

Watlow PM Plus

Programming Guide

Forced Air and Vacuum Ovens

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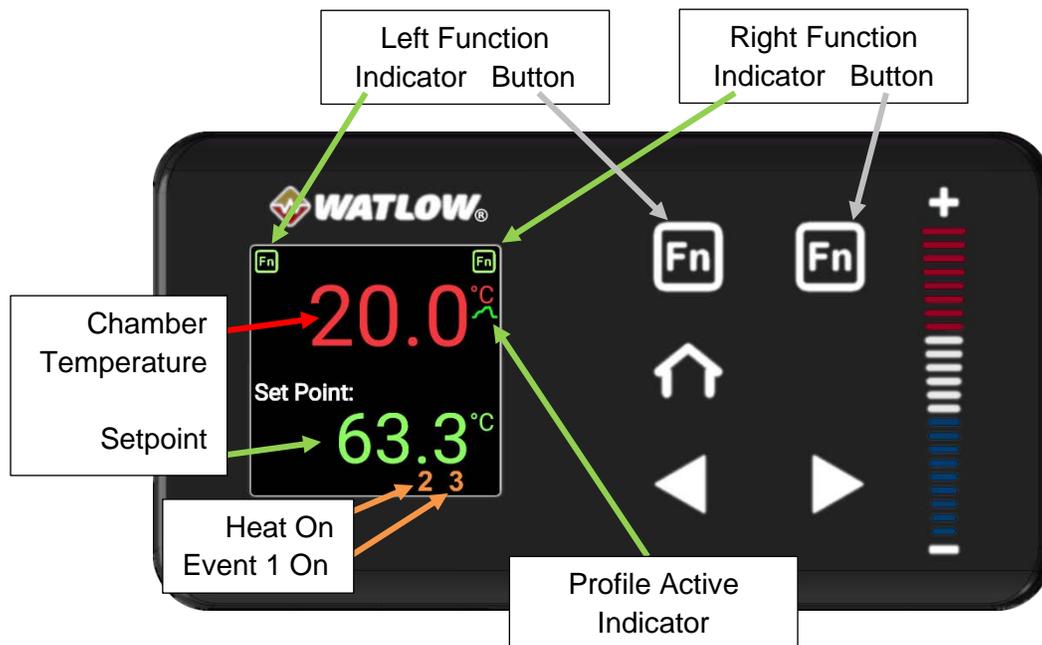
INTRODUCTION

The Watlow PM Plus controller included with your oven enables the programming of profiles and sequences to automate the baking process, including the activation and deactivation of blowers or valves.

This guide offers details tailored to your specific oven. For comprehensive guidance on using this controller, please refer to Watlow's website to download additional manuals and resources as needed.

INTRODUCTION

PM PLUS PANEL



The **Home** button allows immediate navigation back to the home screen, where it displays the current temperature and the set temperature.

While on the homepage, use the **(+)** and **(-)** buttons or swipe up or down on the **+/- bar** to alter the constant temperature setpoint. On Operations pages, these controls are used to select Operation options, modify the high limit setpoint, adjust calibration offsets, and configure profile variables.

From the homepage, pressing the **forward arrow** button progresses through various parameter option pages, such as Event 1 and Units of Measurement (Celsius or Fahrenheit). This button is also used for advancing through menus and parameter lists while programming a temperature recipe.

The **back arrow** button takes the display back to the previous page or menu. Continuously pressing this button will eventually navigate the display back to the homepage.

Pressing the **left function (Fn)** button activates Profile 1. Pressing it again during its execution will stop Profile 1. Similarly, the **right function (Fn)** button initiates Profile 2 (Step 11) and pressing the button a second time while it is running will halt Profile 2

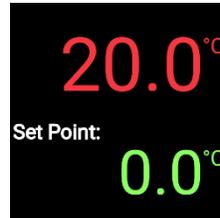


INTRODUCTION

PROFILE ELEMENTS

The oven controller can store up to four heating profiles. A profile acts as a digital heating recipe designed to automate complex baking or heat treatment processes. Each profile can consist of up to 10 steps, arranged in order within the controller's memory.

