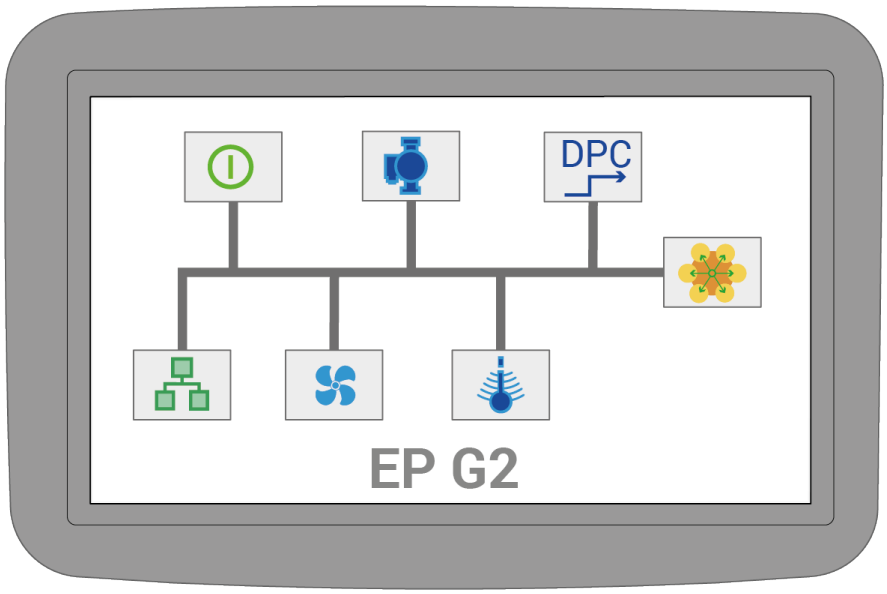
EP G2

Control System and Menus



English - v1.5.0-0 - 20250423

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EP G2 - Control System and Menus

This manual describes the function of the control system and configuration options.
For technical data and electrical connections, please refer to technical manual "Installation and technical data".

ⓘ This manual describes a generic EPG2 boiler. The availability of some sections depend on the configured options. For example, the number of busbars differs between small and large boilers. Also, default values, minimum and maximum etc. depend on the model. However, the correct values can be read directly on the boiler.

ⓘ This manual, **EP G2 [tr: print_front_subheader**], is updated to match new software releases. The latest version can be downloaded from Värmebaronen AB.

ⓘ By default, temperature regulation is off.
Before commisioning, the boiler must be configured and a regulation mode selected. Some of the most common use cases are outlined in section **Quick Start**

☁ It is recommended to logging to Värmebaronen AB is enabled. In addition to providing valuable data for future improvements and aid in troubleshooting it also enables the boiler to send alerts via email to operators etc.

System Update

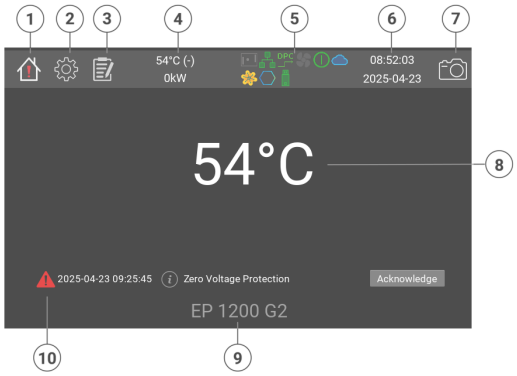
The boiler's system software can be updated by an installer. This makes is possible to get new features and to apply bugfixes.
The updates can be downloaded from https://telemetry.varmebaronen.se:2002 and put on a USB-stick. The download page also contains a changelog, outlining the most important changes between versions.

If the boiler has a working internet connection the alert ⚠ **New Software available** will be shown when a new version is available.

To install an update, activate installer mode, and go to ⚙ -> **Administration** -> **Software Updates**. For more info see section avsnittet **Software Updates**

Alternatively, the system can be updated through the recovery mode that can be reached during boot.

Main page



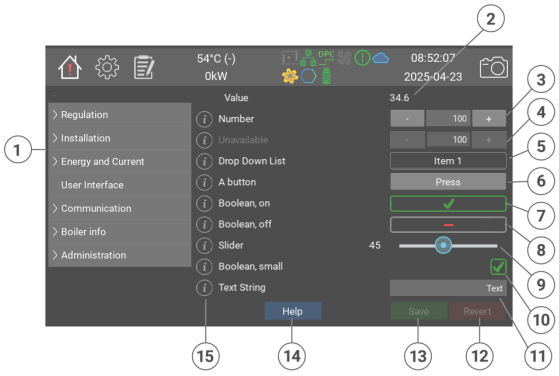
1. Main page
2. Settings
3. Event log
4. Boiler temperature, Temperature Set Point and current power
5. Status icons
6. Time and date
7. Save screenshot
8. Current boiler temperature
9. Boiler model
10. Alerts and warnings

The main page shows current boiler temperature.

Any alarms and information alerts are shown below the temperature.
When more than five alerts are active the temperature is hidden.

The main page can be reached by pressing the house icon at the top left of the screen.

Menu System



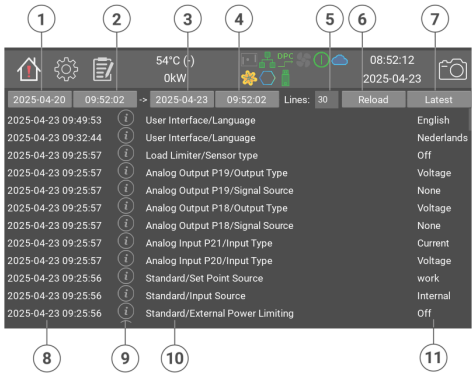
1. Menu tree
2. A label is a read only object that can show a text or number
3. Number field. Can be integer or decimal value. Use plus and minus to increment or decrement. Clicking on the value itself brings up a virtual keyboard.
4. A number field that is disabled
5. A drop down list
6. A button runs a function immediately. Sometimes a window will popup for confirmation
7. A boolean value is toggled on or off by pressing it. This one is on
8. This boolean is off
9. A slider adjusts a numeric value
10. Small booleans are used to indicate the state of an input
11. A text string, can be a name, email adress, internet URI etc.
12. The revert button cancels all unsaved changes on the page
13. The save button stores changes in the configuration
14. The help button brings up a longer help text about the current page
15. Most items have an 'i'. Pressing it will bring up a screen with more information such as default value, min and max, modbus index etc.

Most changes only take effect when the save button has been pressed. Pressing Revert or navigating away from the page reverts any unsaved changes.

Please note that some minimum and

maximum values shown differ between models. The values for the current boiler can always be read on the display.

Event log



1. Start date
2. Start time
3. End date
4. End time
5. Number of rows to show
6. Reload events from date
7. Show latest events
8. Time and date when the event occured
9. Press for detailed information
10. Name of the event
11. Value or status

The event log function is used to view alerts and parameter changes.

Alerts are shown in their normal colors, red, yellow and green.
Parameter changes are shown in white.
Some events have an 'i' that will bring up a window with more information when pressed.

Do the following to load events.

1. Choose start date and time
2. Choose end date and time
3. Enter maximum number of rows to show
4. Press Reload
5. In a few seconds the events will be listed

Quick Start

The following sections contains the minimum steps to get the boiler started. All configuration is done in installer mode.

ⓘ The boiler comes from the factory with regulation turned off.

