPERATING TIME

Some appliances, such as a filtration pump for a swimming pool, require priming before filtration can actually begin. It is recommended that this type of appliance NOT be turned off during this priming period. You can use the field normally used to rename an appliance to set the minimum operating time. To do this, make sure the device in question is the currently selected appliance, and type MINON=7 (in minutes, without spaces, think "MINimum ON") in the field and then click "ABC --> XYZ". To the right you will see "🌀 = 0 / 7 min" displayed. This means that this device will remain on for a minimum of 7 minutes each time that it is turned on. If the appliance is indeed turned on, you will see "🌀 = 1 / 7 min" and one minute later "🌀 = 2 / 7 min". After the 7 minutes have elapsed, "🌀 = 0 / 7 min" will be displayed again.

APPLIANCE PRIORITY MANAGEMENT

In the middle of this section, you will find a  button and a number that indicates the level of priority for the currently selected appliance. If the currently-selected appliance has priority 14,

click the icon and the appliance will now have priority 13 (the appliance that had priority 13 will now have priority 14). After a few moments, the appliance's new order of priority (13) will be displayed. It is not possible to directly lower an appliance's priority. To lower the priority of an appliance, select the appliance on the Control screen with the immediately lower priority, then use the button to increase the priority of this appliance (to lower the priority of appliance 13, you must increase the priority of appliance 14). You cannot increase the priority for appliances beyond the number that you actually have. Obviously, you cannot increase the priority of the appliance that already has top priority.

APPLIANCE WATTS MANAGEMENT

You can use the right part of this section to manage how many watts your appliances need. As you know, SWOpti analyses your production and your consumption. If you are sending electricity to the grid, SWOpti will try to turn on appliances so as to use this free electricity rather than send it to the grid. In order to know whether it can turn on an appliance without causing a need to consume electricity from the grid, SWOpti needs to know how many watts your appliances need to operate. To modify this value, use the -W and +W buttons. Each press increases or decreases the power requirement for the currently selected device by 50 watts. The value cannot be below 10 watts or higher than 10,000 watts.

The main control screen displays information concerning appliances 1 to 18. If your SWOpti controls/monitors more than 18 appliances, you can display appliances 19 to 36 by clicking at the bottom of the screen on the right on the arrow. 

FOR EDF TEMPO CONTRACT HOLDERS

EDF markets an electricity contract where the rates are based on the colour of the day (blue is the most economical, then white, and finally red, the most expensive). A " Tempo day" begins and ends at 6am. Each day is divided into a high-rate period (from 6am to 10pm) and a low-rate period (10pm to 6am). That results in 6 rates, with the colour red in the high-rate period being the most expensive (0.7562 euros per kWh at the time this document was written!).

SWOpti can handle these red days. To activate this mode, press the icon at the bottom of the lefthand side of the screen. Each press activates or deactivates this mode:

Tempo mode activated. SWOpti will monitor the red days and will implement its programme automatically to help you save money when a red day is in progress.

Tempo mode deactivated. SWOpti will still monitor the red days and will display the information, but will not implement its programme when a red day is in progress.

Let's suppose that today is Wednesday and that tomorrow is a red day. At 10pm on Wednesday, SWOpti will set up an override on for the hot water tank and the electric vehicle charger. If you have any electrical radiators, SWOpti will control them as usual, according to the temperature settings that you have set up. SWOpti does not do anything in particular for radiators between 10pm and 6am; heating will be turned on and off as usual as needed. However, at 6am, SWOpti will set up an *Immediate Timed Override Off* for the jot water tank, electric vehicle charger and all the electric radiators. The *Immediate Timed Override Off* will last 960 minutes (until 10pm Thursday). You can see TEMPO in the righthand section of the screen for appliances in "*Tempo* mode" and the number of minutes remaining in this mode. Of course, you don't need to be told that you need to use another method of heating if you have one during a red day, but you can also try wearing a pullover and staying in one room, where you could use a small heater that you can take with you wherever you are in your home. At 10pm, SWOpti will return all the devices that are in *Tempo* mode to *Normal* mode.

The icon for activating/deactivating *Tempo* mode is centred at the bottom of the lefthand part of the main screen. Just to the right of this icon, towards the top and to the left there is a small icon that indicates the current colour for the day and whether the high rate (HP) or low rate (HC) is in effect.