- Profile 1: Steps 1 – 10
- Profile 2: Steps 11 – 20
- Profile 3: Steps 21 – 30
- Profile 4: Steps 31 – 40



Chamber temperature
red (top)

Temperature setpoint
green (middle)

Display Homepage

The operator assigns a "Step Type" to each step, acting as commands that guide the controller for automation purposes. The controller contains a wider range of steps than those covered in this manual. We will concentrate on three specific steps detailed below. For additional details on other "Step Types," please consult the user manual for Watlow's controller.

Step Types:

Time

Integrate temperature and duration configurations to facilitate the process of ramping up or ramping down the oven within a designated timeframe. Take into consideration the maximum heating rate of the oven when adjusting the parameters for heating up and consider ambient conditions when setting the parameters for cooling down the oven.

The maximum programmable time limit for the controller is 99 hours, 55 minutes.

Parameters: Target Set Point Loop 1, Hours, Minutes, Seconds, Event 1, Event 2

Soak

Sets time parameters for running the oven at a constant temperature. A Soak step always uses the temperature setpoint of the previous step.

Parameters: Hours, Minutes, Seconds, Event 1, Event 2

End

Terminates a running profile. Always select the User parameter option for End. This setting restores the oven to operator control and returns the oven to its pre-profile heating state.

Parameters: End Type, Event 1, Event 2

POWER AND MEMORY

Heating profile steps remain stored when the oven is turned off or experiences a power outage. In the event of a power interruption while running a profile, the oven will restart if the Power switch is in the ON position, but it will not automatically resume the profile. The operator must re-launch an interrupted profile.

INTRODUCTION

EVENT PARAMETERS

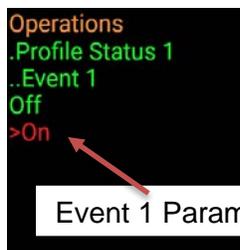
Some models do not support events, if yours does not this section will not apply.

Depending on the model type, the oven may be provided with one of the following:

- Power Outlet Control, intended for powering an accessory exhaust blower fan mounted on the oven exhaust vent.
 - The power outlet and any attached blower can be turned on as part of a heating profile. Power on or off to the outlet is controlled by the Event 1 parameter. This is the final parameter for most heating profile step types. When the Event 1 parameter is set to On, the oven routes power to its external power outlet. When the profile reaches the next step in which Event 1 is set to Off, the oven depowers the outlet.
 - The Event 1 parameter is set to Off by default. It must be set to On for each profile step in which power will be supplied to an exhaust blower.
 - The Event 2 parameter does not have a pre-programmed function.

Note: The exhaust blower will suffer damage if directly exposed for prolonged periods to air 80°C or hotter while turned off. The exhaust vent the blower is mounted on should remain closed until the blower is activated. The vent dampener must be manually opened.

- Vacuum Control, intended for vacuum automation.
 - When Event 1 is set to On, the oven vacuum valve opens. When the program reaches the next step in which Event 1 is turned off, the valve closes, and the oven partially backfills to 600 torr. The parameter can be set to On or Off as part of a heating program or manually set from the homepage menu.
 - The Event 1 parameter is set to Off by default. It must be set to On for each heating program step in which the oven chamber will be evacuating or held under vacuum.
 - The Event 2 parameter does not have a pre-programmed function.

