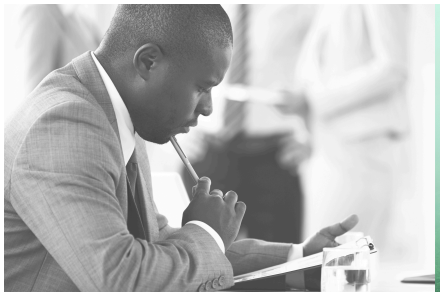

WE TAKE BUILDING AUTO-
MATION PERSONALLY

en

# MANUAL

# EXIGO


REGIN
THE CHALLENGER

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Ever since Regin was established in 1947, we have developed and marketed products and systems that create good levels of indoor comfort. Today, we are an important player with one of the market's broadest ranges for building automation.

Our goal is to make real estates in the world more energy efficient. Regin is an international group and our products sells in over 90 countries. Thanks to our global presence with strong local representation, we are well aware of the requirements of the market, as well as of how our products and systems function under the most variable conditions. Every year, Regin makes substantial investments in the development of our systems and HVAC-products.

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Rev. D, 2019-02-12

REGIN
THE CHALLENGER

# 1 Introduction

## 1.1 About this manual

This manual covers all the models in the Exigo series used with the heating application. This revision covers software revisions from 4.2.

The manual has the following main chapters:

- ✓ Information for the end user
  All the information needed by the end user. How to handle the controller, including how to navigate in the menus, LED:s and indications, how to change setpoints and handle alarms etc.
- ✓ Information for the specialist
  A comprehensive guide to all the functions of the controller.
- ✓ Information for the installer
  Everything related to the installation of the hardware, such as wiring examples and commissioning.
- ✓ Appendix
  Technical data, model overview, input and output lists, alarm list, terminal lists.

Special text formats used in the manual:

**Note!** This box and symbol is used to show useful tips and tricks.

**Caution!** This type of text and symbol is used to show cautions.

**Warning!** This type of text and symbol is used to show warnings.

**This box is used to show formulas and mathematical calculations**

```
This box is used to
represent the
display window on
the controller
```

## 1.2 More information

More information about the product can be found in:

- ✓ Product sheets for Exigo Ardo and Exigo Vido
- ✓ Instructions for Exigo Ardo and Exigo Vido
- ✓ Variable lists
- ✓ Manual for Exigo tool

All the above documents are available for download from Regin's website, http://www.regincontrols.com.

# 2 Information for the end user

## 2.1 Display, LED:s and buttons

The controllers are available in two different hardware platforms:

- ✓ The 230 V Exigo Vido which features 5 buttons.


*Figure 2-1 Exigo Vido*

- ✓ The 24 V Exigo Ardo which features 7 buttons.


*Figure 2-2 Exigo Ardo*

### 2.1.1 Display

The display has 4 rows of 20 characters each. It has background illumination. The illumination is normally off, but is activated as soon as a button is pressed. The illumination will be turned off again after a period of inactivity.

### 2.1.2 LED:s

On the Exigo Ardo models, there are two LEDs on the front, marked with the symbols 🔔 and ✎. For controllers with display, the alarm indication and change mode LEDs are located in the keypad area.

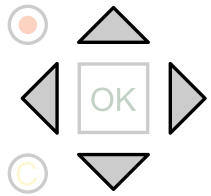
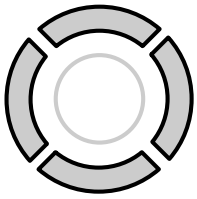
| Symbol | Colour | Function |
|---|---|---|
| 🔔 | Flashing red | There are one or more unacknowledged alarms. |
| 🔔 | Fixed red | There are one or more remaining acknowledged alarms. |
| ✎ | Flashing yellow | You are in a dialog box where it is possible to switch to change mode. A quick blinking (2 times/s) indicates that the parameter can be changed using the current access level. A slower blinking (1 time/s) indicates that a higher access level is required to change the parameter. |
| ✎ | Fixed yellow | You are in change mode. |

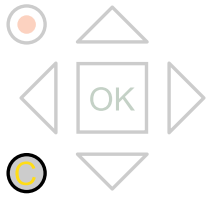
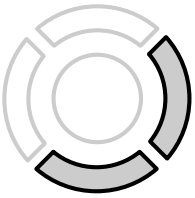
## Status indication

Status indication LEDs can be found in the upper left corner of the Exigo Ardo models.

| Designation | Colour | Description |
|---|---|---|
| P1 RxTx | Yellow/Green | Port 1, receiving/transmitting |
| P2 RxTx | Yellow/Green | Port 2, receiving/transmitting |
| TCP/IP (…W models) | Yellow/Green | Green: Connected to other network equipment<br>Blinking green: Network traffic<br>Blinking yellow: For identifying (for example when marking the unit in Exigo tool) |
| P/B (Power / Battery) | Green/Red | Power on / Battery error |

## 2.1.3 Summary of the function of the buttons

| Exigo Ardo (7 buttons) | Exigo Vido (5 buttons) | Functions | Function in Alarm Mode |
|---|---|---|---|
| **[▲][▼][►][◄]**<br>  | **[▲][▼][►][◄]**<br>  | Navigation buttons:<br>▲ Navigate upwards.<br>▼ Navigate downwards.<br>► Navigate to the right.<br>◄ Navigate to the left.<br>In change mode:<br>◄ Move cursor to the left.<br>► Move cursor to the right.<br>▲ Increase the value by 1.<br>▼ Decrease the value by 1.<br>▲and ▼ Scroll among the texts when there are several alternatives. | ▲ Navigate up in the alarm stack.<br>▼ Navigate down in the alarm stack.<br>◄ Exit alarm display mode. |
| **[OK]**<br>  | **[OK]**<br>  | ✓ Enter change mode.<br>✓ Confirm a new value in change mode. An input must be confirmed with this button in order to change the value in the controller.<br>When a value has been confirmed, the cursor will move to the next manoeuvrable value in the current box. | ✓ A menu with all available maneuvers that are available for the current alarm is displayed. |

| Exigo Ardo (7 buttons) | Exigo Vido (5 buttons) | Functions | Function in Alarm Mode |
|---|---|---|---|
| **[C]**<br>  | **[C]**<br>  <br>Press both buttons simultaneously | ✓ Enter change mode and erase the value in the display.<br>✓ Erase the sign at the cursor.<br>✓ When the current value is completely empty, the maneuver mode is cancelled and the cursor will move to the next value that will also be erased in the window.<br>✓ Undo (erase) the input | ✓ Closes the menu containing available alarm manoeuvres without changing the state of the alarm point. |
| **[ALARM]**<br>  | **[ALARM]**<br>  <br>Press both buttons simultaneously | ✓ Enter alarm display mode. | ✓ Browse among alarms in alarm display mode. |

## 2.2 Navigating the menus

The appearance of the start display may vary since there are several different start displays to choose from during configuration.

```
Heating controller
2017-01-08 14:29
HS1
Sp: 52.0 Act: 52.5°C
```

**Sp** and **Act** stand for Setpoint and Actual value. In the example above they are the values for HS1.

Actual value = the current measured temperature

Setpoint = the desired configured temperature

You can navigate through the menu choises at this level by pressing the **[▼]** and **[▲]** buttons.

Which menu items are shown depends on the access level of the user and the configured inputs/outputs and functions.

Below, all possible menu entries are shown.

```
HS1
HS2
HS3
HS4
HW1
HW2
Buffer
Boiler
DHS
Solar
Cooling Unit
Time settings
Pressure control
Energy/Cold water
Alarm events
Inputs/Outputs
Configuration
Access rights
```

To enter a higher menu level, press the **[►]** button when the display marker is located at the menu item you wish to enter. At each level there may be several new menus through which you may browse using the **[▲]** and **[▼]** buttons.

When there are further submenus linked to a menu or menu item, it is indicated by an arrow symbol at the right-hand edge of the display. To choose one, press the **[►]** button again. To return to a lower menu level, press the **[◄]** button.

## 2.3 Changing values

When you are at a position where it is possible to change one or more values, and your authority is high enough, you can edit the existing value, or enter a completely new one. After changing the value, you confirm the input with the **[OK]** button, or undo the change by pressing the **[C]/ [▼►]** buttons for a short while until the original value reappears in the window and change mode is exited. These manoeuvres are described in detail in the following sections.

### 2.3.1 Editing an existing value

1. Press the **[OK]** button to go to change mode. A flashing cursor appears. If there are multiple editable values in one menu, press the **[OK]** button until the value you want to change flashes.
2. Move the cursor to the right and to the left with the navigation buttons **[►]**and **[◄]**.
3. The value at the cursor can now be changed in the following ways:
   - ✓ Erase the current digit or character with the **[C]/ [▼►]** buttons.
   - ✓ Use the **[▲]**and **[▼]** buttons to increase or decrease the value at the cursor. Maneuverable texts can also be changed with this method.
   - ✓ If the character at the cursor is a decimal point, you cannot browse with the **[▲]** and **[▼]** buttons. You can however erase the decimal point with the **[C]/ [▼►]** buttons.
   - ✓ If the cursor is placed to the right of the value, i.e. the character at the cursor is a space, you can add a decimal point with the **[▼]** button, or the figure 0 with the **[▲]** button.
   - ✓ If you require a negative number, move the cursor to the leftmost position and press the **[▼]** button to get a minus sign. Then edit the following digits to the required value.
   - ✓ Scroll up **[▲]** and down **[▼]** to browse through texts when there are several texts to choose from instead of numerical values.

### 2.3.2 Enter a completely new value

- ✓ Press the **[C]** / **[▼►]** buttons to go to change mode. The value is erased in the window, and you have to enter a completely new value.
- ✓ If you require a negative number, move the cursor to the leftmost position and press the **[▼]** button to get a minus sign. Then edit the following digits to the required value.
- ✓ Press **[▲]** to begin the input with the figure 0, then browse to the required figure or character with **[▲]** and **[▼]**.
- ✓ Press **[▼]** to get a decimal point. When the cursor is placed at a decimal point, you cannot browse with the **[▲]** and **[▼]** buttons.

### 2.3.3 Confirm the change

Press **[OK]** to confirm the change when the required value has been entered. Then the value you see in the window will be updated in the installation.

After the value has been confirmed, the cursor will move to the next maneuverable value in the current menu.

**Note!** As long as you don't confirm a change with the [OK] button, no change will be made in the installation.

### 2.3.4 Undo an initiated change

**Note!** As long as you don't confirm a value with the [OK] button, you can undo an initiated change by pressing the [C] / [▼►] buttons for a short while until the original value reappears in the window and change mode is exited.

## 2.4 Logging on and off

The controller has four different access levels. The choice of access level determines which menus are shown, as well as which parameters can be changed in the displayed menus.

- ✓ **Normal** level does not require logging on, and only permits changes in running mode and gives read-only access to a limited number of menus.
- ✓ **Operator** level gives the same access as **Normal** level, and in addition, access to change setpoints.
- ✓ **Service** level gives the same access as **Operator** level, and in addition, access to change controller settings and manual mode.
- ✓ **Admin** level gives full read/write access to all settings and parameters in all menus.

### 2.4.1 Log on

1. Browse to **Access Rights** in the main menu and press **[►]**.

```
Log on
Log off
Change password
```

2. Select **Log on** and press **[►]**.

```
Log on
Enter password:****
Actual level:
None
```

3. Press **[OK]** to make a cursor marker appear at the first digit position.
4. Enter the password (4-digit code) by pressing **[▲]** until the correct digit is displayed. Press the **[►]** to move to the next position. Repeat the procedure until all four digits are displayed, and press **[OK]** to confirm.

### 2.4.2 Log off

1. Go to **Access Rights** in the main menu and press **[►]**.
2. Select **Log off** and press **[►]**.

```
Log off?
No
Actual level:
Admin
```

3. Select **Yes** and press **[OK]**.

### 2.4.3 Change password

1. Go to **Access Rights** in the main menu and press **[►]**.
2. Select **Change password** and press **[►]**.

```
Change password for
level:Operator
New password: ****
```

3. Select **Yes** and press **[OK]**
4. Press **[OK]** to enter change mode.
5. Use the **[▲]** and **[▼]** buttons to browse and select the access level to change the password for, and press **[OK]** to confirm.

6. Enter the new password (4-digit code) by pressing **[▲]** until the correct digit is displayed. Press the **[►]** to move to the next position. Repeat the procedure until all four digits are displayed, and press **[OK]** to confirm.

   The following passwords are the default for the different access levels:

| Access level | Password |
|---|---|
| Admin | 1111 |
| Service | 2222 |
| Operator | 3333 |
| Normal | 5555 |

You can only change the password for access levels lower or equal to the presently active level, i.e. if you are logged in as **Admin** you can change all passwords, but as **Operator** you can only change the **Operator** and **Normal** passwords. There is no point in changing the **Normal** password since access to that level is granted automatically to all users.

**Caution!** Do not set the password for two different access levels to the same value, as this would prevent access to the higher of these two access levels. This is especially important for the **Admin** level.

**Note!** If the password for the **Admin** level has been changed and then lost, a temporary password can be obtained from . This code is date dependent and valid for one day only.

### 2.4.4 Automatic logoff

When logged in as **Operator**, **Service** or **Admin**, the user will automatically be logged off to **Normal** after a settable time of inactivity (the default is 60 seconds). It is possible to set the controller to disable the automatic logoff.

#### Change password to remove automatic logoff

If you want to remove the automatic logoff, change the password of the desired level to 0000. This can be very useful in certain cases if the unit is intended to be used by trained personnel or, for instance, during commissioning.

**Note!** Removing the automatic logoff should be done with consideration, since no alarm is continuously given that a certain level has been activated.

## 2.5 Menu structure

Only the configured circuits are included in the main menu.

```
HS1
HS2
HS3
HS4
HW1
HW2
Buffer
Boiler
DHS
Solar
Cooling unit
Time settings
Pressure control
Energy/Cold water
Alarm events
Inputs/Outputs
Configuration
Access rights
```

- ✓ Heating system (HS1 – HS4)
- ✓ Domestic hot water (HW1 – HW2)
- ✓ Buffer
- ✓ Boiler
- ✓ District heating system (DHS)
- ✓ Solar

Each of these circuits has up to five submenus:

```
Actual
Setpoint
Temp control
Manual/Auto
Status
```

- ✓ Actual
- ✓ Setpoint
- ✓ Temp control
- ✓ Manual/Auto
- ✓ Status

### 2.5.1 Actual

In this submenu, you can read all the actual values of the configured inputs of the circuit. For more information, see *chapter 3 Information for the specialist*

### 2.5.2 Setpoint

In this submenu, you can read and set all the setpoints for the selected circuit. You need **Operator** access level or higher to be able to change setpoints.

#### Heating system (HS1–HS4)

There are three different setpoint types for heating systems. Each heating system is configured as one of these setpoint types:

- ✓ Constant setpoint
- ✓ 8-point curve

✓ DIN-curve with slope and exponent (only for heating mode)

Only the parameters relevant for the configured setpoint type are visible in the menu.

## Constant setpoint

If the setpoint type is set to constant, the setpoint is the same regardless of the outdoor temperature.

```
Heating Constant
SetP: 45.0 °C
```

## 8–point curve

If the setpoint type is set to 8-point curve, the setpoint depends on the outdoor temperature by means of a control curve. At 8 settable outdoor temperatures, a corresponding supply temperature is entered.

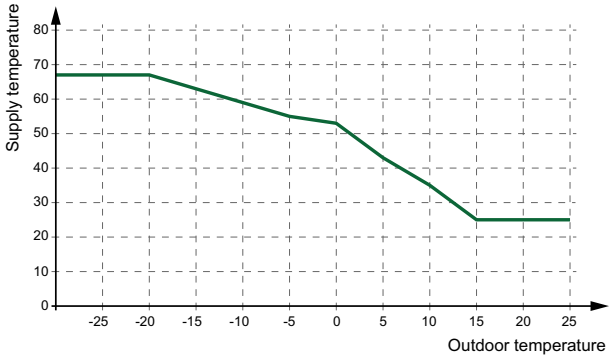



*Figure 2-3 8–point curve*

```
Heating Outd Comp
-20 °C = 67 °C
-15 °C = 63 °C
-10 °C = 59 °C
```

```
Heating Outd Comp
 -5 °C = 55 °C
  0 °C = 53 °C
  5 °C = 43 °C
```

```
Heating Outd Comp
 10 °C = 35 °C
 15 °C = 25 °C
```

A displacement can be added to the 8-point control curve to move the entire curve up or down.

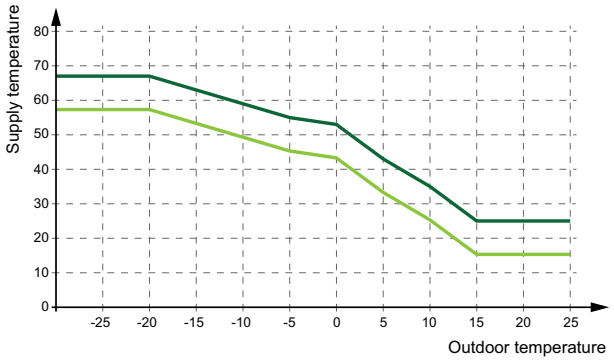
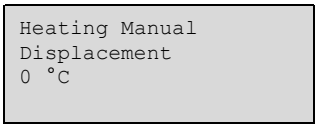



*Figure 2-4 8–point curve with displacement*




## DIN curve with slope and exponent

If the setpoint type is set to DIN curve, the setpoint depends on the outdoor temperature by means of a control curve with settable slope and an exponent which bends the curve.

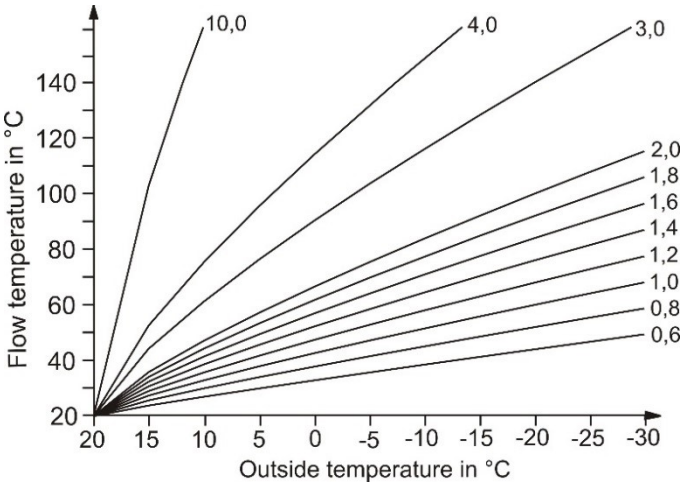



*Figure 2-5 DIN curve slope*

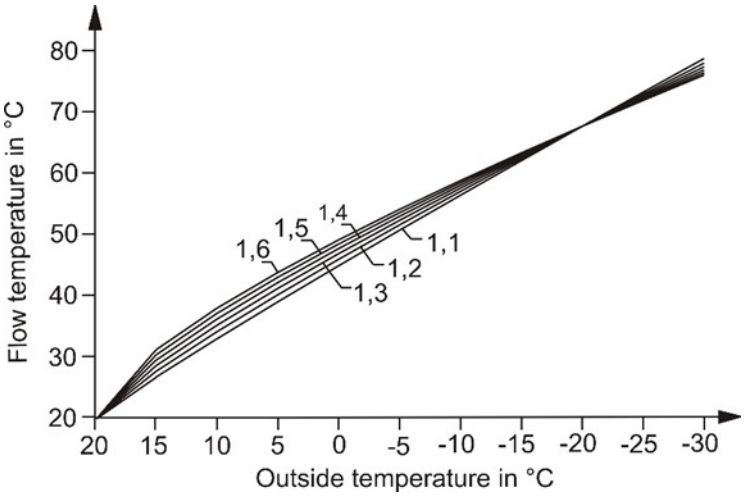



*Figure 2-6 DIN curve exponent*

Some commonly used exponents are:

- ✓ 1.10 underfloor heating
- ✓ 1.20 radiators
- ✓ 1.33 DIN-radiators
- ✓ 1.25…1.40 plate radiators
- ✓ 1.40…1.60 convectors

```
Heating Outd Comp
Slope: 1.4
Exponent: 1.30
```

Room setpoints can be set for the four settable Comfort times (SP-CT1…SP-CT4) and are valid for both types of heating curves. The night setpoint and the holiday setpoint are calculated as a difference (Diff-NCT or Diff-Hol) to the setpoint of the following comfort time or of comfort time 1 (during holiday or if the time to the next comfort time > 24h). The difference will decrease the setpoint in heating mode and increase it in cooling mode. How much the setpoint is changed depends on the calculated supply setpoint and on the difference between the current setpoint of the room and the basic setpoint of 21 °C.

A reduction of the heating setpoint to 0 °C or an increase of the cooling setpoint to 35 °C will stop the heating system.

For more information, see *2.5.7 Time settings*.

```
Room
SP-CT1: 20.0 °C
SP-CT2: 20.0 °C
SP-CT3: 20.0 °C
```

```
Room
SP-CT4: 20.0 °C
```

```
Room
Diff-NCT: 5.0 °C
Diff-Night: 5.0 °C
Diff-Hol: 15.0 °C
```

### Cooling mode

The same setpoints are available for cooling mode as for heating mode except that curve with slope and exponent is not available.

```
Cooling Outd Comp
20 °C = 15 °C
22 °C = 14 °C
24 °C = 13 °C
```

```
Cooling Outd Comp
26 °C = 12 °C
28 °C = 12 °C
30 °C = 11 °C
```

```
Cooling Outd Comp
32 °C = 10 °C
34 °C = 9 °C
```

```
Cooling Constant
SetP:13 °C
```

```
Cooling Manual
Displacement
0 °C
```

### Dehumidification

The dehumidification function can use either a constant setpoint or a calculated setpoint. If constant setpoint is used, it can be set in the **Setpoint** menu. For more information, see *chapter 3 Information for the specialist*

```
Dehumidification
SetP: 55 %RH
```

## Domestic hot water (HW1–HW2)

Each domestic hot water system has setpoints for the four settable *Comfort times* (**SP-CT1**…**SP-CT4**), a night setpoint (**SP-NCT**) and a holiday setpoint (**SP-Hol**).

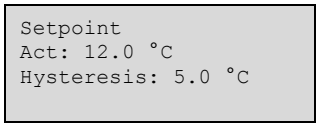
```
Hot Water SetP
SP-CT1: 50 °C
SP-CT2: 50 °C
SP-CT3: 50 °C
```

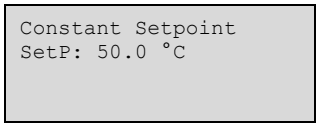
```
Hot Water SetP
SP-CT4: 50 °C
SP-NCT: 2 °C
SP-Hol: 2 °C
```

## Buffer

The program can control buffer tanks with one zone. The **Setpoint** menu displays the currently calculated buffer temperature setpoint **Setpoint Act** based on the demand from the internal heating circuits, the domestic hot water circuits and external heat consumers or on the **Constant Setpoint** depending on the

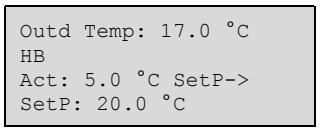
settings. A **Hysteresis** can also be set in order to overheat the buffer tank for switching off the heat producers.



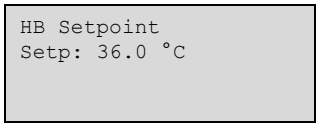




## Boiler (HB1–HB4)

The boiler control setpoint type can be configured to one of the following alternatives, and only the parameters relevant for the configured setpoint type are visible in the menu.




✓ Constant setpoint: A fixed settable value, **SetP**.



✓ Circuit-dependent setpoint: Can be set to any of the following options:

1. HS-dependent
2. HW-dependent
3. HP1-dependent
4. HS- and HW-dependent
5. HS- and HP1-dependent
6. HW- and HP1-dependent
7. HS-, HW- and HP1-dependent

When a circuit-dependent setpoint has been configured, the boiler control setpoint is dependent on the setpoints of other circuits. The circuit whose setpoint is currently the highest will, together with an added offset, **Man Paral Dis**, (pre-set to 5 degrees), constitute the boiler control setpoint.

```
Offset HS Setpoint
 5.0 °C
HB Act: 48.6 °C
HB Setp: 35.3 °C
```

✓ Outdoor compensated setpoint = the setpoint varies with the outdoor temperature.
At 8 settable outdoor temperatures, a corresponding supply temperature is set.

```
Outd Comp Setp HB
-20.0 °C = 67 °C
-15.0 °C = 63 °C
-10.0 °C = 59 °C
```

```
Outd Comp Setp HB
-5.0 °C = 55 °C
-0.0 °C = 53 °C
 5.0 °C = 43 °C
```

```
Outd Comp Setp HB
 10.0 °C = 35 °C
 15.0 °C = 25 °C
Man Paral Dis 0°C
```

### Pressure control

This menu shows the setpoint and the actual control pressure value.

```
Pressure control
Act: 51 kPa
SetP: 50 kPa
```

## 2.5.3 Temp control

In this submenu, the control parameters can be read and set. It is only visible for access level **Operator** and higher, and only maneuvreable for access level **Service** and higher. For more information, see *chapter 3 Information for the specialist*

### 2.5.4 Manual/auto

In this submenu, pumps, valves and other functions of the circuit can be set to manual mode. It is only visible for access level **Operator** and higher, and only maneuvreable for access level **Service** and higher. For more information, see *chapter 3 Information for the specialist*

### 2.5.5 Status

In this submenu, the status of the circuit can be read. Each circuit has a main status that can have the following modes:

| Status | HS | HW | DHS | Buffer | Solar | Description |
|---|---|---|---|---|---|---|
| Not active | ✓ | ✓ | ✓ | ✓ | ✓ | Circuit is not active and will do nothing.<br>Reason: Missing sensor or Mode switch = Off |
| Frost | ✓ | ✓ | ✓ | | | Circuit is in frost-protection because one of the sensors is lower than the frost limit.<br>Frost protection is not working if the status is set to *Not active*. |
| Switch off | ✓ | ✓ | ✓ | ✓ | ✓ | No control function because there is no demand, the main switch of the circuit is not active, unit shut down or switch off by the priority function.<br>Frost protection is still active. |
| Support operation | ✓ | ✓ | | | | Circuit is working with reduced setpoint because either the time channel is outside of a comfort time or reduction by the priority function. |
| Normal operation | ✓ | ✓ | ✓ | ✓ | ✓ | Normal operation, circuit is controlling the demand or comfort setpoint. |
| Holiday | ✓ | ✓ | | | | Time channel is in ECO mode during a holiday period. The holiday setpoint is controlled by the circuit. |
| Screed drying | ✓ | | | | | Heating system is working in *Screed drying* mode. |

Each function also has different sub-statuses. For more information, see *chapter 3 Information for the specialist*

### 2.5.6 Mode switch

In addition to the items in the main menu, there is also an extra menu called **Mode switch**, that is reached by pressing **[►]** in the main menu. The mode switch changes the operation of the system.

| Mode switch position | Heating system | Domestic hot water system | Buffer / Solar / Boiler / District heating system |
|---|---|---|---|
| 0 — Off | Off-mode. No control function, valves closed, pumps off. | | |
| 1 — Auto | Automatic mode. Control function depending on timer and settings. | | Automatic mode, working on demand. |
| 2 — Summer | No heating, which means switch off operation if in heating mode, and automatic operation in cooling mode. | Same as automatic mode. | Same as automatic mode. |
| 3 — Holiday | Holiday operation with setpoint **Holiday** | | Same as automatic mode. |
| 4 — Continuous | Normal operation with setpoint **CT1** | | Same as automatic mode. |

## 2.5.7 Time settings

The controller is equipped with a maximum of 11 week programs (time schedules) and year programs (holiday schedules). One schedule is assigned to each heating circuit and each domestic hot water circuit. Additionally, there are five extra schedules that can be used for multiple purposes, for example to control lighting or door locks etc.

The extra schedules can be assigned to output terminals. These switch on/off in accordance with up to four specified comfort times (switched on during the specified comfort times, switched off in between the comfort times).

The **Time settings** menu contains the submenus **Time/Date**, **Time schedule** and **Holiday schedule**.

### Time/date

This menu displays time, date and weekday, and it permits the setting of time and date.

Time is shown in 24 hour format. Date is shown in the format YY:MM:DD.

### Time schedule

In the time schedules, four comfort times are available for each day of the week. Also, four comfort times are available for days that are configured as holidays in the holiday schedule. During the comfort times the assigned circuit is working with the corresponding setpoint (CTx setpoint). Outside of a comfort time the Eco setpoint is valid or the night setpoint will be activated.

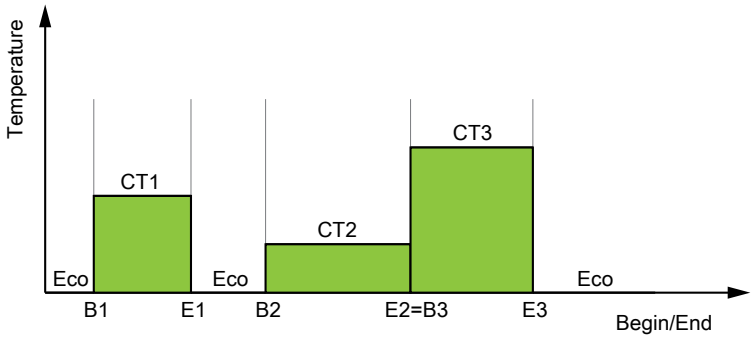



*Figure 2-7 Time schedule*

The above figure shows an example of comfort time (CTx) states. As shown, the end of an comfort time is followed either by a non-operating time (Eco) or by the beginning of a new comfort time (see E2=B3 in the figure). It is not possible for comfort times to overlap each other.

### Parameters

| Name | Unit | Min | Max | Default | Description |
|---|---|---|---|---|---|
| Monday Per.1 Start | hh:mm | 00:00 | 24:00 | 07:00 | Start of comfort time 1 Mondays. |
| Monday Per.1 End | hh:mm | 00:00 | 24:00 | 16:00 | End of comfort time 1 Mondays. |
| Monday Per.2 Start | hh:mm | 00:00 | 24:00 | 00:00 | Start of comfort time 2 Mondays. |
| Monday Per.2 End | hh:mm | 00:00 | 24:00 | 00:00 | End of comfort time 2 Mondays. |
| Monday Per.3 Start | hh:mm | 00:00 | 24:00 | 00:00 | Start of comfort time 3 Mondays. |
| Monday Per.3 End | hh:mm | 00:00 | 24:00 | 00:00 | End of comfort time 3 Mondays. |
| Monday Per.4 Start | hh:mm | 00:00 | 24:00 | 00:00 | Start of comfort time 4 Mondays. |
| Monday Per.4 End | hh:mm | 00:00 | 24:00 | 00:00 | End of comfort time 4 Mondays. |
| ... | | | | | |

| Name | Unit | Min | Max | Default | Description |
|---|---|---|---|---|---|
| Holiday Per.1 Start | hh:mm | 00:00 | 24:00 | 07:00 | Start of comfort time 1 holidays. |
| Holiday Per.1 End | hh:mm | 00:00 | 24:00 | 16:00 | End of comfort time 1 holidays. |
| Holiday Per.2 Start | hh:mm | 00:00 | 24:00 | 00:00 | Start of comfort time 2 holidays. |
| Holiday Per.2 End | hh:mm | 00:00 | 24:00 | 00:00 | End of comfort time 2 holidays. |
| Holiday Per.3 Start | hh:mm | 00:00 | 24:00 | 00:00 | Start of comfort time 3 holidays. |
| Holiday Per.3 End | hh:mm | 00:00 | 24:00 | 00:00 | End of comfort time 3 holidays. |
| Holiday Per.4 Start | hh:mm | 00:00 | 24:00 | 00:00 | Start of comfort time 4 holidays. |
| Holiday Per.4 End | hh:mm | 00:00 | 24:00 | 00:00 | End of comfort time 4 holidays. |

## Holiday schedule

The system operator can define specific periods of operation or non-operation throughout the year. During these defined periods, the settings in the week schedule do not apply. The holiday schedule provides 10 periods for each timer module. All holiday periods of a time schedule are working with a special day plan with a maximum of 4 comfort times. During these comfort times, the assigned circuit is working with the corresponding setpoint (**Setpoint CTx**). Outside of a comfort time, **Setpoint Holiday** is in use or **Night Setback holiday** will be activated.

| Name | Unit | Min | Max | Default | Description |
|---|---|---|---|---|---|
| Holiday Per.1 Start | MM:DD | 01.01 | 31.12 | 00.00 | The start date of holiday period 1. |
| Holiday Per.1 End | MM:DD | 01.01 | 31.12 | 00.00 | The end date of holiday period 1. |
| ... | | | | | |
| Holiday Per.10 Start | MM:DD | 01.01 | 31.12 | 00.00 | The start date of holiday period 10. |
| Holiday Per.10 End | MM:DD | 01.01 | 31.12 | 00.00 | The end date of holiday period 10. |

## 2.5.8 Inputs/Outputs

This is a read-only menu showing the current values for all inputs and outputs. If correction factors have been applied to the input values, the corrected values are shown.

```
AI/UAI
WAI
DI/UDI
AO
DO
```

## Analogue inputs

```
AI1-2.9  UAI1 1.0
AI2 20.3 UAI2-3.2
AI3 28.2 UAI3 22.3
AI4 19.9 UAI4 14.4
```

## Wireless inputs

```
WAI1-0.9 WAI5 21.5
WAI2 3.7 WAI6 22.9
WAI3 1.5 WAI7 17.3
WAI4 2.1 WAI8 16.8
```

```
WAI9 -0.9 WAI13 21.5
WAI10 3.7 WAI14 22.9
WAI11 1.5 WAI15 17.3
WAI12 2.1 WAI16 16.8
```

### Digital inputs

```
DI1 Off  DI5 Off
DI2 Off  DI6 On
DI3 On   DI7 On
DI4 Off  DI8 Off
```

```
UDI1 Off
UDI2 Off
UDI3 Off
UDI4 Off
```

### Analogue outputs

```
AO1 10.0  AO5 2.3
AO2 0.0
AO3 5.7
AO4 3.8
```

### Digital outputs

```
DO1 Off  DO5 On
DO2 Off  DO6 Off
DO3 On   DO7 On
DO4 Off
```

## 2.6 Alarm handling

If an alarm condition occurs, an alarm is logged in an alarm list. The list shows the type of alarm, the alarm date and time and the alarm priority (A, B or C alarm).