Standard

1. Switch to Installer:
   ⚙ -> **Administration**.
   - **tr: press**: **Switch to Installer**.
2. ⚙ -> **Regulation** -> **standard**
   -**Set Point Source** = **Internal/ Network**
   - **Boiler Set Value, internal (°C)** = Desired boiler temperature
   - Save
3. ⚙ -> **Regulation**
   - **Mode** = **Standard**
   - Save
4. ⚙ -> **Communication** -> **Reporting/Logging**
   - **Send logs to Värmebaronen**, check the box
   - Save

External Power Limiting, 0-10V

1. Switch to Installer:
   ⚙ -> **Administration**.
   - **tr: press**: **Switch to Installer**.
   Set Point Source = **Internal/ Network**
   - **Boiler Set Value, internal (°C)** = Desired boiler temperature
   - **External Power Limiting** = **Upper Limit**
   - **Input Source** = **P20**
   - Save
2. ⚙ -> **Installation** -> **Analog Input P20**
   - **Input Type** = **Voltage**.
   - Save
3. ⚙ -> **Regulation**
   - **Mode** = **Standard**
   - Save
4. ⚙ -> **Communication** -> **Reporting/Logging**
   - **Send logs to Värmebaronen**, check the box
   - Save

External Set point source, 0-10V

1. Switch to Installer:
   ⚙ -> **Administration**.
   - **tr: press**: **Switch to Installer**.
2. ⚙ -> **Regulation** -> **standard**
   - **Set Point Source** = **P20**
   - **Min. Set Temp (°C)** = Temperature at 0% input signal
   - **Max. Set Temp (°C)** = Temperature at 100% input signal
3. ⚙ -> **Installation** -> **Analog Input P20**
   - **Input Type** = **Voltage**.
   - Save
4. ⚙ -> **Regulation**
   - **Mode** = **Standard**
   - Save
5. ⚙ -> **Communication** -> **Reporting/Logging**
   - **Send logs to Värmebaronen**, check the box
   - Save

UTK – Outdoor Temperature Compensation

1. Switch to Installer:
   ⚙ -> **Administration**.
   - **tr: press**: **Switch to Installer**.
2. ⚙ -> **Regulation** -> **standard**
   - **Set Point Source** = **UTK**
   - Save
3. ⚙ -> **Regulation** -> **UTK**
   - Temperature nodes: Set the desired boiler temperature at the 11 different points corresponding to the outside temperature between -30°C to +20°C.
   - Save
4. ⚙ -> **Regulation**
   - **Mode** = **Standard**
   - Save

5. ⚙ -> **Communication** -> **Reporting/Logging**
   - **Send logs to Värmebaronen**, check the box
   - Save

None

1. Switch to Installer:
   ⚙ -> **Administration**.
   - **tr: press**: **Switch to Installer**.
2. ⚙ -> **Regulation**-> **Direct Power Control**
   - **Signal Source** = Analog Input P20
   If desired, the size of the power jump can be limited and the time between the power jumps changed for both increasing and decreasing power.
   - Save
3. ⚙ -> **Regulation**-> **overtemp**
   - **Overtemp mode** = Absolute.
   - **Absolute Limit (°C)** = Temperature at which the boiler turns off power
   - Save
4. ⚙ -> **Installation** -> **Analog Input P20**
   - **Input Type** = **Voltage**.
   - Save
5. ⚙ -> **Regulation**, **Mode** = **Direct Power Control**
   - Save
6. ⚙ -> **Communication** -> **Reporting/Logging**
   - **Send logs to Värmebaronen**, check the box
   - Save

Warnings and Alerts

Warnings and Alerts are indicated in two places: On the main page and on the home icon. There are three levels:
⚠ **Green messages** indicate that something important is activated or missing. For example regulation is turned off, or simulator is enabled.
⚠ **Yellow warnings** stops regulation until the issue ahs been resolved. The boiler automatically resumes regulation when the cause is gone, but the message stays until the user acknowledges it.
⚠ **Red alarms** stop the boiler and activate the alarm relay output, P9. The boiler resumes regulation when the error has been resolved and acknowledged.

All warnings and alerts are logged in the event log.

Indication via Modbus/BACNet
Status of alerts can also be read through Modbus/BACNet at the following indices:
40040 Red alarms
40041 Yellow Warnings
40042 Green Messages

An alarm is represented by a bit, whoch index is shown after each heading below in brackets.
Any red or yellow value other than 0 means that something blocks normal operation of th boiler and needs to be rectified.

The following alarms can occur:

⚠ **Simulator Active [6]**
Simulator is active and normal regulation is off.
To change setting: activate installation mode and go to **Installation**. Set **Boiler Simulator** to **Boiler On, Simulator Off**.

⚠ **Load Limiter Active [0]**
The Load Limiter restricts the boiler´s power. For more information and settings, please refer to menu ⚙ -> **Installation** -> **Load Limiter**

⚠ **External Power Limit Active [1]**
An external source limits the boiler's output. For more information, please refer to menu **Installation**.

⚠ **Forced Power Stage [2]**
None

⚠ **Regulation is off [3]**
The boiler is delivered with the regulation switched off.
To change the setting: activate the installer mode, go to **Installation** and **Mode**.

⚠ **Update current boards [4]**
One or more current meter boards can be updated.
Go to **Energy and Current** -> **busbar_n** and press **program_rog_button_text**.

⚠ **New Software available [5]**
A new version of the software is available.
Go to ⚙ -> **Administration** -> **Software Updates** to download and install.

⚠ **Check main breakers' torque [7]**
It is time to check the torque on the mains breaker cable clamps.
For further instructions see the sticker on the inside of the boiler door and please refer to technical manual "Installation and technical data".

⚠ **Low Water Level [0]**
Low water level in the boiler tank. Check the reason, vent and top up with water if necessary.
⚠ On boilers from 900kW and up this will also trigger the alarm output.
For more info, please refer to technical manual "Installation and technical data".

⚠ **Overtemperature [1]**
The overtemperature protection has been activated due to the boiler temperature reaching the set limit. All power is temporarily disconnected. When the boiler temperature has dropped with set hysteresis, regulation will resume automatically. For more information and settings please refer to menu ⚙ -> **Regulation** -> **overtemp**

⚠ **Boiler Temp. Sensor Missing [2]**
Not connected, or interrupted boiler temperature sensor.
For more information and troubleshooting, please refer to technical manual "Installation and technical data".

⚠ **PCB Temperature High [4]**
The temperature of the PCB is too high. Regulation is temporarily stopped and resumed when the temperature has dropped.

⚠ **Boiler Tempeature low [3]**
The boiler temperature is lower than +5°C. Regulation resumes automatically when the boiler temperature exceeds +15°C. Alternatively short circuit in the boiler temperature sensor.
For more information and troubleshooting, please refer to technical manual "Installation and technical data".

⚠ **No UTK sensor connected [5]**
Outdoor sensor is missing or incorrect. For more information and troubleshooting, please refer to technical manual "Installation and technical data".

⚠ **Overtemperature [0]**
The temperature guard has triggered. Reset can take place when the boiler temperature has dropped by approx. 25 degrees. For more information, please refer to technical manual "Installation and technical data".

⚠ **Load switch Off [1]**
Load switch in Off or Tripped position. Press Pause to be able to reset the switch to operating position (On). ATTENTION! All red alerts must be rectified and acknowledged before the load switch can be reset. For more information, please refer to technical manual "Installation and technical data".

⚠ **Pressure High [2]**
The high pressure guard has triggered. For reset and more information, please refer to technical manual "Installation and technical data".

⚠ **Pressure Low [3]**
The low pressure guard has triggered. For reset and more information, please refer to technical manual "Installation and technical data".

⚠ **Zero Voltage Protection [4]**
After a power cut, the boiler must not restart automatically. Acknoledgment must be done manually. For more information, please refer to menu **Installation -> Enable Zero Voltage Protection**.

⚠ **Waterlevel HT [5]**
Low water level in the boiler tank. From High Temperature sensor. Check the reason, vent and top up with water if necessary.
For more info, please refer to technical manual "Installation and technical data".

⚠ **Zero Voltage Relay HT [6]**
At least one of the High Temperature safety switches has triggered

Status Icons

A Grey icon means that the function is available but currently not active.

BACnet
BACnet is enabled

Log to cloud
Send logs to Värmebaronen

DPC – Direct Power Control
DPC is enabled or active

Fan enabled
The fan is enabled and running

Modbus enabled
Modbus communication is enabled

Ethernet
Ethernet connection status

Pump enabled
Shows pump relay status

Screensharing

Indicates that screensharing is active

Simulator
Indicates that the boiler simulator is active

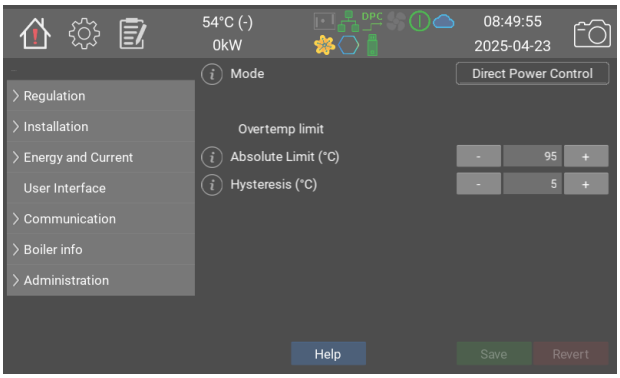
SSL Certificates Missing
SSL Certificates used to secure communication with Värmebaronen AB’s servers are missing. Please contact Värmebaronen’s service department to resolve.

