

# OUMAN H23



## Controller for the three circuits

- control for 2 heating circuits
- 1 domestic hot water control

## USER MANUAL

[www.ouman.fi](http://www.ouman.fi)

The H23 is a heat controller for 3 circuits (two heating circuits and one hot water circuit). Wiring and configuring selections define what the controller displays on the display screen.

**Basic view**

🕒 13:51 14.12.2023	Selection >	
Outdoor temp.	-12.4°C	
H1 Supply water	45.2°C	Automatic
H2 Supply water	32.8°C	Automatic
DHW Supply water	58.0°C	Automatic

**Control knob and OK**



Press the control button to enter the menu.



Turn the control button to navigate in the menu.



**Favourite view button**

You can access favourite views by clicking the favourite view button. It's possible to store 5 menus as favourite views. The info menus of each control circuit are set as default favourite views.

**ESC button**

By pressing the ESC button, the controller returns to the previous menu and if you edit settings you can cancel the setpoint change.

Holding the key down for an extended period of time returns the controller to the basic mode. The display shows the basic view, the monitor dims and the keyboard locks if the locking function is in use.

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# 1 USER INTERFACE

## 1.1 Basic view

There are several different levels in H23's user interface. The most significant measurement information in regulation process' view is shown in the Basic view.

Central factors related to the current heating control are shown in the Basic view. The Basic view will be shown when the controller is in idle state (keys have not been touched for a while).

Outdoor temp.	-12.4°C	
H1 Supply water	45.2°C	Automatic
H2 Supply water	32.8°C	Automatic
DHW Supply water	58.0°C	Automatic

Temperature measurements enable quickly determining proper operation of the circuit.

**Control mode. This shows the current control of the circuit (auto/forced/manual) or in summer mode** (see p. 10).

### Alarms

- A blinking exclamation mark indicates active alarms.
- The number of active alarms is also shown.

### Alarm indication

Acknowledging alarms: Press OK and the alarm sound will stop. If the reason for the alarm has not been corrected, the exclamation mark in the top right will continue to blink.

! Deviation alarm
PRI01 GROUP1
H1 Supply water=10.2 °C
Received: 19.11.2023 02:27
Press OK to acknowledge the alarm

Ouman H23 can generate alarms for several different reasons. In the event of an alarm, an alarm window pops up showing detailed alarm information and a beeping alarm signal goes on.

If there are several unacknowledged alarms, the latest activated alarm is always shown in the display. As soon as all active alarms have been acknowledged, the alarm window disappears and the alarm signal goes off.

Alarm signal of all active alarms may also be muted by pressing Esc button. When you press Esc, the alarm signal stops and the last alarm windows disappear from the display.

You may look into the alarms later by going to "Alarms" > "Active alarms". If an alarm has not been acknowledged, an exclamation mark will appear in the beginning of the row.

# 1.2 Menu structure

## Basic menu

13:51 14.12.2023	Selection > ?	
Outdoor temp.	-12.4°C	
H1 Supply water	45.2°C	Automatic
H2 Supply water	32.8°C	Automatic
DHW Supply water	58.0°C	Automatic



Press the control button to enter the Main menu.

## Main menu

Main menu	
Inputs and Outputs	1 >
H1 Control circuits	2 >
H2 Control circuits	3 >
DHW Control circuits	4 >
Trend logs	5
Alarms	6
System settings	7



Turn the control button to navigate in the menu.

## Sub menus

### 1 INPUTS AND OUTPUTS (See more information p 7).

Inputs and Outputs	
Home-Away- control	Home >
-----INPUTS-----	
Outdoor temp.	-18.2 °C >
H1 Supply	35.1 °C

### 2 H1 CONTROL CIRCUIT (See more information p. 8).

H1 Control circuit	
H1 Info	>
H1 Heating curve	>
H1 Setting values	>
H1 Control mode	Automatic >

### 3 H2 CONTROL CIRCUIT (See more information p. 8).

H2 Control circuit	
H2 Info	>
H2 Heating curve	>
H2 Setting values	>
H2 Control mode	Automatic >

Both H1/H2 Control circuit menus has the same structure.

### 4 DHW DOMESTIC HOT WATER CONTROL (See more information p. 15).

DHW Control circuit	
DHW Info	>
DHW Trend display	>
DHW Setting values	>
DHW Control mode	Automatic >

By pressing OK button, you can view the trend of the measurement.. Sampling interval is 1 s.

### 5 TREND LOGS (See more information p. 17).

Trend logs	
Outdoor temperature	>
H1 Supply water	>
H1 Return water	>
H1 Room temperature	>

By pressing OK button, you can view the trend log of the measurement. The sampling interval is adjustable.

### 6 ALARMS (See more information p. 18). If the GSM-modem (optional accessory) is connected to H23, activated alarms can be sent as SMS to mobile phone. It's possible to define 5 phone numbers and backup number where the alarms are sent.

Alarms	
Alarms	Enable >
Active alarms	>
Acknowledge all alarms	>
Alarm history	>
Reset alarm history	>
Alarm recipient	>
General alarms	>

### 7 SYSTEM SETTINGS (See more information p. 20).

System settings	
Time	17:01 >
Date	14.12.2023 >
Daylight saving time	In use >
Language	English >
SMS settings	>
Modbus RTU slave	>
Display settings	>
Type info	>
Lock code	Not in use >
Restore factory settings	>
Restore backup	>
Create backup	>
Configuration	>
Alarms	Enable >
Communication port	GSM >

By pressing OK you can change the mode of the Home/Away control from the controller.

You can define a fixed value for outdoor temperature by clicking OK-button. This should be used in sensor fault cases only!

H1 Info	
According to curve	35.1 °C
Effect of temperature drop	-6.0 °C
-----H1 MEASUREMENTS-----	
Calculated supply water setting	29.1 °C
Supply water	29.1 °C
Outdoor temp.	-12.4 °C
-----H1 ACTUATOR CONTROL-----	
Control	16 %

When system works optimally, the supply water temperature is very close to the calculated supply water temperature setting value. The circuit specific info view shows the temperature measurements and the states of the actuators of the particular control circuit. (more information on page 9.)

H1 Heating curve	
-20 = 33 °C	-10 = 30 °C
0 = 27 °C	+10 = 23 °C
+20 = 20 °C	
Min.limit: 12	Max limit: 45

A typical heating curve for radiator heating. (More information on the heating curves see page 9.)

Room temperature setting	
21.5 °C >	
min:5.0	max:35.0

Setting values menu includes room temperature setting and settings related to temperature drop (weekly schedule, holiday calendar, see p. 10-14) among other settings.

Temp.drop Weekly schedule	
Monday	9:00 - 6:00
Tuesday	9:00 - 6:00
Wednesday	9:00 - 6:00

In this example, you can see a weekly temperature drop program. Temperature drop is on from Monday to Friday.

Day	Time
31.03.2024	11:30 Drop On >
14.04.2024	16:00 Automatic >
Add new	>

It's possible to define longer temperature drop periods with Holiday calendar. More information on page 12.

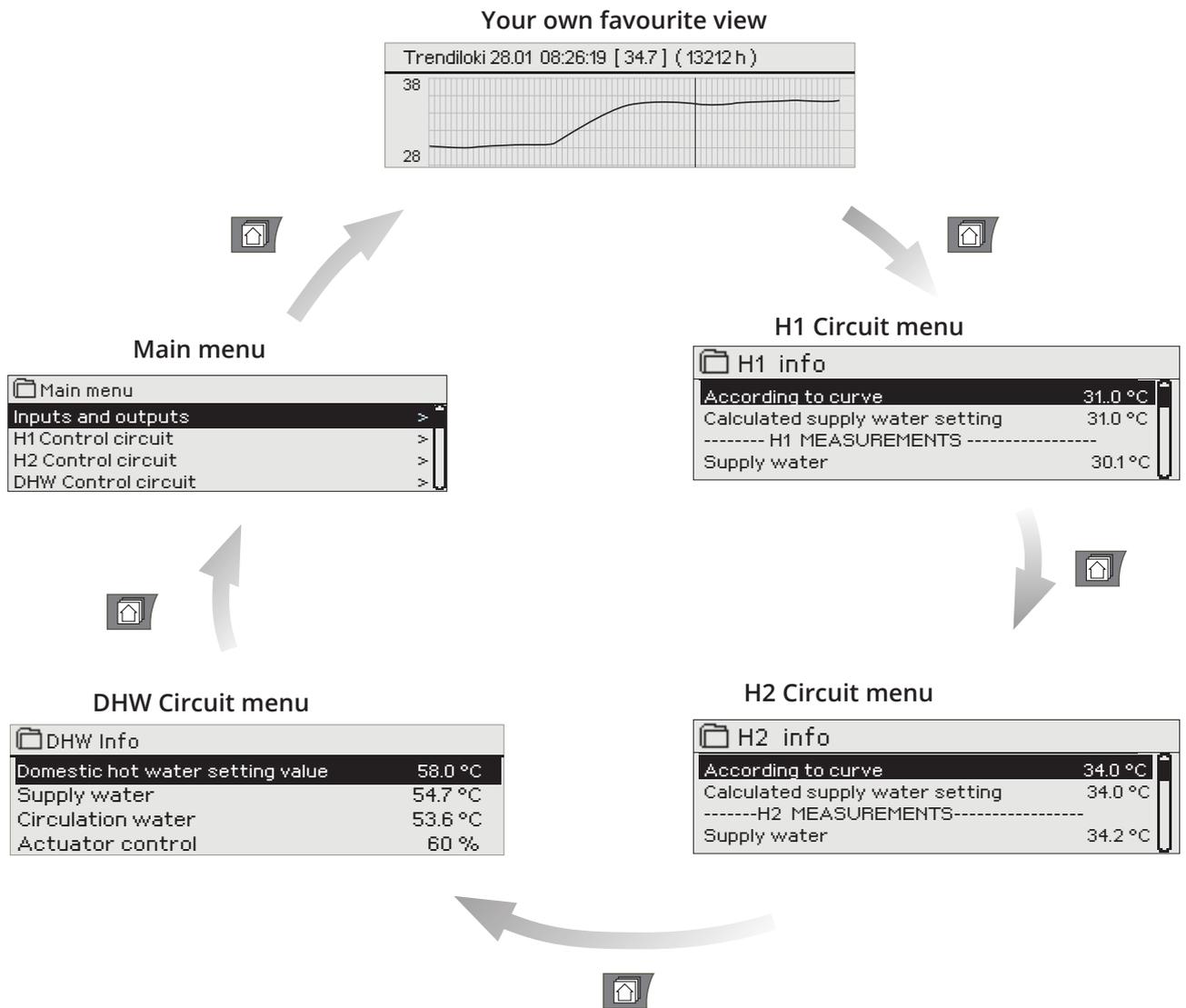
H1 Control mode	
Automatic	>
Manual electr.	>
Manual mech. (voltage controlled actuator)	>

The favourite views include Info menus of the circuits and the Main view. You can access the favourite views by clicking -button.

Main menu	
Inputs and Outputs	>
H1 DHW Info	>
H2 Control	>
DHW Info	>
Supply water	>
Calculated supply water setting	35.1 °C
Effect of temperature drop	-6.0 °C
-----H1 MEASUREMENTS-----	
Supply water	34.2 °C

# 1.3 Favourite views

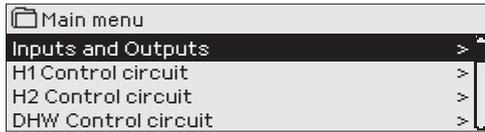
You can easily navigate from the basic view to the desired menu using the favourite view function. You can navigate from one favourite view to another by tapping the  button. There can be a maximum of five of these views. The pre-installed favourite views show the circuits' main menus. You can also save a particular regulator view as your own favourite view. You can return from favourite views to the basic view by tapping the ESC key until the basic view appears.



## Setting a favourite view

Navigate to the view you want to add to your favourite views. Hold down the  button for an extended period of time until the "Save view in memory location:" menu opens. You can't set service display as your favourite display. You can't set any favourite display as long as the service code is active. Deactivate the service code by pressing Esc -button as long as the controller returns to main menu and the display light will dim. You can save the favourite display after that.