### 2.6.1 Alarm priorities

Alarms can be given different priority levels: A alarm, B alarm, C alarm or not active. There are three digital outputs that can be used as alarm outputs: Sum alarm, Sum alarm A and Sum Alarm B/C.

A, B and C alarms all activate the sum alarm output, if it has been configured.

Class A alarms also activate sum alarm A, and class B/C alarms activate sum alarm B/C.

Class C alarms are removed from the alarm list when the alarm input resets even if the alarm has not been acknowledged.

### 2.6.2 Inspect alarms

✓ Press the alarm buttons **[ALARM]** / **[◂▴]** to display the alarms.

- ✓ If there is more than one alarm at the same time, this is indicated by up/down arrow symbols at the right-hand edge of the display. You can browse among them in two ways:
  1. By using the navigation buttons **[▼]** and **[▲]**.
  2. By pressing the alarm buttons **[ALARM]** / **[◄▲]** several times.
- ✓ Press **[◄]** to exit alarm handling and return to the previous menu.

### 2.6.3 Acknowledge, block and unblock alarms

- ✓ Press the **[OK]** button to get a menu with the available alarm maneuvers for the currently displayed alarm.
- ✓ Select the required alarm maneuver with the buttons **[▼]** and **[▲]**.
- ✓ Press the **[OK]** button to execute the maneuver.

At the left end of the bottom display line the alarm status is shown. For active, unacknowledged alarms the space is blank. Alarms that have been reset are indicated by the text Acknowledged. Active or blocked alarms are indicated by the text Acknowledged or Blocked.

Acknowledged alarms will remain on the alarm list until the alarm input signal resets.

Blocked alarms remain on the alarm list until the alarm has been reset and the block has been removed. New alarms of the same type will not be activated as long as the block remains.

**Caution!** Blocking alarms can be potentially dangerous. A high log on authority is therefore required to block alarms.

### Alarm events

In the **Alarm Events** menu, there is an alarm log which contains the 40 latest alarm events. The latest event is shown at the top of the list. The alarm log is only used to view alarm history, which may simplify troubleshooting of the installation.

# 3 Information for the specialist

## 3.1 Function overview

The temperature controllers are PI-controllers for control of heating, cooling, boilers and PID for domestic hot water control. A number of different control functions, as well as analogue and digital inputs and outputs, can be added to these controllers. The user can freely decide which functions to use. The only restriction is the number of physical inputs and outputs of the different models.

Among other things, the program includes the following functions:

**Heating system**

The controller can be equipped with up to 4 heating systems for heating and cooling. The basic function of the heating systems is outdoor temperature and/or room temperature-dependent control of the supply or return temperature.

**Hot water system**

The controller can be configured for one or two domestic hot water systems, HW1 and HW2. There are six different types of domestic hot water systems available, flow through system as well as different storage loading systems.

**District heating system**

The controller can control a District heating circuit. This function permits demand-based control of a district heating unit with or without a heat exchanger (direct heat supply).

**Boiler**

For control of 1-4 boilers in sequence, 1-step, 2-step or modulating burners. It is possible to choose between either a fixed or an outdoor compensated setpoint, or to use the highest setpoint in any other heating systems that have been configured.

**Buffer tank**

A buffer tank has many positive effects on a system, including reducing starts and stops from a boiler. The temperature in the buffer tank is controlled according to the demands of the heating systems and domestic hot water systems, as well as external demand via 0…10 V.

**Solar**

The solar system can be used either for heating the domestic hot water storage tank or in order to heat up the buffer tank. The basic function of the solar circuit is to control the temperature difference between the collector sensor and the storage sensor.

**Time channel**

A maximum of 11 time schedules are available. One time schedule is assigned to each heating system and domestic hot water system. Additionally, there are 5 free time schedules which can be used for multiple purposes.

**Differential pressure control**

One constant differential pressure control circuit.

**Priority**

The priority function permits defining if and how the HW or HS should have priority over the other heat consumers, when heat is required. This function is needed when the heat producer is unable to simultaneously supply heat to all heat consumers.

**Monitoring**

Monitoring the energy and water consumption via digital pulse input or M-Bus-meter.

### 3.1.1 Configuration menu

The different functions are configured from the **Configuration** menu, which can be found in the main menu. To access this menu, you have to be logged in as **Admin**.

The configuration menu contains the following items:

```
Alarm settings
Inputs/Outputs
HS
HW
HB
DHS1
Buffer
Solar
General functions
Alarm Config
Communication
System
```

- ✓ Alarm settings: Configuration of alarm limits and delays
- ✓ Inputs/Outputs: Configuration of inputs and outputs
- ✓ HS: Configuration of heating systems (HS1-4)
- ✓ HW: Configuration of domestic hot water systems (HW1, HW2)
- ✓ HB: Configuration of boilers
- ✓ DHS1: Configuration of district heating system (DHS1)
- ✓ Buffer: Configuration of a buffer tank
- ✓ Solar: Configuration of a solar circuit
- ✓ General functions: Configuration of the *Priority* function, general heating parameters that are mutual for all 4 heating systems and configuration of the *Energy/Cold water monitoring* function
- ✓ Alarm Config: Configuration of the alarm priority for each alarm
- ✓ Communication: Configuration of communication ports
- ✓ System: Configure language, start screen and other system settings

## 3.2 Heating system (HS1–HS4)

There are two different types of heating circuits, mixed and unmixed. Both types can work in heating or cooling mode.

1. Mixed heating circuit

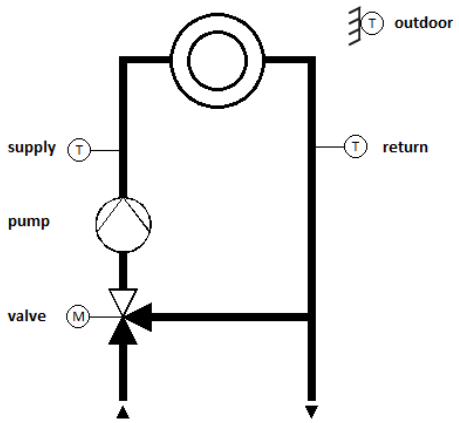



*Figure 3-1 Mixed heating circuit*

2. Unimixed heating circuit

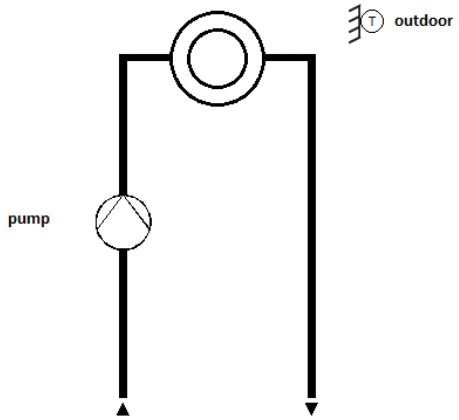



*Figure 3-2 Unimixed heating circuit*

Different control strategies can be used depending on the configuration of the inputs:

| Input | | | | Control strategy used | Setpoint | Demand |
|---|---|---|---|---|---|---|
| Outdoor sensor | Supply sensor | Return sensor | Room sensor | | | |
| ✓ | ✓ | ✓ | ✓ | Supply temp control or return temp control | Curve + adaption | Supply control: setpoint<br>Return control: setpoint + offset |
| ✓ | ✓ | ✓ | - | | Curve | |
| - | ✓ | ✓ | ✓ | | Constant + adaption | |
| - | ✓ | ✓ | - | | Constant | |
| ✓ | - | - | ✓ | Room temp | Constant | Curve + adaption |
| ✓ | - | - | - | Pump only | - | Curve |
| - | - | - | ✓ | Room temp | Constant | Setpoint if control signal > 0% |

## 3.2.1 Inputs and outputs

The following inputs and outputs are used for heating systems.

## Analogue inputs

| Name | Unit | Description |
|---|---|---|
| Outdoor temperature | °C | Frost protection, calculation of curve-setpoint. |
| Supply temperature | °C | Control sensor at supply control or limitation sensor at return control. |
| Room temperature | °C | Control sensor in room control mode or used for room adaption. |
| Return temperature | °C | Used as control sensor at return control, as limitation sensor at supply control and for the HP-Return temperature limitation. |
| Primary return temperature | °C | Used for the return temperature limitation. |
| Limitation sensor | °C | Used for the universal limitation. |
| Shift sensor | °C | Used for the universal limitation to shift the limit depending on this input. |
| Heat capacity | kW | For primary limitation of heating capacity; function capacity limitation. |
| Wind speed | m/s | For a parallel adjustment of the curve. |
| Room humidity | %RH | Humidity in the room. |
| Differential pressure | kPa | Differential pressure at the pump. |
| Extra sensor 1 | °C | Extra sensor that can be used by the remote control unit function. |
| Extra sensor 2 | °C | Extra sensor that can be used by the remote control unit function. |
| Extra sensor 3 | °C | Extra sensor that can be used by the remote control unit function. |
| Extra sensor 4 | °C | Extra sensor that can be used by the remote control unit function. |
| Extra sensor 5 | °C | Extra sensor that can be used by the remote control unit function. |

## Digital inputs

| Name | Unit | Description |
|---|---|---|
| Main switch | Off/On | To shut off the system; change the status between **Auto** and **Switch Off**. |
| Extended run | Off/On | Extended run of the heating system. |
| ChangeOver | Off/On | Change to Cooling mode.<br>0 = Auto<br>1 = Cooling |
| CoolStart | Off/On | “Cooling water” in the system, heating system can start cooling or must stop heating. |
| Thermostat | Off/On | To let the heating system work in “Thermostat mode”. |
| Run indication / alarm pump A | Off/On; Normal/ Error | Feedback from circulation pump A depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |
| Run indication / alarm pump B | Off/On; Normal/ Error | Feedback from circulation pump B (optional for motor protection). If there is no input configured, the function will use input for pump A for both pumps. |
| Heating closed | Off/On | Feedback that the actuator to connect to heating is closed. |
| Cooling closed | Off/On | Feedback that the actuator to connect to cooling is closed. |
| High supply temperature | Off/On | Input to activate the alarm for high supply temperature. |
| Condensation | Off/On | Input to stop cooling in case of condensation. |

## Analogue outputs

| Name | Unit | Description |
|---|---|---|
| Valve continuous | % | Used to control an actuator with continuous control. |
| Pump continuous | % | Used to control a pump with continuous control. |

## Digital outputs

| Name | Unit | Description |
|---|---|---|
| Valve open | Off/On | Used to control an actuator with open/close control. |
| Valve close | Off/On | Used to control an actuator with open/close control. |
| Pump A | Off/On | Used to control a single pump or the first pump of a double pump. |
| Pump B | Off/On | Used to control the second pump of a double pump. |
| Dehumidification | Off/On | Used to control a humidifier. |
| Bypass | Off/On | Used to bypass the cooling system. |
| Heating start | Off/On | Output to connect the system to the heating system. |
| Cooling start | Off/On | Output to connect the system to the cooling system. |

### 3.2.2 Setpoints

It is possible to change the room setpoint for the different operation times and the night setback.

The room setpoints are used in three different functions:

1. As a starting point of the DIN-curve to calculate the output of the curve.
2. To do a parallel adjustment of the 8-point curve depending on the difference between the setpoint and the default value of 21 °C.
3. As an input of the room compensation if a room sensor is configured.

Room setpoints can be set for the four settable comfort times (**Room SP-CT1**…**Room SP-CT4**) and are valid for both types of heating curves. The NCT setpoint, the night setpoint and the holiday setpoint are calculated as a difference (**Room Diff-NCT**, **Room Diff-Night** or **Room Diff-Hol**) to the setpoint of the following comfort time or of comfort time 1 (during holiday or if the time to the next comfort time > 24h) The difference will decrease the setpoint in heating mode and increase it in cooling mode. How much the setpoint is changed depends on the calculated setpoint. A reduction of the heating setpoint to 0 °C or an increase of the cooling setpoint to 35 °C will stop the heating system.

**Room Diff-NCT** is valid between the different comfort times during the day. **Room Diff-Night** is valid between the last comfort time of the day and the first comfort time the next day.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Room Temperature Setp | °C | 0.0 | 50.0 | - | Calculated room setpoint. | **HSx ▶ Actual ▶** |
| Supply Temperature Setp | °C | 0.0 | 160.0 | - | Calculated supply setpoint. | **HSx ▶ Actual ▶** |
| RoomSP-CT1 | °C | 0.0 | 50.0 | 21.0 | Setpoint for Comfort Time 1. | **HSx ▶ Setpoint ▶** |
| RoomSP-CT2 | °C | 0.0 | 50.0 | 21.0 | Setpoint for Comfort Time 2. | **HSx ▶ Setpoint ▶** |
| RoomSP-CT3 | °C | 0.0 | 50.0 | 21.0 | Setpoint for Comfort Time 3. | **HSx ▶ Setpoint ▶** |
| RoomSP-CT4 | °C | 0.0 | 50.0 | 21.0 | Setpoint for Comfort Time 4. | **HSx ▶ Setpoint ▶** |
| Room Diff-NCT | °C | 0.0 | 50.0 | 5.0 | NCT setpoint difference.<br>Decreases the setpoint in heating mode, and increases the setpoint in cooling mode. | **HSx ▶ Setpoint ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Room Diff-Night | °C | 0.0 | 50.0 | 5.0 | Night setpoint difference.<br>Decreases the setpoint in heating mode, and increases the setpoint in cooling mode. | **HSx ▶ Setpoint ▶** |
| Room Diff-Hol | °C | 0.0 | 50.0 | 5.0 | Holiday setpoint difference.<br>Decreases the setpoint in heating mode, and increases the setpoint in cooling mode. | **HSx ▶ Setpoint ▶** |

## 3.2.3 Control curves / Setpoint

The control curve is used to calculate the supply / return setpoint and / or the demand for the heat producer. There are different kinds of control curves / setpoint calculations:

1. Constant setpoint
2. 8–point curve
3. DIN-curve with slope and exponent (only for heating mode)

Both curve types are outdoor temperature compensated curves.

### Constant setpoint

If the setpoint type is set to constant, the setpoint is the same regardless of the outdoor temperature.

### 8–point curve

If the setpoint type is set to 8-point curve, the setpoint depends on the outdoor temperature by means of a control curve. At 8 settable outdoor temperatures, a corresponding supply temperature is entered.

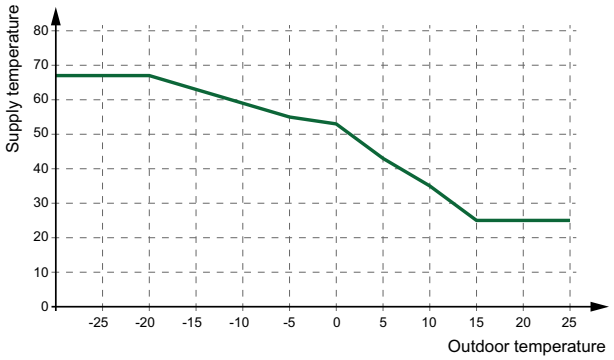



*Figure 3-3 8–point curve*

A displacement can be added to the 8-point control curve to move the entire curve up or down.

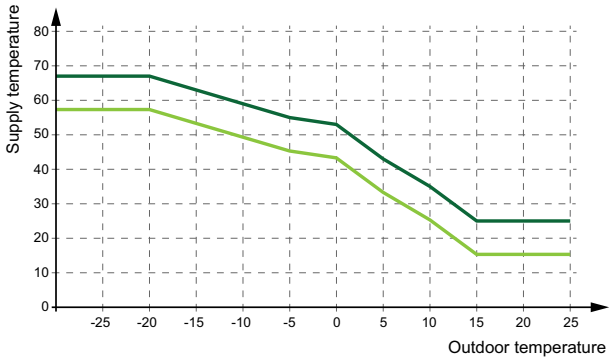



*Figure 3-4 8–point curve with displacement*

## DIN-curve with slope and exponent

If the setpoint type is set to DIN-curve, the setpoint depends on the outdoor temperature by means of a control curve with settable slope and an exponent which bends the curve.

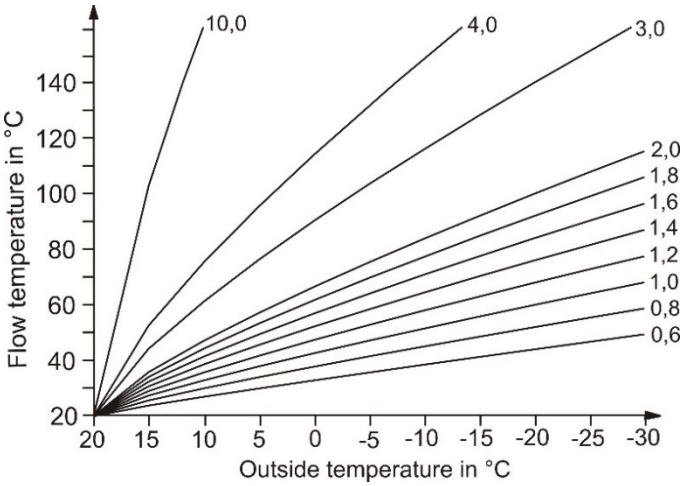



*Figure 3-5 DIN-curve slope*

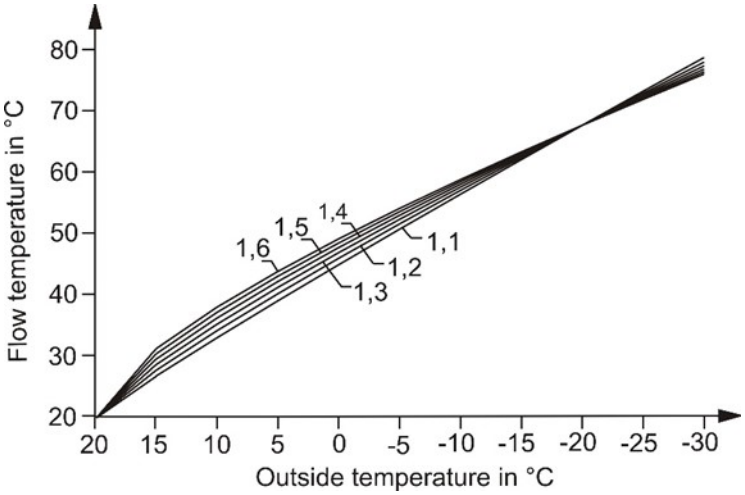



*Figure 3-6 DIN-curve exponent*

Some commonly used exponents are:

- ✓ 1.10 underfloor heating

- ✓ 1.20 radiators
- ✓ 1.33 DIN-radiators
- ✓ 1.25…1.40 plate radiators
- ✓ 1.40…1.60 convectors

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Heating Constant SetP | °C | 2.0 | 90.0 | 45.0 | Constant heating setpoint. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Outdoor Temp 1 | °C | -40.0 | 30.0 | -20.0 | Outdoor temperature 1 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Outdoor Temp 2 | °C | -40.0 | 30.0 | -15.0 | Outdoor temperature 2 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Outdoor Temp 3 | °C | -40.0 | 30.0 | -10.0 | Outdoor temperature 3 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Outdoor Temp 4 | °C | -40.0 | 30.0 | -5.0 | Outdoor temperature 4 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Outdoor Temp 5 | °C | -40.0 | 30.0 | 0.0 | Outdoor temperature 5 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Outdoor Temp 6 | °C | -40.0 | 30.0 | 5.0 | Outdoor temperature 6 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Outdoor Temp 7 | °C | -40.0 | 30.0 | 10.0 | Outdoor temperature 7 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Outdoor Temp 8 | °C | -40.0 | 30.0 | 15.0 | Outdoor temperature 8 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Curve Output 1 | °C | 2.0 | 100.0 | 67.0 | Value at outdoor temperature 1 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Curve Output 2 | °C | 2.0 | 100.0 | 63.0 | Value at outdoor temperature 2 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Curve Output 3 | °C | 2.0 | 100.0 | 59.0 | Value at outdoor temperature 3 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Curve Output 4 | °C | 2.0 | 100.0 | 55.0 | Value at outdoor temperature 4 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Curve Output 5 | °C | 2.0 | 100.0 | 53.0 | Value at outdoor temperature 5 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Curve Output 6 | °C | 2.0 | 100.0 | 43.0 | Value at outdoor temperature 6 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Curve Output 7 | °C | 2.0 | 100.0 | 35.0 | Value at outdoor temperature 7 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Curve Output 8 | °C | 2.0 | 100.0 | 25.0 | Value at outdoor temperature 8 for 8–point heating curve. | **HSx ▶ Setpoint ▶** |
| Heating Outd Comp Slope | - | 0.1 | 10.0 | 1.4 | DIN-curve slope. | **HSx ▶ Setpoint ▶** |
| Heating Outd Exponent | - | 1.10 | 1.60 | 1.30 | DIN-curve exponent. | **HSx ▶ Setpoint ▶** |
| Heating Manual Displacement | °C | -10.0 | 10.0 | 0.0 | Manual displacement of the heating curve, only used for 8-point curve setpoint. | **HSx ▶ Setpoint ▶** |
| Supply Offset Heating | °C | -10.0 | 10.0 | 0.0 | Offset for demand if the circuit is return temperature controlled. | **Configuration ▶ HS ▶ System ▶ Return Temperature Control ▶** |
| Cooling Constant SetP | °C | 2.0 | 25.0 | 13.0 | Constant cooling setpoint. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Outdoor Temp 1 | °C | 10.0 | 40.0 | 20.0 | Outdoor temperature 1 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Cooling Outd Comp Outdoor Temp 2 | °C | 10.0 | 40.0 | 22.0 | Outdoor temperature 2 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Outdoor Temp 3 | °C | 10.0 | 40.0 | 24.0 | Outdoor temperature 3 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Outdoor Temp 4 | °C | 10.0 | 40.0 | 26.0 | Outdoor temperature 4 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Outdoor Temp 5 | °C | 10.0 | 40.0 | 28.0 | Outdoor temperature 5 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Outdoor Temp 6 | °C | 10.0 | 40.0 | 30.0 | Outdoor temperature 6 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Outdoor Temp 7 | °C | 10.0 | 40.0 | 32.0 | Outdoor temperature 7 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Outdoor Temp 8 | °C | 10.0 | 40.0 | 34.0 | Outdoor temperature 8 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Curve Output 1 | °C | 2.0 | 25.0 | 15.0 | Value at outdoor temperature 1 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Curve Output 2 | °C | 2.0 | 25.0 | 14.0 | Value at outdoor temperature 2 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Curve Output 3 | °C | 2.0 | 25.0 | 13.0 | Value at outdoor temperature 3 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Curve Output 4 | °C | 2.0 | 25.0 | 12.0 | Value at outdoor temperature 4 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Curve Output 5 | °C | 2.0 | 25.0 | 12.0 | Value at outdoor temperature 5 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Curve Output 6 | °C | 2.0 | 25.0 | 11.0 | Value at outdoor temperature 6 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Curve Output 7 | °C | 2.0 | 25.0 | 10.0 | Value at outdoor temperature 7 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Outd Comp Curve Output 8 | °C | 2.0 | 25.0 | 9.0 | Value at outdoor temperature 8 for 8–point cooling curve. | **HSx ▶ Setpoint ▶** |
| Cooling Manual Displacement | °C | -10.0 | 10.0 | 0.0 | Manual displacement of the cooling curve, only used for 8-point curve setpoint. | **HSx ▶ Setpoint ▶** |
| Supply Offset Cooling | °C | 0.0 | 20.0 | 5.0 | Offset for demand if the circuit is return temperature controlled. | **Configuration ▶ HS ▶ System ▶ Return Temperature Control ▶** |

## 3.2.4 General settings / Configuration

Depending on the **Control type**, the heating system can work as a heating circuit, a cooling circuit or change between both. If the **Control type** is set to *ChangeOver*, the circuit changes to cooling if the outdoor temperature exceeds the limit **Change Over Cooling** or if the input **ChangeOver** is set to 1 (Cooling). The circuit changes back to heating if the outdoor temperature is falling below the limit **Change Over Heating** and the input **ChangeOver** is set to 0 (Auto). If the input **CoolStart** is configured, the circuit can start to cool if the input is 1 and start to heat if the input is 0. If there is a supply sensor and a return sensor configured, the system can control the return temperature instead of the supply temperature by setting the parameter **Return Temperature Control** to 1.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Control type | - | 0 | 2 | 0 | 0 = Heating<br>1 = Cooling<br>2 = Change Over | **Configuration ▶ HS ▶ HSx ▶ System ▶** |
| Change Over Heating | °C | 10 | 50 | 17 | If the outdoor temperature is lower than **Change Over Heating**, the circuit changes to heating mode. | **Configuration ▶ HS ▶ HSx ▶ System ▶ Control Type ▶** |
| Change Over Cooling | °C | 10 | 50 | 24 | If the outdoor temperature is higher than **Change Over Cooling** the circuit changes to cooling mode. | **Configuration ▶ HS ▶ HSx ▶ System ▶ Control Type ▶** |
| Return Temperature Control | - | 0 | 1 | 0 | The system controls the return temperature instead of the supply temperature when set to 1. | **Configuration ▶ HS ▶ HSx ▶ System ▶** |
| Type of Heating Setpoint | - | 0 | 2 | 1 | 0 = Constant<br>1 = 8-point curve<br>2 = DIN-curve | **Configuration ▶ HS ▶ HSx ▶ System ▶** |
| Type of Cooling Setpoint | - | 0 | 1 | 0 | 0 = Constant<br>1 = 8-point curve | **Configuration ▶ HS ▶ HSx ▶ System ▶** |
| Design Temp | °C | -40 | 10 | -12 | If the outdoor temperature is lower than the design temperature, night setback is stopped. | **HSx ▶ Setpoint ▶** |
| Max supply temperature | °C | 0 | 100 | 100 | The maximum supply temperature. | **Configuration ▶ HS ▶ Alarm settings ▶ Alarm Limits ▶** |
| Pump Type | - | 0 | 1 | 0 | Type of pump.<br>0 = Single pump<br>1 = Double pump | **Configuration ▶ HS ▶ HSx ▶ System ▶** |
| Pump Ind | - | 0 | 1 | 0 | Type of feedback for the pump.<br>0 = motor protection<br>1 = run indication | **Configuration ▶ HS ▶ HSx ▶ System ▶** |
| Pump Delay | s | 0 | 200 | 10 | Delay time of the pump indication. | **Configuration ▶ HS ▶ HSx ▶ System ▶** |
| Pump Runtime | h | 0 | 1000 | 100 | Runtime of the pump, only used for double pumps. | **Configuration ▶ HS ▶ HSx ▶ System ▶** |
| Actuator Type Valve | - | 1 | 4 | 1 | Type of actuator<br>1 = 0-10 V<br>2 = 2-10 V<br>3 = 10-2 V<br>4 = 10-0 V | **Configuration ▶ HS ▶ HSx ▶ System ▶** |
| Actuator Runtime | s | 0 | 600 | 120 | Runtime of the actuator of the control valve. | **Configuration ▶ HS ▶ HSx ▶ System ▶** |
| Actuator Runtime Heat<->Cool | s | 0 | 600 | 120 | Runtime of the actuator that is used to switch between heating and cooling. | **Configuration ▶ HS ▶ HSx ▶ System ▶** |

### 3.2.5 Temperature control

This menu shows all parameters necessary for the configuration of the PI controller of the heating circuit.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Heating P-band | °C | 1 | 1000 | 100 | P-band heating. | **HSx ▶ Temp control ▶** |
| Heating I-time | s | 0 | 9999 | 100 | I-time heating. | **HSx ▶ Temp control ▶** |
| Heating Output | % | 0 | 100 | - | Controller output. | **HSx ▶ Temp control ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Cooling P-band | °C | 1 | 1000 | 20 | P-band cooling. | **HSx ► Temp control ►** |
| Cooling I-time | s | 0 | 9999 | 60 | I-time cooling. | **HSx ► Temp control ►** |
| Cooling Output | % | 0 | 100 | - | Controller output. | **HSx ► Temp control ►** |

### 3.2.6 Frost protection

In order to prevent damage to the heating circuit, the Frost protection function is always active (unless the controller is in *Non-active* or *Manual* mode). There are three different parameters that can make the circuit change to frost mode.

- ✓ **Frost Limit Outdoor**: This parameter permits setting the outdoor temperature at which the pump of the heating circuit will be started. The water in the pipes is kept in motion even if the heating circuit does not require any heat, thereby preventing freezing. This should prevent freezing of pipes running at the outdoor wall of the building. The frost protection mode stops when the outdoor temperature is 1 K above the limit.
- ✓ **Frost Limit Supply**: This parameter permits setting the supply temperature at which the circuit changes to frost protection mode. The frost protection mode stops when the supply temperature is 10 K above the limit.
- ✓ **Frost Limit Room**: This parameter permits setting the room temperature at which the circuit changes to frost protection mode. The frost protection mode stops when the room temperature is 1 K above the limit.

During frost protection mode (activated by **Frost Limit Supply** or **Frost Limit Room**), the setpoint and the heat demand is set to the maximum setpoint.

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Frost Limit Supply | °C | -30.0 | 50.0 | 5.0 | The supply temperature at which the circuit changes to frost protection mode. | **Configuration ► HS ► HSx ► Frost ►** |
| Frost Limit Room | °C | -30.0 | 50.0 | 5.0 | The room temperature at which the circuit changes to frost protection mode. | **Configuration ► HS ► HSx ► Frost ►** |
| Frost Limit Outdoor | °C | -30.0 | 50.0 | 2.0 | The outdoor temperature at which the pump of the heating circuit will be started. | **Configuration ► HS ► HSx ► Frost ►** |

### 3.2.7 Shutdown / Pumpstop

The *Shutdown/Pumpstop* function performs the same function that a building caretaker would perform; monitoring outdoor temperature and switching the heating circuit off. There are different temperatures for day and night. The night temperatures are valid if the timer of the heating system is in Eco- or holiday-mode. The start and stop of the system can be delayed by the parameters **Degree minutes stop** and **Degree minutes start**. With the parameters **Stop date** and **Start date** it is possible to define a heating season/period or a cooling season/period. When in shut-off-mode, the function only attempts to protect the building by preventing clogging or blocking of pumps and valves and watching for frost.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 1 | 1 | Turns the *Pump stop* function on or off.<br>0 = Off<br>1 = On | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Shut Off Heating Day Temp | °C | 0 | 50 | 17 | Outdoor temperature to shut off heating mode during day (within comfort times). | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Shut Off Heating Night Temp | °C | 0 | 50 | 15 | Outdoor temperature to shut off heating mode during night (outside of comfort times). | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Shut Off Cooling Day Temp | °C | 0 | 50 | 20 | Outdoor temperature to shut off cooling mode during day (within comfort times). | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Shut Off Cooling Night Temp | °C | 0 | 50 | 22 | Outdoor temperature to shut off cooling mode during night (outside of comfort times). | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Hysteresis | °C | 0 | 20 | 2 | Hysteresis of the Shut Off temperature. | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Degree minutes Stop | °Cmin | 0 | 1000 | 0 | | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Degree minutes Start | °Cmin | 0 | 1000 | 0 | | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Stop date heating | - | 00.00 | 31.12 | 00.00 | | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Start date heating | - | 00.00 | 31.12 | 00.00 | | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Stop date cooling | - | 00.00 | 31.12 | 00.00 | | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Start date cooling | - | 00.00 | 31.12 | 00.00 | | **Configuration ▶ HS ▶ HSx ▶ Shutdown/ Pumpstop ▶** |
| Switch Off Delay | min | 0 | 60 | 1 | Switch off delay of the pump. | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |

### 3.2.8 Optimizer / Boost

The *Optimizer* function is used in order to reach the set room temperature when comfort time is activated after a period of night set-back. How far in advance the supply temperature is to be increased is calculated as below:

```
Optimization time = (Setpoint Room - Actual value Room) / Heating capacity
```

The heating capacity has a minimum and a maximum value (default minimum value is 0.02°C/min, maximum value is 0.1°C/min). The average of the min. and max. capacities is used as the start value for the function. Then the capacity is converted as below:

```
Heating capacity = (Heating capacity + Temperature boost / Optimization time) / 2
```

Here, the temperature boost is equal to the difference in room temperature when the optimization was stopped and when it was started.