USB Memory Drive
A USB memory drive is inserted

User level
I – Installer
S – Service/admin
P – Production

UTK – Outdoor Temperature Compensation
Outdoor temperature compensation mode selected

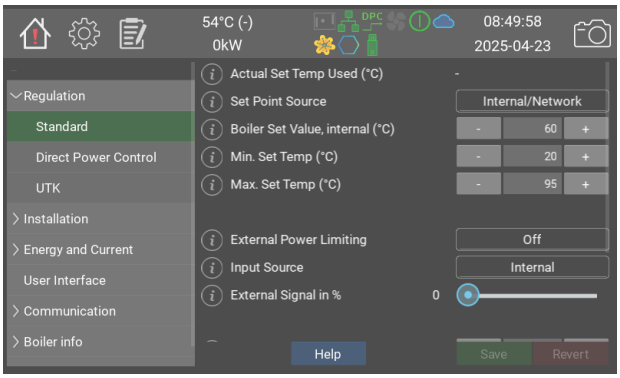
Regulation



The boiler´s overtemperature protection should be set to trip a few degrees below the external overheating protection. When the overtemperature protection triggers, the contactors are shut off and a yellow warning shows. Normal regulation resumes when the boiler temperature has fallen below "Hysteresis (°C)" hysteresis.

	Range/ Options	Default	Modbus ID/ BACNet
Mode Select boiler control mode. **Off** disables all temperature control. **Standard** is the default, predictive temperature control method. **Direct Power Control**, Direct Power Control, lets an external control system regulate the power. Available options depends on ordered configuration.	**0:** Off **1:** Standard **2:** Direct Power Control	**0:** Off	40201
Overtemp limit			
Absolute Limit (°C) The overtemp protection is triggered at this temperature.	0 - 105 (1)	95	40122
Hysteresis (°C) When the boiler temperature has decreased by the set number of degrees (°C) below the Overtemp limit normal regulation resumes.	1 - 10 (1)	5	40124

Standard



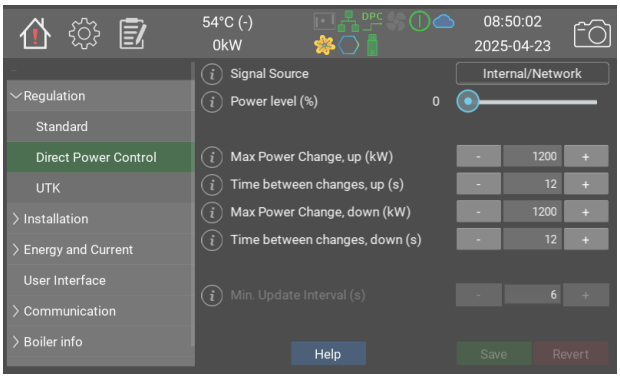
In standard mode, the goal is to keep the boiler temperature as close to the setpoint as possible. The boiler regulates best if it is allopwed to jump freely between availabe steps, but it is possible to limit the jump size if the installation requires it.

P, I and D values are factory set for each boiler size and may therefore differ from the values in the manual.

Please note that Min-, Max- and standard values may vary depending on the boiler model and any accessories. Current values can always be read out directly on the boiler.

	Range/ Options	Default	Modbus ID/ BACNet
Actual Set Temp Used (°C) This is the value the boiler will acutally use as set point. It is read from the selected Set Point Source below.	20 - 200 (1)		40102
Set Point Source Select the set point source. **Internal/Network** uses the value below. Also select this for control via modbus/BACNet **P20** and **P21** are analog inputs. Select input type under Installation. **UTK** uses the optional outdoor sensor (accessory) together with an djustable offset curve. For more information and settings, please refer to **Regulation** -> **UTK**.	**0:** Internal/ Network **1:** UTK **2:** P20 **3:** P21	**0:** Internal/ Network	40101
Boiler Set Value, internal (°C) Set point to use when Internal mode is enabled	20 - 95 (1)	60	40103
Min. Set Temp (°C) Minimum value that can be selected above. This is also corresponds to an analog input of 0%	10 - 95 (1)	20	40104
Max. Set Temp (°C) Maximum value that can be selected above. This is also corresponds to an analog input of 100%	10 - 95 (1)	95	40105
External Power Limiting **Off** disables external power limiting. **Upper Limit** sets an upper limit that is used at next evaulation cycle (see the regulation method settings for timings).	**0:** Off **1:** Upper Limit	**0:** Off	40111
Input Source Select the external limit source. **Internal** is for Modbus/BACnet and testing. **P20** and **P21** uses the analog inputs. **P32, Exp. Board** is three bit binary control from the expansion board, called EP-VP G2. Primarily used together with NIBE's heat pumps.	**0:** Internal **1:** P20 **2:** P21 **3:** P32, Exp. Board	**0:** Internal	40112
External Signal in % The actual power limit level in %	0 - 100 (1)	0	40113
Max Power Change (kW) Maximum permissible power step. For more information about power/stage, please See the boiler's manual.	40.0 - 1200.0 (40.0)	1200	40141 **F**
P (%Ptot/°C)	0.0 - 20.0 (0.1)	4.3	40142 **F**
I (%Ptot/1000/°C/s)	0.0 - 100.0 (0.1)	15.5	40143 **F**
D	0 - 1000 (1)	0	40144

Direct Power Control



DPC enables direct power control from a superior control system. In this mode, the internal temperature control is switched off. Overheating protection, maximum installed power and any external power limitation apply.

The following signal sources can be used:

- **Internal**. The desired value can be set directly on the display or via modbus/ BACnet. This is the fastest control method, with typical delays less than 0.2s.

- **P20/P21**. Control signal is taken from one of the analog inputs. These are configured separately.
When analog input is selected, the external control signal is run through a filter that does not pass the signal on until it has been stable at the same level for a certain time, normally 0.1s.

The control signal also goes through a hysteresis filter that switches only when the signal has reached 2/3 to the next step.

Minimum Switching Time

To avoid overheating in the contactors, the minimum time interval between switching is normally 6s.
ⓘ If at least 6s has elapsed since the last change the boiler doesn't have to wait before changing power next time.
Other intervals are available on request. Please note that shorter intervals generally voids the warranty of the contactors.

Max Power Change

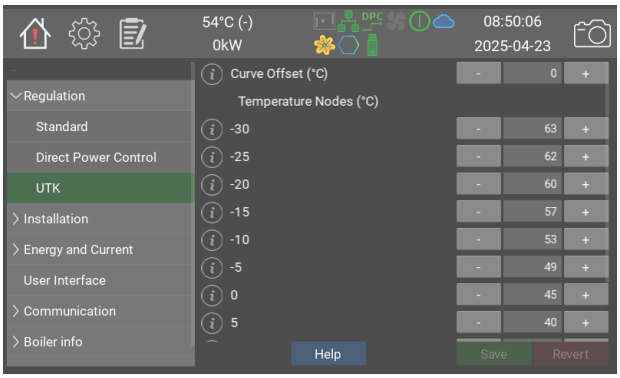
In some cases, it may be desirable to have a smooth ramp-up in steps. This is done by setting the maximum power jump up and down to less than the installed boiler power, as well as specifying a time interval for the change. Please note that these intervals only apply when the maximum allowed power change is less than installed maximum boiler power.

Overtemperature Protection

Since DPC mode doesn't use the temperature set point value, **Overtemp mode** must be set to **Absolute**. This done automatically when enabling DPC mode.