# 2 INPUTS AND OUTPUTS



## INPUTS AND OUTPUTS

Inputs and Outputs	
Home-Away-control Home >	
-----INPUTS-----	
Outdoor temp.	-18.2 °C >
H1 Supply water	35.1 °C
H1 Return water	22.0 °C
H1 Room temperature	21.5 °C
H2 Supply water	35.7 °C
H2 Return water	22.3 °C
H2 Room temperature	21.3 °C
DHW Supply water	58.1 °C
DHW Circulation water	59.0 °C
Digital input 1 status	Open
Digital input 2 status	Open
-----OUTPUTS-----	
H1 Actuator control	-
H2 Actuator control	-
DHW Actuator control	55 %
H1 Pump control (P2/S2)	Off
H2 Pump control (P3/S3)	Off
DHW Pump control (P1/S1)	Off
Sum alarm	Off

You can see the inputs and outputs linked to the H23.

If the H2 heating circuit isn't taken in use, it's possible to use measurements M5, M6 and M7 as freely nameable temperature measurements (NTC).

The measurement range of the temperature sensors are -50 ... +130 °C. If the sensor is not connected or is defective, the measurement value shown will be -50°C or +130 °C.

The circuit specific measurements are found also from the Info menu of the each circuit (H1/H2/DHW).

### -OUTPUTS:

- **Actuator control:** If voltage controlled actuator is used, the current control of the actuator is shown in the menu. By pressing OK you can change the mode of the Home/Away control. The mode can be also changed by Home/Away-switch or by text message "Home" or "Away" when a GSM-modem (optional) is connected into the controller.
- **Pump control:** The control of the pump just now.
- **Sum alarm:** The current state of the alarm.

INPUTS	More information
<b>Home-Away-control</b> 	Home-Away mode. Normally the controller is in the "Home" -mode. When you set the controller to "Away" -mode, the temperature drop will be activated. By pressing OK you can change the status of the Home/Away mode from the regulator. The mode can be changed by Home/Away-switch or by text message "Home" or "Away" when a GSM-modem (optional) is connected into the controller.
<b>Outdoor temp.</b> 	It's possible to set the outdoor temperature measurement to manual mode and give a fixed temperature value to it. If the sensor is defective, the controller uses automatically value 0 °C for regulation. Set the outdoor measurement to manual mode if you want to use other temperature value for control in this case.
<b>H1/H2 Supply water</b>	Present temperature of water entering the heating network.
<b>H1/H2 Return water</b>	Present temperature of water returning form the heating network.
<b>H1/H2 Room temperature</b>	Present room temperature.
<b>DHW Supply water</b>	Domestic hot water temperature. This measurement (M8) is used for supply water temperature control in domesetic hot water circuit.
<b>DHW Circulation water</b>	When there is no consumption, the measurement information will show the temperature of DHW return water. During consumption, the measurement will show the mixed temperature of cold water and return water, in which case the measurement is used in so-called anticipation to improve the regulation result.
<b>Domestic hot water temp. after exchanger</b>	This measurement (M6) is used to adjust the temperature of the supply water in the domestic hot water circuit, when a compensator tank has been added to the DHW supply water pipe. M8 is connected to the outgoing water pipe after the compensator tank, so the measurement shows the temperature of the water going into the network.

**Key word:**

**INPUTS**

**OUTPUTS**

**HOME**

**AWAY**

**Inputs:**  
 Outdoor temp. -18.2 °C /  
 H1 Supply water 35.1 °C /  
 H1 Return water 22.0 °C /  
 H1 Room temperature 21.5 °C /

**Outputs:**  
 H1 = Actuator control = 25 % /  
 H2 Actuator control = 26 % /  
 DHW Actuator control = 52 % /  
 P2 Pump control = On

**Home:**  
 Home-Away control = Home/

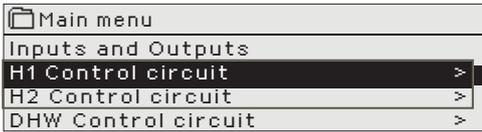
If a GSM is connected to the controller, you can read measurement information form a mobile phone. (If you have a device ID, write the device ID in front of the key word, e.g., TC01 Inputs)

**Send a message: Inputs**  
 The controller sends the present measurement information to your mobile phone.

You can change Home/Away mode.

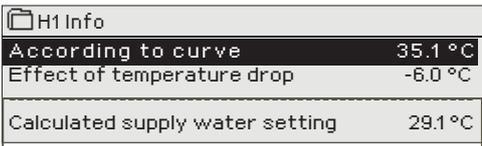
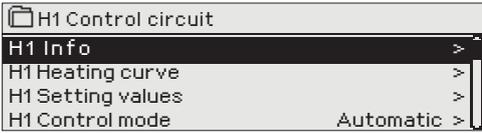
**Same way send a message: Away.**  
 The controller sends a response message, which shows, that Home/Away -control is on Away-mode. Similarly you can send a message: Home.

# 3 SUPPLY WATER CONTROL IN THE HEATING CIRCUITS



## 3.1 Info

H1 (H2) Control circuit-> H1 (H2) Info



The H23 enables control of two different supply water circuits independently (H1 and H2).

Regulation of the temperature of supply water is controlled by the outdoor temperature. Use of room temperature measurements keeps room temperature more consistent.

The info shows which factors are affecting currently to the supply water temperature. The starting point is the supply water temperature according to the outdoor temperature (according to the heating curve).

When the controller is in summer function mode, the H1 (H2) info says "H1 (H2) Control circuit in summer function mode."

In the example image, the supply water temperature according to curve is 35.1°C. Away-mode lowers the temperature 6.0 °C. As result, the calculated supply water temperature setting is 29.1°C.

Factors effecting the supply water temp.	Explanation
According to curve	Supply water temperature according to the curve at the present outdoor temp.
Effect of parallel shift	Effect of parallel shift on the supply water temperature.
Effect of temperature drop	The effect of weekly schedule, holiday calendar or Away-mode to supply water temperature. The Away-mode can be triggered from Home/Away-switch, controller's menu or SMS. If the room temperature sensor is taken in use, the temperature drop affects to room temperature.
Effect of room compensation	If measured room temperature differs from the room temp. setting, the controller corrects the supply water temperature with room compensation function.
Effect of time program	Drop in supply water temperature determined by the time program (weekly/holiday calendar).
Away -control effect	The drop in the supply water temperature determined by the away-control. The control command can come from the home/away switch, the controller or as a text message.
Return water compensation	Increase in supply water temperature due to return water compensation. When the temperature of the return water decreases to low limit alarm setting, the controller increases the supply water temperature with return water compensation function.
Min limit effect	Supply water temperature increase due to the minimum limit.
Max limit effect	Supply water temperature drop due to the maximum limit.
Calculated supply water setting	Present supply water temperature determined by the controller. All the factors are considered that affect the supply water temperature.
-----MEASUREMENTS-----	
Supply water	Present measured supply water temperature.
Return water	Present measured return water temperature.
Room temperature or Room temperature from the bus	The moving average of room temperature. The controller uses this value, when calculating the room compensation demand (the delay time of room temperature measurement is adjustable, default 0.5 hours).
Delayed room temperature or Room temperature from the bus (delayed)	The moving average of room temperature. The controller uses this value, when calculating the room compensation demand (the delay time of room temperature measurement is adjustable, default 0.5 hours).
Delayed outdoor temperature or Outdoor temperature from the bus (delayed)	The moving average of outdoor temperature. In supply water control the controller uses delayed measurement as an outdoor temperature. (the delay time of outdoor temperature measurement is adjustable, default 2 hours).
Outdoor temp. or Outdoor temperature from bus	The measured outdoor temperature or outdoor temperature from the bus. Outdoor temperature data is displayed if the delayed outdoor temperature is not used in supply water control.
-----ACTUATOR CONTROL-----	
Control	Current actuator control.

H1 INFO

H2 INFO

H1 info:  
 --- H1 SUPPLY WATER-----  
 According to curve 35.1 °C/  
 Effect of temperature drop  
 -6.0 °C/Calculated supply water  
 setting = 29.1 °C  
 --- H1 MEASUREMENTS -----  
 Supply water = 35.2 °C  
 Outdoor temp.= -10.7 °C  
 --- H1 ACTUATOR CONTROL-----  
 Actuator control = 20 %

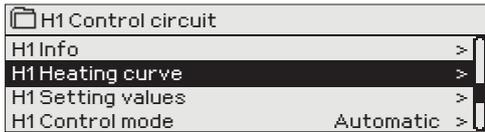
If the controller has a device ID in use, always write the device ID in front of the key word (example. Ou01 KEY WORDS or Ou01 ?).

### Send a message: H1 Info.

The controller sends a supply water info from the H1 heating circuit to your mobile phone that shows you the controller determined supply water temperature at the present and the factors effecting supply water control. The message also includes the measurements which are affecting the supply water control and the actuator control. The message cannot be changed or sent back to the controller.

# 3.2 Heating curve

## H1 (H2) Control circuit-> H1 (H2) Heating curve

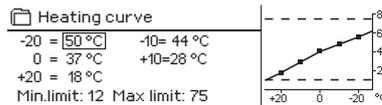


The supply water temperature for different outdoor temperatures is set in heating curve settings.

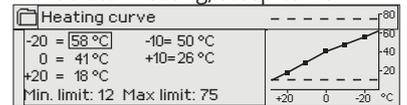
Setting	Factory setting	Explanation
<b>H1 Heating curve</b> -20 = 33 °C    -10= 30 °C 0 = 27 °C    +10=23 °C +20 = 20 °C Min.limit: 18 Max. limit: 45		you can change the regulation curve to the outdoor temperature values -20°C and +20°C as well as to three other outdoor temperatures between -20°C and +20°C. To change the outdoor temperature point, press OK for a long period of time. A floor heating curve is the factory setting.
<b>Min. limit</b>	12.0 °C	Minimum allowed supply water temperature. A higher minimum temperature is used in damp rooms and tiled rooms than in, e.g., rooms having a parquet floor to ensure a comfortable temperature and removal of moisture in the summer.
<b>Max. limit</b>	45 °C	Maximum allowed supply water temperature. If, for example, the setting of the heating curve is incorrect, the maximum limit supply water rise too hot. Still if the building has temperature-sensitive structures, we recommend using a mechanical thermostat C01A installed in the supply water pipe (see page 28 for more information).

The preset heating curves are typical average curves for the heating mode in question. The curve may need to be adjusted to suit your building. The setting should be done during the cold period and if the room compensation is in use, it should be switched off during the setting. The curve is appropriate when the room temperature is maintained constant although the outdoor temperature changes.

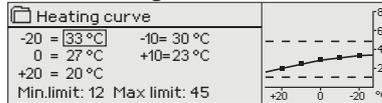
### 1. Radiator heating, normal



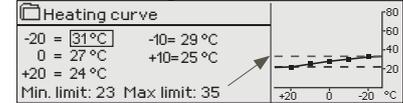
### 2. Radiator heating, steep curve



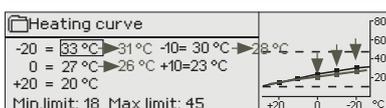
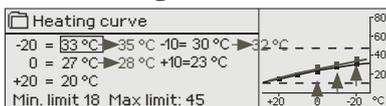
### 3. Floor heating, normal curve



### 4. Floor heating, moist rooms



## Edit heating curve



If room temperature drops, make the curve steeper. (Set higher values for supply water temperature at the outdoor temperatures -20 °C and 0 °C).

If room temperature rises, make the curve less steep. (Set lower values for supply water temperature at the outdoor temperatures -20 °C and 0 °C).

Note! Changes influence room temperature slowly. Wait at least 24 hours before readjusting the settings. Especially in buildings with floor heating, the delays in room temperature changes are quite long. The supply water minimum limit setting ensures that pipes will not freeze. The maximum limit setting ensures that excessively hot water that could damage structures (e.g. parquet in case of floor heating) does not enter the heating system.