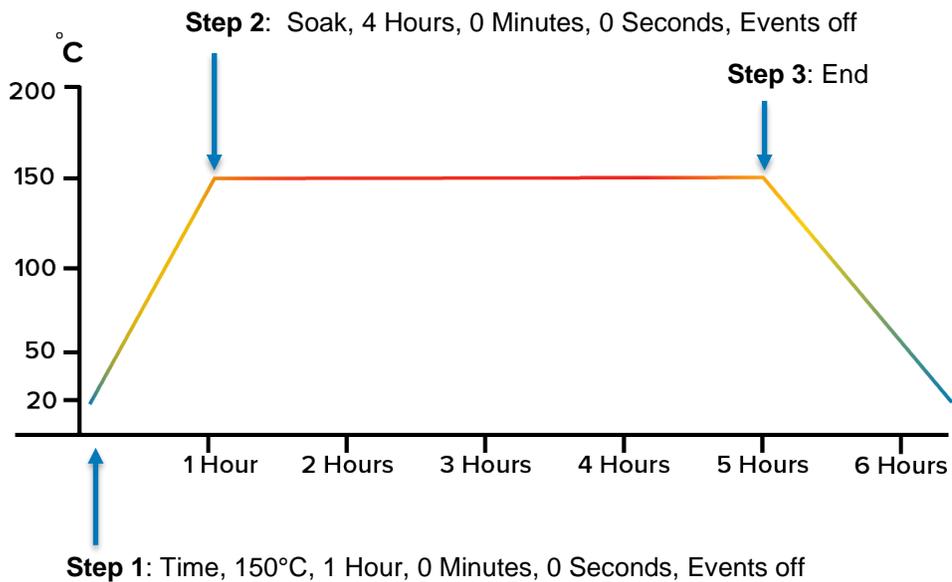


"2" illuminates when oven is calling for heat
"3" illuminates when Event 1 is set to On

SIMPLE HEATING RECIPE PROFILE EXAMPLE



- **Step 1:** Type: Time - Ramps the oven up to 150°C over a 1-hour period
- **Step 2:** Type: Soak - Runs the oven at 150°C for 4 hours
- **Step 3:** Type: End - Terminates the profile and returns the oven to manual user control
-

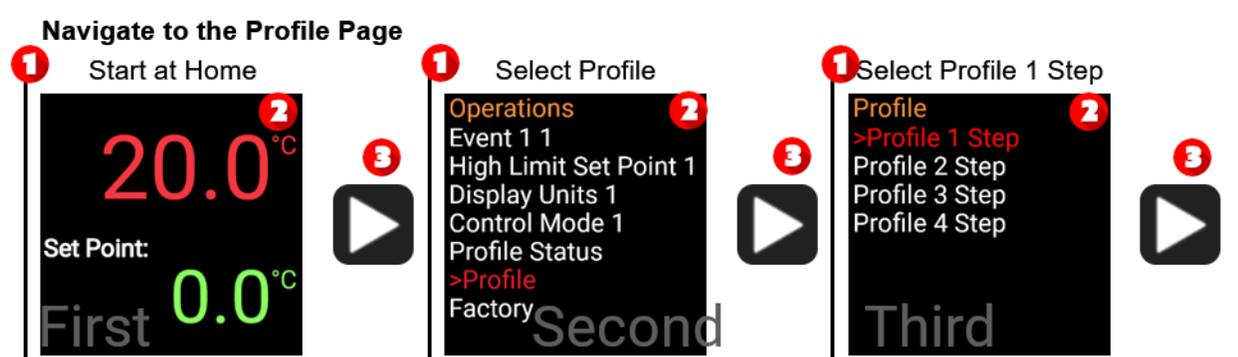


The constant temperature setpoint on the homepage is set to zero in this example. When the profile reaches its End step, the oven returns to the constant temperature setpoint. In this case, it will cool to room temperature plus waste heat from the oven.

Continued next page

PROFILE EXAMPLE

HOW TO USE PROGRAMMING DIRECTIONS.



Demonstration Instructions

Each row will have up to 3 instructions for the operator to follow.

Each instruction will have the following elements.

1) Text instruction

1 Select Profile

Select is used to choose a menu item from the list on the screen

Set or "=", directs the operator to change the mentioned value.

Use the (+/-) bar on the control panel to make these changes



2) Image of screen



The screen shows what the operator's screen should look like before advancing.

Some options may look different on your specific control.

3) Buttons to push to advance to next instruction.



Used to move to the next task.

One image means press once
2 images mean press twice,
etc....



Press once



Press 2 times

Continue to next page to set up your first profile on your control.