	Range/ Options	Default	Modbus ID/ BACNet
Signal Source Signal source for controlling the DPC power level. Select internal when using modbus and BACNet. If using P20/P21 these also need to be configured on their installation page.	**0:** Internal/ Network **1:** Analog Input P20 **2:** Analog Input P21	**0:** Internal/ Network	40131
Power level (%)	0 - 100 (1)	0	40132
Max Power Change, up (kW) This limits the instantaneous change to a set level	40.0 - 1200.0 (40.0)	1200	40133 **F**
Time between changes, up (s) This is the minimum time between steps when the boiler increases power.	6 - 900 (1)	12	40134
Max Power Change, down (kW) This limits the instantaneous change to a set level	40.0 - 1200.0 (40.0)	1200	40135 **F**
Time between changes, down (s) This is the minimum time between steps when the boiler decreases power.	6 - 900 (1)	12	40136
Min. Update Interval (s)	1 - 900 (1)	6	

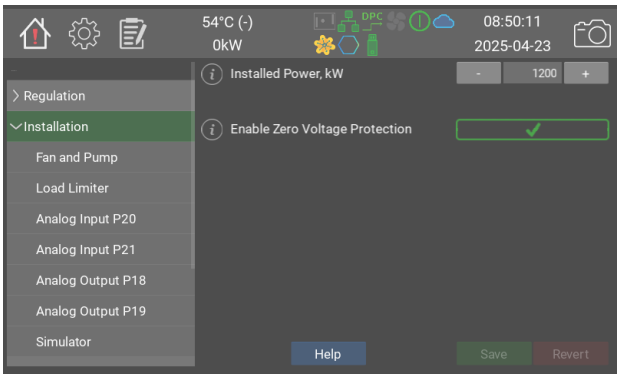
UTK



UTK mode allows the set point value to be adjusted in relation to the outside temperature.
A UTK-sensor must be connected to P13 in order for this function to work.
To enable, select **UTK** as **Set Point Source** in the main regulation settings.

	Range/ Options	Default	Modbus ID/ BACNet
Curve Offset (°C) This moves all the points up or down by the value entered	-10 - 10 (1)	0	40162 **S**
Temperature Nodes (°C)			
-30 Set point value at -30°C outdoors.	20 - 80 (1)	63	40151
-25 Set point value at -25°C outdoors.	20 - 80 (1)	62	40152
-20 Set point value at -20°C outdoors.	20 - 80 (1)	60	40153
-15 Set point value at -15°C outdoors.	20 - 80 (1)	57	40154
-10 Set point value at -10°C outdoors.	20 - 80 (1)	53	40155
-5 Set point value at -5°C outdoors.	20 - 80 (1)	49	40156
0 Set point value at 0°C outdoors.	20 - 80 (1)	45	40157
5 Set point value at +5°C outdoors.	20 - 80 (1)	40	40158
10 Set point value at +10°C outdoors.	20 - 80 (1)	33	40159
15 Set point value at +15°C outdoors.	20 - 80 (1)	27	40160
20 Set point value at +20°C outdoors.	20 - 80 (1)	20	40161

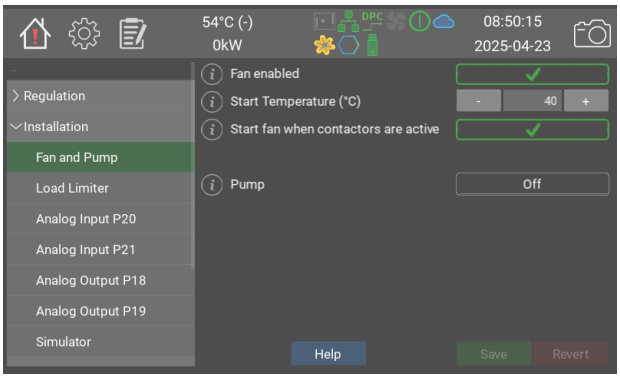
Installation



Installation

	Range/ Options	Default	Modbus ID/ BACNet
Installed Power, kW Limit the boiler to a lower power. The selected level will be considered as 100%	40.0 - 1200.0 (40.0)	1200	40203 **F**
Enable Zero Voltage Protection With this enabled the boiler won't automatically restart the regulator after a power outage or reboot. The alert can only be acknowledged by physically being present at the boiler. For more information, please refer to technical manual "Installation and technical data".	0/1	0	

Fan and Pump



Depending on model and options the boiler comes with installed cooling fan(s). See technical data for the current boiler model for more information.

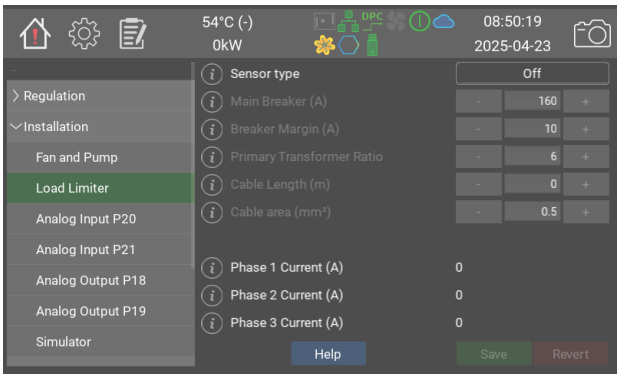
It is recommended to enable the fan and also enable **Start fan when contactors are active**

The boiler can control an external circulation pump. See the help section for the pump for options.

For more information, please refer to technical manual "Installation and technical data"

	Range/ Options	Default	Modbus ID/ BACNet
Fan enabled Enables the fan function for cooling the boiler's electronics.	0/1	1	40131
Start Temperature (°C) When the ambient temperature around the electronics in the boiler reaches the set value, the fan starts.	5 - 60 (1)	40	40232
Start fan when contactors are active When this option is selected, the fan starts at the same time as the first contactor for the power regulation is connected. The fan stops 60 seconds after the last contactor is disconnected.	0/1	1	40235
Pump Operating options: **Off** Always off **Auto** The output is activated when the boiler engages power. Turn off delay is 60 seconds. After 24h of inactivity the pump is automatically excercised for 60s. **Always On** The output is activated when the control board is powered.	**0:** Off **1:** Auto **2:** Always On	**0:** Off	40241

Load Limiter



The load limiter protects the main fuses. The boiler continously measures the current at the junction box and and adusts the output power so that the total current stays below a defined threshold.

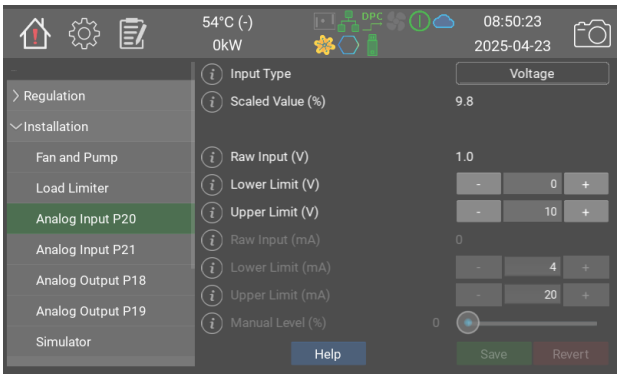
Start by setting the main fuse size and desired margin. The boiler will attempt to keep the measured current below main fuse size minus the margin.
In case a secondary transformer is used, set the primary transformer transfer ratio.
Esitmate and set the cablelength from boiler to transformer, and set the cable cross section area.
For greater accuracy it is recommended to measure the actual running current and adjust the cable length value until the correct current value is shown.

Transformers for direct current measurement can be used with fuses up to 160A. For bigger fuses a set of secondary transformers has to be used. For more information on transformers and boiler models, please refer to technical manual "Installation and technical data".

Please not that in order for the load limiter to work the transformers must measure all three incoming conductors.

	Range/ Options	Default	Modbus ID/ BACNet
Sensor type Direct modes uses one set of transformers. Secondary mode uses primary transformers at the fuses and secondary to the boiler	**0:** Off **1:** Direct **2:** Secondary	**0:** Off	40221
Main Breaker (A)	1 - 1000 (1)	160	40222
Breaker Margin (A)	1 - 1000 (1)	10	40223
Primary Transformer Ratio Primary transformer ratio. Example: A stated ratio of 300:5 on the transformers gives 60.	1 - 500 (1)	6	40224
Cable Length (m)	0 - 250 (1)	0	40225
Cable area (mm²)	0.5 - 15.0 (0.5)	0.5	40226 **F**
Phase 1 Current (A)			40227
Phase 2 Current (A)			40229
Phase 3 Current (A)			40230

Analog Input P20



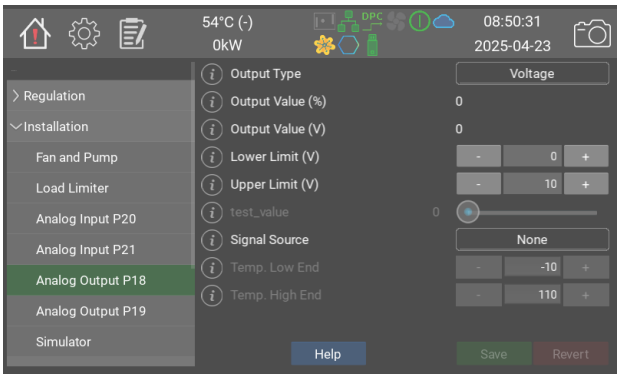
The analog inputs can be used to control set temperature, power limit, DPC power etc.