### Key word:

H1 Heating curve

H2 Heating curve

**H1 Heating curve**  
 Suppl.w. (-20) = 50 °C/  
 Outd.t. 2 = -10 °C/  
 Suppl.w. 2 = 44 °C/  
 Outd.t. 3 = 0 °C/  
 Suppl.w. 3 = 37 °C/  
 Outd.t. 4 = 10 °C/  
 Suppl.w. 4 = 28 °C/  
 Suppl.w. (+20) = 18  
 Minimum limit = 18  
 Maximum limit = 42

**H2 Heating curve**  
 Suppl.w. (-20) = 35 °C/  
 Outd.t. 2 = -10 °C/  
 Suppl.w. 2 = 32 °C/  
 Outd.t. 3 = 0 °C/  
 Suppl.w. 3 = 28 °C/  
 Outd.t. 4 = 10 °C/  
 Suppl.w. 4 = 23 °C/  
 Suppl.w. (+20) = 20 °C  
 Minimum limit = 18 °C/  
 Maximum limit = 42 °C

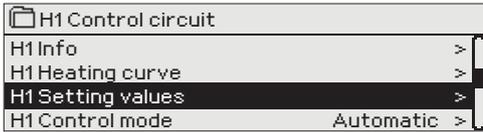
### Send message: H1 Heating curve

The controller sends a message showing curve settings.

You can change the supply water setting values and outdoor temperature 2, 3 and 4 setting values by replacing the setting value with a new one and sending a message back to the regulator.

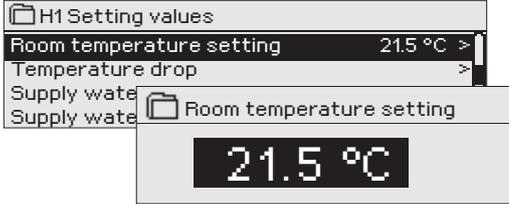
H23 will make the requested changes and send a new message showing the changes made.

### 3.3 Setting values



The regulator has two types of setting values: those that are always visible and those that can only be changed using a service code.

#### H1 (H2) Control circuit -> H1 (H2) Setting values



Changing a setting:

- Choose the desired setting by turning the control knob.
- Press OK to go to the view where editing is possible. Change the setting.
- Press OK to accept the change.

Both circuits (H1 and H2) have the same circuit-specific setting values.

Setting	Factory setting	Range	Explanation
Room temperature setting	21.5	5... 35 °C	Basic room temperature setting for the controller set by the user. This setting value is not visible unless room compensation is in use. Taking it into use is done from the "H1 (2) Setting values" -> "Room temperature settings".
Parallel shift	0	-15... 15 °C	If room temperature is continuously above or below the setting value despite the outdoor temperature, you can add a permanent compensation value to the supply water setting value.
Supply water min limit	18	5... 95 °C	Minimum allowed supply water temperature. A higher minimum temperature is used in damp rooms and tiled rooms than in, e.g., rooms having a parquet floor to ensure a comfortable temperature and removal of moisture in the summer.
Supply water max limit	45	5... 95 °C	Maximum allowed supply water temperature. The maximum limit prevents the temp. in the heating circuit from rising too high, preventing damage to pipes and surface materials.
Summer function outdoor.limit	19	10... 35 °C	Summer function outdoor temperature limit. When the measured outdoor temperature exceeds the outdoor temperature limit of the summer function, the valve will be closed. When the summer function is active, the control mode is "Summer stop" in basic view. The summer function is switched off, when the temperature drops 1,0 °C under summer function outdoor temperature limit. (Commissioning, Service settings -> Other settings, see p.13).

#### 3.3.1 Temperature drop

Both heating circuits have the same circuit-specific settings

##### H1 (H2) Control circuit -> H1 (H2) Setting values -> Temperature drop

Setting	Factory setting	Range	Explanation
Temperature drop or Room temperature drop	0.0 2.0	0... 20 °C 0... 20 °C	Temperature drop of supply water, which can start due to weekly schedule, exception schedule, Home/Away switch, "Away" text message command or when selecting "Away" as the Home/Away control status from the controller (Inputs and outputs). If room temperature measurement has been taken into use, the temperature drop is given directly as a room temperature drop.
Temp.drop Weekly schedule			You can define a weekly schedule for temperature drops. More information on the weekly schedule can be found from the next page.
Temp.drop Exception schedule			Exception schedule is used for temperature drops which deviate from normal weekly schedule. The exception schedule overrides always the weekly schedule. More information can be found from the page 12.
Temperature drop status	No drop		The Home/Away control and time program can change the temperature level. Status can be No drop, Away control, Time program or Away control/ Time program.

#### Key words:

H1 Setting values

H2 Setting values

H1 Setting values:  
Room temperature =  
Temperature drop =

H1 Setting values:  
Room temperature = 21.5 °C/  
Temperature drop = 3.0 °C/

#### Send a message: H1 Settings.

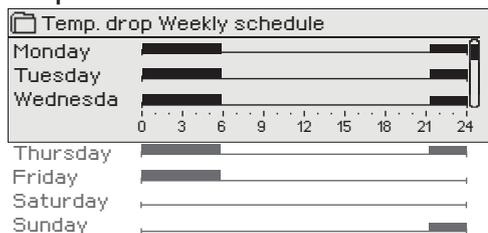
The controller sends the main settings to your mobile phone.

Editing the setting values: write the new setting in place of the old setting and send a message back to the controller. The controller sends the setting as a return message.

### 3.3.1.1 Weekly schedule

H1 (H2) Control circuit -> H1 (H2) Setting values -> Temperature drop -> Temp. drop Weekly schedule

#### Graph view



Weekly programmes have a standard graph view as well as a change view showing the exact time when the new mode command will be executed. In the graph view, exceptions to normal temperature reductions are shown as bars.

#### Browsing a weekly schedule:

Turn the control knob to browse a weekly schedule. If you wish to see the exact switch times or you wish to change, delete or add switch times, press OK at any weekday.

#### Editing view

Time	Mode	M	T	W	T	F	S	S
21:00	Drop On	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
06:00	Drop Off	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00:00	Add new	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In this example, you can see a weekly temperature drop program. Temperature drop is on from 9 pm to 6 am from Monday to Friday.

#### Adding a new temperature drop period:

1. Press OK at the "Add new" row.
2. Set the time, when the temperature drop is activated (set hours and minutes separately). Press OK to accept.
3. Press OK and then turn the control knob to select "Drop On". Press OK to accept.
4. Press OK at each weekday you wish to choose.
5. Press OK at the end of the row to accept the new time program.
6. Press OK at the "Add new" row.
7. Set the time, when the temperature drop goes off (set hours and minutes separately). Press OK to accept.
8. Press OK and then turn the control knob to select "Drop Off". Press OK to accept.
9. Press OK at each weekday you wish to choose.
10. Press OK at the end of the row to accept the new time program.
11. Press Esc to exit.

#### Editing view

Time	Mode	M	T	W	T	F	S	S
21:00	Drop On	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
06:00	Drop Off	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Annotations: "Set switch time" points to the Time column, "Set state (=desired temp. level)" points to the Mode column, "Select day(s)" points to the MTWTFSS columns, and "Accept" points to the OK button at the end of the second row.

#### Editing a weekly schedule:

1. Turn the control knob to move to the value you wish to change and press OK.
2. Turn the control knob to make the time and temperature drop mode changes. Press OK to accept.
3. Press the OK button to change the day of the week.
4. Press Esc to exit.

#### Deleting a switch time:

1. Turn the control knob to move to the switch time you wish to delete and press OK.
2. Press OK at temperature mode and select "Delete switch time".
3. Press OK at the end of the row.

Time	Mode	M	T	W	T	F	S	S
21:00	Drop On	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
06:00	Delete switch time	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00:00	Add new	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 3.3.1.2 Exception schedule

H1 (H2) Control circuit -> H1 (H2) Setting values -> Temperature drop -> Temp.drop Exception schedule

Date	Time
Add new <span style="float: right;">1 &gt;</span>	
Date: 31.03.2024 <span style="float: right;">2</span>	
Time: 11:30	
Mode: Drop On	
Repeat: No <span style="float: right;">3</span>	
Accept: Ready <span style="float: right;">4</span>	

You can easily make changes that differ from normal routine use by using the holiday schedule. The date, time and mode to which heating will be changed in the period in question are entered in the holiday schedule. To switch from an Exception schedule to weekly schedule mode, select automatic mode.

Temperature drop by using Exception schedule:

Date	Time
31.03.2024	11:30 Drop On >
Add new <span style="float: right;">5 &gt;</span>	
Date: 14.04.2024 <span style="float: right;">6</span>	
Time: 16:00	
Mode: Automatic	
Repeat: No	
Accept: Ready <span style="float: right;">7</span>	

1. Navigate to "Exception schedule" and press OK. The display will read "Add new." Press OK.
2. Press OK and set the start date for the temperature program, then the time and "Drop On" mode.
3. Select, if the exception schedule repeats or not. If you select repeat, it can be repeated every month same time or every year same time.
4. Accept the holiday schedule you created by pressing "Ready."
5. Navigate to "Add new" and press OK.
6. Press OK and set the end date for the temperature drop program, then the time. Select "Automatic" mode. If you chose earlier (paragraph 3) "repeat every year" or repeat every month", select now same way.
7. Accept the Exception schedule you created by pressing "Ready."

Date	Time
31.03.2024	11:30 Drop On >
14.04.2024	16:00 Automatic >
Add new <span style="float: right;">&gt;</span>	

The picture shows an exception schedule program. Heat reduction is on from 31 March 2024, 11:30 to 14 April 2024, 16:00

NOTE! Remember to also set the end time for the holiday calendar program! When you set the date and time, the mode will change to "Automatic". In this case, the control returns back to the weekly schedule.

Temperature drop prevention:

The Exception schedule overrides the Weekly schedule. You can bypass the temperature drops for specific time with Exception schedule. Define the program as above (see steps 1-6), but set the mode to "Drop off" in step 2.

Deleting an activation time from an Exception schedule:

1. Navigate to the row with the activation time you want to delete.
2. Select "Delete switch time."
3. Accept the deletion by pressing "Ready."

### 3.3.2 Service setting values

H1 (H2) Control circuit -> H1 (H2) Setting values -> Service setting values



The access to the Service setting values requires entering the service code. The service settings are typically needed only when the controller is configured and taken in use.

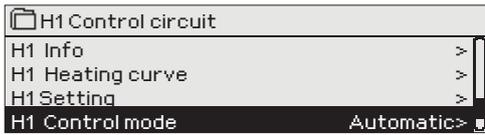
In addition to service settings, there are also other settings for configuration (navigate to "System settings" -> "Connections and configuration")

Setting	Factory setting	Range	Explanation
--- ACTUATOR CONTROL ---			
Actuator selection	3-point	3-point, 0(2)-10V, 10 - 0(2)V	3-point or voltage controlled actuators can be used for heating circuits.
Actuator running time open	150	5...500 s	The running time indicates how many seconds go by if the actuator.
Actuator running time close	150	5...500 s	runs a valve nonstop from a closed position to an open position.