When outdoor compensation of the start time optimization is active, the compensated capacity is calculated as below:

```
Outdoor compensated capacity = capacity * (1 + Outdoor compensation / 100 * Outdoor temperature diff)
```

The outdoor compensation is a settable percentage between 0...100 % (0 % = no compensation). The factory setting is 3 %.

**Outdoor temperature diff** is the difference between the actual outdoor temperature and the outdoor temperature at the latest optimization. This function is used in order to reach the set room temperature when comfort time is activated after a period of night set-back.

Boost: Boost is used to speed up the raising of the indoor temperature when switching from night set back temperature to normal comfort temperature. This is done by temporarily displacing the supply temperature setpoint curve. The following conditions must be met:

- ✓ Average outdoor temperature must be lower than 17°C
- ✓ Supply set-point value must be higher than 25°C
- ✓ Night set-back must be more than 2°C (room temperature)

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 1 | 1 | Turns the *Optimizer* function on or off.<br>0 = Off<br>1 = On | `Configuration ▶ HS ▶ HSx ▶ Optimizer ▶` |
| Heating Capacity Min | °C/min | 0.02 | 0.1 | 0.02 | Minimum heating capacity, see the function description above. | `Configuration ▶ HS ▶ HSx ▶ Optimizer ▶` |
| Heating Capacity Max | °C/min | 0.02 | 0.1 | 0.1 | Maximum heating capacity, see the function description above. | `Configuration ▶ HS ▶ HSx ▶ Optimizer ▶` |
| Outdoor Compensating Factor | % | 0 | 100 | 3 | Compensating factor, see the formula above. | `Configuration ▶ HS ▶ HSx ▶ Optimizer ▶` |
| Boost Factor | h | 0.0 | 10.0 | 0.0 | How long time the heating system will increase the demand to heat up faster. | `Configuration ▶ HS ▶ HSx ▶ Optimizer ▶` |
| Start Optimizer Time Until Start | min | 0 | 1440 | - | Calculated time until start. | `HSx ▶ Actual ▶` |

## 3.2.9 Delayed outdoor / Room temperature

Every building has the capacity to store energy. The amount of energy that a building can store is described in the **Building inertia** parameter. This value is dependent on the construction of the building (e.g. the thickness of its outdoor walls, insulation, type of windows, etc.).

If **Building inertia** is activated (value > 0), the outdoor temperature will be delayed by this value. The delayed outdoor temperature will then be used instead of the real value.

The parameter **Mode** defines how the delayed outdoor temperature will be calculated. **Mode** = 0 means that the function is not active, **Mode** = 1 means that the temperature will be delayed all the time and **Mode** = 2 means that the temperature will be delayed on falling temperatures and not delayed on rising temperatures.

If a room sensor is configured, the measured value at the sensor can be delayed by the value of **Average**. If no room sensor is configured but the building inertia is activated, a virtual room temperature will be calculated.

The calculation of the virtual room temperature is depending on the latest room setpoint, the outdoor temperature and the building inertia and simulates the natural cool down of a building.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 2 | 0 | Defines how the delayed outdoor temperature will be calculated. | |
| Building inertia | h | 0.0 | 24.0 | 0.0 | Delay of the outdoor temperature. | **Configuration ▶ General Functions ▶ Heating ▶** |
| Average | Min | 0.0 | 60.0 | 5.0 | Delay of the measured room temperature. | **Configuration ▶ HS ▶ HSx ▶ Room average ▶** |

## 3.2.10 Remote control unit

The *Remote control unit* function permits configuring the influence of the remote control unit. If the remote control unit is equipped with a setpoint potentiometer, the signal of the potentiometer can be connected to the analogue inputs **Extra Sensor 1 - 5**.

If the remote control unit is equipped with a button, the button can be used to extend the day-mode or insert a day-period with the length of **Extended Run**.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 5 | 0 | Turns the *Remote control unit* function on or off.<br>0 = Off<br>1 = Extra sensor 1<br>2 = Extra sensor 2<br>3 = Extra sensor 3<br>4 = Extra sensor 4<br>5 = Extra sensor 5 | **Configuration ▶ HS ▶ HSx ▶ Remote control ▶** |
| Extended Run | min | 0.0 | 600.0 | 120.0 | Extended run-time. | **HSx ▶ Actual ▶** |

## 3.2.11 Support operation

If a room temperature sensor is configured or a virtual room temperature is calculated, the additional function *Support operation* can be used to switch off the pump and close the valve during non-comfort time until the NCT setpoint is reached. Then the controller starts and controls the non-comfort setpoint.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Support Operation Active | - | 0 | 1 | 0 | Turns the *Support operation* function on or off.<br>0 = Off<br>1 = On | **Configuration ▶ HS ▶ HSx ▶ Support operation ▶** |

## 3.2.12 Flash adaption

The *Flash adaption* function switches off the heating as soon as the room temperature exceeds the setpoint by the settable **Limit** parameter.

Heating starts again if the room temperature is lower than switch-off point minus 1°C.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 1 | 0 | Turns the *Flash adaption* function on or off.<br>0 = Off<br>1 = On | **Configuration ▶ HS ▶ HSx ▶ Flash adaption ▶** |
| Limit | °C | 0 | 10 | 2 | The *Flash adaption* function switches off the heating as soon as the room temperature exceeds the setpoint by this amount. | **Configuration ▶ HS ▶ HSx ▶ Flash adaption ▶** |

### 3.2.13 Wind compensation

The *Wind compensation* function can generate a setpoint displacement to compensate for wind chilling if a wind sensor is connected. The function has a settable displacement factor (°C per m/s).

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 1 | 0 | Turns the *Wind compensation* function on or off.<br>0 = Off<br>1 = On | **Configuration ▶ HS ▶ HSx ▶ Wind compensation ▶** |
| Displacement | °C/(m/s) | 0.0 | 2.0 | 0.1 | Displacement factor to compensate for wind. | **Configuration ▶ HS ▶ HSx ▶ Wind compensation ▶** |

### 3.2.14 Room compensation

If the *Room compensation* function is activated, the calculated setpoint or demand is corrected by means of a Pl controller according to the control deviation in the room.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 1 | 0 | Turns the *Room compensation* function on or off.<br>0 = Off<br>1 = On | **Configuration ▶ HS ▶ HSx ▶ Room compensation ▶** |
| Heat Max Pos Corr | °C | 0.0 | 100.0 | 20.0 | Max. positive correction of the setpoint in heating mode. | **Configuration ▶ HS ▶ HSx ▶ Room compensation ▶** |
| Heat Max Neg Corr | °C | -100.0 | 0.0 | -20.0 | Max. negative correction of the setpoint in heating mode. | **Configuration ▶ HS ▶ HSx ▶ Room compensation ▶** |
| Cool Max Pos Corr | °C | 0.0 | 100.0 | 5.0 | Max. positive correction of the setpoint in cooling mode. | **Configuration ▶ HS ▶ HSx ▶ Room compensation ▶** |
| Cool Max Neg Corr | °C | -100.0 | 0.0 | -5.0 | Max. negative correction of the setpoint in cooling mode. | **Configuration ▶ HS ▶ HSx ▶ Room compensation ▶** |
| Room Comp Heating P-Band | °C | 1 | 100 | 100 | P-band of heating mode. | **HSx ▶ Temp control ▶** |
| Room Comp Heating I-time | s | 0 | 9999 | 0 | I-time of heating mode. | **HSx ▶ Temp control ▶** |
| Room Comp Heating Output | °C | - | - | - | Controller output. | **HSx ▶ Temp control ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Room Comp Cooling P-Band | °C | 1 | 100 | 100 | P-band of cooling mode. | HSx ▶ Temp control ▶ |
| Room Comp Cooling I-time | s | 0 | 9999 | 0 | I-time of cooling mode. | HSx ▶ Temp control ▶ |
| Room Comp Cooling Output | °C | - | - | - | Controller output. | HSx ▶ Temp control ▶ |

## 3.2.15 Temperature limitation

The heating systems have individually settable min. and max. temperature limits on the supply and return. There are different settings for heating and cooling.

If control of supply temperature is selected and the return temperature is not within the set limits, the supply setpoint will be adjusted with a settable limitation factor (**Return Lim. Heating Scale** or **Return Lim. Cooling Scale**) to eliminate the error. However, the supply setpoint will never fall below/exceed the set min. /max. setpoint.

If control of return temperature is selected, the supply temperature will be limited by adjusting the return setpoint.

The displacement minimum limitation is calculated according to:

```
Displacement = (Min Limit – temperature) * Limitation factor
```

This displacement can only provide a positive displacement; otherwise the displacement will be 0.

The displacement maximum limitation is calculated according to:

```
Displacement = (Max Limit - temperature) * Limitation factor
```

This displacement can only provide a negative displacement; otherwise the displacement will be 0.

### Primary and secondary return temperature limits

The primary return temperature must not be more than 3 degrees (settable parameter **Max Delta-T**) higher than the secondary return temperature. When the difference exceeds this value, the control signal to the valve will be overridden to close the valve, i.e. decrease the flow, which will lower the return temperature.

### Parameters, Return limitation heating

| Name | Unit | Min | Max | Defau-lt | Description | Menu path |
|---|---|---|---|---|---|---|
| Min Return Lim. Heating Mode | - | 0 | 1 | 0 | Activates return limitation at the min. temperature limit for heating mode. | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Min Return Lim. Heating Limit | °C | 2.0 | 160.0 | 2.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Max Return Lim. Heating Mode | - | 0 | 1 | 0 | Activates return limitation at the max. temperature limit for heating mode. | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Max Return Lim. Heating Limit | °C | 2.0 | 160.0 | 160.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Return Lim. Heating Scale | - | 0.0 | 10.0 | 1.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |

## Parameters, Supply limitation heating

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Min Supply Lim. Heating Mode | - | 0 | 1 | 0 | Activates supply limitation at the min. temperature limit for heating mode. | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Min Supply Lim. Heating Limit | °C | 2.0 | 160.0 | 2.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Max Supply Lim. Heating Mode | - | 0 | 1 | 0 | Activates supply limitation at the max. temperature limit for heating mode. | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Max Supply Lim. Heating Limit | °C | 2.0 | 160.0 | 160.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Supply Lim. Heating Scale | °C | 0.0 | 10.0 | 1.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |

## Parameters, Return limitation cooling

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Min Return Lim. Cooling Mode | - | 0 | 1 | 0 | Activates return limitation at the min. temperature limit for cooling mode. | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Min Return Lim. Cooling Limit | °C | 2.0 | 160.0 | 2.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Max Return Lim. Cooling Mode | - | 0 | 1 | 0 | Activates return limitation at the max. temperature limit for cooling mode. | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Max Return Lim. Cooling Limit | °C | 2.0 | 160.0 | 160.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Return Lim. Cooling Scale | °C | 0.0 | 10.0 | 1.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |

## Parameters, Supply limitation cooling

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Min Supply Lim. Cooling Mode | - | 0 | 1 | 0 | Activates supply limitation at the min. temperature limit for cooling mode. | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Min Supply Lim. Cooling Limit | °C | 2.0 | 160.0 | 2.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Max Supply Lim. Cooling Mode | - | 0 | 1 | 0 | Activates supply limitation at the max. temperature limit for cooling mode. | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Max Supply Lim. Cooling Limit | °C | 2.0 | 160.0 | 160.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |
| Supply Lim. Cooling Scale | - | 0.0 | 10.0 | 1.0 | | Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶ |

### Parameters, Setpoint limitation

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Minimum Setp | °C | 2.0 | 160.0 | 2.0 | | **Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶** |
| Maximum Setp | °C | 2.0 | 160.0 | 80.0 | | **Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶** |

### Parameters, Delta-T control

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 1 | 0 | Activation of Delta-T control. | **Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶** |
| Max Delta-T | °C | 0.0 | 100.0 | 3.0 | Max. difference between HP-return and HSx-return sensor. | **Configuration ▶ HS ▶ HSx ▶ Temperature limit. ▶** |
| Return Temp P-Band | °C | 1 | 1000 | 100 | P-band. | **HSx ▶ Temp control ▶** |
| Return Temp I-Time | s | 0 | 9999 | 100 | I-time. | **HSx ▶ Temp control ▶** |
| Return Temp Output | % | 0 | 100 | - | Controller output. | **HSx ▶ Temp control ▶** |

## 3.2.16 Power limitation

The *Power limitation* function permits limitation of the capacity output to the heating circuit. This function requires a heat meter to be installed and connected, providing the currently used capacity. Limitation affects the signal to the valve of the heating circuit.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Type of limit | - | 0 | 1 | 0 | 0 = constant<br>1 = curve | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Limit | kW | 0 | 10000 | 10000 | Max. limit of the consumed heat capacity. Used when **Type of limit** is set to constant. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Outdoor Temp 1 | °C | -40.0 | 30.0 | -20.0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Outdoor Temp 2 | °C | -40.0 | 30.0 | -15.0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Outdoor Temp 3 | °C | -40.0 | 30.0 | -10.0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Outdoor Temp 4 | °C | -40.0 | 30.0 | -5.0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Outdoor Temp 5 | °C | -40.0 | 30.0 | 0.0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Outdoor Temp 6 | °C | -40.0 | 30.0 | 5.0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Outdoor Temp 7 | °C | -40.0 | 30.0 | 10.0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Outdoor Temp 8 | °C | -40.0 | 30.0 | 15.0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Limit output 1 | kW | 0.0 | 10000.-0 | 10000.-0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Limit output 2 | kW | 0.0 | 10000.-0 | 10000.-0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Limit output 3 | kW | 0.0 | 10000.-0 | 10000.-0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Limit output 4 | kW | 0.0 | 10000.-0 | 10000.-0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Limit output 5 | kW | 0.0 | 10000.-0 | 10000.-0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Limit output 6 | kW | 0.0 | 10000.-0 | 10000.-0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Limit output 7 | kW | 0.0 | 10000.-0 | 10000.-0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Limit output 8 | kW | 0.0 | 10000.-0 | 10000.-0 | Used when **Type of limit** is set to curve. | **Configuration ▶ HS ▶ HSx ▶ Power limitation ▶** |
| Power Limit P-Band | kW | 1 | 1000 | 100 | P-band. | **HSx ▶ Temp control ▶** |
| Power Limit I-Time | s | 0 | 9999 | 100 | I-time. | **HSx ▶ Temp control ▶** |
| Power Limit Output | % | 0 | 100 | - | Controller output. | **HSx ▶ Temp control ▶** |

### 3.2.17 Dew point / Dehumidification

Dew point control is used in order to avoid condensation in the cooling pipe system, especially when chilled beams are connected. The *Dew point* function increases the supply temperature setpoint of the cooling circuit depending on the present dew point in the room. A combined humidity and temperature transmitter must be connected and configured.

The function calculates the actual dew point temperature and adds it to a settable setpoint displacement (default 1°C). Then the sum is compared with the present setpoint. The highest value will be used as supply temperature setpoint for the cooling system.

The *Dehumidification* function controls the **Dehumidifier** output depending on the humidity in the room.

It has two different operation modes; constant or calculated setpoint.

- ✓ Constant setpoint: **Dehumidifier** is switched on if the humidity is higher than the setpoint and switched off if the humidity is lower than setpoint – hysteresis.
- ✓ Calculated setpoint: **Dehumidifier** is switched on if the dew point temperature is higher than supply temperature – hysteresis and switched off if the dew point temperature is lower than supply temperature – hysteresis – 1K.

The function can be set to work permanently or depending on the time schedule.

## Parameters, Dew point

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 1 | 0 | Turns the *Dew point* function on or off.<br>0 = Off<br>1 = On | **Configuration ▶ HS ▶ HSx ▶ Dewpoint control ▶** |
| SetP Offset | °C | 0 | 10.0 | 1 | The difference between dew point temperature and supply temperature. | **Configuration ▶ HS ▶ HSx ▶ Dewpoint control ▶** |
| Min SetP | °C | 0 | 100.0 | 0 | Min limitation of setpoint. | **Configuration ▶ HS ▶ HSx ▶ Dewpoint control ▶** |
| Max SetP | °C | 0.1 | 100.0 | 100.0 | Max limitation of setpoint. | **Configuration ▶ HS ▶ HSx ▶ Dewpoint control ▶** |

## Parameters, Dehumidifier

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 2 | 0 | Turns the *Dehumidification* function on, off or time program controlled.<br>0 = Off<br>1 = Always on<br>2 = Time program controlled | **Configuration ▶ HS ▶ HSx ▶ Dehumidification ▶** |
| Type of Setpont | - | 0 | 1 | 0 | 0 = Constant<br>1 = Calculated | **Configuration ▶ HS ▶ HSx ▶ Dehumidification ▶** |
| Dehumidification SetP | %RH | 0 | 100 | 55 | Only used for constant setpoint. | **HSx ▶ Setpoint ▶** |
| Start Diff | °C | 0.0 | 100.0 | 1.0 | Start difference, only used for calculated setpoint. | **Configuration ▶ HS ▶ HSx ▶ Dehumidification ▶** |
| Stop Hyst | %RH | 0.0 | 100.0 | 2.5 | Stop hysteresis, only used for constant setpoint. | **Configuration ▶ HS ▶ HSx ▶ Dehumidification ▶** |

## 3.2.18 Heating degrees

The *Heating degrees* function is used to calculate the heating degrees of the current year and store the historical value of the last year.

Heating degrees is the accumulated difference of the mean room temperature of 20°C and the daily average of the outdoor temperature at all days with heating demand.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Heating degrees Act | h | 0 | 10000 | - | Current heating degrees | **Configuration ▶ HS ▶ HSx ▶ Actual ▶** |
| Heating degrees Last year | h | 0 | 10000- | - | Heating degrees last year | **Configuration ▶ HS ▶ HSx ▶ Actual ▶** |

## 3.2.19 Universal limitation

The *Universal limitation* function requires a limitation sensor to be configured.

Depending on the type of limitation, the function can be used optionally for maximum or minimum limitation and the actuator can either open or close in case of limit violation.

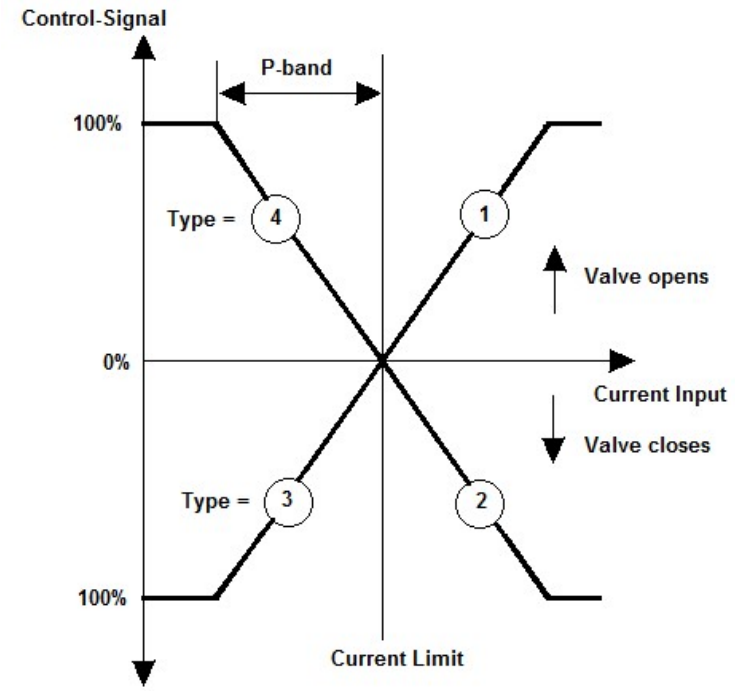



*Figure 3-7 Universal limitation*

Type 1: Maximum limitation, open valve.

Type 2: Maximum limitation, close valve.

Type 3: Minimum limitation, close valve.

Type 4: Minimum limitation, open valve.

The limit can be defined as fixed value or as shifting value with a variable shifting curve according to the value of the shift sensor.

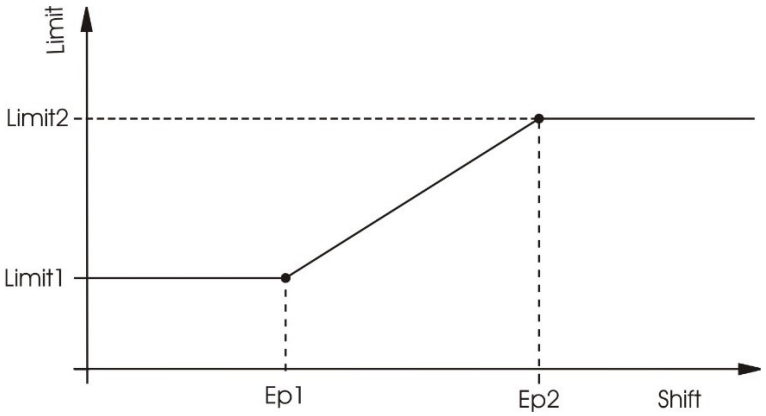



*Figure 3-8 Variable shifting curve*

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Active | - | 0 | 1 | 1 | Turns the *Universal limitation* function on or off.<br>0 = Off<br>1 = On | **Configuration ▶ HS ▶ HSx ▶ Universal limit. ▶** |
| Type | - | 1 | 4 | 2 | 1 = Max limitation, open valve<br>2 = Max limitation, close valve<br>3 = Min limitation, close valve<br>4 = Min limitation, open valve | **Configuration ▶ HS ▶ HSx ▶ Universal limit. ▶** |
| Shift | - | 0 | 1 | 0 | Limit defined as a shifting value (shift sensor required) | **Configuration ▶ HS ▶ HSx ▶ Universal limit. ▶** |
| Limit1 | °C | 2.0 | 160.0 | 80.0 | The limit at **Entry point 1**. | **Configuration ▶ HS ▶ HSx ▶ Universal limit. ▶** |
| EntryPoint1 | °C | -50.0 | 50.0 | 0.0 | Point 1 of the shift curve. | **Configuration ▶ HS ▶ HSx ▶ Universal limit. ▶** |
| Limit2 | °C | 2.0 | 160.0 | 60.0 | The limit at **Entry point 2**. | **Configuration ▶ HS ▶ HSx ▶ Universal limit. ▶** |
| EntryPoint2 | °C | -50.0 | 50.0 | 20.0 | Point 2 of the shift curve. | **Configuration ▶ HS ▶ HSx ▶ Universal limit. ▶** |
| Universal Limit P-Band | °C | 1 | 1000 | 100 | P-band. | **HSx ▶ Temp control ▶** |
| Universal Limit I-Time | s | 0 | 9999 | 60 | I-time. | **HSx ▶ Temp control ▶** |
| Universal Limit Output | % | 0 | 100 | - | The calculated signal to the valve. | **HSx ▶ Temp control ▶** |
| Universal Limit Setp | °C | 2.0 | 160.0 | - | The calculated limit. | **HSx ▶ Actual ▶** |

### 3.2.20 Bypass

In a cooling system, a digital output can be used to control a bypass valve. The conditions for the bypass valve to open are for the outdoor temperature to fall below 3°C and for the control valve to be closed (0 %). The bypass valve closes if the outdoor temperature is higher than 5°C or the control valve opens.

### 3.2.21 Screed drying

The *Screed drying* function is used in order to support the drying of concrete floors in which an underfloor heating system is installed. The function influences the supply temperature to optimize drying time and prevent the possibility of cracks in the floor.

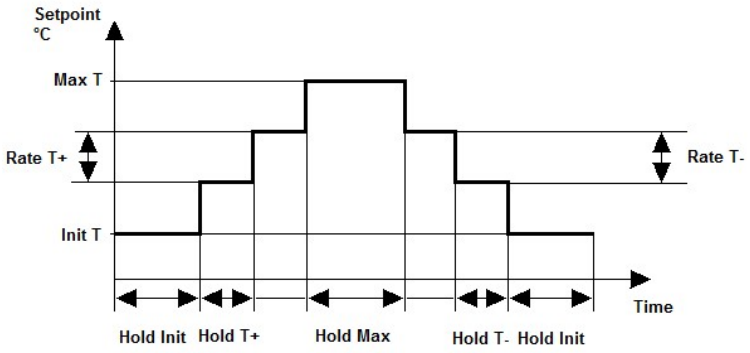



*Figure 3-9 Screed drying*

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 1 | 1 | 0 | Turns the *Screed drying* function on or off.<br>0 = Off<br>1 = On | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Init Temp | °C | 2.0 | 80.0 | 25.0 | The supply temperature with which the screed drying phase will start. | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Hold Init Temp | days | 0 | 10 | 1 | The duration that the controller will hold the **Init Temp**. | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Rate Temp + | °C | 1.0 | 80.0 | 5.0 | The increase of the supply temperature after **Time+**. | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Time+ | days | 1 | 50 | 1 | The duration the controller will hold the temperature of the heat-up period. | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Max Temp | °C | 2.0 | 80.0 | 45.0 | The maximum supply temperature during the phase. | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Time Max | days | 0 | 10 | 3 | The time, during which the controller will hold the **Max Temp**, after which the temperature will slowly decrease. | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Rate Temp - | °C | 1.0 | 80.0 | 5.0 | The decrease of the supply temperature after **Time-**. | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Time- | days | 1 | 50 | 1 | The duration the controller will hold the temperature of the cool-down period. | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Opt Power Fail | - | 2 | 2 | 0 | This parameter permits establishing how the controller should react if a power failure occurs during the screed drying period:<br>0: Restart current step<br>1: Restart completely<br>2: Stop | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Max Xw | °C | 0.0 | 50.0 | 50.0 | Maximum control deviation, that if exceeded, an alarm will be set. | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Duration Xw | h | 0 | 5 | 5 | Delay of the **Max Xw** alarm. | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |
| Reset | - | 1 | 1 | 0 | Restarts the function. | **Configuration ▶ HS ▶ HSx ▶ Screed Drying ▶** |

### 3.2.22 Pump control

The pump can run with a constant or variable speed. The variable speed can be controlled by differential pressure or differential temperature. The setpoint of the speed, controlled by the differential pressure, is settable for comfort period and night/holiday. The setpoint of the temperature will be calculated by an outdoor compensated curve, the current value is the difference between supply and return temperature.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Type Pump Control | - | 0 | 2 | 0 | 0 = constant<br>1 = temperature<br>2 = pressure | **Configuration ▶ HS ▶ HSx ▶ System ▶** |
| Outdoor Temp 1 | °C | -40.0 | 30.0 | -20.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Outdoor Temp 2 | °C | -40.0 | 30.0 | -15.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Outdoor Temp 3 | °C | -40.0 | 30.0 | -10.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Outdoor Temp 4 | °C | -40.0 | 30.0 | -5.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Outdoor Temp 5 | °C | -40.0 | 30.0 | 0.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Outdoor Temp 6 | °C | -40.0 | 30.0 | 5.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Outdoor Temp 7 | °C | -40.0 | 30.0 | 10.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Outdoor Temp 8 | °C | -40.0 | 30.0 | 15.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Difference 1 | °C | 0.0 | 50.0 | 10.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Difference 2 | °C | 0.0 | 50.0 | 10.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Difference 3 | °C | 0.0 | 50.0 | 10.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Difference 4 | °C | 0.0 | 50.0 | 10.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Difference 5 | °C | 0.0 | 50.0 | 10.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Difference 6 | °C | 0.0 | 50.0 | 10.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Difference 7 | °C | 0.0 | 50.0 | 10.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Difference 8 | °C | 0.0 | 50.0 | 10.0 | Only used for **Type** = 1 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Differential pressure Day | kPa | 0.0 | 100.0 | 20.0 | Only used for **Type** = 2 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Differential pressure Night | kPa | 0.0 | 100.0 | 20.0 | Only used for **Type** = 2 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Pump speed Min | % | 10.0 | 100.0 | 10.0 | Only used for **Type** = 1 or 2 | **Configuration ▶ HS ▶ HSx ▶ Pump Control ▶** |
| Pump control P-band | °C / kPa | 0.0 | 1000.0 | 100.0 | | **HSx ▶ Temp control ▶** |
| Pump control I-time | min | 0.0 | 1000.0 | 100.0 | | **HSx ▶ Temp control ▶** |

### 3.2.23 Actuator exercise

The *Actuator exercise* function automatically detects if the actuators (pump, valve) have moved due to having undertaken any control tasks since the last run of the function. If this is not the case, the pumps, followed by the valve, are triggered for an adjustable interval at a settable weekday and time, thereby preventing blocking in the actuator and the pump.

The sequence of exercise is the following, but depending on the type of system:

- ✓ Pump A
- ✓ Pump B (only for double pumps)
- ✓ Valve

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 1 | 1 | 0 | Turns the *Actuator exercise* function on or off.<br>0 = Off<br>1 = On | **Configuration ▶ HS ▶ HSx ▶ Actuator Exercise▶** |
| Day | - | 0 | 7 | 0 | 0 = Daily<br>1 = Monday<br>…<br>7 = Sunday | **Configuration ▶ HS ▶ HSx ▶ Actuator Exercise▶** |
| Time | hh:mm | 00:00 | 23:59 | 02:00 | Time for actuator exercise. | **Configuration ▶ HS ▶ HSx ▶ Actuator Exercise▶** |
| Duration | s | 0 | 600 | 120 | Duration of the actuator exercise. | **Configuration ▶ HS ▶ HSx ▶ Actuator Exercise▶** |

### 3.2.24 Status

Each circuit has the following sub statuses. For more information about the different main statuses, see *chapter 2 Information for the end user*.

| Name | Description |
|---|---|
| Main Status | 0 = Not active<br>1 = Frost<br>2 = Switch Off<br>3 = Support operation<br>4 = Normal operation<br>5 = Holiday<br>6 = Screed drying |
| Sub Status Frost Outdoor | 0 = Off<br>1 = On |
| Sub Status Optimizer | 0 = Off<br>1 = On |
| Sub Status Extended Run | 0 = Off<br>1 = On |
| Sub Status Flash Adaption | 0 = Off<br>1 = On |
| Sub Status Support Op. | 0 = Off<br>1 = On |
| Sub Status Room Comp. | 0 = Off<br>1 = On |
| Sub Status Boost | 0 = Off<br>1 = On |
| Sub Status Wind | 0 = Off<br>1 = On |
| Sub Status Delta-T | 0 = Off<br>1 = On |
| Sub Status Universal Lim | 0 = Off<br>1 = On |
| Sub Status Power Lim | 0 = Off<br>1 = On |
| Sub Status Limitation | 0 = Off<br>1 = On |
| Sub Status Dewpoint Lim | 0 = Off<br>1 = On |

| Name | Description |
|---|---|
| Sub Status Delay Pump | 0 = Off<br>1 = On |
| Sub Status Exercise | 0 = Off<br>1 = On |
| Screed Drying Status | 1 = Hold Init Temp<br>2 = Hold Max Temp<br>3 = Increase to Max<br>4 = Decrease to Init Temp<br>5 = Hold Init Temp<br>6 = Stop |
| Screed Drying Timer | The current duration of the actual status. |
| Nr Power Fail | Number of power failures. |
| Operating Hours Pump A | Counts the operating hours for pump A. Can be reset by the user. |
| Operating Hours Pump B | Counts the operating hours for pump B. Can be reset by the user. |

### 3.2.25 Alarms

For more information about the alarms used by the heating systems, see the full alarm list in *Appendix D Alarm list*.

### 3.2.26 Manual mode

Setting parameters to manual mode is a very useful feature during commissioning or when troubleshooting.

**Caution!** Leaving any output in manual control means that the normal control will be suspended. Therefore, an alarm will be generated as soon as any output is set to any mode other than **Auto**.

The following parameters can be set to manual mode for the heating systems:

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Manual/Auto Valve | - | 0 | 2 | Auto | 0 = Off<br>1 = Manual<br>2 = Auto | **HSx ► Manual/Auto ►** |
| Manual SetP | % | 0 | 100 | - | 0-100% | **HSx ► Manual/Auto ►** |
| Manual/Auto Pump | - | 0 | 3 | Auto | 0 = Manual Off<br>1 = Manual On Pump A<br>2 = Manual On Pump B<br>3 = Auto | **HSx ► Manual/Auto ►** |
| Manual/Auto PumpCont | % | 0 | 100 | Auto | 0-100% | **HSx ► Manual/Auto ►** |
| Manual/Auto Dehumidification Output | - | 0 | 2 | Auto | 0 = Manual Off<br>1 = Manual On<br>2 = Auto | **HSx ► Manual/Auto ►** |
| Manual/Auto Bypass Output | - | 0 | 2 | Auto | 0 = Manual Off<br>1 = Manual On<br>2 = Auto | **HSx ► Manual/Auto ►** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Manual/Auto Heating | - | 0 | 3 | Auto | 0 = Off<br>1 = On<br>2 = Auto | **HSx ► Manual/Auto ►** |
| Manual/Auto Cooling | - | 0 | 3 | Auto | 0 = Off<br>1 = On<br>2 = Auto | **HSx ► Manual/Auto ►** |

## 3.3 Domestic hot water (HW1, HW2)

The controller can be configured for one or two domestic hot water systems, HW1 and HW2.