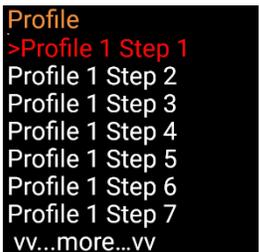
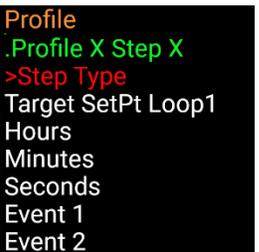
PROFILE EXAMPLE

NAVIGATE TO THE PROFILE PAGE

<p>Start at Home</p> 	<p>Select Profile</p> 	<p>Select Profile 1 Step</p> 
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This screen allows you to choose any of the four available profiles to configure your steps.

SETUP "PROFILE 1", "STEP 1"

<p>Select Step 1</p> 	<p>Set Step Type</p> 	<p>Step Type = Time</p> 
<p>Target SetPt Loop1 = 150</p> 	<p>Hours = 1</p> 	<p>Minutes = 0</p> 
<p>Seconds = 0</p> 	<p>Event 1 = Off</p> 	<p>Event 2 = Off</p> 

Setup step 2 on next page.

PROFILE EXAMPLE 1

SETUP "PROFILE 1", "STEP 2"

<p>Select Step 2</p> <pre>Profile Profile 1 Step 1 >Profile 1 Step 2 Profile 1 Step 3 Profile 1 Step 4 Profile 1 Step 5 Profile 1 Step 6 Profile 1 Step 7 vv...more...vv</pre>	<p>Set Step Type</p> <pre>Profile .Profile X Step X >Step Type Target SetPt Loop1 Hours Minutes Seconds Event 1 Event 2</pre>	<p>Step Type = Soak</p> <pre>Profile .Profile X Step X ..Step Type Unused Step >Soak Wait for Event Wait for Process Wait for Both vv...more...vv</pre>
<p>Hours = 4</p> <pre>Profile .Profile X Step X ..Hours 4</pre>	<p>Minutes = 0</p> <pre>Profile .Profile X Step X ..Minutes 0</pre>	<p>Seconds = 0</p> <pre>Profile .Profile X Step X ..Seconds 0</pre>
<p>Event 1 = Off</p> <pre>Profile .Profile X Step X ..Event 1 >Off On</pre>	<p>Event 2 = Off</p> <pre>Profile .Profile X Step X ..Event 2 >Off On</pre>	

SETUP "PROFILE 1", "STEP 3"

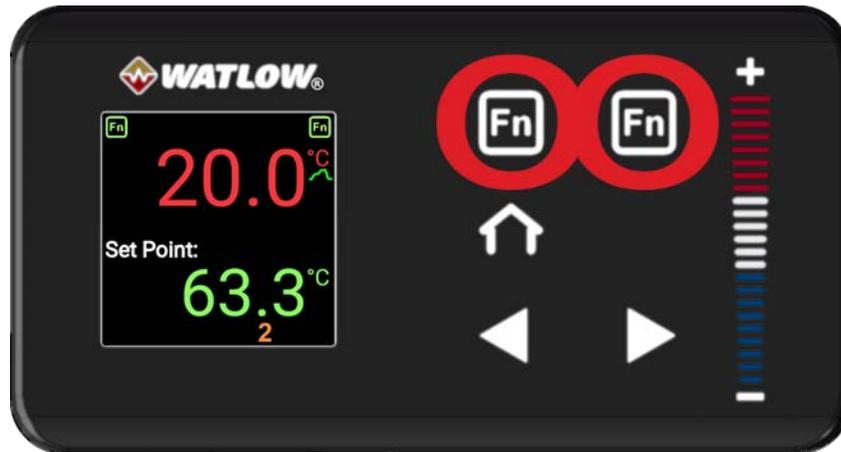
<p>Select Step 3</p> <pre>Profile Profile 1 Step 1 Profile 1 Step 2 >Profile 1 Step 3 Profile 1 Step 4 Profile 1 Step 5 Profile 1 Step 6 Profile 1 Step 7 vv...more...vv</pre>	<p>Set Step Type</p> <pre>Profile .Profile X Step X >Step Type Target SetPt Loop1 Hours Minutes Seconds Event 1 Event 2</pre>	<p>Step Type = End</p> <pre>Profile .Profile X Step X ..Step Type ^^...more...^^ Jump >End Time</pre>
<p>End Type = User</p> <pre>Profile .Profile X Step X ..End Type >User Off Hold</pre> <p>Always User</p>	<p>Event 1 = Off</p> <pre>Profile .Profile X Step X ..Event 1 >Off On</pre>	<p>Event 2 = Off</p> <pre>Profile .Profile X Step X ..Event 2 >Off On</pre>

The profile is now ready to launch.