Setting	Factory setting	Range	Explanation
<b>--- TUNING VALUES---</b>			
<b>P-area</b>	200	2...600 °C	Supply water temperature change at which the actuator runs the valve at 100%. Eg. If the supply water temperature changes 10 °C and the P area is 200 °C the position of the actuator changes 5 % ( $10/200 \times 100 \% = 5 \%$ ).
<b>I-time</b>	50	10 ... 300 s	The deviation in the supply water temperature from the set value is corrected by P amount in I time. For example, if deviation is 10°C, P-range is 200°C and I time is 50 s, the motor will be run at 5 % for 50 seconds.
<b>🔧 D-time</b>	0	0 ... 10 s	Regulation reaction speed up in the event of a temperature change. Beware of constant waver!
<b>--- ALARM SETTINGS ---</b>			
<b>Supply water deviation alarm:</b>			
<b>Max. deviation from setting</b>	10.0	2...100 °C	Amount of difference between measured supply water temperature and the supply water temperature set by the controller that causes an alarm when the deviation has continued for the return delay time. If the summer function is active, the setting for deviation alarm is 2 x defined setting (with default setting it's $2 \times 10.0 \text{ °C} = 20 \text{ °C}$ ).
<b>Alarm delay</b>	60	0...120 min	The alarm goes off if the deviation has lasted for the set time.
<b>Return water low limit alarm:</b>			
<b>Alarm min limit</b>	8.0	2...100 °C	The return water low limit alarm and return water compensation is activated when return water temperature has remained below the low limit for longer than the allowed delay time. The exit delay for low limit alarm is 5 seconds.
<b>Alarm delay</b>	10	0...120 min	
<b>--- MEASUREMENTS / BUS MEASUREMENTS ---</b>			
<b>Outdoor temp. measurement</b>	In use	In use, In use (bus)	A outdoor temperature measurement can be read either from bus or through UI11 or plug connector.
<b>Room measurement</b>	Not in use	Not in use, In use, In use (bus)	A room temperature measurement specific to H1 control circuit can be read either from bus or through UI14.
<b>--- ROOM COMPENSATION ---</b>			
<b>Room compensation ratio</b>	1.5	0...10	Coefficient used in applying the difference between room measurement and the room setting value to the supply water setting value. For example, if the room temperature is one degree below the set value, the supply water is increased by 1.5 degrees ( $1.0 \text{ °C} \times 1.5 = 1.5 \text{ °C}$ , floor heating system). In radiator heating system, 4.0 °C is typically used as the set value for room compensation. Alarm limits can be set for the room temperature read via the bus: by default, the lower limit is 1.0 °C and the upper limit is 50°C and fixed 0 min. alarm delay. If the alarm is activated, room compensation is disabled.
<b>Minimum limit</b>	-20.0	-50...+50	The minimum limit defines how much the compensation can decrease the supply water temperature.
<b>Maximum limit</b>	20.0	-50...+50	The maximum limit defines how much the compensation can increase the supply water temperature.
<b>--- RETURN WATER COMPENSATION ---</b>			
<b>Return water compensation ratio</b>	2.0	0 ... 10.0	If return water temperature falls below the setting value of the "Low limit alarm for return water" supply water temperature is raised by the value: amount of the deficit multiplied by the compensation ratio.
<b>--- OTHER SETTINGS ---</b>			
<b>Outdoor temperature delay</b>	2.0	0 ... 6.0 h	Amount of slowing of outdoor temperature measurement (time constant). Regulation of supply water is based on delayed measurement.
<b>Room temp. measurement delay</b>	0.5	0 ... 6.0 h	Amount of room temperature measurement delay (time constant). Different buildings react to temperature changes at different rates. This setting value can reduce the effect of the building on room regulation.
<b>Summer function</b>	Not in use/ In use	Not in use/ In use	If the summer function is in use, the valve closes in the summer when the outdoor temperature rises above "Summer function outdoor. limit".

### 3.4 Control mode

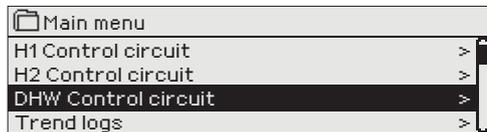
H1 (H2) Control circuit -> H1 (H2) Control mode



Automatic control is the mode that is used normally. You may change automatic control to manual control here, and drive the valve to the desired position.

Control mode	Explanation
Automatic	H23 controls the supply water temperature automatically according to the need for heating and possible time programs (weekly schedule and holiday calendar) or according to the home/away control.
Manual	<p>The actuator remains in the position defined in manual mode until the control mode changed to automatic.</p> <p>The actuators position in manual mode is changed with "Actuator manual control" -setting. If 3-state actuator is in use, the direction of the control of the valve is shown (open/close). If voltage controlled actuator is in use, the position of the valve is shown as percent value.</p>
Manual mech. (voltage controlled actuator)	When the control mode is manual mechanic, the supply voltage from H23 to actuator is cut and the position of the valve can be changed straight from the actuator.

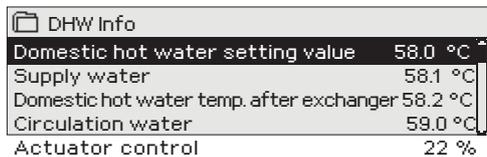
## 4 DOMESTIC HOT WATER



The H23 keeps the temperature of domestic hot water at the designated setting value.

### 4.1 DHW Info

DHW Control circuit -> DHW Info



Info-menu shows the domestic hot water settings, the measurements and actuator control related to the domestic hot water.

### 4.2 Trend display

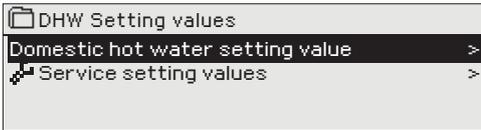
DHW Control circuit -> DHW Trend display



You can read the real-time trends of the temperatures of supply water and circulation water. Also the real-time trend of actuator control in domestic hot water circuit can be read. The sampling interval is 1 s.

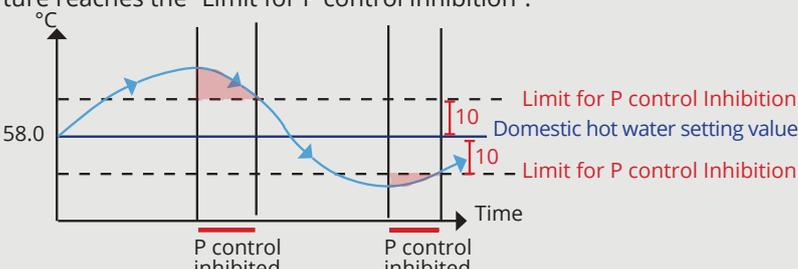
## 4.3 Setting values

### DHW Control circuit -> DHW Setting values



The end user can change the domestic hot water setting value. The settings of the actuator, tuning values and high limit alarm settings can be found from the Service setting values menu.

Setting	Factory setting	Range	Explanation
<b>Domestic hot water setting value</b>	58.0	0.0 ... 100.0	Because of the danger of bacteria, it is recommended that the domestic hot water temperature is not permanently set below +55 °C.
<b>Service setting values</b>			The viewing and setting the Service setting values requires service code. The Service setting values are such settings which are not typically needed to be changed after H23 has been configured and taken in use.
<b>--- ACTUATOR CONTROL ---</b>			
<b>Actuator selection</b>	0-10V	3-point, 0(2)-10V, 10 - 0(2) V	Type of actuator.
<b>Actuator running time</b>	15	10...500 s	The running time indicates how many seconds go by if the voltage controlled actuator runs a valve nonstop from a closed position to an open position or from open position to a closed position
<b>Actuator running time open</b>	15	10...500 s	The running time indicates how many seconds go by if the 3-point controlled actuator runs a valve nonstop from a closed position to an open position
<b>Actuator running time close</b>	15	10...500 s	The running time indicates how many seconds go by if the 3-point controlled actuator runs a valve nonstop from an open position to a closed position.
<b>Actuator offset</b>	0	0...15 %	The actuator dead zone. The controller starts to open the valve zero point onwards.
<b>--- TUNING VALUES---</b>			
<b>P-area</b>	70	2 ... 600 °C	Supply water temperature change at which the actuator runs the valve at 100%.
<b>I-time</b>	14	5 ... 300 s	The deviation in the supply water temperature from the set value is corrected by P amount in I time.
 <b>D-time</b>	0	0 ... 10 s	Regulation reaction speed up in the event of a temperature change. Beware of constant waver!
<b>Anticipation</b>	120.0	1...250 °C	Uses anticipation sensor measurement information to speed up regulation when DHW consumption changes. Increase the anticipation value to decrease reaction to changes in consumption.
<b>DHW Quick run</b>	60	0 ... 100 %	Functions during consumption changes. Decrease this value to decrease reaction to quick temperature changes.
<b>Limit for P control Inhibition</b>	10	0...50 °C	If the measured temperature differs from the setting of the "Limit for P control inhibition" and the temperature change is toward the setting value, the P control is blocked for as long as the measured temperature reaches the "Limit for P control inhibition".



Setting	Factory setting	Range	Explanation
<b>--- ALARM SETTINGS ---</b>			
			Lower and upper alarm limits can be assigned to each input. Alarm limits can be set in the Alarms menu (See Alarms-> General alarms).
<b>Supply water high limit alarm</b>			
<b>Alarm max limit</b>	75	0...100 °C	Supply water high limit alarm.
<b>Alarm delay</b>	10	0...120 min	The high limit alarm is activated when the supply water temperature has exceed the high limit longer than the defined delay time.

**Key word:**

DHW Setting values

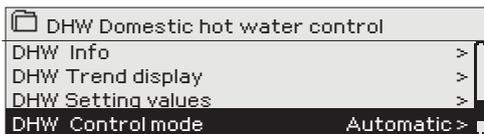
DHW Setting values  
Domestic hot water setting value (58.0) °C/

**Send a message: DHW Settings.**

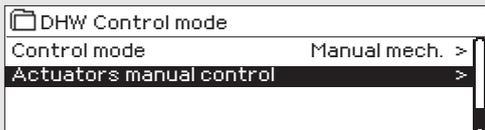
The controller sends the domestic hot water temperature setting to your mobile phone. Editing the setting value: write the new setting in place of the old setting and send a message back to the controller. The controller sends the setting as a return message.

## 4.4 Control mode

### DHW Domestic hot water control -> Control mode

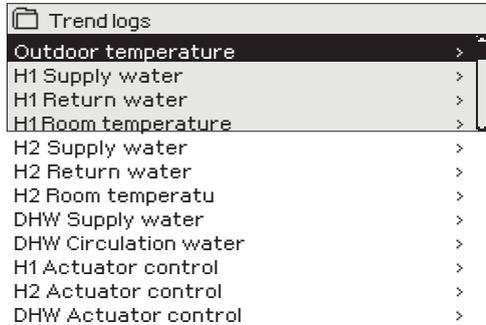
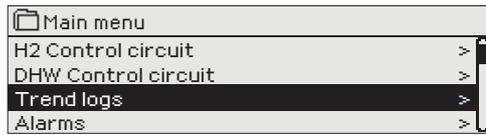


Automatic mode is normally used in regulating domestic hot water. Here you can switch from automatic to manual mode and move the valve into the desired position. You can use manual mode for example when a sensor malfunctions.

Control mode	Explanation
<b>Automatic</b>	H23 maintains the temperature of domestic hot water at the setting value set by the user.
<b>Manual</b> 	The actuator remains in the position defined in manual mode until the control mode changed to automatic. 
<b>Manual mech. (voltage controlled actuator)</b>	The actuators position in manual mode is changed with "Actuator manual control" -setting. If 3-state actuator is in use, the direction of the control of the valve is shown (open/close). If voltage controlled actuator is in use, the position of the valve is shown as percent value.  In mechanical manual mode the valve's position is set from the actuator. To prevent the regulator from changing the position of the valve, the actuator's power supply is prevented by this selection.

# 5 TREND LOGS

## Trend logs

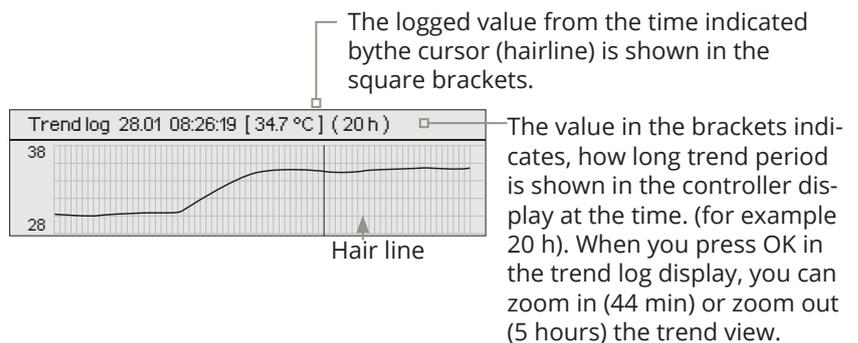


H23 controller automatically logs trend from the measurements. Select the measurement which log you want to view. The trend log will be shown in the controller's display. It's also possible to change the logging interval.