There are six different types of domestic hot water systems available as shown below.

1. PI controlled valve for controlling the supply temperature (flow-through system)

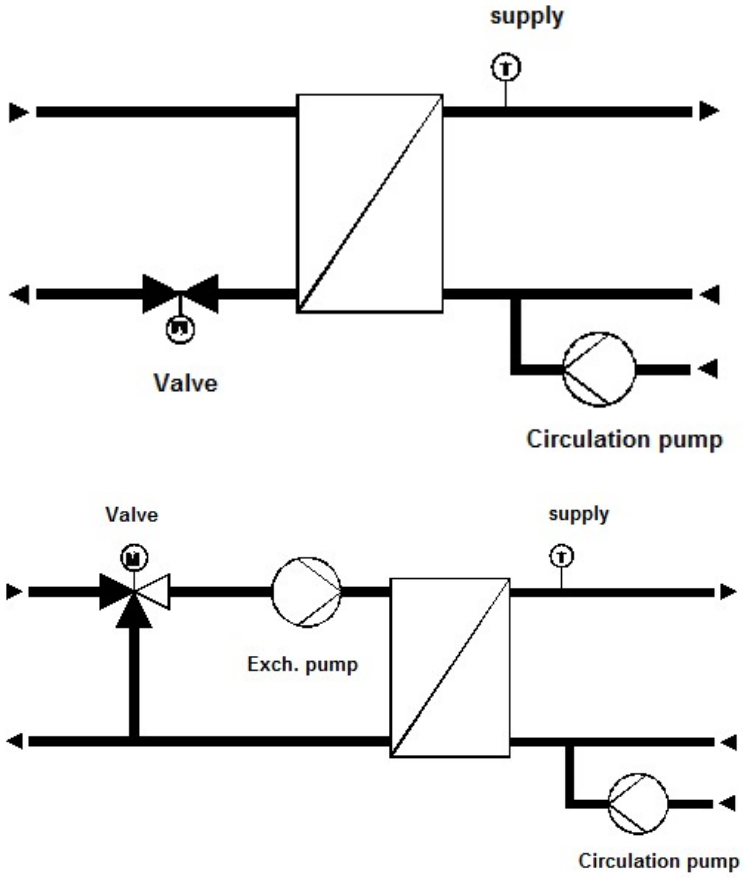



*Figure 3-10 PI controlled valve for controlling the supply temperature*

2. System with storage tank and tank charging pump or two-point valve

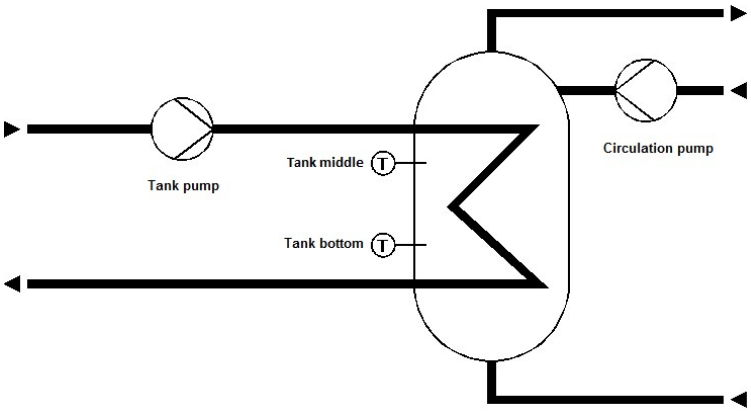



*Figure 3-11 System with storage tank and tank charging pump or two-point valve*

3. System with storage tank and tank charging pump plus valve

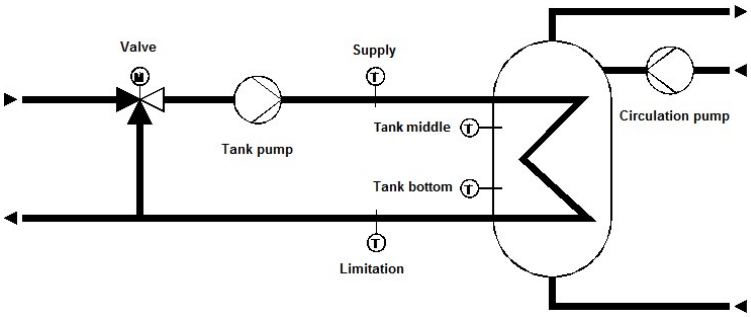



*Figure 3-12 System with storage tank and tank charging pump plus valve*

4. Storage tank charging systems with two point controlled tank and PI controlled load supply temperature

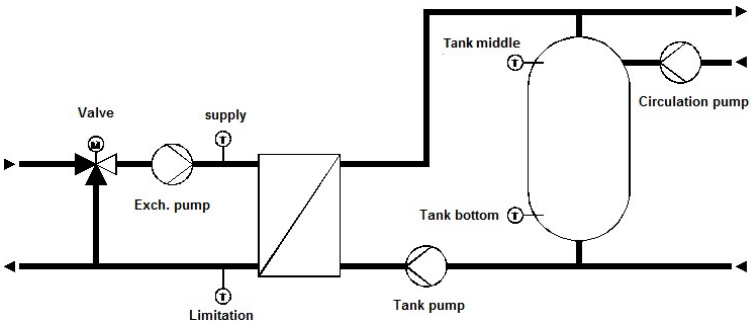



*Figure 3-13 Storage tank charging systems with two point controlled tank and PI controlled load supply temperature*

5. Storage tank charging systems with two-point controlled tank and PI controlled tank supply temperature

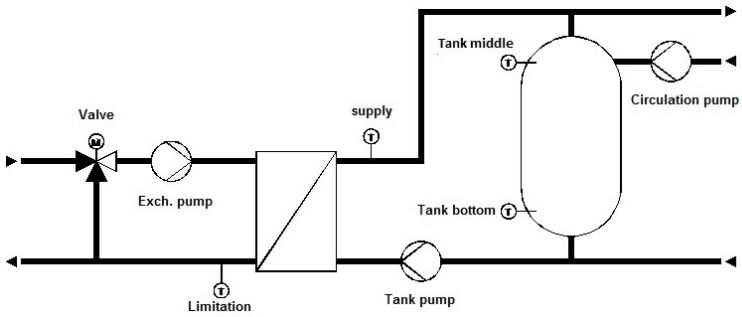



*Figure 3-14 Storage tank charging systems with two-point controlled tank and PI controlled tank supply temperature*

6. Storage tank charging system with two-point controlled tank and two-point controlled tank supply temperature

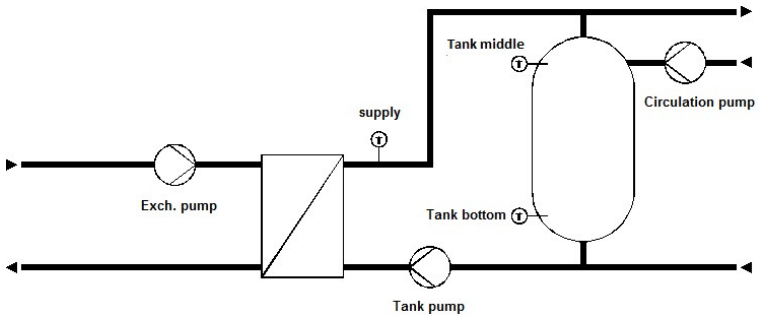



*Figure 3-15 Storage tank charging system with two-point controlled tank and two-point controlled tank supply temperature*

## 3.3.1 Inputs and outputs

The following inputs and outputs are used for domestic hot water systems.

### Analogue inputs

| Name | Unit | Description |
|---|---|---|
| Tank sensor middle | °C | Main sensor placed in the middle of the tank (system type 2-6). |
| Tank sensor bottom | °C | Additional sensor placed in the bottom of the tank (system type 2-6). |
| Supply temperature | °C | Supply temperature (system type 1)<br>Load supply (system type 3-4)<br>Tank supply temperature (system type 5-6) |
| Solar tank temperature | °C | Separate sensor for solar panel systems.<br>If there is no solar tank sensor, the circuit will use the lowest temperature in the tank as solar tank temperature. |
| Circulation return temperature | °C | Used for circulation control (circulation type 3: temperature control) and in the thermal disinfection function. |
| Outdoor temperature | °C | Used for the frost protection function to start the circulation pump. |
| Limitation sensor | °C | Separate sensor for the return temperature limitation function. |
| External setpoint | °C | External setpoint. |
| Heat capacity | kW | Used for the power limitation function. |

## Digital inputs

| Name | Unit | Description |
|---|---|---|
| Main switch | Off/Auto | Used to switch off the system. |
| Flow switch | Off/Auto | Used in system type 1 with electrical heater to shut off the output if there is no flow. |
| Start disinfection | - | Used to manually start thermal disinfection independently of the weekly plan.<br>0 = Auto<br>1 = Start disinfection |
| Feedback tank pump A | - | Feedback from tank pump A depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |
| Feedback tank pump B | - | Feedback from tank pump B (optional for motor protection). If there is no input configured, the function will use input for pump A for both pumps. |
| Feedback exchanger pump A | - | Feedback from exchanger pump A depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |
| Feedback exchanger pump B | - | Feedback from exchanger pump B (optional for motor protection). If there is no input configured, the function will use input for pump A for both pumps. |
| Feedback circulation pump A | - | Feedback from circulation pump A depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |
| Feedback circulation pump B | - | Feedback from circulation pump B (optional for motor protection). If there is no input configured, the function will use input for pump A for both pumps. |

## Analogue outputs

| Name | Unit | Description |
|---|---|---|
| Valve continuous | % | Used to control an actuator with continuous control. |

## Digital outputs

| Name | Unit | Description |
|---|---|---|
| Valve open | Off/On | Used to control an actuator with open/close control. |
| Valve close | Off/On | Used to control an actuator with open/close control. |
| Tank pump A | Off/On | Used to control a single pump or the first pump of a double pump. |
| Tank pump B | Off/On | Used to control the second pump of a double pump. |
| Exchanger pump A | Off/On | Used to control a single pump or the first pump of a double pump. |
| Exchanger pump B | Off/On | Used to control the second pump of a double pump. |
| Circulation pump A | Off/On | Used to control a single pump or the first pump of a double pump. |
| Circulation pump B | Off/On | Used to control the second pump of a double pump. |

| Name | Unit | Description |
|---|---|---|
| Thermal disinfection | Off/On | Used to signal that the Thermal disinfection is working. |
| Thermal cleaning | Off/On | Used to control the flushing of the pipes. |

## 3.3.2 Setpoints

The following parameters are the needed and calculated setpoints for domestic hot water systems. There is one setpoint per period, and it is possible to change the setpoint for the different comfort times, the night setback and the holiday period. The boost values are used to calculate the setpoint of the control circuit depending on the tank/supply setpoint.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Tank SetP | °C | 0.0 | 100.0 | - | Calculated tank setpoint (system type 2-6). | **HWx ► Actual ►** |
| Supply Temperature SetP | °C | 0.0 | 100.0 | - | Calculated supply setpoint (system type 1, 3-6). | **HWx ► Actual ►** |
| Hot Water Setp SP- CT1 | °C | 0.0 | 100.0 | 50.0 | Comfort setpoint, time period 1. | **HWx ► Setpoint ►** |
| Hot Water Setp SP- CT2 | °C | 0.0 | 100.0 | 50.0 | Comfort setpoint, time period 2. | **HWx ► Setpoint ►** |
| Hot Water Setp SP- CT3 | °C | 0.0 | 100.0 | 50.0 | Comfort setpoint, time period 3. | **HWx ► Setpoint ►** |
| Hot Water Setp SP- CT4 | °C | 0.0 | 100.0 | 50.0 | Comfort setpoint, time period 4. | **HWx ► Setpoint ►** |
| Hot Water Setp SP- NCT | °C | 0.0 | 50.0 | 2.0 | Night/Eco mode setpoint. | **HWx ► Setpoint ►** |
| Hot Water Setp SP-Hol | °C | 0.0 | 50.0 | 2.0 | Holiday setpoint. | **HWx ► Setpoint ►** |
| Boost Demand | °C | 0.0 | 50.0 | 10.0 | Boost to calculate demand (system type 3-4). | **HWx ► Setpoint ►** |
| Boost Supply | °C | 0.0 | 50.0 | 5.0 | Boost for tank supply (system type 5-6). | **HWx ► Setpoint ►** |

### Setpoint calculation

System type 1:

```
Setpoint supply = Setpoint CTx, night or holiday
```

System type 2–6:

```
Setpoint tank = Setpoint CTx, night or holiday
```

System type 3–4:

```
Setpoint supply = Setpoint tank + Boost demand
```

System type 5–6:

```
Setpoint supply = Setpoint tank + Boost tank supply
```

## 3.3.3 General settings / Configuration

To adjust the controller program to the structure of the hot water system, the type of hot water system can be configured. Depending on the type of hot water system, the valve output and the pumps can also be configured.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Type | - | 1 | 6 | 1 | Type of domestic hot water system:<br>1 = PI controlled valve for controlling the supply temperature (flow-through system).<br>2 = System with storage tank and tank charging pump or two-point valve.<br>3 = System with storage tank and tank charging pump plus valve.<br>4 = Storage tank charging systems with two point controlled tank and PI controlled load supply temperature.<br>5 = Storage tank charging systems with two-point controlled tank and PI controlled tank supply temperature.<br>6 = Storage tank charging system with two-point controlled tank and two-point controlled tank supply temperature. | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Actuator Type Valve | | 1 | 4 | 1 | Type of actuator:<br>1 = 0-10 V<br>2 = 2-10 V<br>3 = 10-2 V<br>4 = 10-0 V | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Actuator Runtime | s | 0 | 600 | 120 | Runtime of 3-point actuator. | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Tank Pump Type | - | 0 | 1 | 0 | Type of pump:<br>0 = Single<br>1 = Double | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Tank Pump Ind | - | 0 | 1 | 0 | Type of feedback for the pump.<br>0 = motor protection<br>1 = run indication | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Tank Pump Delay | s | 0 | 200 | 10 | Delay time of the pump indication | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Tank Pump Runtime | h | 0 | 1000 | 100 | Runtime of the pump, only used for double pumps. | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Exchanger Pump Type | - | 0 | 1 | 0 | Type of pump:<br>0 = Single<br>1 = Double | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Exchanger Pump Ind | - | 0 | 1 | 0 | Type of feedback for the pump.<br>0 = motor protection<br>1 = run indication | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Exchanger Pump Delay | s | 0 | 200 | 10 | Delay time of the pump indication. | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Exchanger Pump Runtime | h | 0 | 1000 | 100 | Runtime of the pump, only used for double pumps. | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Circulation Pump Type | - | 0 | 1 | 0 | Type of pump:<br>0 = Single<br>1 = Double | **Configuration ▶ HW ▶ HWx ▶ System▶** |
| Circulation Pump Ind | - | 0 | 1 | 0 | Type of feedback for the pump.<br>0 = motor protection<br>1 = run indication | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Circulation Pump Delay | s | 0 | 200 | 10 | Delay time of the pump indication. | **Configuration ▶ HW ▶ HWx ▶ System ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Circulation Pump Runtime | h | 0 | 1000 | 100 | Runtime of the pump, only used for double pumps. | **Configuration ▶ HW ▶ HWx ▶ System ▶** |
| Nr Sensor NCT | | 0 | 1 | 0 | Only used if both tank sensors are configured.<br>0 = Both sensors used during NCT.<br>1 = Only tank top sensor is used during NCT. | **Configuration ▶ HW ▶ HWx ▶ Tank sensor ▶** |

### 3.3.4 Frost protection

The *Frost protection* function is always active (unless the controller is in non-active or manual mode) in order to prevent damage (frozen pipes) to the hot water circuit. It consists of three parts:

- ✓ Frost protection tank:
  Heats up the tank one time.The tank setpoint is calculated as **Frost Limit Tank** + 15°C. Hysteresis is 10 K.
- ✓ Frost protection supply:
  Starts the controller for system type 1 or the loading process for system type 3-6. The supply setpoint is calculated as **Frost Limit Supply** + 15°C. Hysteresis is 1 K.
- ✓ Frost protection outdoor:
  Starts the circulation pump. Hysteresis is 1 K.

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Frost Limit Tank | °C | 2.0 | 50.0 | 5.0 | The temperature at which the tank is heated up. | **Configuration ▶ HW ▶ HWx ▶ Frost ▶** |
| Frost Limit Supply | °C | 2.0 | 50.0 | 5.0 | The temperature at which the loading system is started. | **Configuration ▶ HW ▶ HWx ▶ Frost ▶** |
| Frost Limit Outdoor | °C | -50.0 | 50.0 | 2.0 | The temperature at which the circulation pump is started. | **Configuration ▶ HW ▶ HWx ▶ Frost ▶** |

### 3.3.5 Thermal disinfection

The *Thermal disinfection* function prevents the build-up of bacteria (Legionella) in the water by heating up the temperature in the storage tank to at least 60°C.

If required, the storage tank setpoint, **Setpoint tank**, and the supply setpoint, **Setpoint supply**, can be adjusted in order to achieve shorter heat-up times or higher storage tank temperatures.

When activated, thermal disinfection will be performed at regular intervals, according to the configuration of the parameters **Day** (day of the week, 0 = daily) and **Time** (start time). The disinfection can also be activated by the input **Start Disinfection**.

During thermal disinfection, the switch output **Thermal Disinfection** is triggered in order to, for example, switch an additional heat source on (electric heating, magnet valve for additional volume). If the storage temperature reaches the specified setpoint, a **Hold time** can be used to hold this temperature level for a defined time. This **Hold time** is necessary if the setpoint is lower than 70°C and the bacteria are not killed directly. After the disinfection of the tank, all fittings (taps, shower heads, etc.) should be cleaned. For this purpose, the thermal disinfection triggers the switch output **Thermal Cleaning** for the running time set in the parameter **Cleaning time**. By opening a magnetic valve, automatic cleaning is possible. Alternatively, a warning device (lamp, horn, etc.) can request cleaning. During the cleaning process, the storage tank setpoint of the thermal disinfection remains effective. If required, the storage tank will be reloaded.

If the circulation pump is supposed to run during thermal disinfection, the circulation pump has to be activated (see *3.3.11 Circulation*) with the parameter **Release TD** = 1. If there is a Circulation Return Sensor configured, the temperature at the sensor must be at least at a temperature of **SP Tank** – 10 K.

The current storage tank temperature **Last temp** and the related **Last time** and **Last date** are stored.

If the specified storage tank setpoint is not reached within the **Max time** after start of this function, an alarm is triggered with the status "thermal disinfection" and the function is interrupted.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 1 | 0 | Activates or deactivates the *Thermal disinfection* function.<br>0 = Off<br>1 = On | `Configuration ▶ HW ▶ HWx ▶ Disinfection ▶` |
| SP Tank | °C | 60.0 | 100.0 | 70.0 | Setpoint tank during thermal disinfection. | `Configuration ▶ HW ▶ HWx ▶ Disinfection ▶` |
| SP Supply | °C | 60.0 | 100.0 | 75.0 | Setpoint supply during thermal disinfection. | `Configuration ▶ HW ▶ HWx ▶ Disinfection ▶` |
| Day | - | 0 | 7 | 0 | Weekday for thermal disinfection.<br>0 = Daily<br>1-7 = Monday, …, Sunday | `Configuration ▶ HW ▶ HWx ▶ Disinfection ▶` |
| Time | - | 00:00 | 23:59 | 1:00 | Time for thermal disinfection. | `Configuration ▶ HW ▶ HWx ▶ Disinfection ▶` |
| Clean Time | min | 0 | 240 | 0 | Running time for thermal cleaning. | `Configuration ▶ HW ▶ HWx ▶ Disinfection ▶` |
| Hold Time | min | 0 | 120 | 0 | | `Configuration ▶ HW ▶ HWx ▶ Disinfection ▶` |
| Max Time | min | 0 | 600 | 240 | Max time for thermal disinfection. | `Configuration ▶ HW ▶ HWx ▶ Disinfection ▶` |
| Thermal Disinfect Last Temp | °C | 60.0 | 100.0 | - | The tank temperature for the last thermal disinfection. Read only. | `HWx ▶ Status ▶` |
| Thermal Disinfect Last Time | - | 00:00 | 23:59 | - | The time when the last thermal disinfection occurred. Read only. | `HWx ▶ Status ▶` |
| Thermal Disinfect Last Day | - | 01.01.-00 | 31.12.-99 | - | The date when the last thermal disinfection occurred. Read only. | `HWx ▶ Status ▶` |
| Thermal Disinfect Hold timer | min | 0 | 120 | - | Current value of the thermal disinfection hold time. | `HWx ▶ Status ▶` |
| Thermal Disinfect Clean Timer | min | 0 | 240 | - | Current value of the thermal cleaning run time. | `HWx ▶ Status ▶` |
| Thermal Disinfect Max Timer | min | 0 | 600 | - | Current value of the thermal disinfection max time. | `HWx ▶ Status ▶` |

## 3.3.6 Power limitation

The *Power limitation* function permits limitation of the capacity output to the domestic hot water circuit. The function will be active if a **Heat capacity** input is assigned. This function requires a heat meter to be installed and connected to provide the currently used capacity.

The limitation affects the signal to the valve of the hot water circuit by closing the valve.

**Note!** The function doesn't work for HW of type 2 or 6, since there is no continuous control of supply temperature for these systems.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Limit | kW | 0 | 10000 | 10000 | Max limit of the consumed heat capacity. | **Configuration ▶ HW ▶ HWx ▶ Power limitation ▶** |
| Power Limit P-Band | kW | 1 | 1000 | 100 | P-band. | **HWx ▶ Temp control ▶** |
| Power Limit I-time | s | 0 | 9999 | 0 | I-time. | **HWx ▶ Temp control ▶** |
| Power Limit Output | % | - | - | - | Controller output. | **HWx ▶ Temp control ▶** |

### 3.3.7 Blocking heat producer

When using a solar circuit in the DHW circuit, the criteria for activation of hot water loading can be defined with this function. The solar loading is always active. The hot water loading can be blocked, activated or reserved according to the current operating and/or non-operating time. In reserved operation, the hot water loading is not activated until the specified storage temperature difference is exceeded and the delay expired. If the hot water loading is blocked it can only be loaded via the solar system.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Block at CT | - | 0 | 2 | 1 | 0 = Blocked<br>1 = Released<br>2 = Reserved | **Configuration ▶ HW ▶ HWx ▶ Block of heat prod. ▶** |
| Block at NCT | - | 0 | 2 | 1 | 0 = Blocked<br>1 = Released<br>2 = Reserved | **Configuration ▶ HW ▶ HWx ▶ Block of heat prod. ▶** |
| Dev load | K | 0.5 | 50.0 | 10.0 | Max. negative control deviation (tank sensor<setpoint) for which hot water loading in reserve operation is activated. | **Configuration ▶ HW ▶ HWx ▶ Block of heat prod. ▶** |
| Delay load | min | 1 | 600 | 300 | Delay for hot water loading activation in reserve operation. | **Configuration ▶ HW ▶ HWx ▶ Block of heat prod. ▶** |

### 3.3.8 Return temperature limitation

The *Return temperature limitation* function is used to limit the temperature at the limitation sensor to a maximum value by closing the valve. The function will be active if a return temperature sensor is assigned.

If the temperature on the limitation sensor exceeds the limit, the PI-controller of this function takes over the control of the valve with a seamless transition between the PI-controllers.

The function is working as long as the output of the return limitation PI is lower than the output of the supply PI.

If the valve is completely closed by the function, it will be opened to 5% every 10 min for 15 seconds. This is needed to get enough circulation of water to be able to measure the right temperature.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Limit | °C | 2.0 | 160.0 | 100.0 | Maximum temperature at the limitation sensor. | **Configuration ▶ HW ▶ HWx ▶ Return limitation ▶** |
| Return Temp P-Band | °C | 1 | 500.0 | 100.0 | P-band. | **HWx ▶ Temp control ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Return Temp I-time | s | 0 | 9999 | 100.0 | I-time. | **HWx ▶ Temp control ▶** |
| Return Temp Output | % | 0 | 100 | - | Controller output. | **HWx ▶ Temp control ▶** |

### 3.3.9 Tank control

The *Tank control* function applies to all system types in which the storage tank temperature is controlled by means of on/off control, i.e. system type 2 – 6.

Sensor 1 is placed in the middle of the tank and sensor 2 in the bottom area.

Internally, the HW is working with the lowest and highest tank temperature. If both sensors are configured, the one with the lowest temperature is used for lowest tank temperature and vice versa.

If both tank sensors are configured it is possible to determine which sensor is used depending on the non-comfort time using the **Nr Sensor NCT** parameter.

- ✓ For calculation of the current value for thermal disinfection, the function checks both sensors regardless of setting.
- ✓ For solar panel systems, the lowest of both sensors is used if there is no solar tank sensor configured.

System type 2-3 uses a positive switch difference:

- ✓ Loading is On when lowest temp and highest temp < Setpoint tank
- ✓ Loading is Off when lowest and highest temp >= Setpoint tank + Switch difference

System type 4-6 uses a negative switch difference:

- ✓ Loading is On when lowest and highest temp < Setpoint tank – Switch difference
- ✓ Loading is Off when lowest and highest temp >= Setpoint tank

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Nr Sensor NCT | - | 0 | 1 | 0 | Only used if both tank sensors are configured.<br>0 = Both sensors are used during NCT<br>1 = Only the middle tank sensor is used during NCT. | **Configuration ▶ HW ▶ HWx ▶ Tank sensor ▶** |
| Tank Control Hyst Day | °C | 0.1 | 50.0 | 5.0 | Hysteresis used during comfort mode. | **HWx ▶ Temp control ▶** |
| Tank Control Hyst Night | °C | 0.1 | 50.0 | 5.0 | Hysteresis used during eco mode. | **HWx ▶ Temp control ▶** |

### 3.3.10 Supply control

For system type 1 or systems in combination with system type 1, the supply temperature is controlled continuously by triggering a valve. The behaviour of the PI controller can be compensated by adjusting parameters of the controller.

For system type 3-4, the load supply temperature **Supply temperature** is controlled by means of **Setpoint supply** during HW tank loading. This setpoint is the sum of **Setpoint tank** and **Boost demand**.

For system type 5-6, the tank supply temperature is controlled by means of **Setpoint supply** during HW tank loading. This setpoint is the sum of **Setpoint tank** and **Boost supply**.

The temperature is PI controlled by a valve.

**Hysteresis**: Switch difference for exchanger load pump for system type 6.

- ✓ Exchanger pump is On when tank supply < Setpoint tank supply
- ✓ Exchanger pump is Off when tank supply >= Setpoint tank supply + Switch difference

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Supply Control P-band+ | °C | 1 | 1000 | 25 | P-band for opening the valve. | HWx ▶ Temp control ▶ |
| Supply Control I-time+ | s | 0 | 9999 | 100 | I-time for opening the valve. | HWx ▶ Temp control ▶ |
| Supply Control D-time+ | s | 0 | 9999 | 0 | D-time for opening the valve. | HWx ▶ Temp control ▶ |
| Supply Control P-band- | °C | 1 | 1000 | 25 | P-band for closing the valve. | HWx ▶ Temp control ▶ |
| Supply Control I-time- | s | 0 | 9999 | 100 | I-time for closing the valve. | HWx ▶ Temp control ▶ |
| Supply Control D-time- | s | 0 | 9999 | 0 | D-time for closing the valve. | HWx ▶ Temp control ▶ |
| Hysteresis | °C | 0.0 | 50.0 | 10.0 | Switch difference for the exchanger load pump (system type 6). | HWx ▶ Temp control ▶ |

## 3.3.11 Circulation

This menu permits defining at what point an installed circulation pump should run.

- ✓ If the **Main status** of the circuit is **Not active** or **Switch Off**, the pump is stopped.
- ✓ If the **Main status** is **Frost**, the pump runs all the time.

Different types of circulation control can be used for the pump:

0: Off

1: Permanently On

2: Pulsed mode

- ✓ Pump is running for **On-time**, and then it stops for **Off-time**.

3: Temperature control (this option needs an installed circulation return sensor).

- ✓ Pump is on until the **Circulation return temperature** is higher than the highest value of both tank sensors minus **Return-Temp Control Temp-Diff**.
- ✓ Then the pump stops for **Off-time**.
- ✓ After **Off-time**, the pump starts for 10 seconds to measure the right temperature.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Rel CTx | - | 0 | 3 | 1 | Control mode for the circulation pump during CTx.<br>0 = Off<br>1 = On<br>2 = Pulsed mode<br>3 = Temperature control mode | Configuration ▶ HW ▶ HWx ▶ Circulation ▶ |
| Rel NCT | - | 0 | 3 | 1 | Control mode for the circulation pump during NO.<br>0 = Off<br>1 = On<br>2 = Pulsed mode<br>3 = Temperature control mode | Configuration ▶ HW ▶ HWx ▶ Circulation ▶ |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Rel Load | - | 0 | 1 | 1 | Release of circulation pump during tank load.<br>0 = Off<br>1 = On | **Configuration ▶ HW ▶ HWx ▶ Circulation ▶** |
| Rel TD | - | 0 | 1 | 1 | Control mode for the circulation pump during thermal disinfection.<br>0 = Off<br>1 = On<br>2 = Pulsed mode<br>3 = Temperature control mode | **Configuration ▶ HW ▶ HWx ▶ Circulation ▶** |
| Time Control On-time | min | 0 | 60 | 2 | Pump on time when in *Pulsed* mode. | **Configuration ▶ HW ▶ HWx ▶ Circulation ▶** |
| Time Control Off-time | min | 0 | 60 | 30 | Pump off time when in *Pulsed* mode or *Temperature control* mode. | **Configuration ▶ HW ▶ HWx ▶ Circulation ▶** |
| Return-Temp Control Temp-Diff | °C | 0.0 | 50.0 | 10.0 | Temperature difference to stop the circulation in *Temperature control* mode. | **Configuration ▶ HW ▶ HWx ▶ Circulation ▶** |

## 3.3.12 Switch off delay

The *Switch off delay* function permits delaying storage tank loading switch-off or delaying deactivation of the heat exchanger. The function is divided into two parts, delay of load and delay of heat exchanger. Both parts work in sequence, delay of heat exchanger starts after delay of load.

- ✓ Delay of load is used to cool down the heat producer if the HW sent the highest demand. It works for all types of HW systems if the circuit stops loading the tank or stops the production of tap water for system type 1. While the function runs, the tank pump and the valve are still working.
- ✓ Delay of heat exchanger is used to remove the remaining energy from the heat exchanger for system type 4–6. For system type 4 and 5 the valve is closed, and tank pump and exchanger pump runs.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Delay Load | min | 0.0 | 60.0 | 3.0 | Switch off delay for storage tank loading. | **Configuration ▶ HW ▶ HWx ▶ Switch off delay ▶** |
| Delay Exch | s | 0 | 600 | 120 | Switch off delay for heat exchanger. | **Configuration ▶ HW ▶ HWx ▶ Switch off delay ▶** |

## 3.3.13 Actuator exercise

The *Actuator exercise* function automatically detects if the actuators (pump, valve) have moved due to having undertaken any control tasks since the last run of the function. If this is not the case, the pumps, followed by the valve, are triggered for an adjustable interval at a settable weekday and time, thereby preventing blocking in the actuator and the pumps.