Towards the top and to the right, an indication as to the colour for tomorrow will be displayed. It will display the three colours (like a French flag) until about 12h05 pm, when the colour for the next day becomes known. If you do not have a Tempo contract with the EDF electricity supplier, these icons will not be displayed on the screen.

DO YOU HAVE "PLUG-n-PLAY" PHOTOVOLTAIC PANELS?

The production from your solar panels that you do not use is sent to the grid (unless you have a battery and it is not fully charged). Given that the grid may not be able to absorb all the excess electricity that is sent to it, your grid operator may impose an "injection limit", for example, you may not be allowed to inject more than 6000 watts. SWOpti allows you to have a relatively high number of plug-n-play solar panels, because it is constantly monitoring the amount of excess production that you are injecting to the grid. If you exceed the limit that is imposed upon you, SWOpti will automatically cut off as many plug-n-play panels as necessary so that you fall back down below your injection limit, thus allowing you to comply with this limit. You can tell SWOpti what your injection limit is by typing INJMAX=n in the command field (where n is the number of injected watts not to be exceeded) and then by clicking on "ABC → XYZ" to confirm. If you do not want to configure an injection limit, type INJMAX=99999.

CONFIGURATION SCREEN

Click on  at the bottom of the main screen to access the Configuration screen.

LANGUAGE SELECTION

The Configuration screen allows you to select the language in which the information bubble will be displayed (if your browser supports this feature) and in which the days of the week will be displayed on the main control screen and in the Temperature Settings screen. The language currently in effect is displayed at the top of the column. Click on a language to switch SWOpti into that language. The modification takes effect almost immediately.

CUSTOMER INFORMATION

In the central part of this screen, if you need assistance, click on the blue technician with the gear. At the time this manual was written, it is the contact form on the www.swopti.fr website that will be displayed. In the future, a more appropriate page will be displayed.

Under this section, you will find your customer number, information on your subscription (the date when your subscription expires or if it has expired), and a location to display any special messages coming from SWOpti if needed. When you change the language, the information concerning your subscription will not be displayed in the new language until the following morning.

CONSUMPTION TOLERANCE MANAGEMENT

As you know, SWOpti analyses your production and your consumption. If you are consuming (you are drawing electricity from the grid), SWOpti tries to turn off appliances to reduce or even eliminate this consumption. When it analyses your consumption, SWOpti takes a consumption tolerance into account, which has a default value of 100 watts. If your production is for example 5000 watts, and your home is consuming 5075 watts (of which 3000 watts for your electric vehicle charger), you are going to draw 75 watts from the grid. This means that you are only missing 75 watts to operate the charger entirely free, and as 75 < 100, SWOpti will leave this consumption as it is and will not try to turn off any appliances. In other words, SWOpti will try to turn off appliances only if you are drawing more than 100 watts from the grid. The value of this consumption tolerance can be modified at the bottom of the Configuration screen using the -W and +W buttons. Each press increases or decreases the tolerance by 50 watts. You cannot set a negative value or a value over 3000 watts.