LAUNCH PROFILES / STEPS

QUICK LAUNCH FUNCTION (FN) BUTTONS (PROFILE 1 & 2)

Profile 1 (Step 1) can be fast launched on the Homepage using the left (Fn) Button and Profile 2 (Step 11) can be fast launched using the right (Fn) button.



1. Quick launch Profile 1 (Step 1).



a. Push the left (Fn) button.

Left (Fn) indicator illuminated



The current setpoint, which adjusts during timed interval steps as the oven heats or cools.

"2" illuminates when heating after calculations



Ramping icon illuminates

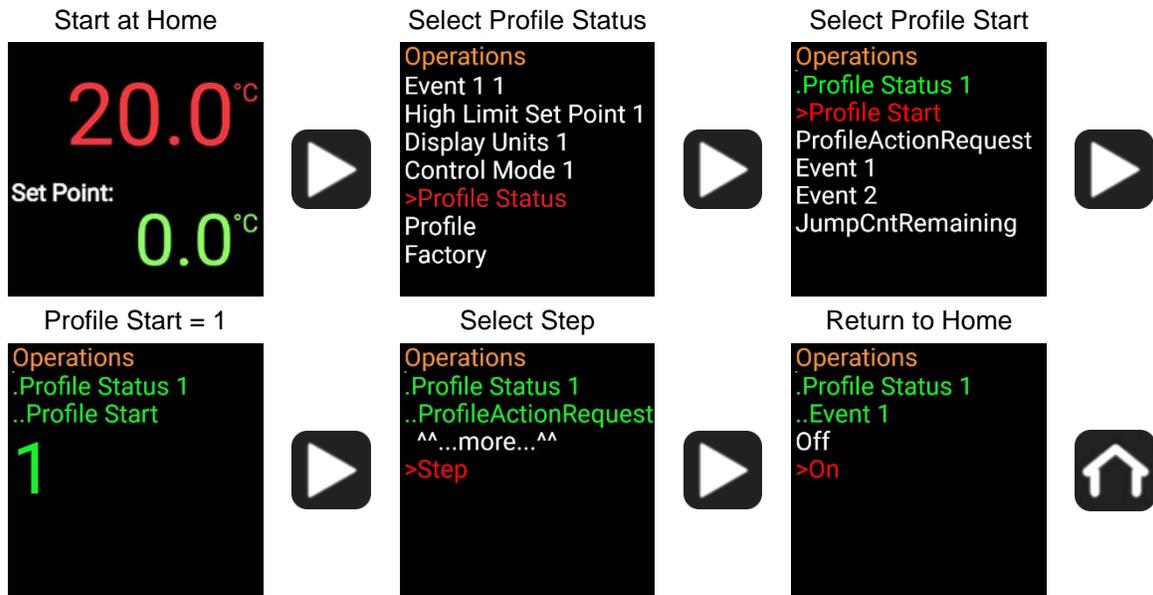
Profile 1 is now active and will run for its complete duration unless aborted by pushing the left (Fn) button, again.

The right (Fn) button launches Profile 2 (Step 11).