Measurement	Factory setting	Range	Attention!
Outdoor temperature	600 s	10 ... 600 s	
H1/H2 Supply water	60 s	10 ... 600 s	
H1/ H2 Return water	60 s	10 ... 600 s	
H1/ H2 Room temp.	10 s	10 ... 600 s	
DHW Supply water	10 s	10 ... 600 s	
DHW Circulation water	60 s	10 ... 600 s	
H2 Actuator control	60 s	10 ... 600 s	The trend is available only with the voltage controlled actuators.
DHW Actuator control	10 s	10 ... 600 s	

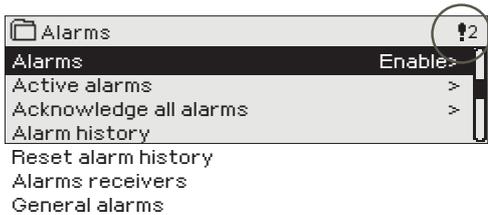
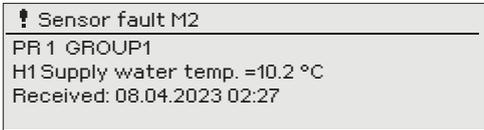
A different sampling interval can be set for different measurements.

You can browse the trend log by turning the control knob.



# 6 ALARMS

Acknowledging alarms: press OK and the alarm sound will mute. If the reason for the alarm is still present, the exclamation mark in the top right will continue to blink.



H23 can send an alarm for a number of different reasons. Information about the alarm is shown on the display. The alarm also sounds a beeping noise.

If the regulator has a number of unacknowledged alarms and you acknowledge the last one, the one before it will appear on the monitor.

When all active alarms have been acknowledged, the alarm window closes and the alarm sound stops.

You can also use ESC button. The alarm sound then stops and the alarm windows close when you press the Esc button once.

In the alarm menu of H23 device, you can check the active alarms and what alarms have been active. The number of active alarms will be shown in the right corner of the main view.

## Alarms

Alarms > Alarms

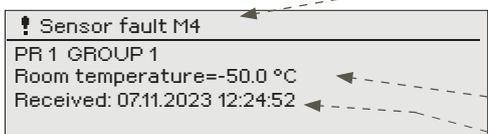
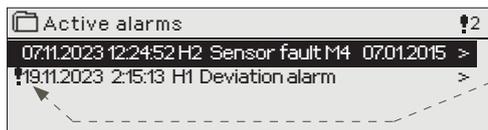
The disabling of alarms can be activated. If the alarms are disabled, the next symbol is shown in the main display.

The disabling is taken out of use in System settings -> Alarms: Disabled/ Enabled (requires a service code).

## Active alarms

Alarms > Active alarms

Every active alarm is shown in a separate row, where you can see when the alarm has become active. Press OK to get more information about the alarm.



- An exclamation mark in front of the date shows that the alarm has not been acknowledged.
- The heading of the alarm view shows the reason for the alarm.
- What location the alarm is coming from
- Time the alarm was received.

**Key word:**

ACTIVE ALARMS

**Send message: Active alarms**

The regulator sends a message showing all active alarms. Message is informational.

## Acknowledge all alarms

Alarms > Acknowledge all alarms

You can acknowledge all alarms by pressing OK.

## Alarm history

### Alarms > Alarm history

Alarm history 

- 29.11.2023 15:55:10 Sensor fault H1 Supply w. >
- 02.12.2023 11:22:40 Sensor fault H1 Return >

From alarms you can see the cause of the alarm, where the alarm has come from and when the alarm has become inactive. The last 10 alarms can be seen in inactive alarms.

**Key word:**

Alarm history

**Send message: Alarm history**

The controller sends a message showing the last alarms. Message is informational.

## Reset alarm history

### Alarms > Reset alarm history

Confirm

Reset alarm history

Yes  No

H23 requests confirmation before deleting alarm history.

## Alarms receivers

### Alarms -> Alarms receivers

Alarms receivers

- 1. Phone number >
- 2. Phone number >
- 3. Phone number >
- 4. Phone number >
- 5. Phone number >
- Backup user >

1. Phone number

+ 3 5 8 4 0 8 4 0 0 0 0 0

Approve: Press OK a number of seconds  
Cancel: Press ESC a number of seconds

A GSM modem can be connected to the H23 for alarm sending as a text message to the alarm receivers.

The alarm will be routed to defined alarm numbers (phone numbers 1-5). The alarm will be sent also to backup number (if defined), if the alarm isn't acknowledged within 5 minutes after its activated.

The controller sends a maximum of 100 messages per day (1 message = 160 characters).

Entering the telephone numbers:

1. Turn the control knob. Press OK to accept a number/sign.
2. Press OK to move to the next square.  
Press Esc to return to the previous square. OK
3. Press OK for a number of seconds to accept the number.  
Press Esc for a number of seconds to cancel.



Removal of the defined phone number:

You can delete the phone number one character at a time by pressing the  button.

## General alarms

### Alarms > General alarms

General alarms

- M1 General alarm >
- M2 General alarm >
- M3 General alarm >
- M4 General alarm >

M1 General alarm

Alarm min limit -51.0 °C>

Alarm max limit 131.0 °C>

Alarm delay 1 min>

Name of the alarm Outdoor temp.>

It's possible to configure general alarms to measurement inputs. The low and high limits and delay can be defined for alarms. In addition, the alarms can be named as desired. The default settings for alarms are: low limit -51 °C, high limit 131 °C and delay 1 min. Note that with default settings, the alarms will never activate due to measurement range of the sensors. The measurement range is -50 ... 130 °C.

As an exception, H1 and H2 room measurements and also DH Supply and DH return temperature (Measurements 4 and 7), which have a factory setting of 5.0 °C and an upper limit of 131.0 °C. The lower limit of room measurements read via the bus is 1.0 °C (0 ... 30 °C) and the upper limit is 50 °C (0 ... 100 °C).

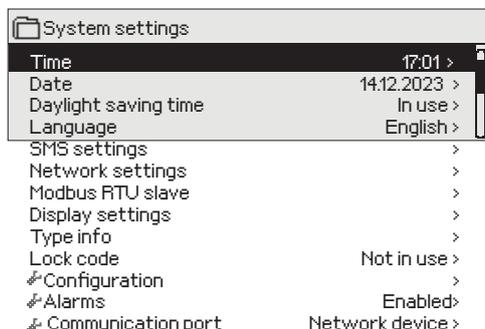
If digital inputs are configured for alarm use, you can modify the alarm delay and rename the alarm. The default value for alarm delay is 1 min (setting range 0...120 min).

# 7 SYSTEM SETTINGS



System settings include date and time, language, SMS and network settings, display settings and device type information.

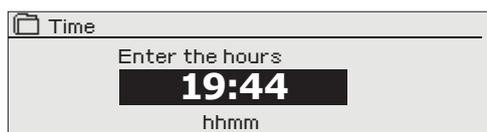
If you want to connect the H23 unit to an Ethernet network, you will need an M-Link adapter (additional equipment).



## 7.1 Setting date, time and language

### Time

System settings -> Time



It is important that date and time are correct. The date and time are used e. g. in time programs (weekly schedule and holiday calendar) as well as alarm indication and routing.

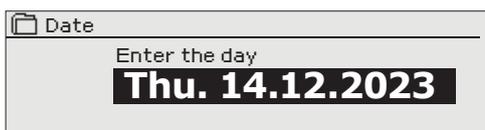
The H23 clock takes daylight savings and leap years into account automatically. The clock has a backup for power outages lasting at least day.

Hours and minutes can be set separately.

1. Set hours and press OK to accept.
2. Set minutes and press OK to accept.

### Date

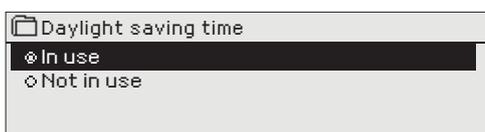
System settings -> Date



1. Set day and press OK to accept (name of weekday is updated automatically).
2. Set month and press OK to accept.
3. Set month and press OK to accept. Aseta päivä ja hyväksy OK:lla.

### Daylight saving time

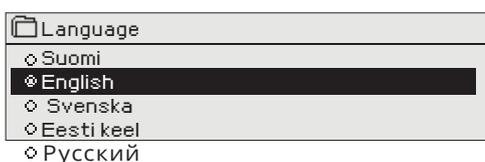
System settings -> Daylight saving time



The controller will automatically be switched to to daylight saving time and to standard time, if the selection "In use" is made.

### Language

System settings -> Language



The language of the user interface can be change here.

## 7.2 Text message (SMS) settings

System settings ->SMS settings

Use of text messaging requires that the H23 is connected to a GSM modem (additional equipment, see p. 29). SMS settings are shown in the controller when GSM is selected in communication port (see 7.12 on page 26).

### Setting

### Explanation

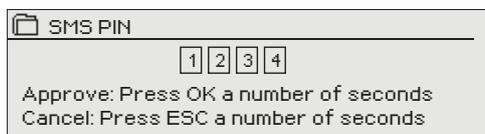
#### Message center number:

A H23 device can identify the operator in use from the modem's SIM card.

You can delete the message center number one character at a time by pressing the  button.

#### SMS PIN:

If the SIM card has PIN inquiry in use, H23 device asks you to enter the PIN (default 1234).



Entering the code:

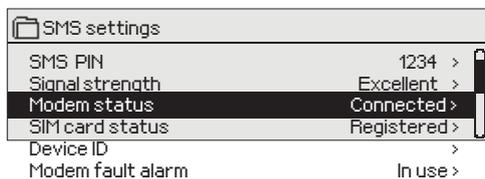
1. Turn the control knob and press OK to accept each number. Press ESC to return to the previous square.
2. Press OK for a number of seconds to accept the code. Press ESC for a number of seconds to cancel.

#### Signal strength:

Signal strength is expressed with description: "Excellent", "Good", "Moderate", "Low", "Very low" and "No network". If signal strength indicates "No network," try changing the modem's location or use an additional antenna. If the signal strength is "Very low" you should also move the modem to another location to try to improve signal strength. If the unit displays "Initialisation failed," check that the SIM card is correctly installed.

#### Modem status:

H23 detect whether the modem is connected or not. The device automatically initializes the GSM modem.



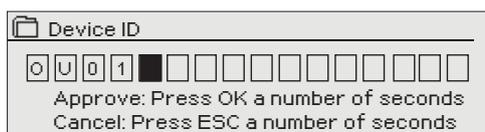
Mode	Explanation
Connected	Modem is ready for use.
Not connected	The modem is not connected or the connection is incorrect. Connect the modem to the communication port I of H23. The power supply for modem can be taken through a network device.

#### SIM card status

Mode	Explanation
Unregistered	The subscription is not valid.
Registered	The SIM card is ready to use
PIN error	Enter H23 controller the same PIN as as the GSM modem's SIM card PIN
PUK	SIM card is locked (PUK code).

#### Device ID:

It's possible to define device ID to H23.



Device ID works as a password for SMS communication. When device ID is in use, it should be added in front of the keyword in every SMS (e.g. TC01 INPUTS).

#### Modem fault alarm:

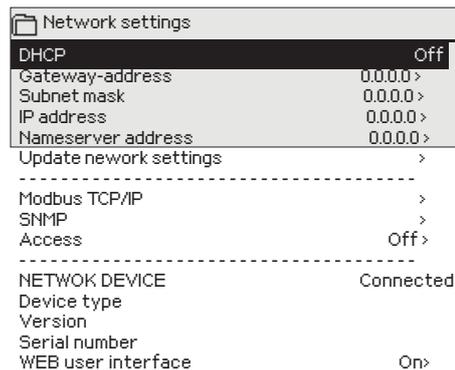
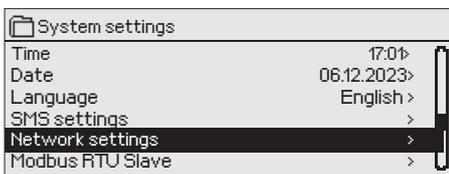
The modem fault alarm is activated in the controller if the SMS-communication isn't working. The entry delay for alarm is 600s and exit delay is 5s.

If the modem fault alarm is activated, please check SIM-card's settings, network's availability and GSM-modem's state (for possible malfunctions). If the signal strength is weak, it's possible to add an external antenna for GSM-modem (optional accessory).

## 7.3 Network settings

If you want to connect the H23 unit to an Ethernet network, you will need an M-LINK (optional accessory). M-LINK is connected to RJ-45-I communication port located in the side of the H23. The network cable used (length max. 10 m) must be fully connected, ie all 4 pairs in the cable.