The sequence of exercise is the following:

1. Pump A
2. Pump B (only for double pumps)
3. Valve

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 1 | 0 | Activates or deactivates the *Actuator exercise* function.<br>0 = Off<br>1 = On | **Configuration ▶ HW ▶ HWx ▶ Actuator exercise ▶** |
| Day | - | 0 | 7 | 0 | Weekday for actuator exercise.<br>0 = Daily<br>1-7 = Monday, …, Sunday | **Configuration ▶ HW ▶ HWx ▶ Actuator exercise ▶** |
| Time | hh:mm | 00:00 | 23:59 | 02:00 | Time for actuator exercise. | **Configuration ▶ HW ▶ HWx ▶ Actuator exercise ▶** |
| Duration | s | 0 | 600 | 120 | Duration of the actuator exercise. | **Configuration ▶ HW ▶ HWx ▶ Actuator exercise ▶** |

### 3.3.14 Status

Each circuit has the following sub statuses. For more information about the different main statuses, see *chapter 2 Information for the end user*.

| Name | Description |
|---|---|
| Main Status | 0 = Not active<br>1 = Frost<br>2 = Switch off<br>3 = Support operation<br>4 = Normal operation<br>5 = Holiday |
| Sub Status Load | 0 = Off<br>1 = Load<br>2 = Hold<br>3 = Cooling |
| Sub Status 2PntOff | 0 = Off<br>1 = On |
| Sub Status Switch Off | 0 = Off<br>1 = SwitchOffLoad<br>2 = SwitchOffExchanger |
| Sub Status Return Lim | 0 = Off<br>1 = On |
| Sub Status Circulation | 0 = Off<br>1 = On<br>2 = Timer controlled<br>3 = Temperature controlled |
| Sub Status Frost Outd | 0 = Off<br>1 = On |
| Sub Status Power Lim | 0 = Off<br>1 = On |
| Sub Status Exercise | 0 = Off<br>1 = On |
| Sub Status Block heat producer | 0 = Off<br>1 = On |
| Operating Hours Tank Pump A | Operating hours for Storage tank load pump A. |
| Operating Hours Tank Pump B | Operating hours for Storage tank load pump B. |
| Operating Hours Exchanger Pump A | Operating hours for Exchanger pump A. |
| Operating Hours Exchanger Pump B | Operating hours for Exchanger pump B. |

| Name | Description |
|---|---|
| Operating Hours Circulation Pump A | Operating hours for Circulation pump A. |
| Operating Hours Circulation Pump B | Operating hours for Circulation pump B. |

### 3.3.15 Alarms

For more information about the alarms used by the domestic hot water systems, see the full alarm list in *Appendix D Alarm list*.

### 3.3.16 Manual mode

Setting parameters to manual mode is a very useful feature during commissioning or when troubleshooting.

**Caution!** Leaving any output in manual control means that the normal control will be suspended. Therefore, an alarm will be generated as soon as any output is set to any mode other than **Auto**.

The following parameters can be set to manual mode for the domestic hot water systems:

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Manual/Auto Valve | - | 0 | 2 | Auto | 0 = Off<br>1 = Manual<br>2 = Auto | **HWx ▶ Manual/Auto ▶** |
| Manual Set | % | 0 | 100 | - | 0-100% | **HWx ▶ Manual/Auto ▶** |
| Manual/Auto Tank-Pump | - | 0 | 3 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3 = Auto | **HWx ▶ Manual/Auto ▶** |
| Manual/Auto Exchanger-Pump | - | 0 | 3 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3 = Auto | **HWx ▶ Manual/Auto ▶** |
| Manual/Auto Circulation-Pump | - | 0 | 3 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3 = Auto | **HWx ▶ Manual/Auto ▶** |
| Manual/Auto Thermal disinfect. Manual | - | 0 | 2 | Auto | 0 = Off<br>1 = On<br>2 = Auto | **HWx ▶ Manual/Auto ▶** |
| Manual/Auto Thermal disinfect. Clean | - | 0 | 3 | Auto | 0 = Off<br>1 = On<br>2 = Auto | **HWx ▶ Manual/Auto ▶** |

## 3.4 Buffer tank (HP1)

A buffer tank has many positive effects on a system, including reducing starts and stops from a boiler or heat pump and generating cheaper heat production when available (solar, pellet, etc.). The temperature in the buffer tank is controlled according to the demands of the internal heat circuits and domestic hot water circuits, as well as demand via 0…10 V. The controller makes use of all available heat producers using the following priority:

1. Solar panel
2. Internal heat producer

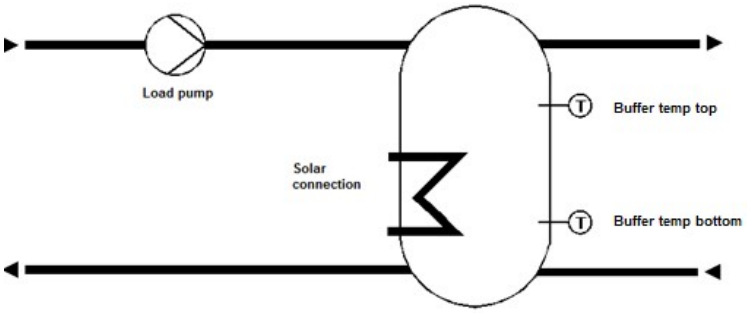



*Figure 3-16 Buffer tank*

## 3.4.1 Inputs and outputs

The following inputs and outputs are used for the buffer tank.

### Analogue inputs

| Name | Unit | Description |
|---|---|---|
| Buffer temp top | °C | Buffer temperature top, main sensor. |
| Buffer temp bottom | °C | Buffer temperature bottom, additional sensor. |
| Additional heat source | °C | Temperature additional heat source, additional sensor. |
| Demand heating extern | °C | Demand for an external heat consumer. |

### Digital inputs

| Name | Unit | Description |
|---|---|---|
| Main switch | Off/Auto | Used to switch off the system. |
| Feedback load pump A | - | Feedback from pump A depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |
| Feedback load pump B | - | Feedback from pump B depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |

| Name | Unit | Description |
|---|---|---|
| Feedback additional heat source pump A | - | Feedback from pump A depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |
| Feedback additional heat source pump B | - | Feedback from pump B depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |

## Analogue outputs

| Name | Unit | Description |
|---|---|---|
| Demand | °C | Internal connection to the heat producer to send the heating/cooling demand. |

## Digital outputs

| Name | Unit | Description |
|---|---|---|
| Load pump A | Off/On | Used to control a single pump or the first pump of a double pump. |
| Load pump B | Off/On | Used to control the second pump of a double pump. |
| Additional heat source pump A | Off/On | Used to control a single pump or the first pump of a double pump. |
| Additional heat source pump B | Off/On | Used to control the second pump of a double pump. |

### 3.4.2 Setpoints

The program can control normal buffer tanks with one zone. The Setpoint menu displays the currently calculated buffer temperature setpoint **Setpoint Act** based on the demand from the internal heating circuits, the domestic hot water circuits and external heat consumers or on the **Constant Setpoint** depending on the settings. A **Hysteresis** can also be set in order to overheat the buffer tank for switching off the heat producers.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Setpoint Act | °C | 2.0 | 160.0 | - | Calculated setpoint, only used if the parameter **Temperature SP Type** is 1. | `Buffer ► Setpoint ►` |
| Hysteresis | °C | 1.0 | 25.0 | 5.0 | Hysteresis to overheat the buffer. | `Buffer ► Setpoint ►` |
| Constant Setpoint | °C | 0.0 | 90.0 | 50.0 | Constant setpoint, only used if the parameter **Temperature SP Type** is 0. | `Buffer ► Setpoint ►` |

### 3.4.3 Buffer tank configuration

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Temperature SP Type | - | 0 | 1 | 1 | Type of setpoint.<br>0 = constant setpoint<br>1 = calculated setpoint depending on demand | **Configuration ▶ Buffer ▶ System ▶** |
| Max Temp | °C | 20.0 | 90.0 | 70.0 | Maximum buffer tank temperature. | **Configuration ▶ Buffer ▶ System ▶** |
| Pump Type | - | 0 | 1 | 0 | Type of load pump.<br>0 = single pump<br>1 = twin pump | **Configuration ▶ Buffer ▶ System ▶** |
| Pump Ind | - | 0 | 1 | 0 | Type of feedback for the load pump.<br>0 = motor protection<br>1 = run indication | **Configuration ▶ Buffer ▶ System ▶** |
| Pump Delay | s | 0 | 200 | 10 | Delay time of the pump indication. | **Configuration ▶ Buffer ▶ System ▶** |
| Pump Runtime | h | 1 | 100 | 100 | Runtime of the load pump. | **Configuration ▶ Buffer ▶ System ▶** |

### 3.4.4 Boost

The *Boost* function can be used to set a boost for each demand (HS, HW, …). The boost can be used to compensate for loss of energy in long pipes or to disconnect an energy consumer (HS, HW).

The internal demand of the circuit is calculated as:

```
internal demand = demand * (1 + Boost/100)
```

A boost of -100% disconnects the circuit from the setpoint calculation.

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Boost HS1 | % | -100 | 100 | 0 | Boost for the demand of heating system 1 (only if **Type of setpoint** = 1). | **Configuration ▶ Buffer ▶ Boost ▶** |
| Boost HS2 | % | -100 | 100 | 0 | Boost for the demand of heating system 2 (only if **Type of setpoint** = 1). | **Configuration ▶ Buffer ▶ Boost ▶** |
| Boost HS3 | % | -100 | 100 | 0 | Boost for the demand of heating system 3 (only if **Type of setpoint** = 1). | **Configuration ▶ Buffer ▶ Boost ▶** |
| Boost HS4 | % | -100 | 100 | 0 | Boost for the demand of heating system 4 (only if **Type of setpoint** = 1). | **Configuration ▶ Buffer ▶ Boost ▶** |
| Boost HW1 | % | -100 | 100 | 0 | Boost for the demand of domestic hot water system 1 (only if **Type of setpoint** = 1). | **Configuration ▶ Buffer ▶ Boost ▶** |
| Boost HW2 | % | -100 | 100 | 0 | Boost for the demand of domestic hot water system 2 (only if **Type of setpoint** = 1). | **Configuration ▶ Buffer ▶ Boost ▶** |
| Boost EXT | % | -100 | 100 | 0 | Boost for external demand (only if **Type of setpoint** = 1). | **Configuration ▶ Buffer ▶ Boost ▶** |

### 3.4.5 Additional heat source

The *Additional heat source* function permits activating and configuring control of an additional heat source, which can be used to load the buffer tank with additional heat, if available. A maximum temperature and frost limit can also be defined.

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| TempDiffOn | K | 0.0 | 30.0 | 8.0 | The temperature difference between the additional heat source temperature and the buffer temperature at which the pump is switched on. | **Configuration ▶ Buffer ▶ Add. Heat Source ▶** |
| TempDiffOff | K | 0.0 | 20.0 | 2.0 | The temperature difference between the additional heat source temperature and the buffer temperature at which the pump is switched off. | **Configuration ▶ Buffer ▶ Add. Heat Source ▶** |
| Max Temp | °C | 50.0 | 160.0 | 90.0 | The temperature at which the additional heat source pump is always switched on. | **Configuration ▶ Buffer ▶ Add. Heat Source ▶** |
| Frost Limit | °C | -60.0 | 10.0 | -10.0 | The temperature at which the additional heat source pump is always switched on. | **Configuration ▶ Buffer ▶ Add. Heat Source ▶** |
| Add HeatS Pump Runtime | h | 0 | 999 | 100 | Runtime of the additional heat source pump. | **Configuration ▶ Buffer ▶ System ▶** |

### 3.4.6 Block heat producer

When using a solar circuit or additional heat source in the buffer, the criteria for activation of buffer loading can be defined with this function. The solar loading and additional heat source is always active. The buffer loading can be activated or reserved. In reserved operation, the buffer loading is not activated until the specified storage temperature difference is exceeded and the delay expired. If the buffer loading is blocked, the buffer can only be loaded via the solar circuit or additional heat source.

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Block at Load | - | 1 | 2 | 1 | 1 = Released<br>2 = Reserved | **Configuration ▶ Buffer ▶ Block of heat prod. ▶** |
| Dev Release Load | K | 0.5 | 50.0 | 10.0 | Max. negative control deviation (actual<-setpoint) for which buffer loading in reserve operation is activated if exceeded at tank sensor. | **Configuration ▶ Buffer ▶ Block of heat prod. ▶** |
| Delay Release Load | min | 1 | 600 | 10 | Delay for buffer loading activation in reserve operation. | **Configuration ▶ Buffer ▶ Block of heat prod. ▶** |

### 3.4.7 Actuator exercise

The *Actuator exercise* function automatically detects if the actuators (pump, valve) have moved due to having undertaken any control tasks since the last run of the function. If this is not the case, the pumps, followed by the valve, is triggered for an adjustable interval at a settable weekday and time, thereby preventing blocking in the actuator and the pump. The sequence of exercise is the following, but depending on the type of system:

1. Pump A

2. Pump B (only for double pumps)
3. Valve

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 1 | 1 | 0 | Turns the *Actuator exercise* function on or off.<br>0 = Off<br>1 = On | **Configuration ▶ Buffer ▶ Actuator exercise ▶** |
| Day | | 0 | 7 | 0 | 0 = Daily<br>1 = Monday…7 = Sunday | **Configuration ▶ Buffer ▶ Actuator exercise ▶** |
| Time | hh:mm | 00:00 | 23:59 | 02:00 | Time for actuator exercise. | **Configuration ▶ Buffer ▶ Actuator exercise ▶** |
| Duration | s | 0 | 600 | 120 | Duration of the actuator exercise. | **Configuration ▶ Buffer ▶ Actuator exercise ▶** |

## 3.4.8 Status

The buffer tank has the following sub statuses. For more information about the different main statuses, see *chapter 2 Information for the end user*.

| Name | Description |
|---|---|
| Main Status | 0 = Not active<br>2 = Switch off<br>4 = Normal operation |
| Sub Status Load | 0 = Off<br>1 = Load<br>2 = Hold |
| Sub Status Exercise | 0 = Off<br>1 = On |
| Sub status Block heat producer | 0 = Off<br>1 = On |
| Operating Hours Pump A | Operating hours for load pump A. |
| Operating Hours Pump B | Operating hours for load pump B. |
| Add Heat source Pump A | Operating hours for additional heat source pump A. |
| Add Heat source Pump B | Operating hours for additional heat source pump B. |

## 3.4.9 Alarms

For more information about the alarms used by the buffer tank, see the full alarm list in *Appendix D Alarm list*.

## 3.4.10 Manual mode

Setting parameters to manual mode is a very useful feature during commissioning or when troubleshooting.

**Caution!** Leaving any output in manual control means that the normal control will be suspended. Therefore, an alarm will be generated as soon as any output is set to any mode other than **Auto**.

The following parameters can be set to manual mode for the buffer tank:

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Manual/Auto Pump | - | 0 | 3 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3= Auto | **Buffer ▶ Manual/ Auto ▶** |
| Add Heat source Pump | - | 0 | 2 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3 = Auto | **Buffer ▶ Manual/ Auto ▶** |

## 3.5 District heating system (DHS1)

A district heating circuit is a demand based system. It's controlling the secondary temperature with an actuator, using continuous or 3-point control signal. The system collects the demand from the internal and/ or external heat consumer.

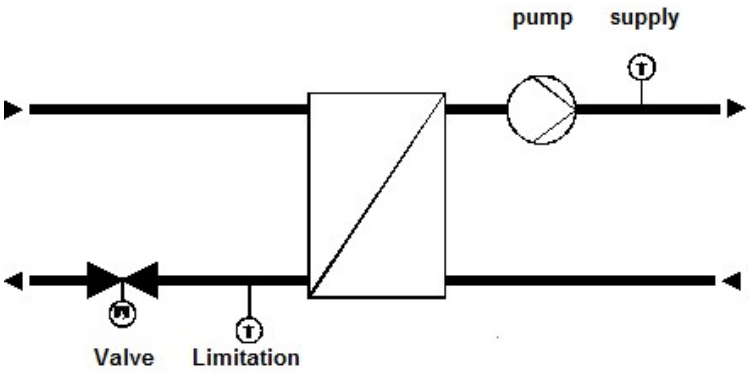



*Figure 3-17 District heating system*

### 3.5.1 Inputs and outputs

The following inputs and outputs are used for district heating systems.

### Analogue inputs

| Name | Unit | Description |
|---|---|---|
| Secondary supply temperature | °C | Main sensor. |
| Primary return temperature | °C | Sensor for return limitation. |
| Outdoor temperature | °C | Used for frost protection to start the pump. |
| Heat capacity | kW | Used for primary limitation of heating capacity. |
| Demand heating extern | °C | Demand for an external heat consumer 0-10 V input. |

## Digital inputs

| Name | Unit | Description |
|---|---|---|
| Main switch | Off/Auto | Used to switch off the system. |
| Feedback pump A | - | Feedback from pump A depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |
| Feedback pump B | - | Feedback from pump B depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |

## Analogue outputs

| Name | Unit | Description |
|---|---|---|
| Valve continuous | % | Used to control an actuator with continuous control. |

## Digital outputs

| Name | Unit | Description |
|---|---|---|
| Valve open | Off/On | Used to control an actuator with open/close control. |
| Valve close | Off/On | Used to control an actuator with open/close control. |
| Pump A | Off/On | Used to control a single pump or the first pump of a double pump. |
| Pump B | Off/On | Used to control the second pump of a double pump. |

### 3.5.2 Setpoints

The **Actual** menu displays the calculated setpoint **Supply Temperature SetP**.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Supply Temperature SetP | °C | 2.0 | 160.0 | - | Calculated setpoint. | `DHS1 ► Actual ►` |

### 3.5.3 General settings / Configuration

To adjust the controller program to the structure of the district heating circuit, the type of the valve output can be configured and a pump can be configured.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Actuator Type Valve | - | 1 | 4 | 1 | Type of actuator:<br>1 = 0-10 V<br>2 = 2-10 V<br>3 = 10-2 V<br>4 = 10-0 V | **Configuration ▶ DHS1 ▶ System ▶** |
| Actuator Runtime | s | 10 | 600 | 120 | Runtime of 3-point actuator. | **Configuration ▶ DHS1 ▶ System ▶** |
| Pump Type | - | 0 | 1 | 0 | Type of pump:<br>0 = Single<br>1 = Double | **Configuration ▶ DHS1 ▶ System ▶** |
| Pump Ind | - | 0 | 1 | 0 | Type of feedback for the pump.<br>0 = motor protection<br>1 = run indication | **Configuration ▶ DHS1 ▶ System ▶** |
| Pump Delay | s | 0 | 200 | 10 | Delay time of the pump indication. | **Configuration ▶ DHS1 ▶ System ▶** |
| Pump Runtime | h | 1 | 1000 | 100 | Runtime of the pump, only used for double pumps. | **Configuration ▶ DHS1 ▶ System ▶** |

### 3.5.4 Boost

The *Boost* function can be used to set a boost for each demand (HS, HW, etc.). The boost can be used to compensate for loss of energy in long pipes or to disconnect an energy consumer (HS, HW).

The internal demand of the circuit is calculated as:

```
internal demand = demand * (1 + Boost/100)
```

A boost of -100% disconnects the circuit from the setpoint calculation.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Boost HS1 | % | -100 | 100 | 0 | Boost of demand for heating system 1. | **Configuration ▶ DHS1 ▶ Boost ▶** |
| Boost HS2 | % | -100 | 100 | 0 | Boost of demand for heating system 2. | **Configuration ▶ DHS1 ▶ Boost ▶** |
| Boost HS3 | % | -100 | 100 | 0 | Boost of demand for heating system 3. | **Configuration ▶ DHS1 ▶ Boost ▶** |
| Boost HS4 | % | -100 | 100 | 0 | Boost of demand for heating system 4. | **Configuration ▶ DHS1 ▶ Boost ▶** |
| Boost HW1 | % | -100 | 100 | 0 | Boost of demand for domestic hot water system 1. | **Configuration ▶ DHS1 ▶ Boost ▶** |
| Boost HW2 | % | -100 | 100 | 0 | Boost of demand for domestic hot water system 2. | **Configuration ▶ DHS1 ▶ Boost ▶** |
| Boost EXT | % | -100 | 100 | 0 | Boost for external demand. | **Configuration ▶ DHS1 ▶ Boost ▶** |

### 3.5.5 Setpoint limitation

The *Setpoint limitation* function consists of three different sub-functions.

The functions are only active if the circuit is in normal operation (Main status = 4).

Static limitation:

- ✓ Limitation of the setpoint using the parameters **Min SP** and **Max SP**.
- ✓ Limitation of setpoint adjustment speed: Limitation of the setpoint adjustment speed using the **Ramp-** (negative deviation) and **Ramp+** (positive deviation) parameters. A ramp of 1400 means that the function is disabled. When the function is activated it starts at the current supply temperature.
- ✓ Limitation of deviation: Limitation of the deviation of the setpoint compared to the supply temperature. The setpoint can't be higher than the supply temperature + **Max Dev**. This limitation is mainly used when you have steam as a heat source to avoid steam explosions that could occur if the temperature difference between the steam and the water is too big.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Setpoint Limitation Min SP | °C | 2.0 | 90.0 | 2.0 | Minimum setpoint temperature. | `Configuration ▶ DHS1 ▶ Setpoint limitation ▶` |
| Setpoint Limitation Max SP | °C | 2.0 | 160.0 | 85.0 | Maximum setpoint temperature. | `Configuration ▶ DHS1 ▶ Setpoint limitation ▶` |
| Setpoint Limitation Ramp + | °C/h | 0.1 | 1400.0 | 1400.0 | Maximum setpoint adjustment speed when increasing the setpoint. | `Configuration ▶ DHS1 ▶ Setpoint limitation ▶` |
| Setpoint Limitation Ramp- | °C/h | 0.1 | 1400.0 | 1400.0 | Maximum setpoint adjustment speed when decreasing the setpoint. | `Configuration ▶ DHS1 ▶ Setpoint limitation ▶` |
| Setpoint Limitation Max Dev | °C | 1.0 | 100.0 | 100.0 | Maximum difference between the setpoint and the current supply temperature. | `Configuration ▶ DHS1 ▶ Setpoint limitation ▶` |

## 3.5.6 Supply control

The *Temp control* menu contains the settings of the PI-supply controller.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Supply Control P-Band+ | °C | 1 | 1000 | 25 | P-band for opening the valve. | `DHS1 ▶ Temp control ▶` |
| Supply Control I-Time+ | s | 0 | 9999 | 100 | I-time for opening the valve. | `DHS1 ▶ Temp control ▶` |
| Supply Control P-Band- | °C | 1 | 1000 | 25 | P-band for closing the valve. | `DHS1 ▶ Temp control ▶` |
| Supply Control I-Time- | s | 0 | 9999 | 100 | I-time for closing the valve. | `DHS1 ▶ Temp control ▶` |
| Supply Control Ouput | % | 0 | 100 | - | Controller output. | `DHS1 ▶ Temp control ▶` |

## 3.5.7 Supply limitation

The *Supply limitation* function ensures that the supply temperature will not rise above a given value. This function closes the valve.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Supply Limitation Mode | - | 0 | 1 | 0 | Turns the *Supply limitation* function on or off.<br>0 = Off<br>1 = On | **Configuration ▶ DHS1 ▶ Supply limitation ▶** |
| Max-Supply | °C | 2.0 | 90.0 | 90.0 | Maximum supply temperature. | **Configuration ▶ DHS1 ▶ Supply limitation ▶** |

### 3.5.8 Power limitation

The *Power limitation* function permits limitation of the capacity output to the district heating circuit. The function will be active if a **Heat capacity** input is assigned. This function requires a heat meter to be installed and connected to provide the currently used capacity. The limitation affects the signal to the valve of the district heating system by closing the valve.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Limit | kW | 0 | 10000 | 10000 | Max limit of the consumed heat capacity. | **Configuration ▶ DHS1 ▶ Power limitation ▶** |
| P-Band | kW | 1 | 1000 | 100 | P-band. | **DHS1 ▶ Temp control ▶** |
| I-time | s | 0 | 9999 | 0 | I-time. | **DHS1 ▶ Temp control ▶** |
| Output | % | 0 | 100 | - | Controller output. | **DHS1 ▶ Temp control ▶** |

### 3.5.9 Frost limitation

The *Frost limitation* function is used to keep the water in the pipes in motion to prevent freezing. It is only available if a pump is installed. If the outdoor temperature falls below **Frost Limit Outdoor** the pump is always on.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Frost Limit Outdoor | °C | -40.0 | 50.0 | 2.0 | The temperature at which the pump is always on. | **Configuration ▶ DHS1 ▶ Frost ▶** |

### 3.5.10 Return temperature limitation

The *Return temperature limitation* function is used to limit the temperature at the primary return sensor to a maximum value by closing the valve. The function is active if a return temperature sensor is assigned.

It is possible to define different limits for HS and HW. The current limit can be calculated depending on the outdoor temperature.

If the temperature on the limitation sensor exceeds the limit, the PI-controller of this function takes over the control of the valve with a seamless transition between the PI-controllers.

The function is working as long as the output of the return limitation PI is lower than the output of the supply PI.

If the valve is completely closed by the function, it will be opened to 5% every 10 min for 15 seconds. This is needed to get a circulation of water to measure the right temperature.

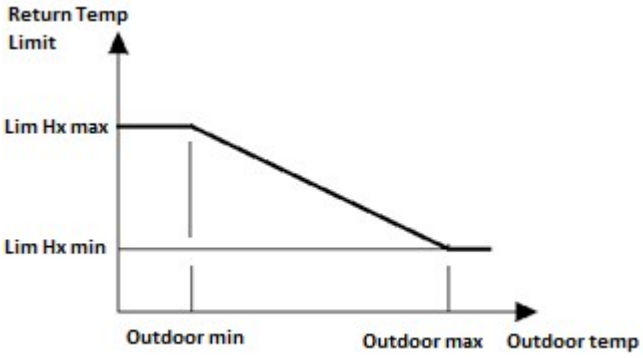



*Figure 3-18 Return temperature limitation*

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Return Limitation LimHS min | °C | 2.0 | 160.0 | 60.0 | Limit at **Entry-Point Outdoor Max**, "Outdoor max" in the picture above. Used if the demand is from HS. | `Configuration ▶ DHS1 ▶ Return limitation ▶` |
| Return Limitation LimHS max | °C | 2.0 | 160.0 | 60.0 | Limit at **Entry-Point Outdoor Min**, "Outdoor min" in the picture above. Used if the demand is from HS. | `Configuration ▶ DHS1 ▶ Return limitation ▶` |
| Return Limitation LimHW min | °C | 2.0 | 160.0 | 80.0 | Limit at **Entry-Point Outdoor Max**, "Outdoor max" in the picture above. Used if the demand is from HW. | `Configuration ▶ DHS1 ▶ Return limitation ▶` |
| Return Limitation LimHW max | °C | 2.0 | 160.0 | 80.0 | Limit at **Entry-Point Outdoor Min**, "Outdoor min" in the picture above. Used if the demand is from HW. | `Configuration ▶ DHS1 ▶ Return limitation ▶` |
| Return Limitation Entry-Point 1 Outdoor Min | °C | -20.0 | 20.0 | 0.0 | "Outdoor min" in the picture above. | `Configuration ▶ DHS1 ▶ Return limitation ▶` |
| Return Limitation Entry-Point 2 Outdoor Max | °C | -20.0 | 20.0 | 0.0 | "Outdoor max" in the picture above. | `Configuration ▶ DHS1 ▶ Return limitation ▶` |
| Return Limitation P-Band | °C | 1 | 1000 | 25 | P-band | `DHS1 ▶ Temp control ▶` |
| Return Limitation I-Time | s | 0 | 9999 | 100 | I-time | `DHS1 ▶ Temp control ▶` |
| Return Temperature Setp | °C | 2.0 | 160.0 | - | The current calculated limit. | `DHS1 ▶ Actual ▶` |
| Return Temperature Act | % | 0 | 100.0 | - | The current correction signal of the PI controller. | `DHS1 ▶ Actual ▶` |

## 3.5.11 Pump

It is possible to activate a switch off delay of the pump used after the district heating circuit changed its state to shutoff.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Switch-Off Delay | s | 0 | 600 | 120 | Switch off delay of the pump. | `Configuration ▶ DHS1 ▶ Pump ▶` |

## 3.5.12 Actuator exercise

The *Actuator exercise* function automatically detects if the actuators (pump, valve) have moved due to having undertaken any control tasks since the last run of the function. If this is not the case, the pumps, followed by the valve, are triggered for an adjustable interval at a settable weekday and time, thereby preventing blocking in the actuator and the pump.

The sequence of exercise is the following:

1. Pump A
2. Pump B (only for double pumps)
3. Valve

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 1 | 0 | Activates or deactivates the *Actuator exercise* function.<br>0 = Off<br>1 = On | **Configuration ▶ DHS1 ▶ Actuator exercise ▶** |
| Day | - | 0 | 7 | 0 | Weekday for actuator exercise.<br>0 = Daily<br>1-7 = Monday, …, Sunday | **Configuration ▶ DHS1 ▶ Actuator exercise ▶** |
| Time | hh:mm | 00:00 | 23:59 | 02:00 | Time for actuator exercise. | **Configuration ▶ DHS1 ▶ Actuator exercise ▶** |
| Duration | s | 0 | 600 | 120 | Duration of the actuator exercise. | **Configuration ▶ DHS1 ▶ Actuator exercise ▶** |

## 3.5.13 Status

The district heating system has the following sub statuses. For more information about the different main statuses, see *chapter 2 Information for the end user*.

| Name | Description |
|---|---|
| Main Status | 0 = Not active<br>1 = Frost<br>2 = Switch off<br>4 = Normal operation |
| Sub Status Frost Outd | 0 = Off<br>1 = On |
| Sub Status Supply Lim | 0 = Off<br>1 = On |
| Sub Status Switch Off Del | 0 = Off<br>1 = On |
| Sub Status Power Lim | 0 = Off<br>1 = On |
| Sub Status Exercise | 0 = Off<br>1 = On |
| Sub Status Setpoint Lim | 0 = Off<br>1 = On |
| Operating Hours Pump A | Operating hours for pump A. |
| Operating Hours Pump B | Operating hours for pump B. |

### 3.5.14 Alarms

For more information about the alarms used by the district heating system, see the full alarm list in *Appendix D Alarm list*.

### 3.5.15 Manual mode

Setting parameters to manual mode is a very useful feature during commissioning or when troubleshooting.

**Caution!** Leaving any output in manual control means that the normal control will be suspended. Therefore, an alarm will be generated as soon as any output is set to any mode other than **Auto**.

The following parameters can be set to manual mode for the district heating system:

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Manual/Auto Valve | - | 0 | 2 | Auto | 0 = Off<br>1 = Manual<br>2 = Auto | DHS1 ► Manual/Auto ► |
| Manual Set | % | 0 | 100 | - | 0-100% | DHS1 ► Manual/Auto ► |
| Manual/Auto Pump | - | 0 | 3 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3 = Auto | DHS1 ► Manual/Auto ► |

## 3.6 Solar

The solar circuit can be used either for heating the domestic hot water storage tank or in order to heat up the buffer tank. The basic function of the solar circuit is to control the temperature difference between the collector sensor and the storage sensor.

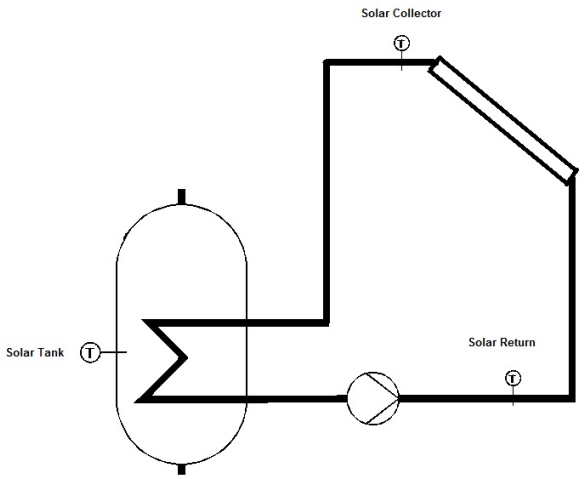



*Figure 3-19 Solar circuit*

### 3.6.1 Inputs and outputs

The following inputs and outputs are used for solar panel systems:

## Analogue inputs

| Name | Unit | Description |
|---|---|---|
| Solar HW1 | °C | Solar sensor in Domestic hot water 1. |
| Solar HW2 | °C | Solar sensor in Domestic hot water 2. |
| Solar buffer | °C | Solar sensor in the buffer tank. |
| Solar collector temperature | °C | Solar collector sensor. |
| Solar return temperature | °C | Solar collector return sensor. |

## Digital inputs

| Name | Unit | Description |
|---|---|---|
| Main switch | Off/Auto | Used to switch off the system. |
| Feedback pump A | - | Feedback from pump A depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |
| Feedback pump B | - | Feedback from pump B depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |

## Analogue outputs

| Name | Unit | Description |
|---|---|---|
| Continuous pump | % | Output to control the speed of a pump. |

## Digital outputs

| Name | Unit | Description |
|---|---|---|
| Solar pump A | Off/On | Used to control a single pump or the first pump of a double pump. |
| Solar pump B | Off/On | Used to control the second pump of a double pump. |
| Switch HW-buffer | Off/On | 0 = Load HW tank<br>1 = Load buffer tank |
| Cool down | Off/On | Cool down the solar collector. |

### 3.6.2 General settings / Configuration

The *Solar* function permits activating and configuring control of an integrated solar thermal collector, which can be used to load the buffer tank or a hot water tank with additional heat, if available. A maximum temperature and frost limit can also be defined.

The basic function of the solar circuit is to control the temperature difference between the collector sensor and the storage tank sensor. If the temperature difference rises above **T-Diff On**, the solar pump is switched on.

A P-controller controls the difference between the tank temperature and the collector temperature by reducing the pump speed.