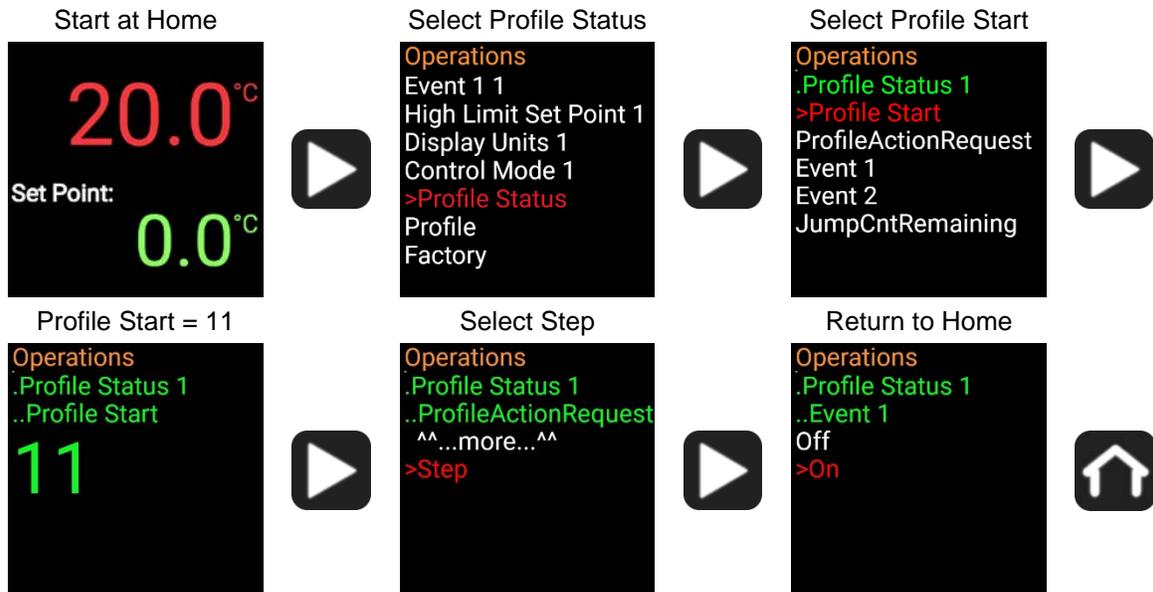
Pushing the right (Fn) button, again aborts Profile 2.

LAUNCH PROFILES / STEPS

HOW TO START [PROFILE 1 (STEP 1)]