	Range/ Options	Default	Modbus ID/BACNet
Input Type	**0:** Off **1:** Voltage **2:** Current **3:** Digital, NO **4:** Digital, NC **5:** Manual	**0:** Off	40251
Scaled Value (%)	0 - 100 (1)	0	40252
Raw Input (V)	0.0 - 12.0 (1.0)	0	40253 **F**
Lower Limit (V)	0.0 - 10.0 (0.1)	0	40254 **F**
Upper Limit (V)	0.0 - 10.0 (0.1)	10	40255 **F**
Raw Input (mA)	0.0 - 25.0 (1.0)	0	40256 **F**
Lower Limit (mA)	0.0 - 20.0 (0.1)	4	40257 **F**
Upper Limit (mA)	0.0 - 20.0 (0.1)	20	40258 **F**
Manual Level (%)	0 - 100 (1)	0	40259

Analog Input P21

	Range/ Options	Default	Modbus ID/BACNet
Input Type	**0:** Off **1:** Voltage **2:** Current **3:** Digital, NO **4:** Digital, NC **5:** Manual	**0:** Off	40261
Scaled Value (%)	0 - 100 (1)	0	40262
Raw Input (V)	0.0 - 12.0 (1.0)	0	40263 **F**
Lower Limit (V)	0.0 - 10.0 (0.1)	0	40264 **F**
Upper Limit (V)	0.0 - 10.0 (0.1)	10	40265 **F**
Raw Input (mA)	0.0 - 25.0 (1.0)	0	40266 **F**
Lower Limit (mA)	0.0 - 20.0 (0.1)	4	40267 **F**
Upper Limit (mA)	0.0 - 20.0 (0.1)	20	40268 **F**
Manual Level (%)	0 - 100 (1)	0	40269

Analog Output P18



The analog outputs can be used to read an internal process value. The output voltage, 0-10V, will be proportional to the selected value.

In **Active Power** mode the output voltage is proportional to the ratio of active power to installed power, as defined on the Installation page.

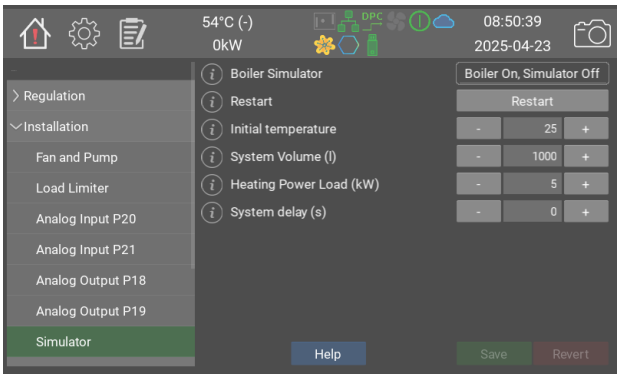
In **Boiler Temperature** the output voltage is proportional to the boiler temperature as compared to the min and max set values on the Regulation page.

	Range/ Options	Default	Modbus ID/BACNet
Output Type	**0:** Off **1:** Voltage **2:** Test	**0:** Off	40271
Output Value (%)	0 - 100 (1)	0	40272
Output Value (V)	0.0 - 10.0 (1.0)	0	40273 **F**
Lower Limit (V)	0.0 - 10.0 (0.1)	0	40274 **F**
Upper Limit (V)	0.0 - 10.0 (0.1)	10	40275 **F**
test_value	0 - 100 (1)	0	40276
Signal Source	**0:** None **1:** Active Power **2:** Boiler Temperature	**0:** None	40277
Temp. Low End	-10 - 100 (1)	-10	40278 **S**
Temp. High End	50 - 160 (1)	110	40279 **S**

Analog Output P19

	Range/ Options	Default	Modbus ID/BACNet
Output Type	**0:** Off **1:** Voltage **2:** Test	**0:** Off	40281
Output Value (%)	0 - 100 (1)	0	40282
Output Value (V)	0.0 - 10.0 (1.0)	0	40283 **F**
Lower Limit (V)	0.0 - 10.0 (0.1)	0	40284 **F**
Upper Limit (V)	0.0 - 10.0 (0.1)	10	40285 **F**
test_value	0 - 100 (1)	0	40286
Signal Source	**0:** None **1:** Active Power **2:** Boiler Temperature	**0:** None	40287
Temp. Low End	-10 - 100 (1)	-10	40288 **S**
Temp. High End	50 - 160 (1)	110	40289 **S**

Simulator

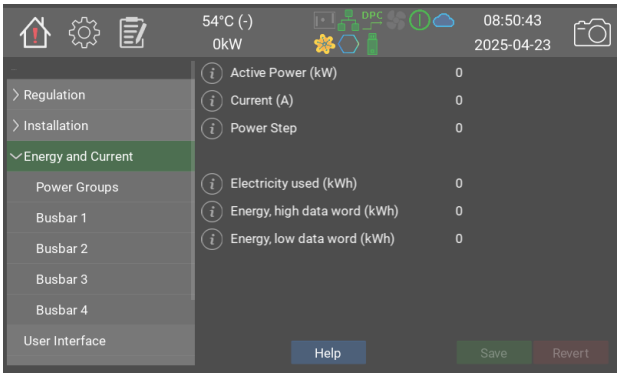


The simulator can be used fo demoing and is useful for testing input and output signals before deploying the boiler.

It is a simple physics model of a tank of water. Power is applied to heat it at the same time as a fixed amount of heat is subtracted.

	Range/ Options	Default	Modbus ID/BACNet
Boiler Simulator Turn on or off the internal boiler simulator. The simulator can be used fo demoing and is useful for testing input and output signals before deploying the boiler.	**0:** Boiler Off, Simulator On **1:** Boiler On, Simulator Off	**1:** Boiler On, Simulator Off	40202
Restart			40211
Initial temperature	1 - 100 (1)	25	40212
System Volume (l)	1 - 15000 (1)	1000	40213
Heating Power Load (kW)	0 - 1500 (1)	5	40214
System delay (s)	0 - 900 (1)	0	40215

Energy and Current

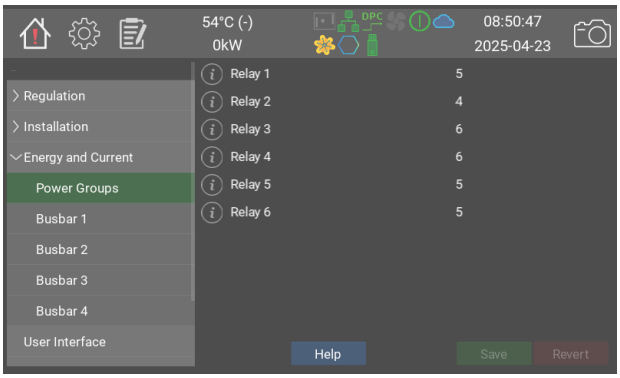


This page shows current total power, current and the current power step.

The accumulated energy is the total amount of energy used.
The high and low data words are used when reading over Modbus and BACNet

	Range/ Options	Default	Modbus ID/ BACNet
Active Power (kW)			40401
Current (A)			40402
Power Step			40403
Electricity used (kWh) This is the total energy used by the boiler. Please not that since modbus can only handle values up to 65535, it is recommended to use the high and low word fields below instead when monitoring remotely via modbus.	0.0 - 429483622.0 (0.1)		40404 **F**
Energy, high data word (kWh) The higher 16bits of the accumulated energy, without decimals. For reading over Modbus and BACNet	0 - 65535 (1)		40405
Energy, low data word (kWh) The lower 16bits of the accumulated energy, without decimals. For reading over Modbus and BACNet	0 - 65535 (1)		40406

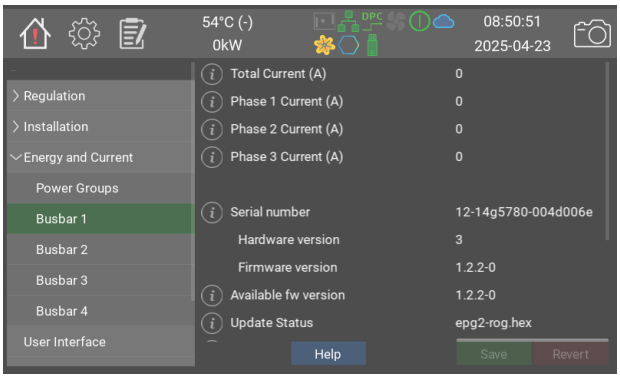
Power Groups



This page shows the number of times the relays controlling the power groups have operated.