This pump is switched off when the temperature difference decreases below **T-Diff Off**.

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Pump Type | - | 0 | 1 | 0 | Type of pump used.<br>0 = single pump<br>1 = twin pump | **Configuration ▶ Solar ▶ System ▶** |
| Pump Ind | - | 0 | 1 | 0 | Type of feedback for the load pump.<br>0 = motor protection<br>1 = run indication | **Configuration ▶ Solar ▶ System ▶** |
| Pump Delay | s | 0 | 200 | 10 | Delay time of the pump indication. | **Configuration ▶ Solar ▶ System ▶** |
| Pump Runtime | h | 1 | 1000 | 100 | Runtime of the load pump. | **Configuration ▶ Solar ▶ System ▶** |
| Priority Buffer/HW | - | 0 | 2 | 0 | Priority of Buffer and HW.<br>0 = Auto<br>1 = only HW<br>2 = only Buffer | **Configuration ▶ Solar ▶ System ▶** |
| Priority HW1/HW2 | - | 0 | 1 | 0 | 0 = Use HW1 (default)<br>1 = Use HW2 | **Configuration ▶ Solar ▶ System ▶** |
| Solar 2 Point Control T-Diff On | °C | 0.0 | 30.0 | 8.0 | The temperature difference between the collector sensor and storage tank sensor at which the solar pump is switched on. | **Configuration ▶ Solar ▶ System ▶** |
| Solar 2 Point Control T-Diff Off | °C | 0.0 | 20.0 | 2.0 | The temperature difference between the collector sensor and storage tank sensor at which the solar pump is switched off. | **Configuration ▶ Solar ▶ System ▶** |
| P-Band | °C | 1 | 100 | 8 | P-band | **Solar ▶ Temp control ▶** |
| Temperature Limits Max-T Coll | °C | 70.0 | 160.0 | 110.0 | Temperature at which the solar pump is always switched on. | **Configuration ▶ Solar ▶ System ▶** |
| Temperature Limits Frost Coll | °C | -50.0 | 10.0 | -10.0 | Temperature at which the solar pump is always switched on. | **Configuration ▶ Solar ▶ System ▶** |

### 3.6.3 Actuator exercise

The *Actuator exercise* function automatically detects if the actuators (pump, valve) have moved due to having undertaken any control tasks since the last run of the function. If this is not the case, the pumps, followed by the valve, are triggered for an adjustable interval at a settable weekday and time, thereby preventing blocking in the actuator and the pump.

The sequence of exercise is the following:

1. Pump A
2. Pump B (only for double pumps)

3. Valve

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Mode | - | 0 | 1 | 0 | Activates or deactivates the *Actuator exercise* function.<br>0 = Off<br>1 = On | **Configuration ▶ Solar ▶ Actuator exercise ▶** |
| Day | - | 0 | 7 | 0 | Weekday for actuator exercise.<br>0 = Daily<br>1-7 = Monday, …, Sunday | **Configuration ▶ Solar ▶ Actuator exercise ▶** |
| Time | hh:mm | 00:00 | 23:59 | 02:00 | Time for actuator exercise. | **Configuration ▶ Solar ▶ Actuator exercise ▶** |
| Duration | s | 0 | 600 | 120 | Duration of the actuator exercise. | **Configuration ▶ Solar ▶ Actuator exercise ▶** |

### 3.6.4 Status

The solar circuit has the following sub statuses. For more information about the different main statuses, see *chapter 2 Information for the end user*.

| Name | Description |
|---|---|
| Main status | 0 = Not active<br>2 = Switch off<br>4 = Normal operation |
| Sub status Solar | 0 = Off<br>1 = Load<br>2 = Hold<br>3 = Cooling<br>4 = Frost |
| Sub Status Exercise | 0 = Off<br>1 = On |
| Operating Hours Pump Cont | Operating hours for the continuous pump |
| Operating Hours Pump-A | Operating hours for pump A. |
| Operating Hours Pump-B | Operating hours for pump B. |

### 3.6.5 Alarms

For more information about the alarms used by the solar circuit, see the full alarm list in *Appendix D Alarm list*.

### 3.6.6 Manual mode

Setting parameters to manual mode is a very useful feature during commissioning or when troubleshooting.

**Caution!** Leaving any output in manual control means that the normal control will be suspended. Therefore, an alarm will be generated as soon as any output is set to any mode other than **Auto**.

The following parameters can be set to manual mode for the solar circuit:

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Manual/Auto P-Cont | - | 0 | 2 | Auto | 0 = Off<br>1 = Manual<br>2 = Auto | **Solar ► Manual/Auto ►** |
| Manual Set | % | 0 | 100 | - | 0-100% | **Solar ► Manual/Auto ►** |
| Manual/Auto Pump | - | 0 | 3 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3 = Auto | **Solar ► Manual/Auto ►** |
| Manual/Auto Load Buffer Output | - | 0 | 2 | Auto | 0 = Off<br>1= On<br>2 = Auto | **Solar ► Manual/Auto ►** |
| Cool down | - | 0 | 1 | Auto | 0 = Off<br>1 = On<br>2 = Auto | |

## 3.7 Boiler control (HB1–HB4)

The controller can be configured for boiler control with 1-4 boilers. Depending on the type of boiler control, the burners of each boiler can be configured as 1-step, 2-step and modulating. The burners are controlled either by a PI-controller with settable P-band and I-time or by using a thermostat function.

### 3.7.1 Inputs and outputs

The following inputs and outputs are used for boiler control systems.

### Analogue inputs

| Name | Unit | Description |
|---|---|---|
| Supply temperature | °C | |
| Return temperature | °C | |
| Boiler 1 supply temperature | °C | |
| Boiler 1 return temperature | °C | |
| Boiler 2 supply temperature | °C | |
| Boiler 2 return temperature | °C | |
| Boiler 3 supply temperature | °C | |
| Boiler 3 return temperature | °C | |
| Boiler 4 supply temperature | °C | |
| Boiler 4 return temperature | °C | |

### Digital inputs

| Name | Unit | Description |
|---|---|---|
| Run indication Boiler 1 | Off/On | |
| Run indication / alarm Boiler 1 Pump A | Off/On | |
| Run indication / alarm Boiler 1 Pump B | Off/On | |

| Name | Unit | Description |
|---|---|---|
| Run indication / alarm Boiler 1 Return Pump | Off/On | |
| Run indication Boiler 2 | Off/On | |
| Run indication / alarm Boiler 2 Pump A | Off/On | |
| Run indication / alarm Boiler 2 Pump B | Off/On | |
| Run indication / alarm Boiler 2 Return Pump | Off/On | |
| Run indication Boiler 3 | Off/On | |
| Run indication / alarm Boiler 3 Pump A | Off/On | |
| Run indication / alarm Boiler 3 Pump B | Off/On | |
| Run indication / alarm Boiler 3 Return Pump | Off/On | |
| Run indication Boiler 4 | Off/On | |
| Run indication / alarm Boiler 4 Pump A | Off/On | |
| Run indication / alarm Boiler 4 Pump B | Off/On | |
| Run indication / alarm Boiler 4 Return Pump | Off/On | |
| Run indication / alarm Transport Pump A | Off/On | |
| Run indication / alarm Transport Pump B | Off/On | |
| Boiler Alarm | Off/On | |
| Expansion Vessel | Off/On | |
| External stop Boiler 1–4 | Off/On | |
| Pressure / Flow switch | Off/On | |

## Analogue outputs

| Name | Unit | Description |
|---|---|---|
| Boiler 1 Modulating | % | |
| Boiler 1 Return Valve | % | |
| Boiler 2 Modulating | % | |
| Boiler 2 Return Valve | % | |
| Boiler 3 Modulating | % | |
| Boiler 3 Return Valve | % | |
| Boiler 4 Modulating | % | |
| Boiler 4 Return Valve | % | |

## Digital outputs

| Name | Unit | Description |
|---|---|---|
| Boiler 1 Burner | Off/On | |
| Boiler 1 Burner (high effect) | Off/On | |
| Boiler 1 Return Pump | Off/On | |
| Boiler 1 Pump A | Off/On | |
| Boiler 1 Pump B | Off/On | |
| Boiler 2 Burner | Off/On | |
| Boiler 2 Burner (high effect) | Off/On | |

| Name | Unit | Description |
|---|---|---|
| Boiler 2 Return Pump | Off/On | |
| Boiler 2 Pump A | Off/On | |
| Boiler 2 Pump B | Off/On | |
| Boiler 3 Burner | Off/On | |
| Boiler 3 Burner (high effect) | Off/On | |
| Boiler 3 Return Pump | Off/On | |
| Boiler 3 Pump A | Off/On | |
| Boiler 3 Pump B | Off/On | |
| Boiler 4 Burner | Off/On | |
| Boiler 4 Burner (high effect) | Off/On | |
| Boiler 4 Return Pump | Off/On | |
| Boiler 4 Pump A | Off/On | |
| Boiler 4 Pump B | Off/On | |

### 3.7.2 Setpoint

The boiler control setpoint can be configured to one of the following alternatives:

- ✓ Constant setpoint: A fixed settable value.
- ✓ Circuit-dependent setpoint: Can be set to any of the following options:
  1. HS-dependent
  2. HW-dependent
  3. HP1-dependent
  4. HS- and HW-dependent
  5. HS- and HP1-dependent
  6. HW- and HP1-dependent
  7. HS-, HW- and HP1-dependent

  When a circuit-dependent setpoint has been configured, the boiler control setpoint is dependent on the setpoints of other circuits. The circuit whose setpoint is currently the highest will, together with an added offset (pre-set to 5 degrees), constitute the boiler control setpoint.
- ✓ Outdoor compensated setpoint = the setpoint varies with the outdoor temperature.

#### Heat demand

In addition to the internal setpoint, an analogue input may also be configured to receive a setpoint from another controller. The highest setpoint (internal or external) will be used as the relevant setpoint for the boiler.

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| HB Setpoint | °C | 2.0 | 160.0 | - | The current setpoint. | **HB ► Actual/ Setpoint ►** |
| Offset HS Setpoint | °C | 0.0 | 20.0 | 5.0 | Offset of circuit dependent setpoint. | **HB ► Actual/ Setpoint ►** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Type of Setpoint | - | 0 | 5 | 0 | 0 = Constant<br>1 = HS<br>2 = HS, HW<br>3 = HS, HP<br>4 = HS, HW, HP<br>5 = Curve | Configuration ▶ HB ▶ General ▶ |
| Constant Setpoint | °C | 2.0 | 100.0 | 36.0 | Constant setpoint. | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Outdoor Temp 1 | °C | -40.0 | 30.0 | -20.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Outdoor Temp 2 | °C | -40.0 | 30.0 | -15.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Outdoor Temp 3 | °C | -40.0 | 30.0 | -10.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Outdoor Temp 4 | °C | -40.0 | 30.0 | -5.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Outdoor Temp 5 | °C | -40.0 | 30.0 | 0.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Outdoor Temp 6 | °C | -40.0 | 30.0 | 5.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Outdoor Temp 7 | °C | -40.0 | 30.0 | 10.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Outdoor Temp 8 | °C | -40.0 | 30.0 | 15.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Curve Output 1 | °C | 2.0 | 100.0 | 67.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Curve Output 2 | °C | 2.0 | 100.0 | 63.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Curve Output 3 | °C | 2.0 | 100.0 | 59.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Curve Output 4 | °C | 2.0 | 100.0 | 55.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Curve Output 5 | °C | 2.0 | 100.0 | 53.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Curve Output 6 | °C | 2.0 | 100.0 | 43.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Curve Output 7 | °C | 2.0 | 100.0 | 35.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Curve Output 8 | °C | 2.0 | 100.0 | 25.0 | | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |
| Man Paral Dis | °C | -10.0 | 10.0 | 5.0 | Offset of the curve setpoint. | HB ▶ Actual/ Setpoint ▶ Outd temp setP ▶ |

### 3.7.3 Type of boiler control

The boiler can be set as off/on control, control using off/on/modulating or as control using modulating (parameter **Type of Boiler Ctrl**).

#### Off/on control

In this control mode, the burners are controlled using a thermostat function. The burners for each boiler can be configured as 1- or 2-step burners with settable hysteresis, Switch difference 1 (SD1) and Switch difference 2 (SD2) respectively, and an offset for step 2 (high output).

Starting and stopping takes place according to the formulas below, see *Figure 3-20 Off/on control* for an example:

```
Start low output = SP – SD1
Start high output = SP – SD2 – offset
Stop low output = SP
Stop high output = SP – offset
```

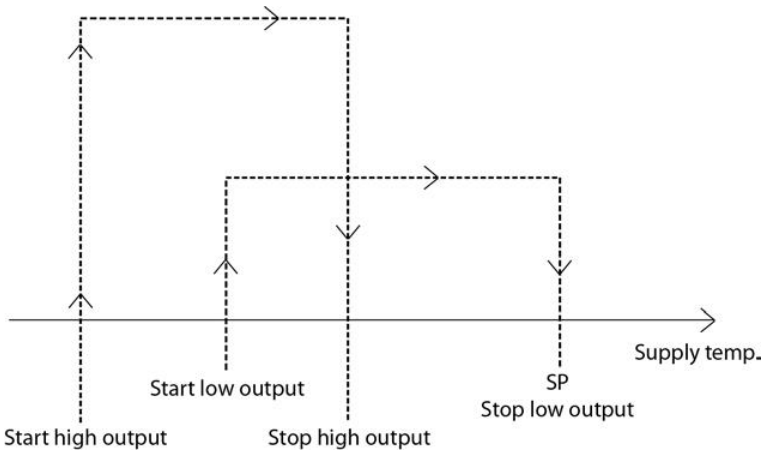



*Figure 3-20 Off/on control*

#### Control using off/on modulating

In this control mode, the boilers are controlled by a PI-controller with settable P-band and I-time. The initial boiler can either be set to modulating (0…10 V), off/on (1-step) or off/on/high (2-step). Boiler 2-4 can be either 1-step or 2-step.

When boiler 1 is configured as modulating:

Upon a heating requirement increase the analogue output is first controlled 0…10 V. If the heating requirement becomes so great that the first burner is inadequate, the first digital output will be added. The analogue output is kept to 0 V for a settable time period and the controller is blocked. Thereafter, the analogue output will once more be controlled 0…10 V, depending on the heating requirement. A decrease in heating requirement will result in the opposite function (see *Figure 3-21 Control using off/on modulating, analogue*). The controller will increase/decrease by one step at a time, and each time a digital output is switched on or off, the controller will be blocked for the set time period.

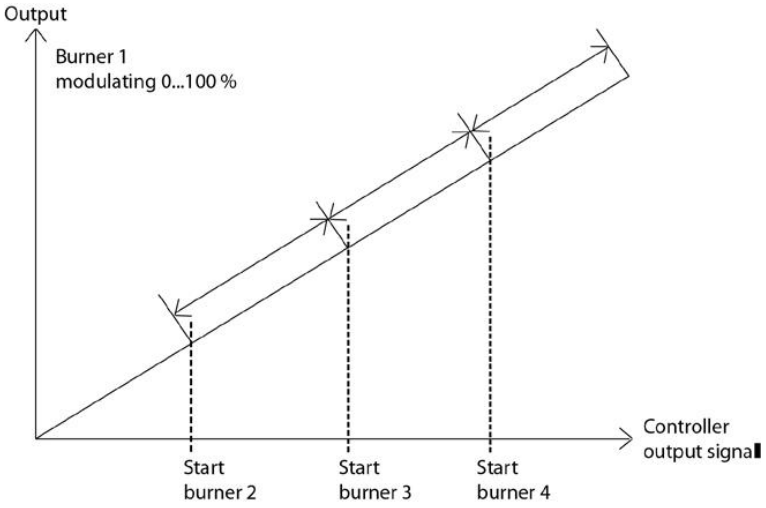



*Figure 3-21 Control using off/on modulating, analogue*

When boiler 1 is configured to a digital function (1-step or 2-step) the digital outputs will step into sequence by one step at a time, and each time a digital output is switched on or off the controller will be blocked for the set time period (see *Figure 3-22 Control using off/on modulating, digital*).

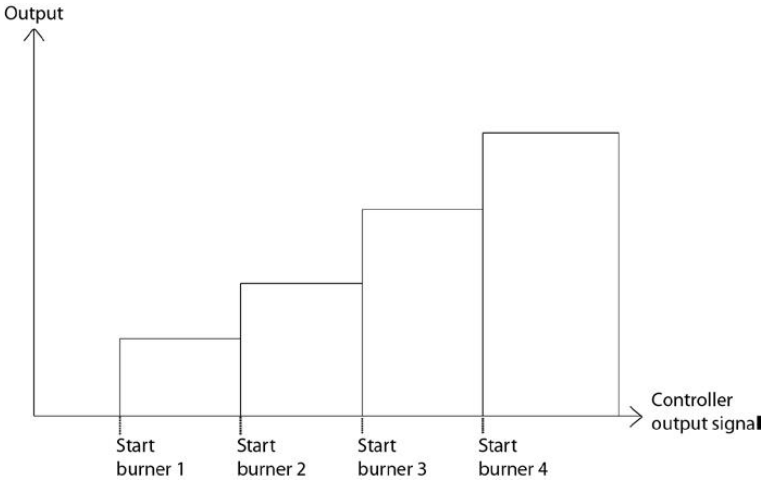



*Figure 3-22 Control using off/on modulating, digital*

## Control using modulating

In this control mode, the burners can only be set as modulating burners (0…10 V). The burners are controlled by a PI-controller with settable P-band and I-time. When there is a heating requirement, the burners are controlled 0…10 V in sequence, and each time a digital output is switched on or off the controller will be blocked for the set time period (see *Figure 3-23 Control using modulating*).

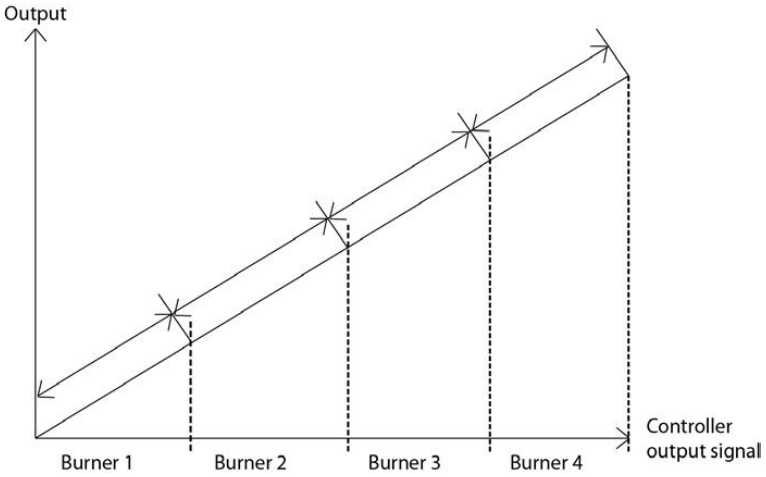



*Figure 3-23 Control using modulating*

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Type of Boiler Ctrl | - | 0 | 2 | 0 | Type of boiler:<br>0 = Off/on control<br>1 = Control using off/on/modulating<br>2 = Control using modulating | **Configuration ▶ HB ▶ General ▶** |
| Number of Boilers | - | 0 | 4 | 0 | | **Configuration ▶ HB ▶ General ▶** |
| P-band | °C | 1 | 1000 | 30 | | **HB ▶ Temp control ▶** |
| I-time | s | 0 | 9999 | 15 | | **HB ▶ Temp control ▶** |
| Time That The Ctrl is Blocked at Start/Stop | s | 0 | 600 | 180 | Time that the controller is blocked at start / stop of boiler. | **HB ▶ Temp control ▶** |
| Hysteresis | % | 0 | 100 | 0.5 | Hysteresis for start / stop boiler. | **HB ▶ Temp control ▶** |

## 3.7.4 Boiler settings

The type of burner and the type of modulation can be set separately for each boiler.

A minimum run and stop time for each boiler are individually settable. When the heating requirement increases, the next boiler can start only after the previous boiler has completed its minimum runtime, and when the heating requirement decreases the boiler will not switch off until after its minimum runtime has been completed. A stopped boiler can start again only after it has been switched off for a minimum duration of the set stop time.

These variables are both set to 180 seconds for all boilers.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Type of Burner Boiler 1 | - | 0 | 3 | 0 | Type of Burner, Boiler 1<br>0 = 1-step<br>1 = 2-step<br>3 = Modulating | **Configuration ▶ HB ▶ HB1 ▶** |
| Burner1 Control Signal | - | 1 | 4 | 1 | Actuator Type, Boiler 1<br>1 = 0-10 V<br>2 = 2-10 V<br>3 = 10-2 V<br>4 = 10-0 V | **Configuration ▶ HB ▶ HB1 ▶** |
| Min run time Boiler 1 | s | 0 | 3600 | 180 | | **Configuration ▶ HB ▶ HB1 ▶** |
| Min stop time Boiler 1 | s | 0 | 3600 | 180 | | **Configuration ▶ HB ▶ HB1 ▶** |
| Switch Diff1 (Boiler 1) | °C | 0 | 100 | 5 | Switch difference 1, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB1 ▶** |
| Switch Diff2 (Boiler 1) | °C | 0 | 100 | 5 | Switch difference 2, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB1 ▶** |
| Off Sw Diff2 (Boiler 1) | °C | 0 | 100 | 3 | Offset switch difference 2, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB1 ▶** |
| Type of Burner Boiler 2 | - | 0 | 3 | 0 | 0 = 1-step<br>1 = 2-step<br>3 = Modulating | **Configuration ▶ HB ▶ HB2 ▶** |
| Burner2 Control Signal | - | 1 | 4 | 1 | Actuator Type, Boiler 2<br>1 = 0-10 V<br>2 = 2-10 V<br>3 = 10-2 V<br>4 = 10-0 V | **Configuration ▶ HB ▶ HB2 ▶** |
| Min run time Boiler 2 | s | 0 | 3600 | 180 | | **Configuration ▶ HB ▶ HB2 ▶** |
| Min stop time Boiler 2 | s | 0 | 3600 | 180 | | **Configuration ▶ HB ▶ HB2 ▶** |
| Switch Diff1 (Boiler 2) | °C | 0 | 100 | 5 | Switch difference 1, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB2 ▶** |
| Switch Diff2 (Boiler 2) | °C | 0 | 100 | 5 | Switch difference 2, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB2 ▶** |
| Off Sw Diff2 (Boiler 2) | °C | 0 | 100 | 3 | Offset switch difference 2, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB2 ▶** |
| Type of Burner Boiler 3 | - | 0 | 3 | 0 | 0 = 1-step<br>1 = 2-step<br>3 = Modulating | **Configuration ▶ HB ▶ HB3 ▶** |
| Burner3 Control Signal | - | 1 | 4 | 1 | Actuator Type, Boiler 3<br>1 = 0-10 V<br>2 = 2-10 V<br>3 = 10-2 V<br>4 = 10-0 V | **Configuration ▶ HB ▶ HB3 ▶** |
| Min run time Boiler 3 | s | 0 | 3600 | 180 | | **Configuration ▶ HB ▶ HB3 ▶** |
| Min stop time Boiler 3 | s | 0 | 3600 | 180 | | **Configuration ▶ HB ▶ HB3 ▶** |
| Switch Diff1 (Boiler 3) | °C | 0 | 100 | 5 | Switch difference 1, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB3 ▶** |
| Switch Diff2 (Boiler 3) | °C | 0 | 100 | 5 | Switch difference 2, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB3 ▶** |
| Off Sw Diff2 (Boiler 3) | °C | 0 | 100 | 3 | Offset switch difference 2, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB3 ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Type of Burner Boiler 4 | - | 0 | 3 | 0 | 0 = 1-step<br>1 = 2-step<br>3 = Modulating | **Configuration ▶ HB ▶ HB4 ▶** |
| 4 Control Signal | - | 1 | 4 | 1 | Actuator Type, Boiler 4<br>1 = 0-10 V<br>2 = 2-10 V<br>3 = 10-2 V<br>4 = 10-0 V | **Configuration ▶ HB ▶ HB4 ▶** |
| Min run time Boiler 4 | s | 0 | 3600 | 180 | | **Configuration ▶ HB ▶ HB4 ▶** |
| Min stop time Boiler 4 | s | 0 | 3600 | 180 | | **Configuration ▶ HB ▶ HB4 ▶** |
| Switch Diff1 (Boiler 4) | °C | 0 | 100 | 5 | Switch difference 1, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB4 ▶** |
| Switch Diff2 (Boiler 4) | °C | 0 | 100 | 5 | Switch difference 2, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB4 ▶** |
| Off Sw Diff2 (Boiler 4) | °C | 0 | 100 | 3 | Offset switch difference 2, see section *Off/on control*. | **HB▶ Actual/Setpoint ▶ HB4 ▶** |

### 3.7.5 Starting order

Boiler starting order can be set individually:

- ✓ Fixed starting order. The boilers will always start in the same order: Fixed Boiler 1, Fixed Boiler 2, Fixed Boiler 3 and Fixed Boiler 4.
- ✓ Runtime-controlled: The boilers will start in order based on shortest runtime.
- ✓ Alternating: The start order of the boilers will be changed once per week, alternatively once per day, at a settable time. When changing, the start order will be displaced by one step. I.e.: The boiler which before changing started first will, after changing, start the next boiler, and so on. When the start order is changed, all boilers will shut down and start again if a heating requirement exists.

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Boiler 1 Start Mode | - | 0 | 5 | 0 | 0 = Alternating<br>1 = Boiler 1 is always first in the starting order<br>2 = Boiler 1 is always second in the starting order<br>3 = Boiler 1 is always third in the starting order<br>4 = Boiler 1 is always last in the starting order<br>5 = Run time controlled | **Configuration ▶ HB ▶ HB1 ▶** |
| Boiler 2 Start Mode | - | 0 | 5 | 0 | 0 = Alternating<br>1 = Boiler 2 is always first in the starting order<br>2 = Boiler 2 is always second in the starting order<br>3 = Boiler 2 is always third in the starting order<br>4 = Boiler 2 is always last in the starting order<br>5 = Run time controlled | **Configuration ▶ HB ▶ HB2 ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Boiler 3 Start Mode | - | 0 | 5 | 0 | 0 = Alternating<br>1 = Boiler 3 is always first in the starting order<br>2 = Boiler 3 is always second in the starting order<br>3 = Boiler 3 is always third in the starting order<br>4 = Boiler 3 is always last in the starting order<br>5 = Run time controlled | **Configuration ▶ HB ▶ HB3 ▶** |
| Boiler 4 Start Mode | - | 0 | 5 | 0 | 0 = Alternating<br>1 = Boiler 4 is always first in the starting order<br>2 = Boiler 4 is always second in the starting order<br>3 = Boiler 4 is always third in the starting order<br>4 = Boiler 4 is always last in the starting order<br>5 = Run time controlled | **Configuration ▶ HB ▶ HB4 ▶** |
| Boiler Exchange Weekday | - | 0 | 7 | 0 | 0 = Never<br>1 = Monday…7 = Sunday | **Configuration ▶ HB ▶ General ▶ Type of Boiler ctrl ▶** |
| Boiler Exchange Hour | - | 0 | 23 | 10 | | **Configuration ▶ HB ▶ General ▶ Type of Boiler ctrl ▶** |

## 3.7.6 Boiler exercise

The boilers can be exercised for a settable duration on a settable time and weekday. It is also possible to set the number of weeks between each exercise.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Boiler 1 Exercise | - | 0 | 1 | 0 | 0 = Off<br>1 = On | **Configuration ▶ HB ▶ HB1 ▶** |
| Boiler 1 Exercise No of Weeks | - | 0 | 52 | 4 | Number of weeks between exercises. | **Configuration ▶ HB ▶ HB1 ▶** |
| Boiler 1 Exercise Day | - | 1 | 7 | 7 | Weekday for exercise.<br>1 = Monday…7 = Sunday | **Configuration ▶ HB ▶ HB1 ▶** |
| Boiler 1 Exercise Hour | - | 0 | 23 | 15 | Hour for exercise. | **Configuration ▶ HB ▶ HB1 ▶** |
| Exercise time Boiler 1 | min | 0 | 120 | 5 | Duration for exercise. | **Configuration ▶ HB ▶ HB1 ▶** |
| Boiler 2 Exercise | - | 0 | 1 | 0 | 0 = Off<br>1 = On | **Configuration ▶ HB ▶ HB2 ▶** |
| Boiler 2 Exercise No of Weeks | - | 0 | 52 | 4 | Number of weeks between exercises. | **Configuration ▶ HB ▶ HB2 ▶** |
| Boiler 2 Exercise Day | - | 1 | 7 | 7 | Weekday for exercise.<br>1 = Monday…7 = Sunday | **Configuration ▶ HB ▶ HB2 ▶** |
| Boiler 2 Exercise Hour | - | 0 | 23 | 15 | Hour for exercise. | **Configuration ▶ HB ▶ HB2 ▶** |
| Exercise time Boiler 2 | min | 0 | 120 | 5 | Duration for exercise. | **Configuration ▶ HB ▶ HB2 ▶** |
| Boiler 3 Exercise | - | 0 | 1 | 0 | 0 = Off<br>1 = On | **Configuration ▶ HB ▶ HB3 ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Boiler 3 Exercise No of Weeks | - | 0 | 52 | 4 | Number of weeks between exercises. | **Configuration ▶ HB ▶ HB3 ▶** |
| Boiler 3 Exercise Day | - | 1 | 7 | 7 | Weekday for exercise.<br>1 = Monday…7 = Sunday | **Configuration ▶ HB ▶ HB3 ▶** |
| Boiler 3 Exercise Hour | - | 0 | 23 | 15 | Hour for exercise. | **Configuration ▶ HB ▶ HB3 ▶** |
| Exercise time Boiler 3 | min | 0 | 120 | 5 | Duration for exercise. | **Configuration ▶ HB ▶ HB3 ▶** |
| Boiler 4 Exercise | - | 0 | 1 | 0 | 0 = Off<br>1 = On | **Configuration ▶ HB ▶ HB4 ▶** |
| Boiler 4 Exercise No of Weeks | - | 0 | 52 | 4 | Number of weeks between exercises. | **Configuration ▶ HB ▶ HB4 ▶** |
| Boiler 4 Exercise Day | - | 1 | 7 | 7 | Weekday for exercise.<br>1 = Monday…7 = Sunday | **Configuration ▶ HB ▶ HB4 ▶** |
| Boiler 4 Exercise Hour | - | 0 | 23 | 15 | Hour for exercise. | **Configuration ▶ HB ▶ HB4 ▶** |
| Exercise time Boiler 4 | min | 0 | 120 | 5 | Duration for exercise. | **Configuration ▶ HB ▶ HB4 ▶** |

### 3.7.7 Boiler return temperature

To minimize the risk of condensation accumulating in the boiler, it is important that the temperature is higher than the condensation temperature. This can be solved in two ways:

- ✓ Common return temperature

  Setting a common return temperature sensor can reduce the risk of condensation. If the temperature at the sensor falls below a settable value (**Block Valves at Low Boiler Return Temp**, default 40°C), the valves of all HS circuits will be forced to close. The valves will remain closed for as long as the boiler return temperature is lower than the settable value + hysteresis (settable parameter **Block Valves at Low Boiler Return Hyst**, default 10°C).

- ✓ Individual return temperatures

  Each boiler has a return temperature sensor that controls a mixing valve or a pump. If the return temperature falls below a settable temperature (**Return Temp SetP**, default 40°C):

  - ✓ The mixing valve will be controlled for increased recirculation by a P-controller with settable P-band (**HBx Return Temp P-Band/Hyst**, default 10°C )

    or

  - ✓ The pump will be switched on with a settable hysteresis (**HBx Return Temp P-Band/Hyst**, default 10°C).