The network settings will appear in the menu once the communication port is configured to M-Link's use (see section 7.12 on p. 25). After the network settings are changed, H23 will reboot.



### System settings > Network settings

The network settings are practically all M-LINK settings, but can also be controlled / set via the H23 controller display when the controller and M-LINK are connected.

There are two alternative ways to set the H23 device IP address and network settings:

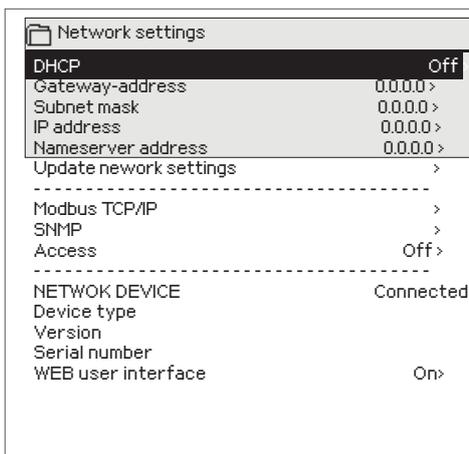
1. IP address is retrieved via DHCP function. This requires that DHCP service is in use in the network and network cables have been connected.
2. IP address is set manually.

#### Setting the IP address via DHCP function:

1. Go to DHCP and press OK.
2. Select "On" and press OK to accept selection.
3. Select "Update network settings" and press OK to accept selection.
4. Wait approximately one minute.
5. If DHCP is "On", setting the IP address and other network settings was successful. The device now functions in the network. Otherwise, make sure the connections and the fact that the network has a DHCP server.

#### Setting the IP address manually:

1. Go to DHCP and press OK.
2. Select "Off" and press OK to accept selection. If DHCP function is on, manual changes in "Subnet mask", "Gateway address", "Name server address" and "IP address" will be ignored.
3. Request correct network settings (IP address, Gateway address, Subnet mask, Nameserver address) from the network administrator.
4. Select "Update network settings".



The M-LINK device includes the Ouman Access service, which provides a secure connection to automation devices via an Internet connection.

The access connection can use the internet connection already in the property or it can be through your own 3 / 4G modem.

Ouman sells 4G modems and data subscriptions to them. You can also get a subscription from the operator of your choice.

If you are connecting the H23 controller to a network using a 3 / 4G modem, turn on DHCP on the controller. You will automatically receive other network settings.

Setting	Explanation
---------	-------------

## Modbus TCP/IP

### System settings > Network settings -> Modbus TCP/IP



ModbusTCP/IP communication settings

<b>Modbus TCP port (internal registers):</b>	Port definition for Modbus TCP/IP -communication. The default port is 502.
<b>Max connections:</b>	It is possible to decrease server load by changing this setting that defines the maximum number of simultaneous connections from different IP addresses to the server.
<b>Idle timeout:</b>	This setting defines the time after which the server closes an inactive connection.
<b>Allowed address:</b>	It is possible to improve the information security of the system by taking permitted connection address into use. If the value is 0.0.0.0, connections to the server are permitted from any IP address. If you define one permitted connection address, connections to the server are not permitted from any other IP address.
<b>Function active:</b>	This selection either enables or disables the entire Modbus/TCP communication.

## SNMP

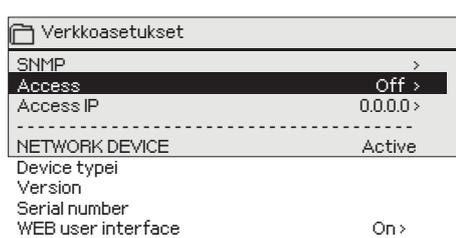
### System settings > Network settings-> SNMP



<b>SNMP:</b>	SNMP function can be used to send notifications about alarms activating, inactivating and being acknowledged via SNMP protocol to a desired server.
<b>IP address:</b>	The IP address of the target server to which messages are sent.
<b>Function active:</b>	This selection either enables or disables the entire SNMP function.  <b>If the Ouman Access is taken into use, the sent SNMP alarm message will include the Access IP-address. In this case, Access IP address must be entered as local IP-address in Ounet..</b>

## Access

### System settings > Network settings-> Access



M-LINK supports Ouman Access-service which gives you a secure remote connection to the H23-device. With this setting you can activate the ACCESS-service in order to be able to use it. OUMAN ACCESS- service is "off" by default in H23.

The H23 device will be connected to a C port of M-LINK device or as a slave device to the Modbus RTU bus. After that, you have to activate the ACCESS service from the device (Access "on").

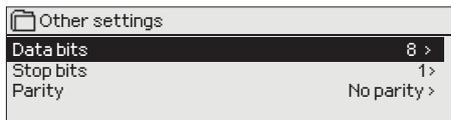
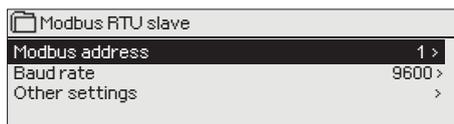
If the controller is on the M-LINK RTU bus and the C-bus is not in use, then the controller display will not be able to control anything from the M-LINK network plug but will be all tasks directly through the M-LINK's WEB UI.

OUMAN ACCESS- device can be connected to LAN if following conditions are fulfilled:

- 1. LAN is routed via Internet**  
The Access service operates on the Internet so the Access service is not available if the device is not connected to the Internet. The Access device examines the availability of Internet connection by sending a Ping packet to the Internet server at 3-minute intervals. The network must allow the ICMP outwards from any port and the receipt of the reply message to the same port.
- 2. The VPN protocol used by Access service outwards is not blocked**  
The Access service is based on the VPN connection which the Access device creates to the Access server. The network must allow the UDP outwards from any port to the port 1194 and the receipt of the reply message to this port.

## 7.4 Modbus RTU slave

System settings -> Modbus RTU Slave

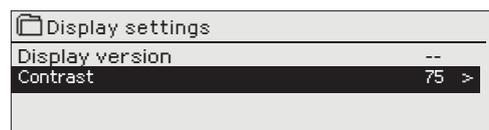


Ouman H23 can be connected as a slave device to Modbus RTU bus (Modbus RTU slave). Note that there must not be several devices with the same address in the bus. The communication baudrate must be the same in every device in the same bus.

All the Modbus RTU –communication settings can be found from the Modbus RTU slave menu.

## 7.5 Display settings

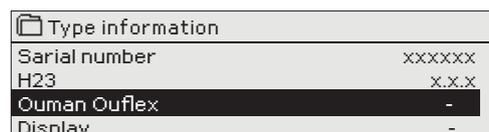
System settings -> Display settings



You can adjust contrast. If you wish the display to be brighter, set a smaller numerical value. The setting range is 50... 100. The display changes after you have confirmed the setting change.

## 7.6 Type information

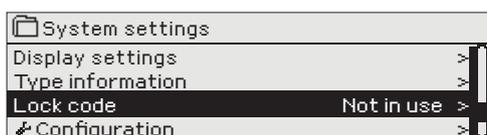
System settings -> Type information



Type information shows the hardware configuration and the software versions that have been used to create the application. This information is useful especially in case of maintenance or upgrade.

## 7.7 Lock code

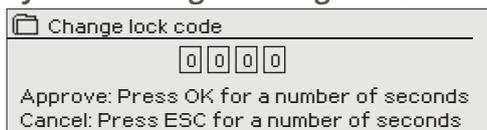
System settings->Lock code



When lock code is taken in use, it's not possible to change any settings without entering lock code. It is recommended that you take lock code into use if the device is located so that anyone could reach it and change settings. Locking the device and changing the lock code prevents unauthorized use of the device.

Lock code function	Explanation
Not in use	You can read H23 device information and change settings.
In use	You can read H23 device information but you can not change settings without entering the lock code. The factory setting of lock code is 0000. If you take lock code into use, change the code for security reasons.

System settings > Change lock code



**NOTE!** When you enter a locking code when changing the default, the code will not be required again until the unit has been untouched for 10 minutes, when the unit goes into hibernation mode. You can also place the unit in hibernation mode by pressing the ESC button for a long period of time

If you have taken lock code into use, you may change the code. The factory setting of lock code is 0000.

1. H23 device asks you to enter the current code. The factory setting of lock code is 0000.
2. Turn the control knob and press OK to accept each number. Press ESC to return to the previous square.
3. Press OK for a number of seconds to accept the code. Press ESC for a number of seconds to cancel.

## 7.8 Restore factory settings



When you return the factory settings, the controller takes into use those control circuits, which were in use before factory reset. The restoring factory settings is done in System settings by pressing the OK-button down for an extended period of time (Backup-menu appears to System settings).

## 7.9 Create backup and Restore backup

### Create backup



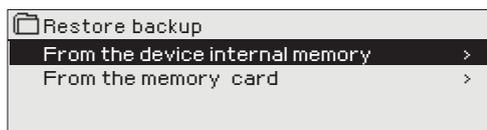
Backup is done in System settings by pressing the OK-button down for an extended period of time (Backup-menu appears to System settings).

Create a backup, when H23 has been configured and the device-specific settings have been set.

If desired, also the factory settings can be restored to the device.

All the parameters which are saved in the non-volatile memory will be included in the backup. Such parameters are e.g. all the setting values and time programs. The backup can be saved to the internal memory or to micro SD memory card. Memory card backups can be copied from one device to another.

### Restore backup

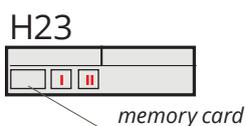


Restoring backup is done in System settings by pressing the OK-button down for an extended period of time (Backup-menu appears to System settings). If you created a backup, you can restore the backup by pressing OK. You can restore the backup from the memory card or from the internal memory.

### Software updates

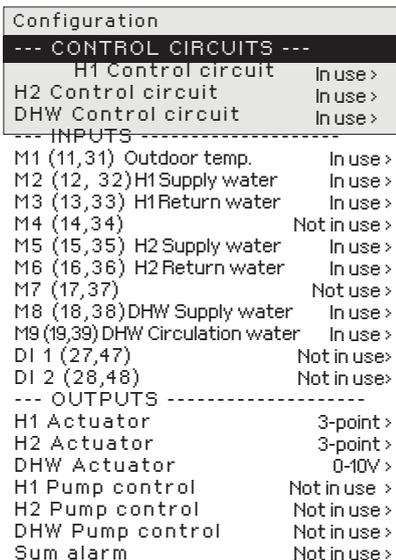
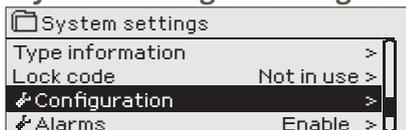
It is recommended to create a backup of the system before software update. The software update is done with following steps:

1. Insert microSD memory card which includes new software to controller
2. H23 asks: "Would you like to restart device?"
3. Select: "Yes"
4. H23 reboot to start the update of the new software. The updating of the software takes few minutes.



## 7.10 Configuration

### System settings -> Configuration



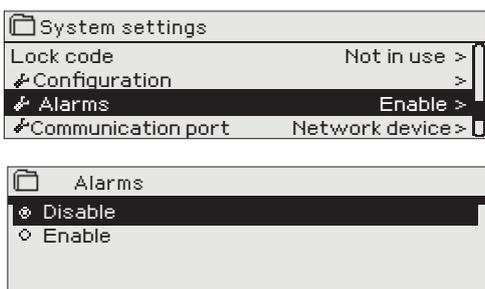
In Configuration menu the heating circuits and the inputs and outputs are configured and taken in use. The service code is needed for the access to the Configuration menu.

The minimum and maximum alarm limits and entry delay can be defined for every **input**. The default values are: minimum limit -51 °C, maximum limit 131°C and entry delay 1 min.

The inputs M5 (supply water temperature measurement), M6 (return water temperature measurement) and M7 (room temperature measurement) are reserved for H2 heating circuit. If these inputs are not used for the control of the H2 heating circuit, they can be used as freely nameable general temperature measurements (NTC-10).