	Range/ Options	Default	Modbus ID/BACNet
Relay 1			40411
Relay 2			40412
Relay 3			40413
Relay 4			40414
Relay 5			40415
Relay 6			40416

Busbar 1



Each busbar has a current measurement board. This board measures the current on the three phases and any imbalance between them.
The boiler calculates the total power used by using the measured current and resistance of the heaters. This is presented on the page Energy and Current

The imbalance is used to detect increased leakage to earth and avoid breaking of the immersion heaters.

The current boards are automatically updates to the latest version when new boiler control software is loaded.

	Range/ Options	Default	Modbus ID/BACNet
Total Current (A) Total current of this busbar, in Amperes			40421
Phase 1 Current (A)			40422
Phase 2 Current (A)			40423
Phase 3 Current (A)			40424
Serial number This number is unique from the factory			
Hardware version			
Firmware version			
Available fw version This is the latest available software version.			
Update Status This field show the status of software update. Please note that the same information is shown on all board's pages even though only one is updated at a time.			
Load Hex File to Board			
Board Enabled	0/1	0	40426
Indentify Board	0/1	0	
Test protocol version			

Busbar 2

	Range/ Options	Default	Modbus ID/BACNet
Total Current (A) Total current of this busbar, in Amperes			40431
Phase 1 Current (A)			40432
Phase 2 Current (A)			40433
Phase 3 Current (A)			40434
Serial number This number is unique from the factory			
Hardware version			
Firmware version			
Available fw version This is the latest available software version.			
Update Status This field show the status of software update. Please note that the same information is shown on all board's pages even though only one is updated at a time.			
Load Hex File to Board			
Board Enabled	0/1	0	40436
Indentify Board	0/1	0	
Test protocol version			

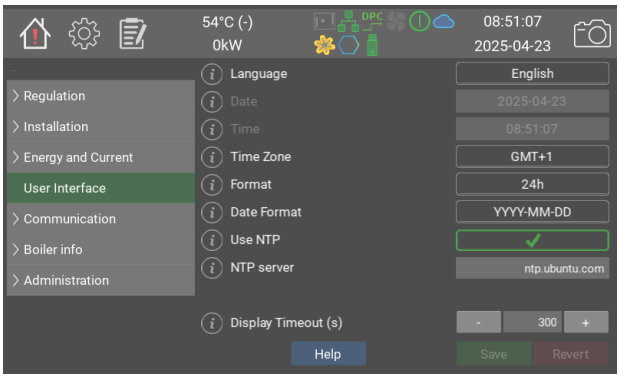
Busbar 3

	Range/ Options	Default	Modbus ID/BACNet
Total Current (A) Total current of this busbar, in Amperes			40441
Phase 1 Current (A)			40442
Phase 2 Current (A)			40443
Phase 3 Current (A)			40444
Serial number This number is unique from the factory			
Hardware version			
Firmware version			
Available fw version This is the latest available software version.			
Update Status This field show the status of software update. Please note that the same information is shown on all board's pages even though only one is updated at a time.			
Load Hex File to Board			
Board Enabled	0/1	0	40446
Indentify Board	0/1	0	
Test protocol version			

Busbar 4

	Range/ Options	Default	Modbus ID/BACNet
Total Current (A) Total current of this busbar, in Amperes			40451
Phase 1 Current (A)			40452
Phase 2 Current (A)			40453
Phase 3 Current (A)			40454
Serial number This number is unique from the factory			
Hardware version			
Firmware version			
Available fw version This is the latest available software version.			
Update Status This field show the status of software update. Please note that the same information is shown on all board's pages even though only one is updated at a time.			
Load Hex File to Board			
Board Enabled	0/1	0	40456
Indentify Board	0/1	0	
Test protocol version			

User Interface



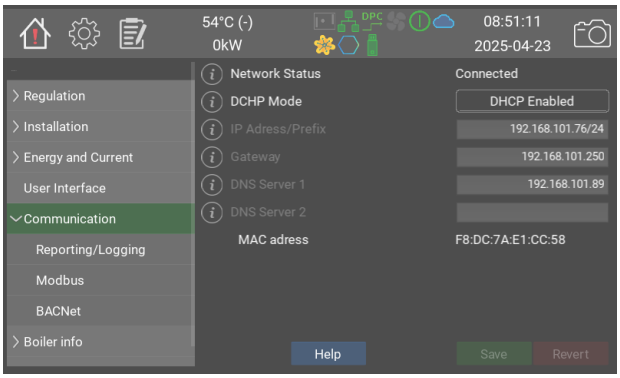
Time and language settings.

The boiler comes preconfigured for use with NTP, a timeserver. If the boiler has a working internet connection it will automatically fetch the correct time from the specified server.

ⓘ Please note that the boiler does not automatically switch between standard and daylight saving time.

	Range/ Options	Default	Modbus ID/ BACNet
Language	**0:** English **1:** Svenska **2:** Deutsch **3:** Nederlands **4:** Francais **5:** Suomi	**1:** Svenska	
Date			
Time			
Time Zone	**0:** GMT-14 **1:** GMT-13 **2:** GMT-12 **3:** GMT-11 **4:** GMT-10 **5:** GMT-8 **6:** GMT-7 **7:** GMT-6 **8:** GMT-5 **9:** GMT-4 **10:** GMT-3 **11:** GMT-2 **12:** GMT-1 **13:** GMT **14:** GMT+1 **15:** GMT+2 **16:** GMT+3 **17:** GMT+4 **18:** GMT+5 **19:** GMT+6 **20:** GMT+7 **21:** GMT+8 **22:** GMT+9 **23:** GMT+10 **24:** GMT+11 **25:** GMT+12 **26:** GMT+13 **27:** GMT+14	**14:** GMT+1	
Format	**0:** 12h **1:** 24h	**1:** 24h	
Date Format	**0:** YYYY-MM-DD **1:** MM/DD/YY	**0:** YYYY-MM-DD	
Use NTP Network Time Protocol Enable to automatically synchronize the clock will with the selected time server	0/1	1	
NTP server A valid URI to the NTP server.		ntp.ubuntu.com	
Display Timeout (s) After this long time of inactivity the system goes back to the main page and the display dims. Active warnings and errors will cause the backlight to blink.	30 - 7200 (1)	300	

Communication

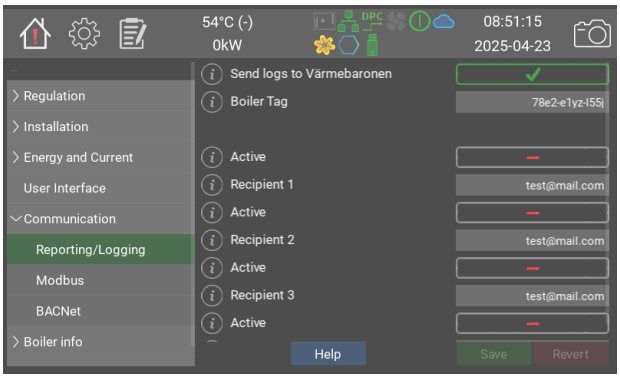


Network configuration.

ⓘ Please note that IP-adresser are written as adress/prefix.
Netmask 255.255.255.0 is equivalent to prefix 24

	Range/ Options	Default	Modbus ID/BACNet
Network Status	**0:** Connected **1:** Connected, No IP adress **2:** No Connection **3:** Unknown **4:** Disconnected		40501
DCHP Mode	**0:** DHCP Enabled **1:** Manual Configuration	**0:** DHCP Enabled	40502
IP Adress/Prefix The ethernet IP adress should be in the following format: aaa.bbb.ccc.ddd/pp where pp is the prefix, usually 24		192.168.1.2/24	
Gateway		192.168.1.2	
DNS Server 1		192.168.1.2	
DNS Server 2		192.168.1.2	
MAC adress			

Reporting/Logging



If the boiler has a working internet connection, it can periodically send log and system data to Värmebaronen.