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Block valves at low boiler return temp | °C | 0 | 100 | 40 | | **Configuration ▶ HB ▶ General ▶** |
| Block valves at low boiler return Hyst | °C | 1 | 50 | 10 | | **Configuration ▶ HB ▶ General ▶** |
| HB1 Return Limitation Type | - | 0 | 1 | 0 | Type of return limitation Boiler 1.<br>0 = Valve<br>1 = Pump | **Configuration ▶ HB ▶ HB1 ▶** |
| Return-Pump Ind (Boiler 1) | - | 0 | 1 | 0 | Type of run indication<br>0 = Motor protection<br>1 = Run indication<br>Only visible if **HB1 Return Limitation Type** = 1 | **Configuration ▶ HB ▶ Boiler pumps▶ HB1 ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Return-Pump Delay (Boiler 1) | s | 0 | 200 | 10 | Delay time of the pump indication. | **Configuration ▶ HB ▶ Boiler pumps ▶ HB1 ▶** |
| Return Temp SetP (Boiler 1) | °C | 0 | 100 | 40 | | **HB ▶ Actual/ Setpoint ▶ HB1 ▶** |
| HB1 Return Temp P-Band/Hyst | °C | 0 | 50 | 10 | | **HB ▶ Temp control ▶** |
| Boiler 2 Return Limitation Type | - | 0 | 1 | 0 | Type of return limitation Boiler 2.<br>0 = Valve<br>1 = Pump | **Configuration ▶ HB ▶ HB2 ▶** |
| Return-Pump Ind (Boiler 2) | - | 0 | 1 | 0 | Type of run indication<br>0 = Motor protection<br>1 = Run indication<br>Only visible if **HB2 Return Limitation Type** = 1 | **Configuration ▶ HB ▶ Boiler pumps ▶ HB2 ▶** |
| Return-Pump Delay (Boiler 2) | s | 0 | 200 | 10 | Delay time of the pump indication | **Configuration ▶ HB ▶ Boiler pumps ▶ HB2 ▶** |
| Return Temp SetP (Boiler 2) | °C | 0 | 100 | 40 | | **HB ▶ Actual/ Setpoint ▶ HB2 ▶** |
| Boiler 2 Return Temp P-Band/Hyst | °C | 0 | 50 | 10 | | **HB ▶ Temp control ▶** |
| Boiler 3 Return Limitation Type | - | 0 | 1 | 0 | Type of return limitation Boiler 3.<br>0 = Valve<br>1 = Pump | **Configuration ▶ HB ▶ HB3 ▶** |
| Return-Pump Ind (Boiler 3) | - | 0 | 1 | 0 | Type of run indication<br>0 = Motor protection<br>1 = Run indication<br>Only visible if **HB3 Return Limitation Type** = 1 | **Configuration ▶ HB ▶ Boiler pumps ▶ HB3 ▶** |
| Return-Pump Delay (Boiler 3) | s | 0 | 200 | 10 | Delay time of the pump indication. | **Configuration ▶ HB ▶ Boiler pumps ▶ HB3 ▶** |
| Return Temp SetP (Boiler 3) | °C | 0 | 100 | 40 | | **HB ▶ Actual/ Setpoint ▶ HB3 ▶** |
| Boiler 3 Return Temp P-Band/Hyst | °C | 0 | 50 | 10 | | **HB ▶ Temp control ▶** |
| Boiler 4 Return Limitation Type | - | 0 | 1 | 0 | Type of return limitation Boiler 4.<br>0 = Valve<br>1 = Pump | **Configuration ▶ HB ▶ HB4 ▶** |
| Return-Pump Ind (Boiler 4) | - | 0 | 1 | 0 | Type of run indication<br>0 = Motor protection<br>1 = Run indication<br>Only visible if **HB4 Return Limitation Type** = 1 | **Configuration ▶ HB ▶ Boiler pumps ▶ HB4 ▶** |
| Return-Pump Delay (Boiler 4) | s | 0 | 200 | 10 | Delay time of the pump indication. | **Configuration ▶ HB ▶ Boiler pumps ▶ HB4 ▶** |
| Return Temp SetP (Boiler 4) | °C | 0 | 100 | 40 | | **HB ▶ Actual/ Setpoint ▶ HB4 ▶** |
| Boiler 4 Return Temp P-Band/Hyst | °C | 0 | 50 | 10 | | **HB ▶ Temp control ▶** |

## 3.7.8 Boiler pump

Each boiler has an individual circulation pump. When there is a heating requirement, and before a burner can start, its circulation pump will start up and run for 30 seconds (settable), after which the burner will be permitted to start. When stopping, the burner will stop first, and then the pump will stop after a set shutdown delay.

Pumps are exercised for 5 minutes at 3 pm daily (settable).

## Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Run Time Before Start of HB | s | 0 | 255 | 30 | Runtime of the pump before the boiler starts. | Configuration ▶ HB ▶ Boiler pumps ▶ Boiler pump(s) ▶ |
| Run Time After Stop | s | 0 | 255 | 30 | Extended runtime of the pump. | Configuration ▶ HB ▶ Boiler pumps ▶ Boiler pump(s) ▶ |
| Pump Exercise Hour | | 0 | 23 | 15 | Start time of the exercise. | Configuration ▶ HB ▶ Boiler pumps ▶ Boiler pump(s) ▶ |
| Pump Exercise Time | min | 0 | 255 | 5 | Duration of the exercise. | Configuration ▶ HB ▶ Boiler pumps ▶ Boiler pump(s) ▶ |
| Pump Type (Boiler 1) | - | 0 | 1 | 0 | Type of pump<br>0 = Single pump<br>1 = Double pump | Configuration ▶ HB ▶ Boiler pumps ▶ HB1 ▶ |
| Pump Ind (Boiler 1) | - | 0 | 1 | 0 | Type of run indication<br>0 = Motor protection<br>1 = Run indication | Configuration ▶ HB ▶ Boiler pumps ▶ HB1 ▶ |
| Pump Delay (Boiler 1) | s | 0 | 200 | 10 | Delay time of the pump indication. | Configuration ▶ HB ▶ Boiler pumps ▶ HB1 ▶ |
| Pump Runtime (Boiler 1) | h | 0 | 1000 | 100 | Runtime of the pump, only used for double pumps. | Configuration ▶ HB ▶ Boiler pumps ▶ HB1 ▶ |
| Pump Type (Boiler 2) | - | 0 | 1 | 0 | Type of pump<br>0 = Single pump<br>1 = Double pump | Configuration ▶ HB ▶ Boiler pumps ▶ HB2 ▶ |
| Pump Ind (Boiler 2) | - | 0 | 1 | 0 | Type of run indication<br>0 = Motor protection<br>1 = Run indication | Configuration ▶ HB ▶ Boiler pumps ▶ HB2 ▶ |
| Pump Delay (Boiler 2) | s | 0 | 200 | 10 | Delay time of the pump indication. | Configuration ▶ HB ▶ Boiler pumps ▶ HB2 ▶ |
| Pump Runtime (Boiler 2) | h | 0 | 1000 | 100 | Runtime of the pump, only used for double pumps. | Configuration ▶ HB ▶ Boiler pumps ▶ HB2 ▶ |
| Pump Type (Boiler 3) | - | 0 | 1 | 0 | Type of pump<br>0 = Single pump<br>1 = Double pump | Configuration ▶ HB ▶ Boiler pumps ▶ HB3 ▶ |
| Pump Ind (Boiler 3) | - | 0 | 1 | 0 | Type of run indication<br>0 = Motor protection<br>1 = Run indication | Configuration ▶ HB ▶ Boiler pumps ▶ HB3 ▶ |
| Pump Delay (Boiler 3) | s | 0 | 200 | 10 | Delay time of the pump indication. | Configuration ▶ HB ▶ Boiler pumps ▶ HB3 ▶ |
| Pump Runtime (Boiler 3) | h | 0 | 1000 | 100 | Runtime of the pump, only used for double pumps. | Configuration ▶ HB ▶ Boiler pumps ▶ HB3 ▶ |
| Pump Type (Boiler 4) | - | 0 | 1 | 0 | Type of pump<br>0 = Single pump<br>1 = Double pump | Configuration ▶ HB ▶ Boiler pumps ▶ HB4 ▶ |
| Pump Ind (Boiler 4) | - | 0 | 1 | 0 | Type of run indication<br>0 = Motor protection<br>1 = Run indication | Configuration ▶ HB ▶ Boiler pumps ▶ HB4 ▶ |
| Pump Delay (Boiler 4) | s | 0 | 200 | 10 | Delay time of the pump indication. | Configuration ▶ HB ▶ Boiler pumps ▶ HB4 ▶ |
| Pump Runtime (Boiler 4) | h | 0 | 1000 | 100 | Runtime of the pump, only used for double pumps. | Configuration ▶ HB ▶ Boiler pumps ▶ HB4 ▶ |

### 3.7.9 Transport pump

The boiler control has a common transport pump. It can be configured either as a single pump (pump A) or as a double pump (pump A and pump B). The pump will start when a burner is active, or if the outdoor temperature drops beneath 18°C (settable). Should an alarm occur in the transport pump, all burners will stop and remain blocked until the alarm has been reset and acknowledged. If the system has been configured as a double pump, it will automatically switch from transport pump A to transport pump B and vice versa, should an alarm occur.

It is also possible to use a digital input for pressure/flow indication. When the transport pump is running, a missing signal will generate an alarm and all boilers will be stopped.

The pump is exercised daily at 3 PM for 5 minutes. If the transport pump has been configured as a double pump, both pumps are exercised.

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Pump Type | - | 0 | 1 | 0 | Type of pump<br>0 = Single pump<br>1 = Double pump | **Configuration ▶ HB ▶ Boiler pumps▶ Transport pump ▶** |
| Pump Ind | - | 0 | 1 | 0 | Type of run indication<br>0 = Motor protection<br>1 = Run indication | **Configuration ▶ HB ▶ Boiler pumps▶ Transport pump ▶** |
| Pump Delay | s | 0 | 200 | 10 | Delay time of the pump indication. | **Configuration ▶ HB ▶ Boiler pumps▶ Transport pump ▶** |
| Pump Runtime | h | 0 | 1000 | 100 | Runtime of the pump, only used for double pumps. | **Configuration ▶ HB ▶ Boiler pumps▶ Transport pump ▶** |
| Outd Temp for Start of Pump | °C | -40 | 50 | 18 | | **Configuration ▶ Boiler ▶ Boiler pumps ▶ Transport pump ▶** |
| Hyst for Start/Stop of Pump | °C | 1 | 20 | 5 | | **Configuration ▶ Boiler ▶ Boiler pumps ▶ Transport pump ▶** |

### 3.7.10 Manual mode

Setting parameters to manual mode is a very useful feature during commissioning or when troubleshooting.

**Caution!** Leaving any output in manual control means that the normal control will be suspended. Therefore, an alarm will be generated as soon as any output is set to any mode other than **Auto**.

The following parameters can be set to manual mode for the boilers:

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Manual/Auto Modulating Boiler | - | 0 | 2 | Auto | 0 = Manual-Off<br>1 = Manual<br>2 = Auto | **HB▶ Manual/Auto ▶ HB ▶** |
| Manual/Auto Manual Set | % | 0 | 100 | - | 0-100% | **HB▶ Manual/Auto ▶ HB ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| HB1 Manual/Auto Boiler | - | 0 | 3 | Auto | 0 = Off<br>1 = Low<br>2 = High<br>3 = Auto | HB► Manual/Auto ► HB1 ► |
| HB1 Manual/Auto Pump | - | 0 | 3 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3 = Auto | HB► Manual/Auto ► HB1 ► |
| HB1 Manual/Auto Return Temp Valve | - | 0 | 2 | Auto | 0 = Off<br>1 = Manual<br>2 = Auto | HB► Manual/Auto ► HB1 ► |
| HB1 Manual/Auto Manual Set | % | 0 | 100 | - | 0-100% | HB► Manual/Auto ► HB1 ► |
| HB1 Manual/Auto Return Temp Pump | - | 0 | 2 | Auto | 0 = Off<br>1 = Pump<br>2 = Auto | HB► Manual/Auto ► HB1 ► |
| HB2 Manual/Auto Boiler | - | 0 | 3 | Auto | 0 = Off<br>1 = Low<br>2 = High<br>3 = Auto | HB► Manual/Auto ► HB2 ► |
| HB2 Manual/Auto Pump | - | 0 | 3 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3 = Auto | HB► Manual/Auto ► HB2 ► |
| HB2 Manual/Auto Return Temp Valve | - | 0 | 2 | Auto | 0 = Off<br>1 = Manual<br>2 = Auto | HB► Manual/Auto ► HB2 ► |
| HB2 Manual/Auto Manual SetP | % | 0 | 100 | - | 0-100% | HB► Manual/Auto ► HB2 ► |
| HB2 Manual/Auto Return Temp Pump | - | 0 | 2 | Auto | 0 = Off<br>1 = Pump<br>2 = Auto | HB► Manual/Auto ► HB2 ► |
| HB3 Manual/Auto Boiler | - | 0 | 3 | Auto | 0 = Off<br>1 = Low<br>2 = High<br>3 = Auto | HB► Manual/Auto ► HB3 ► |
| HB3 Manual/Auto Pump | - | 0 | 3 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3 = Auto | HB► Manual/Auto ► HB3 ► |
| HB3 Manual/Auto Return Temp Valve | - | 0 | 2 | Auto | 0 = Off<br>1 = Manual<br>2 = Auto | HB► Manual/Auto ► HB3 ► |
| HB3 Manual/Auto Manual SetP | % | 0 | 100 | - | 0-100% | HB► Manual/Auto ► HB3 ► |
| HB3 Manual/Auto Return Temp Pump | - | 0 | 2 | Auto | 0 = Off<br>1 = On<br>2 = Auto | HB► Manual/Auto ► HB3 ► |
| HB4 Manual/Auto Boiler | - | 0 | 3 | Auto | 0 = Off<br>1 = Low<br>2 = High<br>3 = Auto | HB► Manual/Auto ► HB4 ► |
| HB4 Manual/Auto Pump | - | 0 | 3 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3 = Auto | HB► Manual/Auto ► HB4 ► |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| HB4 Manual/Auto Return Temp Valve | - | 0 | 2 | Auto | 0 = Off<br>1 = Manual<br>2 = Auto | HB► Manual/Auto ►<br>HB4 ► |
| HB4 Manual/Auto Manual SetP | % | 0 | 100 | - | 0-100% | HB► Manual/Auto ►<br>HB4 ► |
| HB4 Manual/Auto Return Temp Pump | - | 0 | 2 | Auto | 0 = Off<br>1 = On<br>2 = Auto | HB► Manual/Auto ►<br>HB4 ► |
| Manual/Auto Pump | - | 0 | 3 | Auto | 0 = Off<br>1 = Pump A On<br>2 = Pump B On<br>3 = Auto | HB► Manual/Auto ►<br>Transport pump ► |

# 3.8 Pump control

Function to control a single or a double pump depending on the demand. This chapter is a general description of the pump control function. Configuration of the pumps are done within the other functions.

The function provides following features:

- ✓ Change between pump A and B after a settable difference of runtime or an alarm at the running pump
- ✓ Alarm can be a signal from a motor-protection or a missing feedback
- ✓ Delay time for the error detection
- ✓ Feedback can work with one or two inputs

## 3.8.1 Inputs and outputs

The following inputs and outputs are used for the pump control function.

### Digital inputs

| Name | Unit | Description |
|---|---|---|
| Input | - | Control signal to start / stop the pump |
| Feedback Pump A | - | Feedback from pump A depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |
| Feedback Pump A assigned | - | Signal **Feedback pump A** is configured |
| Feedback Pump B | - | Feedback from pump A depending on the type of feedback.<br>Motor protection:<br>0 = Okay<br>1 = Error<br>Run indication:<br>0 = Off<br>1 = Running |
| Feedback Pump B assigned | - | Signal **Feedback pump B** is configured |
| Exercise running | - | Exercise took over the control of the pump |

### Digital outputs

| Name | Unit | Description |
|---|---|---|
| Pump A | Off/On | |
| Pump B | Off/On | |
| Manual State | Off/On | Pump function is in manual mode |
| Alarm Pump A | Off/On | |
| Alarm Pump B | Off/On | |

### 3.8.2 Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Pump Type | - | 0 | 1 | 0 | Type of pump<br>0= Single pump<br>1 = Double pump | Configuration► HS ► HS1 ► System ► |
| Pump Ind | - | 0 | 1 | 0 | Type of feedback for the load pump.<br>0 = motor protection<br>1 = run indication | Configuration► HS ► HS1 ► System ► |
| Pump Delay | s | 0 | 200 | 10 | Delay time of the pump indication. | Configuration► HS ► HS1 ► System ► |
| Pump Runtime | h | 0 | 1000 | 100 | Runtime of the pump, only used for double pumps. | Configuration► HS ► HS1 ► System ► |
| Manual/Auto Pump PumpA | - | 0 | 2 | Auto | 0 = Off<br>1 = On<br>2 = Auto | HS1 ► Manual/Auto ► |
| Manual/Auto Pump PumpB | - | 0 | 2 | Auto | 0 = Off<br>1= On<br>2 = Auto | HS1 ► Manual/Auto ► |

## 3.9 General functions

The general functions menu contains three different items:

- ✓ Building inertia
- ✓ Split valve
- ✓ Priority

### 3.9.1 Building inertia

Every building has the capacity to store energy. The amount of energy that a building can store is described in the **Building inertia** parameter. This value is dependent on the construction of the building (e.g. the thickness of its outdoor walls, insulation, type of windows, etc.).

If **Building inertia** is activated (value > 0), the outdoor temperature will be delayed by this value. The delayed outdoor temperature will then be used instead of the real value.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Building inertia | h | 0.0 | 24.0 | 0.0 | Delay of the outdoor temperature. | Configuration ► General functions ► Heating ► |

### 3.9.2 Split valve

The signal of an actuator can be split to two different outputs. The controller output 0% – **Split point** is sent to the main output (HSx/HWx actuator) and **Split point** – 100% is sent to the split output.

Any of the signals HS1, HS2, HS3, HS4, HW1, HW2 or DHS1 can be split in two.

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Split Valve | - | 0 | 7 | 0 | 0 = No split<br>1 = HS1<br>2 = HS2<br>3 = HS3<br>4 = HS4<br>5 = HW1<br>6 = HW2<br>7 = DHS1 | **Configuration ▶ General functions ▶ Heating ▶** |
| Split point | % | 0 | 100 | 50 | | **Configuration ▶ General functions ▶ Heating ▶** |
| Runtime | s | 0 | 600 | 120 | Actuator runtime if connected to an increase/decrease output. | **Configuration ▶ General functions ▶ Heating ▶** |

## 3.10 Priority

Function for prioritizing the domestic hot water circuits over the heating system circuits or vice versa. This can be useful for example in a system that is somewhat undersized when it is very cold outside. The configuration parameters for the Priority function can be found in the **General functions** menu.

### 3.10.1 Priority function

The *Priority* function permits defining if and how the HW circuits should have priority over the heating systems or the other way around, when heat is required. This function is needed when the heat producer is unable to simultaneously supply heat to all heat consumers. Therefore, it is possible to define a reduction of the reduced circuit.

There are two types of priority:

- ✓ If there is a deviation / load in one of the assigned HW's (parameter **HW1** or **HW2**) the function starts to reduce the assigned HS's (parameter **HS1**, **HS2**, **HS3** and **HS4**)
- ✓ If there is a deviation in one of the assigned HS's (parameter **HS1**, **HS2**, **HS3** or **HS4**) the function starts to reduce the assigned HW's (parameter **HW1** and **HW2**)

The function only works with heating systems which are not in *Cooling* mode (inputs **Cooling HSx** must be 0)

If the function has to reduce something, the timer **DelayTime** starts.

If the timer **DelayTime** expires, the function sends out the reduction signals to the HS's (when **Activation Direction** = 1) or to the HW's (when **Activation Direction** = 2).

The timer **MaxTime** starts and the following signals are sent out to the circuits which have to be reduced:

- ✓ **Type** = 1: Sent out: Status = 1
- ✓ **Type** = 2: Sent out: Status = 2

If the timer **MaxTime** expires, the system goes back to "parallel" mode (no reduction, **Status HSx /Status HWx** = 0) and the timer **MaxTime** starts again.

If the timer **MaxTime** expires again, the function starts again from the beginning.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Activation Direction | - | 0 | 2 | 0 | Activates or deactivates the *Priority* function.<br>0 = Not active<br>1 = HW's are prioritized<br>2 = HS's are prioritized | **Configuration ▶ General functions ▶ Priority ▶** |
| Type | - | 1 | 2 | 1 | 1 = Absolute (off)<br>2 = Reduced NCT (reduced circuits works with setpoint NCT) | **Configuration ▶ General functions ▶ Priority ▶** |
| MaxDeviation | °C | 0.1 | 50.0 | 2.0 | Max deviation to start the function. | **Configuration ▶ General functions ▶ Priority ▶** |
| Working on HS1 | - | 0 | 1 | 1 | HS1 will be influenced by / will influence the priority function. | **Configuration ▶ General functions ▶ Priority ▶** |
| Working on HS2 | - | 0 | 1 | 1 | HS2 will be influenced by / will influence the priority function. | **Configuration ▶ General functions ▶ Priority ▶** |
| Working on HS3 | - | 0 | 1 | 1 | HS3 will be influenced by / will influence the priority function. | **Configuration ▶ General functions ▶ Priority ▶** |
| Working on HS4 | - | 0 | 1 | 1 | HS4 will be influenced by / will influence the priority function. | **Configuration ▶ General functions ▶ Priority ▶** |
| Working on HW1 | - | 0 | 1 | 1 | HW1 will be influenced by / will influence the priority function. | **Configuration ▶ General functions ▶ Priority ▶** |
| Working on HW2 | - | 0 | 1 | 1 | HW2 will be influenced by / will influence the priority function. | **Configuration ▶ General functions ▶ Priority ▶** |
| DelayTime | min | 0 | 60 | 30 | Delay of the reduction. | **Configuration ▶ General functions ▶ Priority ▶** |
| DelayTime Timer | min | | | | The current value of the DelayTime timer. | **Configuration ▶ General functions ▶ Priority ▶** |
| MaxTime | min | 0 | 600 | 120 | Max time of the reduction. | **Configuration ▶ General functions ▶ Priority ▶** |
| MaxTime Timer | min | | | | The current value of the MaxTime timer. | **Configuration ▶ General functions ▶ Priority ▶** |

## 3.11 Refill

Automatic refill of the system in case of low pressure. Limitation of the refill time and the time between two cycles. Needs either an AI or DI and DO.

### 3.11.1 Inputs and outputs

The following inputs and outputs are used for the refill function.

#### Analogue inputs

| Name | Unit | Description |
|---|---|---|
| Pressure | bar | The pressure in the system. |

#### Digital inputs

| Name | Unit | Description |
|---|---|---|
| Low Pressure | Off/On | |

#### Digital inputs

| Name | Unit | Description |
|---|---|---|
| Refill | Off/On | Output to refill the system. |

### 3.11.2 Function

In case of **Low Pressure** (DI) or **Pressure** (AI) < **Min pressure**, the function starts to refill the system by activation of the DO **Refill**.

The refill ends if:

- ✓ **Low Pressure** is On again
- ✓ **Pressure** > **Min Pressure** + **Hysteresis**
- ✓ Output **Refill** is active for **Duration of refill cycles**

The maximum number of refill cycles is limited by the parameter **Max number of cycles**. The time between two cycles of refill must be higher than **Time between refill cycles**. The cycle counter can be reset by the parameter **Reset**.

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Min pressure | bar | 0.0 | 10.0 | 2.0 | | `Configuration ▶ General functions ▶ Refill ▶` |
| Hysteresis | bar | 0.0 | 10.0 | 0.1 | | `Configuration ▶ General functions ▶ Refill ▶` |
| Max number of cycles | - | 1 | 10 | 1 | Number of refill cycles. | `Configuration ▶ General functions ▶ Refill ▶` |
| Time between refill cycles | min | 0 | 600 | 60 | | `Configuration ▶ General functions ▶ Refill ▶` |
| Duration of refill cycles | s | 0 | 600 | 30 | | `Configuration ▶ General functions ▶ Refill ▶` |
| Reset | - | 0 | 1 | 0 | Reset of duration counter. | `Configuration ▶ General functions ▶ Refill ▶` |

# 3.12 Energy / Cold water monitoring

The controller can be configured to monitor the energy or water consumption. Digital pulse inputs can be configured for monitoring the consumption as well as M-Bus meters.

## 3.12.1 Inputs and outputs

The following inputs and outputs are used for the energy/cold water monitoring function.

### Digital inputs

| Name | Unit | Description |
|---|---|---|
| Heating system 1 energy pulse | - | Digital pulse input to count the pulses from the meter of HS1. |
| Heating system 2 energy pulse | - | Digital pulse input to count the pulses from the meter of HS2. |
| Heating system 3 energy pulse | - | Digital pulse input to count the pulses from the meter of HS3. |
| Heating system 4 energy pulse | - | Digital pulse input to count the pulses from the meter of HS4. |
| Domestic hot water 1 energy pulse | - | Digital pulse input to count the pulses from the meter of HW1. |
| Domestic hot water 2 energy pulse | - | Digital pulse input to count the pulses from the meter of HW2. |
| District heating energy pulse | - | Digital pulse input to count the pulses from the meter of DHS1. |
| Water pulse | - | Digital pulse input to count the pulses from the heat-water-meter. |
| Energy pulse | - | Digital pulse input to count the pulses from the heat-energy-meter. |
| Cold water 1 pulse | - | Digital pulse input to count the pulses from the cold water meter 1. |
| Cold water 2 pulse | - | Digital pulse input to count the pulses from the cold water meter 2. |
| Electric pulse | - | Digital pulse input to count the pulses from the electrical meter. |

## 3.12.2 Pulse meter

One digital input can be configured to monitor the energy consumption of each circuit separately. The pulse constant is settable and the maximum pulse rate is 2 Hz. There are 4 additional inputs to monitor the volume of 3 water meters (**Volume pulse**, **Cold water 1 pulse**, **Cold water 2 pulse**) and the consumption of electrical energy (**Electric pulse**).

### Parameters

Configuration of the pulse meters is done by setting the right pulse constant of the connected meters.

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Energy Pulse Heating | kWh/ pulse | 0 | 10000 | 1 | Pulse constant of the heat energy meter. | `Configuration` ▶ `General functions` ▶ `Pulse constants` ▶ |
| Volume Pulse Heating | l/pulse | 0 | 10000 | 10 | Pulse constant of the heat water meter. | `Configuration` ▶ `General functions` ▶ `Pulse constants` ▶ |
| Energy Pulse HS1 | kWh/ pulse | 0 | 10000 | 1 | Pulse constant of energy meter Heating system 1. | `Configuration` ▶ `General functions` ▶ `Pulse constants` ▶ |
| Energy Pulse HS2 | kWh/ pulse | 0 | 10000 | 1 | Pulse constant of energy meter Heating system 2. | `Configuration` ▶ `General functions` ▶ `Pulse constants` ▶ |
| Energy Pulse HS3 | kWh/ pulse | 0 | 10000 | 1 | Pulse constant of energy meter Heating system 3. | `Configuration` ▶ `General functions` ▶ `Pulse constants` ▶ |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Energy Pulse HS4 | kWh/ pulse | 0 | 10000 | 1 | Pulse constant of energy meter Heating system 4. | **Configuration ▶ General functions ▶ Pulse constants ▶** |
| Energy Pulse HW1 | kWh/ pulse | 0 | 10000 | 1 | Pulse constant of energy meter Domestic hot water 1. | **Configuration ▶ General functions ▶ Pulse constants ▶** |
| Energy Pulse HW2 | kWh/ pulse | 0 | 10000 | 1 | Pulse constant of energy meter Domestic hot water 2. | **Configuration ▶ General functions ▶ Pulse constants ▶** |
| Energy Pulse DHS1 | kWh/ pulse | 0 | 10000 | 1 | Pulse constant of energy meter District heating system. | **Configuration ▶ General functions ▶ Pulse constants ▶** |
| Electric Meter | kWh/ pulse | 0 | 10000 | 1 | Pulse constant of electricity meter. | **Configuration ▶ General functions ▶ Pulse constants ▶** |
| Cold Water1 | l/pulse | 0 | 10000 | 10 | Pulse constant of Cold water meter 1. | **Configuration ▶ General functions ▶ Pulse constants ▶** |
| Cold Water2 | l/pulse | 0 | 10000 | 10 | Pulse constant of Cold water meter 2. | **Configuration ▶ General functions ▶ Pulse constants ▶** |

## Meter data

Depending on the kind of meter, the following parameters will be calculated by the controller. The heating power is calculated by measuring the time between energy pulses.

### Energy meter

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| HSx/HWx/DHS1 Energy Total | MWh | 0 | 10000-00 | 0 | Total energy consumption, can be reset. | **Energy/Cold water ▶ Energy HSx/HWx/DHSx ▶** |
| HSx/HWx/DHS1 Energy Today | kWh | - | - | - | 24h usage, today. | **Energy/Cold water ▶ Energy HSx/HWx/DHSx ▶** |
| HSx/HWx/DHS1 Energy Yesterday | kWh | - | - | - | 24h usage, yesterday. | **Energy/Cold water ▶ Energy HSx/HWx/DHSx ▶** |
| HSx/HWx/DHS1 Energy D B Y-day | kWh | - | - | - | 24h usage, day before yesterday. | **Energy/Cold water ▶ Energy HSx/HWx/DHSx ▶** |
| HSx/HWx/DHS1 Power Instant | kW | - | - | - | Instantaneous power. | **Energy/Cold water ▶ Energy HSx/HWx/DHSx ▶** |
| HSx/HWx/DHS1 Power Average | kW | - | - | - | Average of the instantaneous power for the last hour. | **Energy/Cold water ▶ Energy HSx/HWx/DHSx ▶** |
| HSx/HWx/DSH1 Power Max Aver | kW | - | - | - | Maximum average value of the instantaneous power. | **Energy/Cold water ▶ Energy HSx/HWx/DHSx ▶** |

### Heat meter

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Energy Total | MWh | 0 | 10000-00 | 0 | Total energy consumption, can be reset. | **Energy/Cold water ▶ Heat meter ▶** |
| Hot water total | m³ | 0 | 10000-00 | 0 | Total water consumption, can be reset. | **Energy/Cold water ▶ Heat meter ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Energy Today | kWh | - | - | - | 24h usage, today. | **Energy/Cold water ► Heat meter ►** |
| Energy Yesterday | kWh | - | - | - | 24h usage, yesterday. | **Energy/Cold water ► Heat meter ►** |
| Energy D B Y-day | kWh | - | - | - | 24h usage, day before yesterday. | **Energy/Cold water ► Heat meter ►** |
| Consumption Today | l | - | - | - | 24h consumption, today. | **Energy/Cold water ► Heat meter ►** |
| Consumption Yesterday | l | - | - | - | 24h consumption, yesterday. | **Energy/Cold water ► Heat meter ►** |
| Consumption D B Y-day | l | - | - | - | 24h consumption, day before yesterday. | **Energy/Cold water ► Heat meter ►** |
| Power Consumption Instant | kW | - | - | - | Instantaneous power consumption. | **Energy/Cold water ► Heat meter ►** |
| Power Consumption Average | kW | - | - | - | Average of the instantaneous power consumption for the last hour. | **Energy/Cold water ► Heat meter ►** |
| Power Consumption Max Aver | kW | - | - | - | Maximum average value of the instantaneous power consumption. | **Energy/Cold water ► Heat meter ►** |

## Cold water meter

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| CWx Consump Total | m³ | 0 | 10000-00 | 0 | Total water consumption, can be reset. | **Energy/Cold water ► Cold water meterx ►** |
| CWx Flow | l/min | - | - | - | Water flow. | **Energy/Cold water ► Cold water meterx ►** |
| CWx Consump Today | l | - | - | - | 24h usage, today. | **Energy/Cold water ► Cold water meterx ►** |
| CWx Consump Yesterday | l | - | - | - | 24h usage, yesterday. | **Energy/Cold water ► Cold water meterx ►** |
| CWx Consump D B Y-day | l | - | - | - | 24h usage, day before yesterday. | **Energy/Cold water ► Cold water meterx ►** |
| Lowest CWx Consump Today | l | - | - | - | Lowest hourly usage today. | **Energy/Cold water ► Cold water meterx ►** |
| Lowest CWx Consump Yesterday | l | - | - | - | Lowest hourly usage yesterday. | **Energy/Cold water ► Cold water meterx ►** |

## Electricity meter

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Energy Total | MWh | 0 | 10000-00 | 0 | Total energy consumption, can be reset. | **Energy/Cold water ► Electricity meter ►** |

## Alarms

Alarms are generated for the main energy meter and the cold water meters. For more information about these alarms, see the full alarm list in *Appendix D Alarm list*.

| Name | Description |
|---|---|
| Pulse error | If no pulses are detected within a settable time, an alarm is activated. Setting the time to 0 inhibits the alarm function. |
| High usage | If the daily usage is higher than a settable value an alarm is activated. |

## 3.12.3 M-Bus meter

M-bus meters can be connected to a serial port of the controller via an M-Bus to serial converter X1176 or to the built-in M-Bus interface if the controller has one.

Up to 7 M-bus meters can be configured to monitor the energy consumption of the Heating systems, Domestic hot water systems and the District heating system.