INTERNAL AND EXTERNAL ACCESS A SWOPTI AND HOMESEER

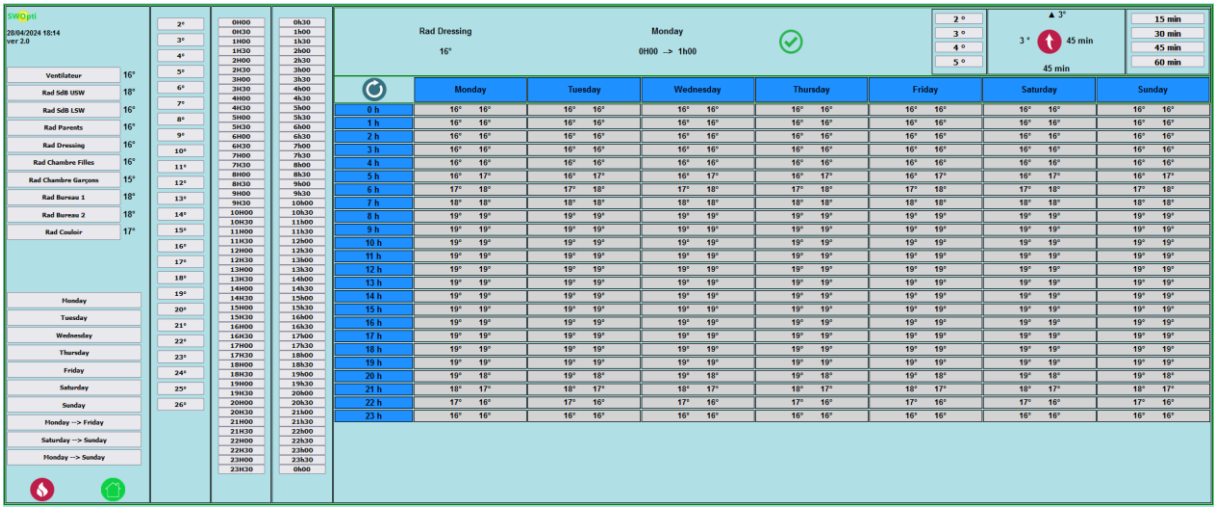
The right-hand portion of the screen provides information on how to access your SWOpti and HomeSeer from an internet browser using a PC, tablet, or mobile phone. At the bottom of this section, you have the address for access to SWOpti and HomeSeer when you are connected to your local network (therefore in your home). Your SWOpti Box has a port number (the default is 85). If you configure your internet box to "forward" any incoming traffic coming into your box on port 85 to port 85 of your SWOpti Box (supposing that you have already set up a static IP address for your SWOpti Box), you will then be able to access SWOpti and HomeSeer from outside your home. For this, you need to know your public IP address. Your public IP address is indicated at the top of this part of the screen. However, unless you have a static public IP address arrangement with your internet service provider, this address changes on a regular basis. You may very well note this address but once you are outside your home, your service provider could change this address. To overcome this problem, SWOpti provides you with a permanent link (therefore a link that never changes). This link displays the SWOpti and HomeSeer logos. By clicking on these logos, you can access your system when you are outside your home. Please note that for obvious security reasons, you will not be granted access to your system until you have entered your HomeSeer username and password.

SWOpti AND HEATING

SWOpti can manage your electric radiators. SWOpti has a temperature settings table to the nearest half-hour and per day of the week for each radiator. The temperature setting is the temperature that you wish to have in the room in question. The temperature setting tables are filled in with default values, but you can of course change these as you wish. On this screen, there is an icon in the lower lefthand corner. This icon indicates whether heating is on  or off.  When heating is off, all radiators are in *Override Off* mode. As such, they cannot be turned on. This is the case in the summer. You can switch between *Heating On* and *Heating Off* simply by pressing this icon. In the winter, you can use this button to temporarily turn off heating when you are on holiday away from your home.

We have already mentioned that the righthand portion of the main control screen displays the watts that all controlled or monitored appliance are consuming. You can therefore see the number of watts consumed by each radiator. SWOpti displays the total number of watts being used for all radiators just to the right of the heating icon, under the  icon.

To manage the temperature settings, click on the  icon and the following screen will be displayed:



At the bottom left, there is an icon to show the state of the *Heating* (on or off). You can switch between *Heating On* and *Heating Off* by clicking this icon. To the right of this icon, click on  to return to the main control screen.

At first glance, this screen appears to be complicated, but it is actually very simple. The upper lefthand part of the screen shows the list of radiators (or fans) and the current temperature in the rooms in question. Click on the name of one of these radiators to select it. This will update the righthand part of the screen with the data pertaining to the radiator that you have selected. On the sample screen shown here, the radiator in the dressing Room is selected (we can see its name displayed at the top of the righthand side of the screen), and we can see the temperature settings in the table configured for this radiator, per day and half-hour by half-hour. We can see for example that the desired temperature between 5am and 5h30am on Mondays for this room is 16°, and that the desired temperature between 5h30am and 6am on Mondays is 17°.