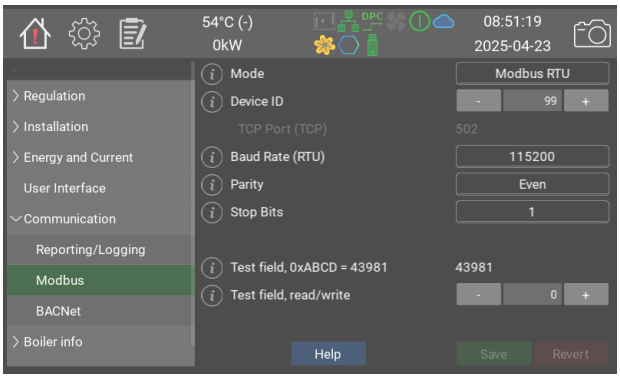
This allows Värmebaronen to improve the performance and functions of the boiler and helps the service department solve issues faster.

The connection is secured with SSL, like all modern web pages, and does not allow external control of the boiler.

This is required in order to send alarms to email.
Up to four email recipients can be added

	Range/ Options	Default	Modbus ID/ BACNet
Send logs to Värmebaronen Enable this option to periodically send logs to Värmebaronen.	0/1	1	
Boiler Tag This will be used in alarm mails			
Active	0/1	0	
Recipient 1 Recipient		email@test.com	
Active	0/1	0	
Recipient 2 Recipient		email@test.com	
Active	0/1	0	
Recipient 3 Recipient		email@test.com	
Active	0/1	0	
Recipient 4 Recipient		email@test.com	

Modbus



The optional modbus module allows controlling and monitoring parameters via RS485 or ethernet.

The boiler uses a prefix of 40001, which means that index 40002 in the manual is internally index 1.
For a good and deeper read on calculating indices see https://www.teracomsystems.com/blog/demystifying-modbus-rtu-addressing/

F Decimal numbers are written and read with a factor of 10. Ex. 46.7°C reads as 467
S Negative numbers are indicated by bit 15, 0x8000, and are calculate as follows:
-31 is 65536 + (-31) = 65505
-14.5 is 65536 + (-145) = 65391
Reading a value of 65372 means -164 or -16.4, depending on data type.

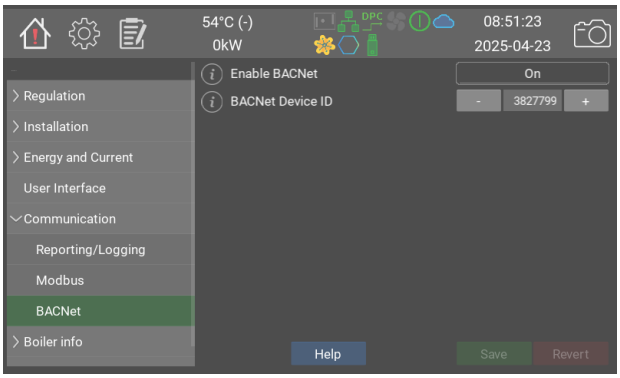
A disconnected sensors shows as "-" on the display. This is read as 0x8000 or 32768 via modbus.

The computer program **mbpoll** is recommend for testing.
To read the boiler temperature (index 40002) via TCP from server 99 the following command can be used:
> mbpoll -a 99 -r 1 192.168.101.67
Example responses:
-- Polling slave 99... Ctrl-C to stop)
1: 65199 (-337)
-- Polling slave 99... Ctrl-C to stop)
1: 87
-- Polling slave 99... Ctrl-C to stop)
1: 65527 (-9)

Modbus poll is not recommended since it seems to do index conversion backwards.

	Range/ Options	Default	Modbus ID/BACNet
Mode Select communication medium: **Modbus RTU** uses RS485 on connector **P22**. **Modbus TCP** uses ethernet on connector **P26**	**0:** Off **1:** Modbus RTU **2:** Modbus TCP	**0:** Off	
Device ID	1 - 254 (1)	99	
TCP Port (TCP)			
Baud Rate (RTU)	**0:** 9600 **1:** 19200 **2:** 38400 **3:** 57600 **4:** 115200	9600	
Parity	**0:** None **1:** Even **2:** Odd	**0:** None	
Stop Bits	**0:** 1 **1:** 2	1	
Test field, 0xABCD = 43981		43981	40511
Test field, read/write	0 - 65535 (1)	0	40512

BACNet



With the BACNet option the boiler can be controlled and monitored via BACNet IP.

A BACNet device is required to have a unique ID. This is automatically generated from the serial number, but can, in case of collisions, easily be changed in the settings if required.

Any field in the manual with a Modbus index is also accessible via BACNet. In addition to the index they use a prefix that indicates the data type:

- **ai**, Analog Input
- **bi**, Binary Input
- **msv**, Multi State Value.

Please note that list indices start at 0 in Modbus, BACNet at 1. This means that the controller needs to add one to the listed items. Example: input type **Voltage** on **Analog Input P21**, id msv40261, is at index 2 instead of the 1 stated in the list.

Most BACNet clients should be able to read a translated string description of the field as well as the unit used.

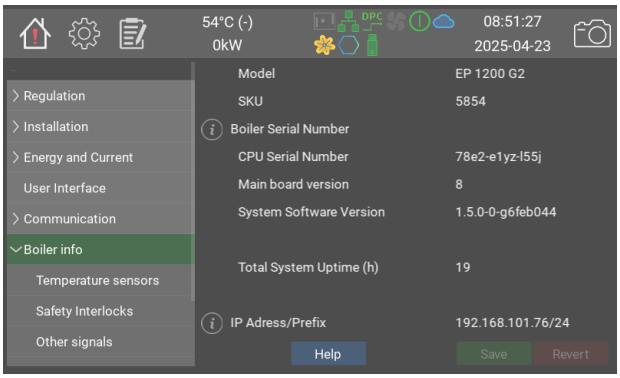
Example: **P10, Boiler**, can be found at ai40002.

The section **Warnings and Alerts** outlines how to read warnings and message status.

Värmebaronens official BACNet Vendor ID is 1526

	Range/ Options	Default	Modbus ID/ BACNet
Enable BACNet	**0:** Off **1:** On	**0:** Off	
BACNet Device ID Unique Device ID. Automatically generated from the boiler serial number, but can be manually set here if needed.	0 - 4194302 (1)	-1	

Boiler info

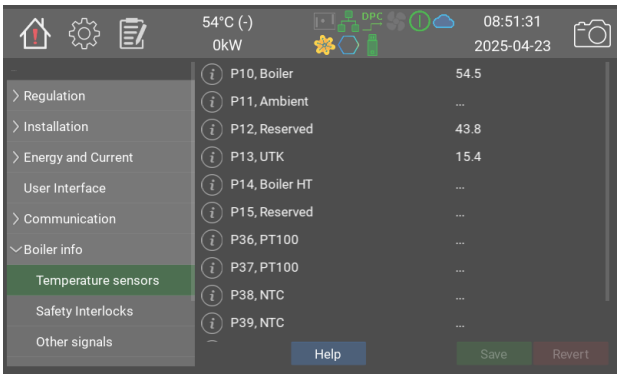


Information about the boiler.

Boiler model, serial number system software version etc.

	Range/ Options	Default	Modbus ID/ BACNet
Model			
SKU			
Boiler Serial Number The serial number is found on the silver sticker.			
CPU Serial Number			
Main board version			
System Software Version			
Total System Uptime (h)			
IP Adress/Prefix The ethernet IP adress should be in the following format: aaa.bbb.ccc.ddd/pp where pp is the prefix, usually 24			

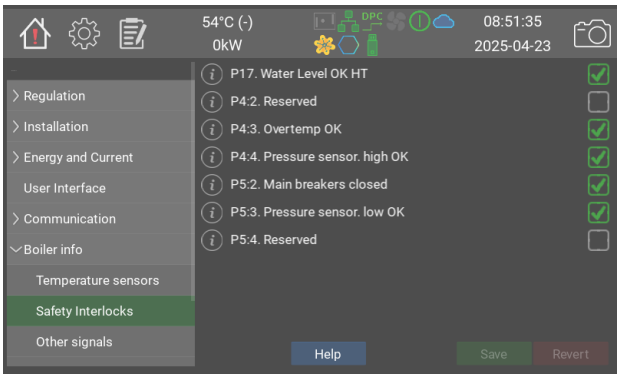
Temperature sensors



This page shows current values for all connected temperature sensors.