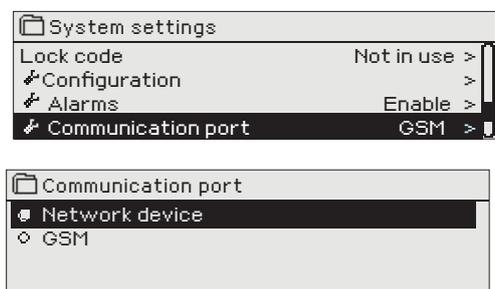
It's possible to use digital inputs for Home/Away switch or for alarm purposes (open/close). Note! It's possible to use Home/Away -feature without physical Home/Away switch. The change of the state can be done from the controller's user interface (Inputs and outputs -> Home/Away control) or with SMS (keywords HOME and AWAY). (more information see page 30)

## 7.11 Disable/enable alarms



**-When alarms are enabled in H23, the alarm signal goes on and information of the alarm is shown in user interface if alarm activates. It's possible to disable all the alarms if needed (e.g. for installation or service).**

## 7.12 Communication port



A GSM-modem or network device (M-LINK adapter) can be connected to H23's communication port. M-LINK provides Modbus TCP/IP interface to H23.

GSM-modem enables SMS-communication to H23 and sending alarm messages to mobile phone.

If you change the setting, the controller boots and starts with the new setting.

# TEXT MESSAGE QUICK GUIDE

If a GSM modem is connected to the H23 you can communicate with the controller by text message using command words.

Send the following text message to the controller: **KEY WORDS**.

You can send the text message question mark to the controller to get a list of key words. If the controller has a device ID in use, always write the device ID in front of the key word (example. Ou01 KEY WORDS or Ou01 ?). Capital and small letters are different characters in the device ID!

The controller sends a list of key words as a text message that gives you information about the controllers' function. The key word is separated by a /. You can write the key word using capital or small letters. **Write only one key word/message.**

Key word	Explanation
? or Key words	Send the text message question mark or word "Key word". Reply messages show all key words for the controller.
Home	H23 goes into "Home" mode.
Away	H23 goes into "Away" mode.
Inputs	The most important measurement information and state of the input is shown in the reply message.
Outputs	The state of actuators and pumps controls and sum alarm is shown in the reply message.
H1 Info H2 Info DHW Info	The reply message shows the computational setting value of supply water. Data are informational.
H1 Setting values H2 Setting values	The room temperature and temperature drop setting values are shown in the reply message. You can change the setting values. Send a changed message back to the controller, and it will make the change to the setting value and send you another message showing the changes to the setting values.
H1 Heating curve H2 Heating curve	you can set temperatures for supply water for 5 outdoor temperatures. Of the outdoor temperatures two are fixed values (-20 and +20°C). You can change the three outdoor temperature setting values between these. You can also change the minimum and maximum limits of supply water.
DHW Setting values	The reply message will show the setting value for domestic hot water and you can change the setting value.
Active alarms	The reply message will show all active alarms.
Alarm history	The reply message will show information about the last alarms.
Type info	The reply message will show information about the device and software.

Attention! If the controller has a device ID in use, always write the device ID in front of the key word.

# ADDITIONAL INFORMATION OF THE ALARMS

Sensor fault alarms and functionality in malfunction cases.

Fixed delays

Input	Sensor type	Sensor	Alarm text	Operation when a sensor is defective	Entry delay	Exit delay	Alarm group	Alarm priority
M1	NTC-10	TMO	Sensor fault M1	The control system uses the value of the outdoor temp. at 0 °C.	10 s	5 s	1	2
M2	NTC-10	TMW/TMS	Sensor fault M2	H1 Valve remains in the position it was in before the sensor defect.	10 s	5 s	1	2
M3	NTC-10	TMW/TMS	Sensor fault M3	H1 Return water control is disabled.	10 s	5 s	1	2
M4	NTC-10	TMR	Sensor fault M4	H1 Room compensation is taken away of use.	10 s	5 s	1	2
M5	NTC-10	TMW/TMS	Sensor fault M5	Valve remains in the position it was in before the sensor defect.	10 s	5 s	1	2
M6	NTC-10	TMW/TMS	Sensor fault M6	H2 Return water control is disabled.	10 s	5 s	1	2
M7	NTC-10	TMR	Sensor fault M7	H2 Room compensation is taken away of use.	10 s	5 s	1	2
M8	NTC-10	TMW/TMS	Sensor fault M8	Valve is closed (DHW Supply water) and pump is stopped.	10 s	5 s	1	2
M9	NTC-10	TMW/TMS	Sensor fault M9	Does not affect regulation. (DHW Circulation).	10 s	5 s	1	2

Measurements 5, 6 and 7 can be configured as informative measurements. Sensor fault alarms are not available for informative measurements.

Sensor fault alarms, A (Alarm)

Delays setting range: 0...120 min

Input	Alarm text	Min alarm limit	Max alarm limit	Cause of the alarm	Entry delay	Exit delay	Alarm group	Alarm priority
M1	M1 Alarm	X	X	Outdoor temperature sensor or bus	1 min	5 s	1	1
M2	M2 Alarm	X	X	H1 Supply water water sensor	1 min	5 s	1	1
M3	M3 Alarm	X	X	H1 Return water sensor	1 min	5 s	1	1
M4	M4 Alarm	X	X	H1 Room temp. sensor	1 min	5 s	1	1
M5	NTC-10	X	X	H2 Supply water sensor or free temperature measurement	1 min	5 s	1	1
M6	M6 Alarm	X	X	H2 Return water sensor or free temperature measurement	1 min	5 s	1	1
M7	M7 Alarm	X	X	H2 Room temperature sensor or free temperature measurement	1 min	5 s	1	1
M8	M8 Alarm	X	X	DHW Supply water sensor	1 min	5 s	1	1
M9	M9 Alarm	X	X	DHW Circulation water sensor	1 min	5 s	1	1
D1	D1 Alarm			Digital input 1 switch alarm	1 min	5 s	1	1
D2	D2 Alarm			Digital input 2 switch alarm	1 min	5 s	1	1

## Deviation alarms

The deviation alarm is used in H1 and H2 Supply water. The entry delay is 10 sec and exit delay is 5 sec.

## General alarms

If the home/away -switch is not connected into digital input 1 or 2, the contact alarm can be taken from the inputs. You can select in start-up, if the alarm comes from normally open (NO) contact or from NC (normally closed) contact. The alarm delay can be set. As a default the delay is 1 min.

## GSM-modem fault alarm

The alarm entry delay is 600 sec and exit delay is 5 sec.

# OPTIONAL EQUIPMENTS

## M-LINK



Adapter for H23 for networking. If M-LINK adapter is taken in use in H23, it's not possible to use GSM-mode simultaneously.

Modbus TCP/IP interface to H23 device.

- Integrated Ouman Access-connection
- Modbus TCP/IP
- Modbus TCP/IP ↔ RTU Gateway
- SNMP alarm transfer

If you change a point in the M-Link WEB UI to manual mode, the controller may not be informed that the point is in manual mode. Remember to reset the point to auto mode.

## GSMMOD

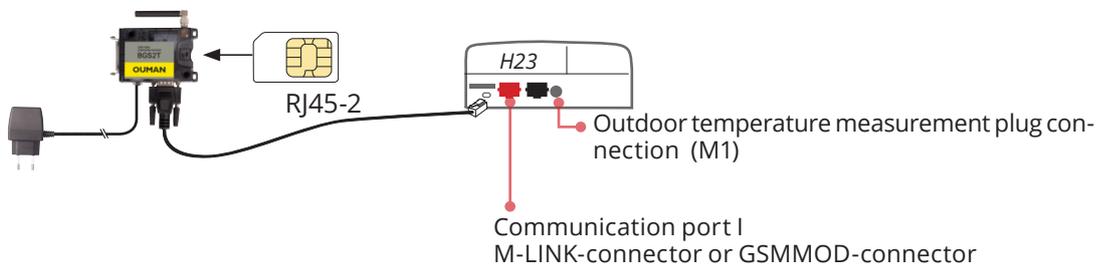


By connecting the modem to the H23 regulator, you can communicate with the regulator text messages and pass this information on alarms to your mobile via SMS.

If M-LINK adapter is taken in use in H23, it's not possible to use GSM-mode simultaneously.

The modem has a fixed antenna that can be changed to an external antenna with a 2,5m cord (optional equipment) if needed. The modem's indicator light shows what mode it is in.

Operating voltage for the GSM-modem can be taken from the external power supply. The GSM-modem is connected to H23's communication port I.



## C01A

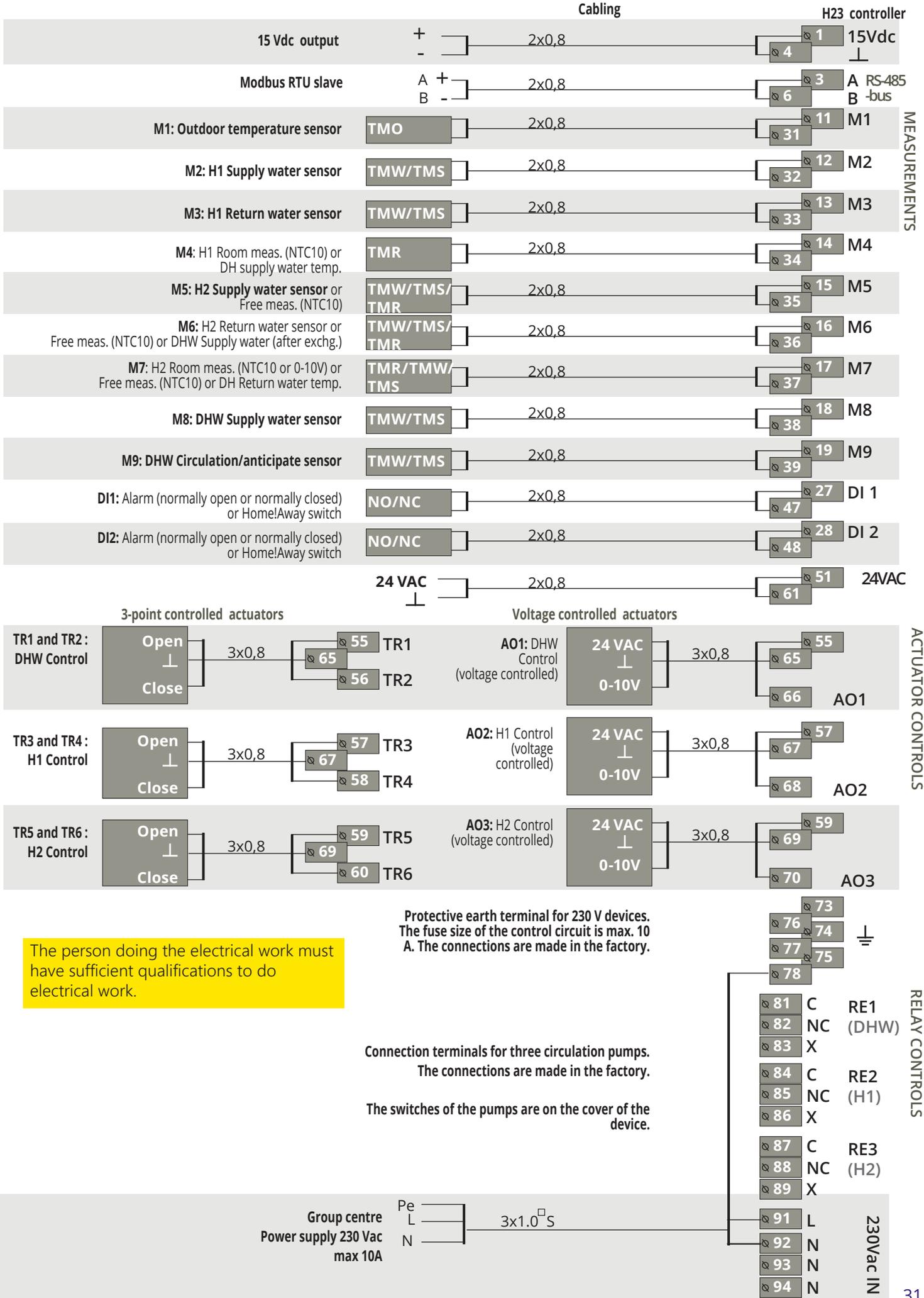


In floor heating solutions it is important to make sure that excessively hot water which could damage structures or surfaces doesn't ever get into the network. A mechanical thermostat should be installed on a supply water pipe which stops the circulation pump in case of overheating. Set the thermostat at 40 ... 45 °C. Set the H23 regulator's maximum limit between +35 ... +40 °C and the minimum limit between +20 ... +25 °C.