It is very easy to change the temperature settings that SWOpti must use to manage the radiators. Once you have selected the radiator in question, select the day (or days) for your modification in the day column (the top of the righthand part of the screen will be update to reflect your selection). Then, in the temperature column from 2° and 26°, select the temperature setting to be applied. It is possible to select such low temperatures so as to maintain a room just above freezing. Finally, in the two columns with times, select the start time for your modification in the first column and the end time in the second column. Check that the top part of the righthand portion of the screen is correctly displaying the selections that you have just made, then click on  to confirm your modifications. Wait a few seconds and then check that your modifications have been taken into account in the updated table that will be displayed.

NOTE: When you are working with a device that cools, such as the "Ventilateur" (Fan) in the sample screen, the temperature setting is the temperature that you do not want to exceed in the room. If you configure a temperature setting of 23° for a cooling fan, SWOpti will turn on the fan when the temperature reaches 23°.

THE DELTA TEMPERATURE AND "CATCH-UP" TIME

SWOpti decides to turn on or off a radiator according to the current temperature in the room and the temperature setting (desired temperature) for the room. But at the same time, SWOpti is trying to reduce or avoid drawing power from the grid. This means that SWOpti could turn on a radiator (because

it is 18° in a room where the temperature setting is 19°), but just a few minutes later, SWOpti detects that we are drawing power from the grid. According to the watts consumed and the order of priority for the appliances, SWOpti may very well turn off the radiator that it turned on just a few minutes ago. As time passes, this could result in that the temperature in the room continues to drop, until it becomes uncomfortably cold. To overcome this problem, SWOpti benefits from the notion of "delta temperature" and "catch-up" time. In the sample screen, we can see, above and below the red button with the arrow pointing upwards, that the delta temperature for the selected radiator is 3° and that the catch-up time is 45 minutes. If the temperature setting at a given time for the room is 19°, and the temperature in the room drops to 16° (a difference of 3°), we have reached the delta temperature. SWOpti will automatically programme an *Immediate Timed Override On* for this radiator so that is stays on in order to heat the room. The duration of this *Immediate Timed Override On* is the "catch-up" time (45 minutes in the example). To modify these two settings, select a delta temperature between 2 and 5° with the buttons on the left and the catch-up time with the buttons on the right. Your selections will be displayed just to the left and right of the  icon.

You must however confirm your selections by clicking on the  icon. The modifications concerning the delta temperature and catch-up time will be applied only to the selected radiator.

Use the  button to return to the main control screen.

ADVICE TO KEEP YOUR SWOpti IN GOOD WORKING ORDER

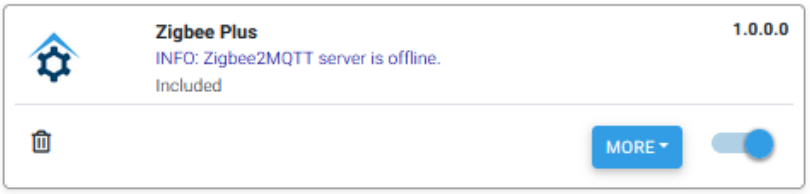
SWOpti does not require any particular maintenance, but like any other software that is running on a computer, there are a few basic rules that you should comply with.

1. THE MEASUREMENTS AND STATUS INFORMATION SEEM TO BE INCORRECT

SWOpti uses a Zigbee controller to communicate with the clamps and micromodules. If there is an issue with Zigbee, SWOpti cannot operate correctly. Sometimes, after a long period of time with no incidents, a problem arises because the cache memory is saturated or there are too many "temporary" files on the computer. PCs need to be shut down and turned back on to "clean" the memory. HomeSeer uses a Plugin to communicate with the Zigbee controller, and the controller itself is managed by a driver which has to be active. To "reset" the Zigbee plugin: Go to the "Plugins → Manage" menu of your HomeSeer and slide the blue button towards the left to deactivate the Plugin:

Wait for the following screen to be displayed, then slide the button back to the right:

After a minute or two, you should see the following screen ,with OKAY in green (as in the first image hereinabove). If the screen is showing:

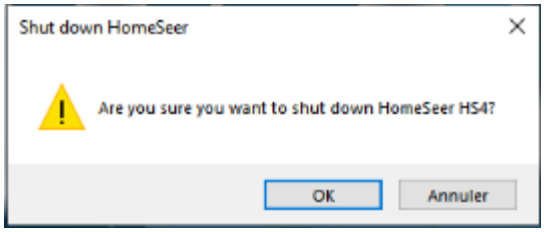


this means that the plugin has been reset but not the driver. Click on MORE → Zigbee2MQTT Back-End, then click on START to reset the driver. After a minute or two, you should see the message "Zigbee2MQTT is running" above the START button. Otherwise, do another START until you obtain the "Zigbee2MQTT is running" message.