	Range/ Options	Default	Modbus ID/BACNet
P10, Boiler	-40.0 - 200.0 (1.0)		40002 **FS**
P11, Ambient	-40.0 - 200.0 (1.0)		40003 **FS**
P12, Reserved	-40.0 - 200.0 (1.0)		40004 **FS**
P13, UTK	-40.0 - 200.0 (1.0)		40005 **FS**
P14, Boiler HT	-40.0 - 200.0 (1.0)		40006 **FS**
P15, Reserved	-40.0 - 200.0 (1.0)		40007 **FS**
P36, PT100	-40.0 - 200.0 (1.0)		40008 **FS**
P37, PT100	-40.0 - 200.0 (1.0)		40009 **FS**
P38, NTC	-40.0 - 200.0 (1.0)		40010 **FS**
P39, NTC	-40.0 - 200.0 (1.0)		40011 **FS**
PCB, Interior	-40.0 - 200.0 (1.0)		40012 **FS**
Relative Humidity, %	0 - 100 (1)		40013

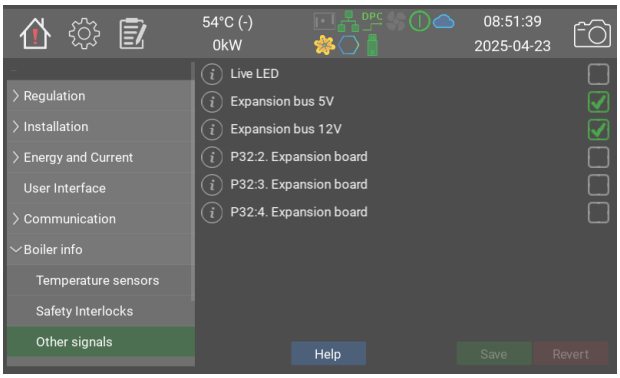
Safety Interlocks



Status of the safety related inputs. P4 and P5 also have LEDs on the main board

	Range/ Options	Default	Modbus ID/BACNet
P17. Water Level OK HT	0/1	0	40021
P4:2. Reserved	0/1	0	40022
P4:3. Overtemp OK	0/1	0	40023
P4:4. Pressure sensor. high OK	0/1	0	40024
P5:2. Main breakers closed	0/1	0	40025
P5:3. Pressure sensor. low OK	0/1	0	40026
P5:4. Reserved	0/1	0	40027

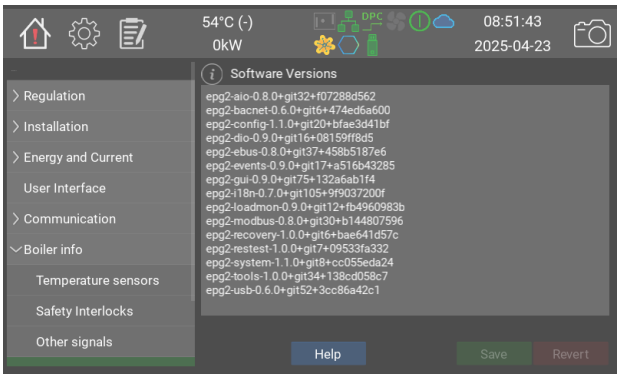
Other signals



Status of other inputs and outputs on the main board, and on the expansion board

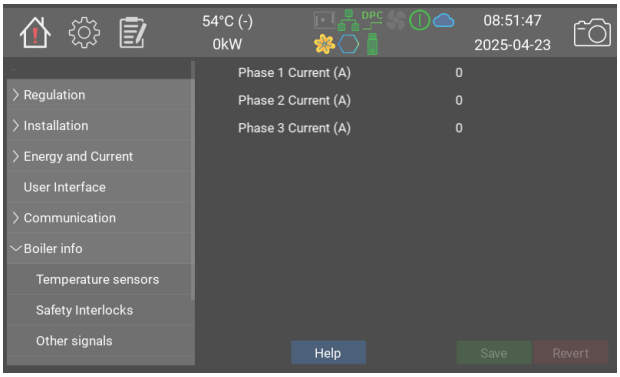
	Range/ Options	Default	Modbus ID/BACNet
Live LED	0/1	0	
Expansion bus 5V	0/1	0	40031
Expansion bus 12V	0/1	0	40032
P32:2. Expansion board	0/1	0	40028
P32:3. Expansion board	0/1	0	40029
P32:4. Expansion board	0/1	0	40030

Software Versions



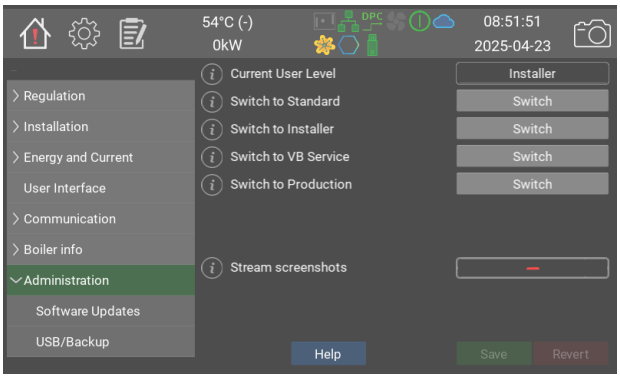
List of internal software modules and their versions

Load Monitor



This page shows the actual current/ phase at the fuses the load limiter protects. For correct display, it is required that all settings regarding the load monitor are correctly performed and adjusted.
For setting the load monitor, see the section load monitor in the manual EP G2 Menus and Control System.

Administration

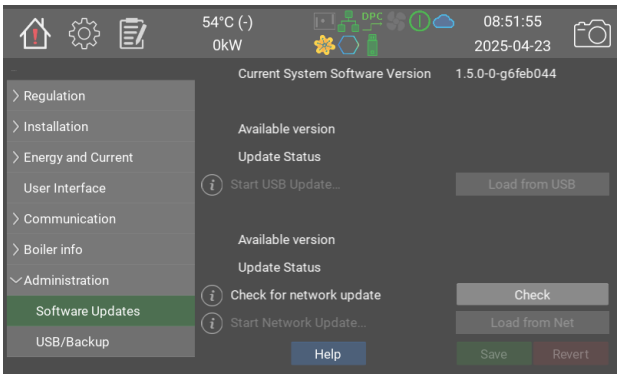


Select user access level:
Standard user can view most settings.
Installer can view and change most parameters.

Stream screenshots allows the boiler to send screenshots to Värmebaronen to aid in service and installation.

	Range/ Options	Default	Modbus ID/ BACNet
Current User Level	**0:** User **1:** Installer **2:** VB Service **3:** VB Production	0	
Switch to Standard			
Switch to Installer			
Switch to VB Service			
Switch to Production			
Stream screenshots When enabled, this will allow the boiler to send a live stream of screenshots to Värmebaronen Service to help installation and troubleshooting. The streaming automatically turns off 20min after the display dims. This requires a working internet connection.	0/1	0	

Software Updates



The boiler can be updated either from a USB memory or, if connected to the internet, directly from Värmebaronen's software server.

The currently running version is shown on top of the page.

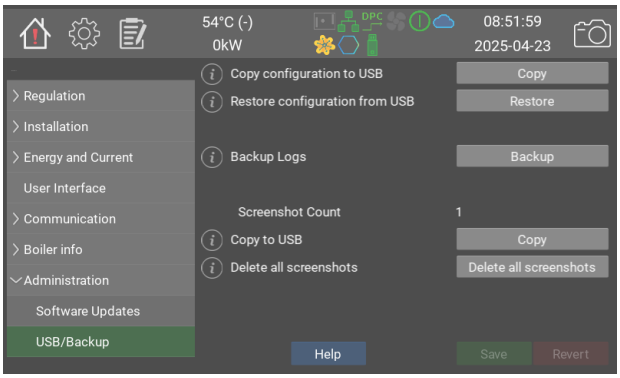
Next is the version available on USB, if any.

Last is the version available from the server. The boiler periodically checks for updates, but will also check when Check is pressed.

Only versions newer than the current one are shown.

	Range/ Options	Default	Modbus ID/BACNet
Current System Software Version			
Available version			
Update Status			
Start USB Update…			
Available version			
Update Status			
Check for network update			
Start Network Update...			

USB/Backup



When a USB-memory is present configuration, logs and screendumps can be copied for backup and troubleshooting.

	Range/ Options	Default	Modbus ID/BACNet
Copy configuration to USB			
Restore configuration from USB			
Backup Logs			
Screenshot Count			
Copy to USB			
Delete all screenshots			

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