# CONFIGURATION

Check the functions on the screen that have been initialised.

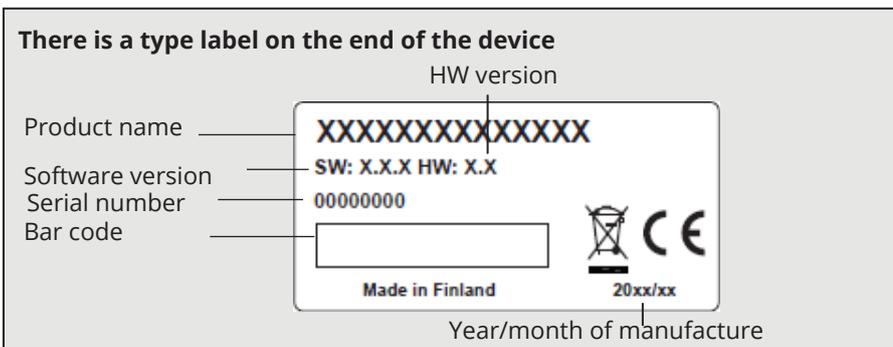
Connection place	Alternative measurement options	Setting values, factory setting (setting range)	General alarm setting values, factory setting (setting range)
<b>INPUT:</b>			
M 1 (11,31)	<input type="checkbox"/> Outdoor temperature <input type="checkbox"/> Outdoor temp. from bus	Outdoor temperature delay 2.0 h (0...6 h) Manual control option (Inputs and outputs)	Alarm limits can be set for measurements M1 ... M9  M1-M3 and M5-M9 alarm limits: Alarm min limit -51°C (-51...131 °C) Alarm max limit 131°C (-51...131 °C) Alarm delay 1 min (0...120)  M4 and M7 alarm limits when Room temperature, DH Supply water temp. or DH Return water temp. is selected:  Alarm min limit 5 °C (-51...131 °C) Alarm max limit 131°C (-51...131°C) Alarm delay 1 min (0...120)  M4 and M7 alarm limits when Room temp. from bus is selected:  Alarm min limit 1 °C (0 ... 30 °C) Alarm max limit 50 °C (0 ...100 °C) Alarm delay 1 min (0...120)
M 2 (12,32)	<input type="checkbox"/> H1 Supply water		
M 3 (13,33)	<input type="checkbox"/> H1 Return water	Return water compensation ratio 2.0 (0...10)	
M 4 (14,34)	<input type="checkbox"/> H1 Room temperature <input type="checkbox"/> H1 Room temp. from bus <input type="checkbox"/> DH supply water temp.	Room temp. measurement delay 0.5 h (0...6 h) Room compensation ratio 2.0 (0...10)	
M 5 (15,35)	<input type="checkbox"/> H2 Supply water <input type="checkbox"/> Free meas. (NTC-10)	Free meas., Name _____	
M 6 (16,36)	<input type="checkbox"/> H2 Return water <input type="checkbox"/> DHW Supply water (after exchg.) <input type="checkbox"/> Free meas. (NTC-10)	Return water compensation ratio 2.0 (0...10). If DHW Supply wter (after exchg.) is connected, this meas. works as a regulating measurement. Free meas., Name _____	
M 7 (17,37)	<input type="checkbox"/> H2 Room temp. <input type="checkbox"/> H2 Room temp. from bus <input type="checkbox"/> DH Return water temp. <input type="checkbox"/> Free meas. (NTC-10)	Room temp. measurement delay 0.5 h (0...6 h) Room compensation ratio 1.5 (0...10) Free meas., Name _____	
M 8 (18,38)	<input type="checkbox"/> DHW Supply water	Must always be connected if domestic hot water control is used. If DHW Supply wter (after exchg.) is connected to M6, this measurement is an informative measurement.	
M 9 (19,39)	<input type="checkbox"/> DHW Circulation water	The measurement is used in so-called anticipation to improve the regulation result.	
DI 1 (27,47)	<input type="checkbox"/> Alarm Normally open <input type="checkbox"/> Alarm Normally closed <input type="checkbox"/> Home/Away switch	Alarm, Name _____	Switch alarm Alarm delay 1 min (0...120)
DI 2 (28,48)	<input type="checkbox"/> Alarm Normally open <input type="checkbox"/> Alarm Normally closed <input type="checkbox"/> Home/Away switch	Alarm, Name _____	Switch alarm Alarm delay 1 min (0...120)
<b>OUTPUT:</b>			
Control	Selection	Setting	Connection
<input type="checkbox"/> H1 Actuator	<input type="checkbox"/> 3-point	Running time open 150 s (5...500 s) Running time closed 150 s (5...500 s)	57 Open (TR 3) 67  58 Closed (TR 4)
	<input type="checkbox"/> 0...10 V <input type="checkbox"/> 2...10 V <input type="checkbox"/> 10...0 V <input type="checkbox"/> 10...2 V	Running time open 150 s (5...500 s)	57 H1 Actuator 24 VAC 67  68 Voltage control (Y2)
<input type="checkbox"/> H2 Actuator	<input type="checkbox"/> 3-point	Running time open 150 s (5...500 s) Running time closed 150 s (5...500 s)	59 Open (TR 5) 69  60 Closed (TR 6)
	<input type="checkbox"/> 0...10 V <input type="checkbox"/> 2...10 V <input type="checkbox"/> 10...0 V <input type="checkbox"/> 10...2 V	Running time open 150 s (5...500 s)	59 H2 Actuator 24 VAC 69  70 Voltage control (Y3)
<input type="checkbox"/> DHW Actuator	<input type="checkbox"/> 3-point	Running time open 15 s (5...500 s) Running time closed 15 s (5...500 s)	55 Open (TR 1) 65  56 Closed (TR 2)
	<input type="checkbox"/> 0...10 V <input type="checkbox"/> 2...10 V <input type="checkbox"/> 10...0 V <input type="checkbox"/> 10...2 V	Running time open 15 s (5...500 s) Actuator offset (0...15 %) (Actuator dead zone)	55 DHW Actuator 24 VAC 65  66 Voltage control (Y1)
<input type="checkbox"/> DHW Pump control (P1/S1)		The display shows the pump control mode: on/off.	81, 82 RE1
<input type="checkbox"/> H1 Pump control (P2/S2)		By pressing OK, you can change the pump control to manual control. If the manual control is selected, the hand image appears in the beginning of the line Pump control.	84, 85 RE2
<input type="checkbox"/> H2 Pump control (P3/S3)			87, 88 RE3
<input type="checkbox"/> Sum alarm (24 VAC)	<input type="checkbox"/> TR2 <input type="checkbox"/> TR4 <input type="checkbox"/> TR6		56,65 TR 2 58,67 TR 4 60,69 TR 6



# PRODUCT INFORMATION AND WARRANTY

<b>Product:</b>	Controller for the three circuit
<b>Manufacturer:</b>	Ouman Oy Linnunrata 14 FI-90440 Kempele FINLAND tel. +358 424 840 1 www.ouman.fi
<b>Product name:</b>	Ouman H23
<b>Models:</b>	H23
<b>Version:</b>	4.0.4 Check the HW and SW version on the type label
<b>Valid:</b>	2023/12

It is possible that the regulator has been updated later.  
In the event of a fault, check the current information from the controller (System settings -> Type information).



## WARRANTY

The seller provides a 24-month warranty for the quality of the materials and workmanship of all delivered goods. The warranty period begins on the date of purchase. In the event that material or workmanship defects are detected and the goods are sent, without delay or no later than by the end of the warranty period, back to the seller, the seller agrees to address the defect at their own discretion either by repairing the damaged goods or by delivering a new, defect-free goods, free of charge, to the buyer.

The buyer is responsible for the costs resulting from delivering the goods to the seller for warranty repairs, while the seller is responsible for the costs resulting from returning the goods to the buyer.

The warranty shall not cover damages resulting from accidents, lightning, floods or other natural events, normal wear and tear, inappropriate, negligent or unusual use of the goods, overloading, incorrect maintenance, or reconstruction, alteration and installation work which is not carried out by the seller (or their authorized representative).

The buyer shall be responsible for selecting material of equipment susceptible to corrosion, unless other agreements are signed. In the event that the seller alters the structure of their equipment, they shall not be obligated to make similar changes to previously procured equipment. The validity of the warranty requires that the buyer has fulfilled their contractual obligations related to the delivery.

The seller shall provide a new warranty for goods replaced or repaired under the original warranty. However, the new warranty shall only be valid until the expiration of the warranty period of the original goods. For any repairs not covered by the warranty shall be subject to a 3-month maintenance warranty covering the material and workmanship.

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#### Product disposal

The enclosed marking on the additional material of the product indicates that this product must not be disposed of together with household waste at the end of its life span. The product must be processed separately from other waste to prevent damage caused by uncontrolled waste disposal to the environment and the health of fellow human beings. The users must contact the retailer responsible for having sold the product, the supplier or a local environmental authority, who will provide additional information on safe recycling opportunities of the product. This product must not be disposed of together with other commercial waste.

# TECHNICAL INFORMATION

<b>Dimensions</b>	width 230 mm, height 160 mm, depth 60 mm	
<b>Weight</b>	1.3 kg	
<b>Protection class</b>	IP 41	
Operating temperature	0 °C...+50 °C	
Storing temperature	-20 °C...+70 °C	
<b>Power supply L (91), N (92)</b>		
Operating voltage	230 Vac / 200 mA	
The internal 24 V power source, total load capacity of max.	1A/23 VA	
Supply cable fuse	max 10A	
<b>Measurements inputs:</b>		
Sensor measurements (inputs 11-19)	<p>NTC10-element:  M1 (input 11): <math>\pm 0,4</math> °C between -50 °C...+40 °C  M2-M9 (inputs 12-19): <math>\pm 0,5</math> °C between -10 °C...+100 °C  Also sensor tolerances and the effect of cables must be considered when calculating total accuracy.  Measurement M1 can be connected also from outside of the casing by a plug-connector.</p>	
Digital inputs (27, 28)	<p>Contact voltage 15 Vdc,  switching current 5 mA  Transfer resistance max. 250 <math>\Omega</math> (closed), min. 350 <math>\Omega</math> (open).</p>	
<b>Analog outputs (66, 68, 70)</b>		
	<p>Output voltage range 0...10 V  Output current max. 7mA / output</p>	
<b>24 VAC output (51)</b>		
	Total current of 24 VAC output and triac-outputs max. 1A.	
<b>Pump control contacts (81-89)</b>		
	<p>Contacts for three circulation pump.  Pumps are controlled by a switches on the top of the H23 device. Relay max. load 3A (resistive).</p>	
<b>Protective earth terminal (73-78)</b>		
	<p>Protective earth terminal block for 230V devices.  Control circuit fuse max. 10A</p>	
<b>Control outputs (51)</b>		
Triac (55...60)	24 VAC -control output Total current of triac-outputs and 24 VAC output max. 1A.	
<b>Data transfer connections</b>		
RS-485-bus A (3) and B (6)	Unisolated, supported protocols Modbus-RTU.	
<b>Options</b>		
M-LINK	M-LINK adapter provides Modbus TCP / IP interface for H23 device.	
GSMMOD	By connecting the GSM modem to the H23 , you can communicate with the text messages to device and receive alarms to GSM phone.	
C01A	A mechanical thermostat should be installed on a supply water pipe which stops the circulation pump in case of overheating.	
<b>APPROVALS</b>		
EMC-directive	2014/30/EU	
Interference tolerance	EEN 61000-6-1 (EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-11)	
Interference emissions	EN 61000-6-3 (EN 55022B)	
Safety	EN 60730-1	
Low voltage directive	2014/35/EU	

Ouman products do not contain harmful substances defined in the REACH regulation, excluding the products that are listed on the website behind the attached QR code.



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We reserve the right to make changes to our products without a special notice.

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