2. POWER OUTAGES

If you are planning to work on your electrical network and you need to cut off the power, remember to shut down HomeSeer and then shut down the SWOpti Box. Computers do not like to be shut off abruptly when it can be avoided. To shut down HomeSeer, connect to your SWOpti Box with Remote Ripple, and shut down the HomeSeer application with the red X:

Then click on "OK" to confirm the shutdown:



Then use the normal Windows functions to shut down the PC.

3. BACKUPS

Your SWOpti performs a backup all by itself at 3:01 am on Mondays, Wednesdays, Fridays and Sundays. The 10 most recent backups are kept (when the 11th backup is done, the oldest backup will be deleted). Backups are stored in the \html\backups directory in your HomeSeer directory on the SWOpti Box. Use the procedure below to modify the time for the backup, the number of backups to be retained, the days of the week and, very important, the destination directory for the backup. Indeed, it is better to not store the backups on the SWOpti Box itself but on another computer, if you have a network drive or USB key for example. Here is HomeSeer's procedure for managing backups:

1. In HomeSeer, go to **Tools > Backup/Restore** and click **EDIT** at thje bottom right in order to enable modifications.
2. **Save To** should be left on "default" unless you want to use a network drive or USB key. If this is the case, enter the complete path to the destination folder. Example: \\MY-SERVER\HomeSeerBackups.
3. **Max Backups** determines how many backups are kept.
4. Tick **Auto Local Backup**.
5. **Time** determines when the backup will start. We recommend a time late at night or early in the morning when in principle fewer HomeSeer events are running.
6. In the **Days** section, tick the days of the week for the backup. If you do not generally make many changes to your system, one backup a week is probably enough.
7. Click **Save**, and your automatic backup schedule will be activated!

4. WHEN SWOpti SEEMS TO NO LONGER BE COMMUNICATING WITH APPLIANCES

Your SWOpti mini PC has to be able to run without interruption. By default, the PC is configured to turn off the screen, put the hard drive on standby, etc. if there is no activity with the keyboard, mouse, etc. If Windows deactivates components, this can cause malfunctions for HomeSeer and SWOpti. When it is manufactured, these "standby" or "sleep" functions are deactivated in your SWOpti Box so that SWOpti can operate correctly.

After a Windows update, these features are sometimes automatically reactivated. They have to be deactivated again. In particular, your Zigbee controller operates on a USB port; the USB ports must never go into standby or sleep mode.

Check that standby/sleep modes are deactivated by going to Control Panel* → System → Power Options. In the "Standby" section, the parameters should be set to "Never". Then click "Additional power settings", then "Modify the computer's conditions for standby" and finally "Modify advanced power settings ". Expand the options under "Hard drive " and set them to "Never". In "Standby" set the parameters to "Never" or "Deactivated" for the first 3 options ("Standby after", "Allow hybrid standby" and "Go to prolonged standby after"). In "USB settings" then "USB selective suspension setting", set the two options to " Deactivated". Don't forget to click OK.

* The names of these menus and options were translated from French. They may be worded differently on your PC.

5. HOMESEER'S "LOG" IS FILLING UP FAST

When an "event" is triggered in the system, HomeSeer logs this by writing a line to a log file. You can view this log file via the menu Tools → Log. Some events are triggered every five seconds, which causes the log file to grow in size very quickly. Fortunately, there is an option that can be used to tell HomeSeer not to write these lines to the log for such and such an event. Unfortunately, after an update (new version of SWOpti…) has been made to the system, this option is reset to its default value, which is to write these lines. To "alleviate" your system, you must reactivate this option manually. To do this, go to the menu Events and click JJF Services. In the list of events, click JJF-PowerCalc then Advanced Options. Tick the box Do not log if it is not ticked and click Save. Click JJF Services to display the list of events again, then do the same for events JJF-Power, JJF-SoH, JJF-OverrideMaint, JJF-TempControl and Refresh.