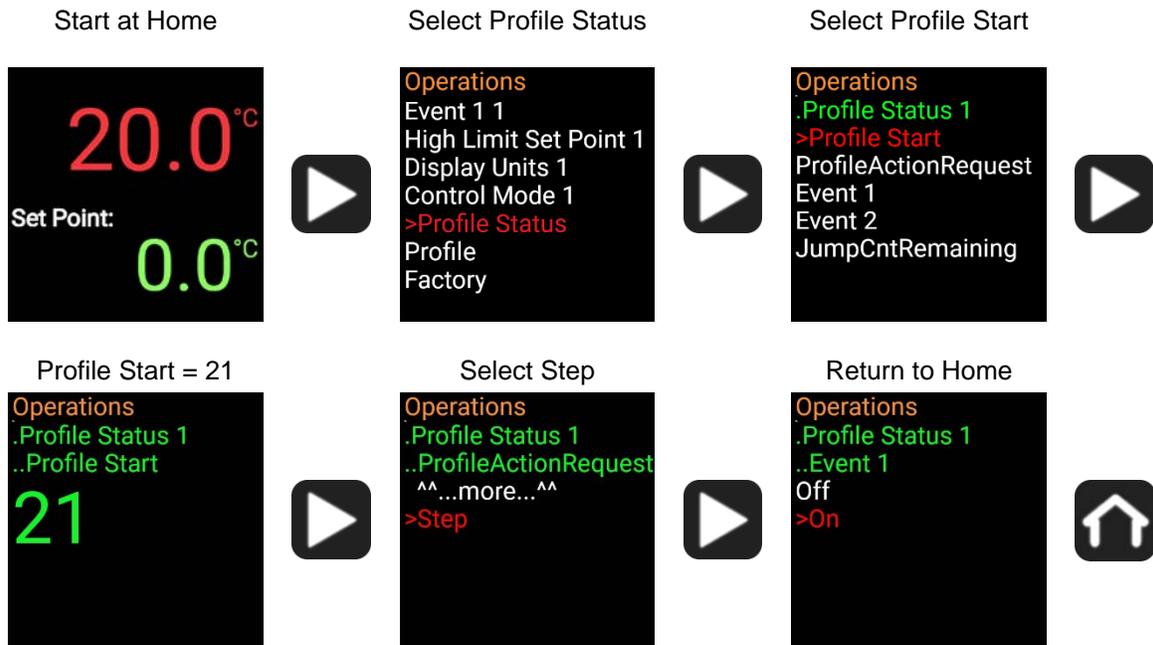


HOW TO START [PROFILE 2 (STEP 11)]

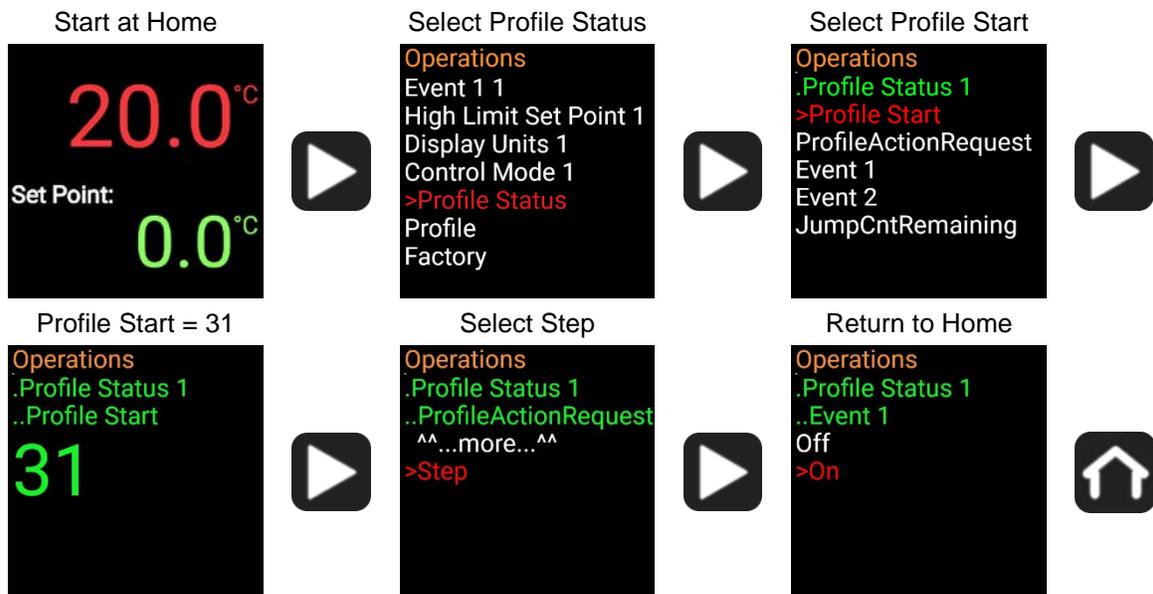


LAUNCH PROFILES / STEPS

HOW TO START [PROFILE 3 (STEP 21)]



HOW TO START [PROFILE 4 (STEP 31)]



The operator can start a profile at any step, it does not have to be just 1,11,21 or 31.

COMBINING PROFILES

Profiles may be combined by configuring steps sequentially as a single profile.

For example, programming steps 1 – 14 sequentially and choosing the End Option for Step 14 causes Profile 1 to run through all 14 steps when launched. Launching Profile 2 in this configuration would only run Steps 11 – 14.

ABORTING PROGRAMS

ABORTING A RUNNING PROFILE



The left function (Fn) button can be used to abort an active profile.

- Push the button **once** to abort Profile 1 if it was launched using the **left (Fn) quick launch function**.
- Push the button **twice** to abort any programs launched from the Profile Action page.

Note: Pushing the **left (Fn)** button while running a profile launched from the Profile Action page does the following.

2. It immediately quick launches Profile 1, ending the previous profile.
3. Pushing the button a second time then aborts the newly launched Profile 1.

End of Guide