In addition, two M-bus meters can be configured to monitor the water consumption, Water meter 1 and Water meter 2.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Heat Meter | Off/On | 0 | 1 | Off | Activation of the meter<br>0 = Off<br>1 = On | **Configuration ▶ Communication ▶ Function port M-Bus ▶ Heat meter HSx/HWx/DHSx ▶** |
| Address | - | 0 | 255 | 1-7 | Bus-address of the meter. Default addresses:<br>HS1 = 1<br>HS2 = 2<br>HS3 = 3<br>HS4 = 4<br>HW1 = 5<br>HW2 = 6<br>DHS1 = 7 | **Configuration ▶ Communication ▶ Function port M-Bus ▶ Heat meter HSx/HWx/DHSx ▶** |
| Interval | - | 0 | 4 | 1 | Interval to read out the meter:<br>0 = Always<br>1 = 15 minutes<br>2 = 30 minutes<br>3 = 1 hour<br>4 = 24 hours | **Configuration ▶ Communication ▶ Function port M-Bus ▶ Heat meter HSx/HWx/DHSx ▶** |
| Water Meter | Off/On | 0 | 1 | Off | Activation of the meter<br>0 = Off<br>1 = On | **Configuration ▶ Communication ▶ Function port M-Bus ▶ Water meter ▶ Water meterx ▶** |
| Address | - | 0 | 255 | 8-9 | Bus-address of the meter. Default addresses:<br>Water meter 1 = 8<br>Water meter 2 = 9 | **Configuration ▶ Communication ▶ Function port M-Bus ▶ Water meter ▶ Water meterx ▶** |
| Interval | - | 0 | 4 | 1 | Interval to read out the meter:<br>0 = Always<br>1 = 15 minutes<br>2 = 30 minutes<br>3 = 1 hour<br>4 = 24 hours | **Configuration ▶ Communication ▶ Function port M-Bus ▶ Water meter ▶ Water meterx ▶** |

### Meter data

Depending on the meter, the following parameters can be read:

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Temperature Supply | °C | - | - | - | Supply temperature. | **Energy/Cold water ▶ HM HSx/HWx/DHSx ▶** |
| Temperature Return | °C | - | - | - | Return temperature. | **Energy/Cold water ▶ HM HSx/HWx/DHSx ▶** |

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Delta-T | °C | - | - | - | Temperature difference betwween supply and return. | **Energy/Cold water ► HM HSx/HWx/DHSx ►** |
| Energy | MWh | - | - | - | Total energy consumption. | **Energy/Cold water ► HM HSx/HWx/DHSx ►** |
| Power | kW | - | - | - | Instantaneous power. | **Energy/Cold water ► HM HSx/HWx/DHSx ►** |
| Volume | m³ | - | - | - | Total water volume. | **Energy/Cold water ► HM HSx/HWx/DHSx ►** |
| Flow | l/min | - | - | - | Water flow. | **Energy/Cold water ► HM HSx/HWx/DHSx ►** |

### Alarms

Each M-Bus meter can generate an alarm if the communication is broken. For more information about these alarms, see the full alarm list in *Appendix D Alarm list*.

## 3.13 Pressure control

The signal of an analogue output can be controlled to maintain a constant pressure.

### 3.13.1 Inputs and outputs

The following inputs and outputs are used for the pressure control function.

### Analogue inputs

| Name | Unit | Description |
|---|---|---|
| Differential pressure | kPa | Input signal from the pressure sensor |

### Analogue outputs

| Name | Unit | Description |
|---|---|---|
| Diff pressure valve | % | Control signal of the frequency converter |

### Digital outputs

| Name | Unit | Description |
|---|---|---|
| Frequency converter start | Off/On | Start signal to the frequency converter |

### 3.13.2 Setpoint

The **Actual/Setpoint** menu shows the calculated setpoints.

### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| Pressure control SetP | kPa | 0.0 | 10000.-0 | 50.0 | Setpoint to be controlled by the PI-controller. | **Pressure control ► Actual/Setpoint ►** |

### 3.13.3 Control pressure

The **Control pressure** menu permits the configuration of the PI-controller.

A digital output signal can be used to give a start signal to the frequency converter. This output is enabled as soon as the converter control signal rises above 0.1 V.

#### Parameters

| Name | Unit | Min | Max | Default | Description | Menu path |
|---|---|---|---|---|---|---|
| P-band | kPa | 1 | 1000 | 25 | P-band pressure control. | **Pressure control ► Control pressure ►** |
| I-time | s | 0 | 9999 | 100 | I-time pressure control. | **Pressure control ► Control pressure ►** |
| Min Output | % | 0 | 100 | 0 | Minimum output of the PI-controller. | **Pressure control ► Control pressure ►** |

## 3.14 Inputs/outputs

```
AI/UAI
WAI
DI/UDI
AO
DO
```

### 3.14.1 General

#### Free configuration

Any control signal can be bound to any input/output. The only restriction is that digital signals cannot be bound to analogue inputs and vice versa. It is up to the user doing the binding to make sure that activated functions are bound to appropriate in- and outputs.

#### Analogue inputs, AI/UAI

```
AI1 Raw:-4.5
Outdoor temp
Compensation: 0.0 °C
Sensor type: PT1000
```

All analogue inputs are for PT1000, Ni1000 or 0…10 V.

Input signals can be compensated, e.g. for wiring resistance.

The raw value will show the actual, uncompensated input value.

If input type is set to 0…10 V, the parameter values that should correspond to the input signal levels 0 V and 10 V can be set.

```
Sensor type
 0 V = 0
10 V = 100
```

## Wireless inputs, WAI

```
WAI1 Raw:-4.5
Outdoor temp
Compensation: 0.0 °C
Sign: 0 Bat:Ok
```

Wireless input signals can be compensated.

The raw value will show the actual, uncompensated input value.

**Sign** shows the strength of the wireless signal. **Bat** shows if the battery is low.

## Connecting wireless sensors

Menu to connect/disconnect a wireless sensor with the receiver. Select the wireless sensor and the **Action** can be changed; *No action*/*Connect*/*Disconnect*. For more information, see the documentation for the wireless sensors.

```
Connect/Disconnect
WAI: 1
Action: No action
```

## Digital inputs, DI/UDI

```
DI1 Status:Off
HS1 Pump A ind
NO/NC:NO
```

To simplify adaptation to external functions, all digital inputs can be set to be either normally open, NO, or normally closed, NC.

The digital inputs are set to normally open as default, i.e. if the input is closed, the function connected to the input is activated.

**Caution!** Be careful when changing the input from NO to NC, since some digital functions can be configured to either NO or NC themselves.

## Analogue outputs, AO

```
AO1 Value: 10.0V
HS1 Actuator
Manual/Auto:Auto
```

Analogue outputs are 0…10 V DC.

Analogue outputs can be set to run mode **Auto**, **Manual** or **Off**. If they are set to **Manual** mode, the **AOx** value can be changed.

## Digital outputs, DO

```
DO1 Status:On
HS1 Pump A Start
Man/Auto:Auto
```

Digital outputs can be set to run mode **Auto**, **Manual-On** or **Manual-Off**.

# 3.15 Alarm settings

The alarm settings menu has two submenus, **Alarm limits** and **Alarm delay**. In these submenus, the alarm limits and alarm delays are configured for all alarms. They contain limits and delays for the following alarms:

## 3.15.1 Alarm limits

- ✓ Control deviation HS1, HS2, HS3 and HS4
- ✓ Control deviation HW1 and HW2
- ✓ High temperature limit HW1 and HW2
- ✓ High temperature limit DHS1
- ✓ Solar collector max temperature
- ✓ Solar collector frost limit
- ✓ High temperature buffer tank
- ✓ High temperature boiler
- ✓ Low temperature boiler
- ✓ High supply temperature boiler 1-4
- ✓ High water consumption 24 hours
- ✓ High water consumption 1 hour
- ✓ High energy consumption 24 hours
- ✓ Maximum time between pulses

## 3.15.2 Alarm delays

- ✓ Control deviation HS1, HS2, HS3 and HS4
- ✓ Control deviation HW1 and HW2
- ✓ High temperature limit HW1 and HW2
- ✓ High temperature boiler
- ✓ Low temperature boiler
- ✓ Expansion vessel
- ✓ External alarm

# 3.16 Alarm configuration

The Alarm config menu permits configuration of the priority for all alarms. A complete alarm list can be found in *Appendix D Alarm list*. It contains all the default alarm texts and priorities.

## 3.16.1 Priority

The alarm priority that is shown in the display in the event of an alarm can only be changed using Exigo tool. For more information, see the Exigo tool manual.

### 3.16.2 Alarm text

The alarm text that is shown in the display in the event of an alarm can only be changed using Exigo tool. For more information, see the Exigo tool manual.

## 3.17 Communication

The Communication menu contains settings for Function port 1 and 2, Function port M-Bus and TCP/IP.

The controller is capable of communication via the BACnet protocol, using either IP or MS/TP data link formats. In order to connect a controller to a BAS (Building Automation System) via BACnet/IP, a controller with a TCP/IP port is required. To connect to a BAS via BACnet MS/TP, a controller with an RS485 communication port is required.

### 3.17.1 Serial port 1 and 2

In a controller with two serial ports, both ports have the same functions. However, they can not both be configured to have the same function at the same time, except that both can be slaves.

Four different types of communication can be selected:

- ✓ Slave
- ✓ Expansion unit
- ✓ Wireless sensors
- ✓ M-Bus

```
Function port1
Slave
```

#### Slave

For connection to Exigo tool or a SCADA system.

```
Function port1
Slave
```

The default protocol in slave-mode is EXOline. The communication protocol can be changed to Modbus or BACnet MS/TP.

#### Modbus

To connect the controller to a network for Modbus communication, the Modbus-slave must be activated.

```
Modbus
communication
Slave, port 1
Not Active
```

If Modbus communication is activated, you can set the address etc.

```
Modbus address: 1
Speed: 9600 bps
Two stop bits:No
Parity:No
```

## BACnet MS/TP

To connect the controller to a BACnet MS/TP network, the BACnet MS/TP of the port must be activated. The default communication settings upon delivery are as follows:

- ✓ Speed = 9600 bps
- ✓ MAC address = 0
- ✓ Device ID = 2640
- ✓ Max Master = 127

```
Function port1


Slave
```

```
BACnet MS/TP
communication
port1
Active
```

```
Device name
Exigo
MAC
 0
```

```
Device ID low
 2640
Device ID high
 0          (x10000)
```

```
Speed
9600 bps
Max master address
 127
```

### Device name

This is the name of the device, as shown on the BAS when discovering devices.

### MAC

The MAC address of the device. This needs to be unique only to the subnet to which the device is attached.

### Device ID

The ID of a device, used to identify it on the BACnet network. To set an ID value of 34600, the low number would be set to 4600 and the high number to 3.

**Note!** The ID number must be unique, and can not be duplicated anywhere on the BACnet network.

### Speed

Sets the communication speed of the MS/TP network. This value can be 9600, 19200, 38400 or 76800, but is typically set to 38400 or 76800.

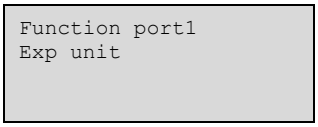
### Max master address

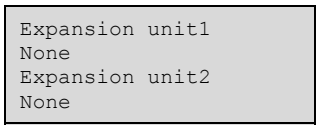
The max master address is the MAC address of the highest master device on the BACnet MS/TP network segment. Setting this number above the highest MAC address will decrease network performance.

For additional information, see the Exigo PICS document available at http://www.bacnetinternational.net/btl/index.php?m=133.

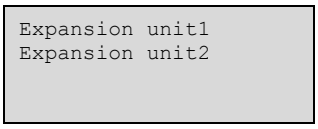
## Expansion unit

In order to connect additional inputs and outputs to the controller, port 1 or 2 should be set as **Expansion unit + External sensor** (IO-expansion units IO-A15MIXW-3-BEM, IO-A28MIXW-3-BEM, IO-V19MIXW-1-BEM or controllers configured as expansion units can be connected). It is possible to connect two expansion units, giving a maximum number of 28*3 = 84 inputs/outputs. The expansion units must have the addresses 241:1 and 241:2 respectively (PLA:ELA).




To initiate the expanded controllers, select **Expansion unit** at start-up (see below). After initiating the expansion units and setting the master controller, all inputs and outputs are available for configuration in the master controller under **Configuration ▶ Inputs/Outputs ▶** (the inputs/outputs of the expansion units are named Exp1/Exp2).




## Wireless sensor

In order to connect additional wireless sensors to the controller, port 1 or 2 should be configured as **Wireless sensor + Modbus pumps**. Up to 16 sensors (outdoor sensors and room sensors), can be connected via the wireless receiver.

The room sensors can be connected to an average function (**HSx Room Temp Aver.**). The result of the average calculation is used as room temperature in the chosen heating system. Different kind of calculations are selectable at **Configuration ▶ Inputs/Outputs ▶WAI▶Type of average calc:**

- ✓ Minimum
- ✓ Maximum
- ✓ Average
- ✓ Average without lowest and highest value
- ✓ Median filter

The communication to the wireless receiver needs to be activated under **Configuration ▶ Communication ▶Function port x ▶Wireless Sensor**.

After the port is set to **Wireless sensor**, all inputs are available for configuration in the master controller under **Configuration ▶ Inputs/Outputs ▶** (the wireless inputs are named WAI).

## Modbus pumps

In order to connect modbus pumps to the controller, port 1 or 2 should be configured as **Wireless sensor + Modbus pumps**. Up to 10 pumps can be connected.

The communication to the pumps needs to be activated under **Configuration ▶ Communication ▶Function port x ▶Modbus Pumps**

The type of the pump (Grundfos or Wilo) and the Modbus-address can be selected for each pump under **Configuration ▶ Communication ▶Function port x ▶Modbus Pumps ▶Pump x**.

A digital output (**Configuration ▶ Inputs/Outputs ▶Pumps DO**) can be configured to start the pump.

Informations read from the pump are shown under **Inputs/Outputs ▶Pump x**:

- ✓ Start/Stop
- ✓ Alarm
- ✓ Flow ($m^3/h$)
- ✓ Head (bar)
- ✓ Power (W)

## M-Bus

M-Bus meters can be connected to to a serial port on the controller (via the M-Bus-converter X1176) or to the built-in M-Bus-interface (only models with the letter "M" in the article number).

```
Function port1
M—Bus
```

```
Function port M-Bus
Active
```

Up to 9 M-Bus meters can be connected to the controller, 7 heat meters and 2 water meters.

```
Heat meter
Water meter
```

```
HS1
HS2
HS3
HS4
HW1
HW2
DHS1
```

```
Heat meter
Not Active
Address: 0
Interval:Always
```

```
Water meter 1
Water meter 2
```

### Intervals

Different intervals are possible to set; Always, 15 min, 30 min, 1h and 24h.

## External sensor

EcoGuard can be used instead of a physically connected (AI) room sensor. It uses the RS485 port to register values from the sensors connected to an EcoGuard unit.

It is possible to select which HS circuit(s) (one or several) that the EcoGuard should be connected to. Please note that it is not possible to use both EcoGuard and a physically connected (AI) sensor for the same HS circuit.

In order to connect EcoGuard to Exigo, it is first necessary to configure a RS485 port to **Expansion unit/ External sensor**.

EcoGuard makes use of the fixed PLA:ELA address 200:241, load number 10 and cell number 0 (pre-set in EcoGuard).

## 3.17.2 TCP/IP

The *Dynamic Host Configuration Protocol* (DHCP) is a network protocol used on *Internet Protocol* (IP) networks for dynamic distribution of network configuration parameters, such as IP addresses, DNS servers and other services. The controller can be configured to either obtain an IP address from a DHCP server (dynamic) or the address can be set manually (static).

Three additional functions can be activated on the network interface:

- ✓ BACnet IP communication
- ✓ Connection to the Cloud-server
- ✓ Modbus TCP

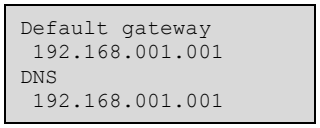
If you wish to set a static IP address for the controller, enter the IP address you wish to use along with the subnet mask, gateway address and DNS server address:

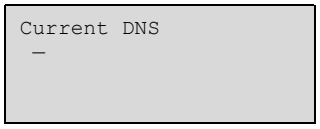
```
TCP/IP
```

```
DHCP: Yes
 Set static IP
Current IP
—
```

```
IP
 192.168.001.234
Subnet mask
 255.255.255.000
```

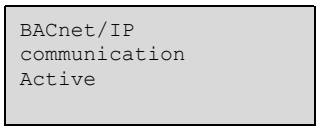
```
Current subnet mask
 —
Current gateway
 —
```

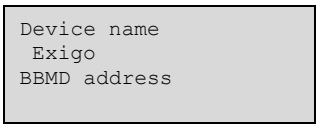


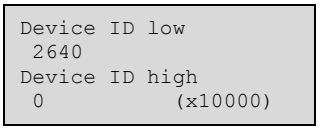



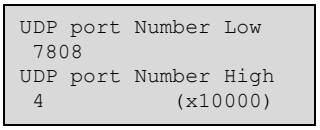

## BACnet / IP configuration

The BACnet/IP protocol is disabled as default. To enable BACnet/IP communication, change the setting from **Not active** to **Active**. The protocol will then be available for use:


### Device name

This is the device name that is shown on the BAS when a device is discovered.

### BBMD address

The BBMD address (BACnet/IP Broadcast Management Device) is used for discovering devices that are attached to different BACnet/IP subnets and separated by an IP router. The address is entered as **host:port**, where **host** can be the host's name if DNS is configured. If DNS is not configured, the host address should be entered in the format **xxx.xxx.xxx.xxx**, followed by the port number (default setting 47808).

Example: mybbmd:47808 (with DNS configured) or 10.100.50.99:47808

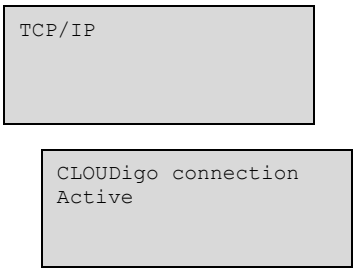
### Device ID

The ID of a device, used to identify it on the BACnet network. To set an ID value of 34600, the low number would be set to 4600 and the high number to 3.

**Note!** The ID number must be unique, and cannot be duplicated anywhere on the BACnet network.

## CLOUDigo connection

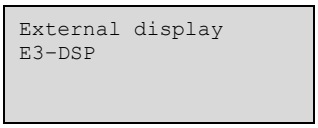
To connect the controller to the Cloud server, this option must be activated.




### 3.17.3 External display

The type of external display, connected to the display port can be set in this menu. Two options are available:

- ✓ E3-DSP – external text display
- ✓ ED-T7 – external touch display




**Note!** When changing the display mode to ED-T7, the controller must be switched off and back on again for the change to take effect.

### 3.17.4 M-Bus ports

In units with an M-Bus port, that port can only be used to connect an M-Bus meter. A maximum of three meters can be connected.

### 3.17.5 Expansion units

A unit with at least one RS485 port is required in order for expansion units to be used.

### 3.17.6 External sensor

EcoGuard can be used instead of a physically connected (AI) room sensor. It uses the RS485 port to register values from the sensors connected to an EcoGuard unit.

It is possible to select which HS circuit(s) (one or several) that the EcoGuard should be connected to. Please note that it is not possible to use both EcoGuard and a physically connected (AI) sensor for the same HS circuit.

In order to connect EcoGuard to Exigo, it is first necessary to configure a RS485 port to **Expansion unit/ External sensor**.

EcoGuard makes use of the fixed PLA:ELA address 200:241, load number 10 and cell number 0 (pre-set in EcoGuard).

# 3.18 System

## 3.18.1 Changing language

Use this menu to change the display language.

```
Choose language
English
```

**Note!** This menu is also directly accessible by holding the **[OK]** button pressed during power-up or by pressing the **[►]** button four times when the start display is shown.

## 3.18.2 Choose start screen

There are several different start screens to choose from.

### Type 1

The second line shows the date and time.

The third line shows the text HS1.

The fourth line shows the current temperature setpoint and actual values for HS1.

```
Heating controller
 04:09:15 11:28
HS1
Sp:32.8°C Act:33.1
```

### Type 2

The second line shows the date and time.

The third line shows the text HW1.

The fourth line shows the current temperature setpoint and actual values for HW1.

```
Heating controller
 04:09:15 11:28
HW1
Sp:55.0°C Act:54.8°C
```

### Type 3

The second line shows the text HS1/HW1.

The third line shows the current setpoint and actual temperature for HS1.

The fourth line shows the current setpoint and actual temperature for HW1.

```
Heating controller
HS1/HW1
Sp:45.5°C Act:43.8°C
Sp:55.0°C Act:54.8°C
```

## Type 4

The second line shows the current outdoor temperature.

The third line shows the text HS1.

The fourth line shows the current temperature setpoint and actual values for HS1.

```
Heating controller
Outd temp: 8.2°C
HS1
Sp:32.8°C Act:33.1°C
```

## Type 5

The second line shows the text HS1/HS2.

The third line shows the current setpoint and actual temperature for HS1.

The fourth line shows the current setpoint and actual temperature for HS2.

```
Heating controller
HS1/HS2
Sp:34.0°C Act:34.2°C
Sp:42.0°C Act:41.5°C
```

## Type 6

The second line shows the date and time.

```
Heating controller
 04:09:15 11:28
```

## Type 7

The second line shows the date and time.

The third line shows the actual value for the boiler.

```
Heating controller
 04:09:15 11:28
Boiler Act:57.8°C
```

## Type 8

The second line shows the date and time.

The third line shows the actual value for the boiler.

The fourth line shows the current outdoor temperature.

```
Heating controller
 04:09:15 11:28
Boiler Act:57.8°C
Outd temp: 8.2°C
```

### 3.18.3 Automatic summer / winter time adjustment

The internal clock is normally configured for automatic summer/winter time adjustment. The function can be disabled in this menu. When enabled, the clock will be advanced one hour at 02:00 am the last Sunday of March and adjusted back one hour at 03:00 am the last Sunday of October.

```
Automatic
summer/winter time
change-over
On
```

### 3.18.4 Address

The controller uses the below addresses when connecting to Exigo tool and when multiple controllers are connected in a network. Exigo tool normally uses the addresses below, so if an address is changed, the new address must also be entered in Exigo tool. If several controllers are connected in a network, all the units must have the same PLA address, but each unit must have a unique ELA address.

```
Address:
PLA: 254
ELA: 254
```

### 3.18.5 Address for remote communication

If multiple controller units are connected in a network, it is possible to remote control a unit in the network from a unit with display. This is done by entering the address of the unit you wish to remote control in the unit with display. This function is aborted by pressing the buttons **[▲]**, **[OK]** and **[▼]** simultaneously.

```
Address for remote
communication
(PLA:ELA) : 00:00
```

### 3.18.6 Automatic logoff

If the access level is set to **Operator** or **Admin**, the user will automatically be logged off after a set time of inactivity. The time is settable in units of 5 seconds. Default 60 units = 5 minutes.

The automatic logoff can be disabled, see *chapter 2 Information for the end user*.

```
Time before user
automatically is
logged off: 60
(unit 5 s)
```

## 3.19 Changing the battery

The controller has an internal battery to ensure the operation of the memory and real-time clock in the event of a power failure. When the alarm **Internal Battery** is activated and the battery LED lights up red (24 V

models), the battery has become too weak and needs to be changed. Nonetheless, due to a backup capacitor, the controller will function at least 10 minutes without power supply.

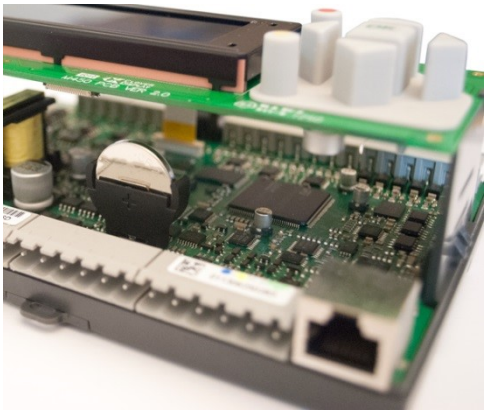
**Caution!** Changing the battery, as well as dismantling and opening the unit requires knowledge of proper ESD protection. Therefore, this should be handled by qualified personnel.

An earthed wristband must be used during this procedure.

### 3.19.1 24 V models (Exigo Ardo)

1. Remove the cover by pressing down the locking torques at the edge of the cover using a small screwdriver, and at the same time pulling the cover outwards.


2. Grip the battery firmly with your fingers and lift it upwards until it rises from its holder.



3. Press the new battery firmly down into place.

**Note!** For proper functionality, ensure that the polarity is correct. The replacement battery must be of type CR2032.

### 3.19.2 230 V models (Exigo Vido)

The 230 models should not be opened by the user. Please contact Regin if you need to change the battery.

# 4 Information for the installer

## 4.1 Installation

The controller can be mounted in a DIN-standard casing (minimum 9 modules), on a DIN-rail in a cabinet or, using a suitable front-mounting kit, in a cabinet door or other control panel. The 230 V models can also be mounted directly on a wall.

### 4.1.1 Terminals

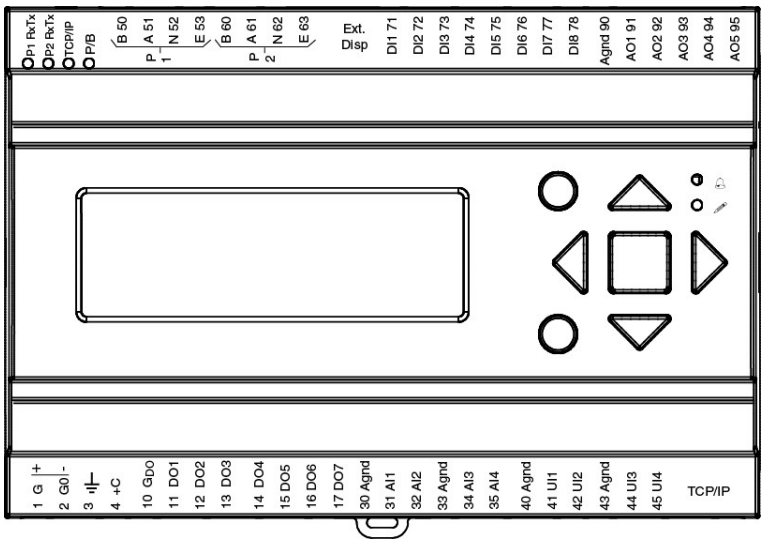



*Figure 4-1 Terminal positions 24 V models*

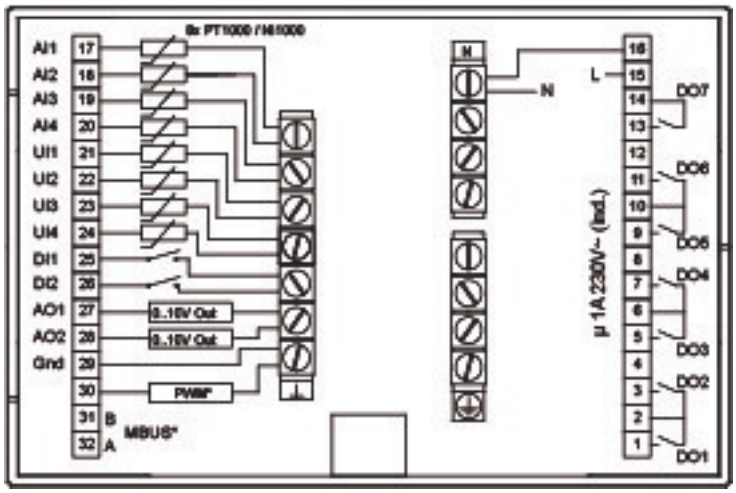



*Figure 4-2 Terminal positions 230 V models*

* depending on the model

### 4.1.2 Wiring

**Caution!** Before removing the controller from the terminal block, be sure to switch off the supply voltage.

**Caution!** It is important to ensure that the wiring is performed correctly and in accordance with the instructions given in this manual.

## Wiring examples

*Figure 4-3 Wiring example* and *Figure 4-4 Wiring example* show wiring examples for Exigo Ardo

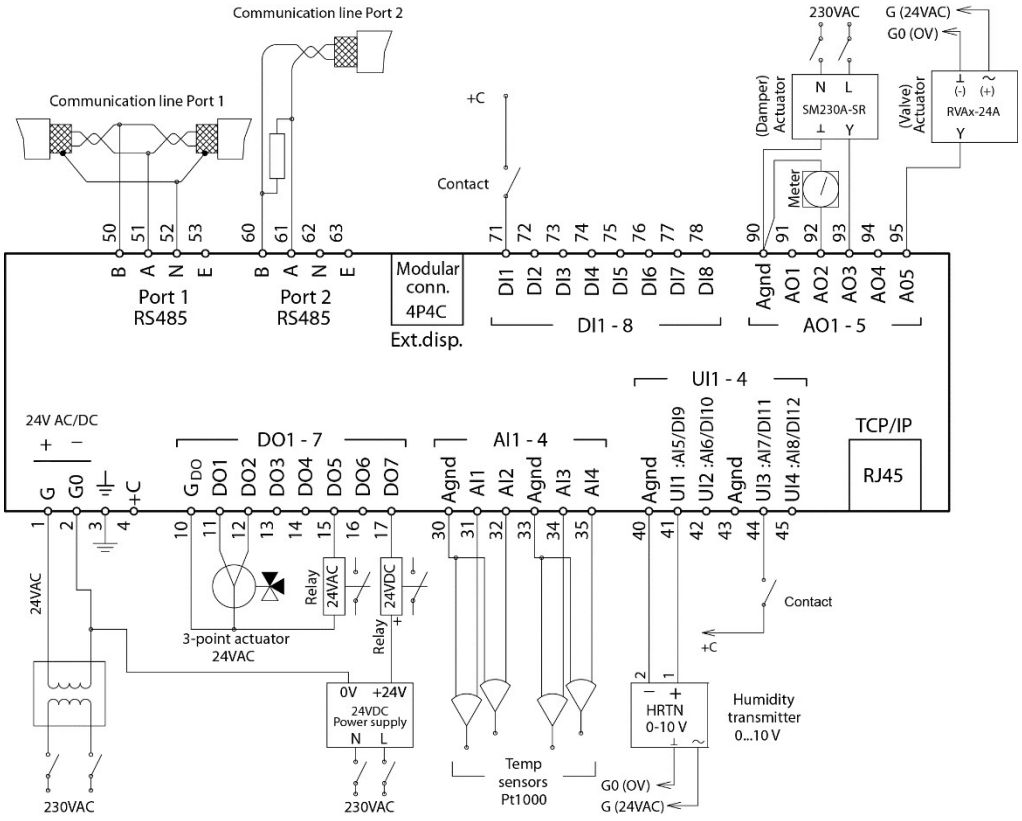



*Figure 4-3 Wiring example*

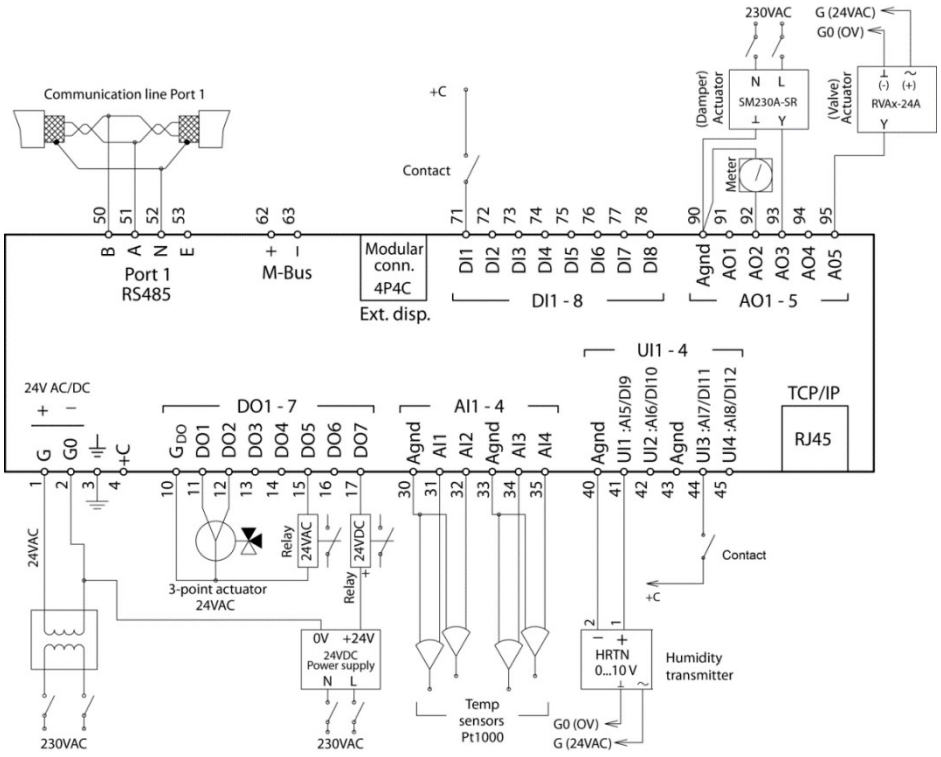



*Figure 4-4 Wiring example*

## Inputs and outputs 24 V models (Exigo Ardo)

There is a list of input and outputs in *Appendix C Input and output lists* that can be a handy instrument to help you keep track of which inputs and outputs you need to configure.

### Analogue inputs

Analogue inputs must refer to an Agnd terminal.

Analogue inputs can, depending on the configuration, be used for either PT1000/Ni1000 temperature sensors or for 0…10 V DC analogue input signals, for example from a pressure transmitter.

### Digital inputs

Digital inputs must refer to +C on terminal 4. Digital inputs may only be wired to voltage-free contacts. Any external voltage applied to a digital input may harm the unit.

### Universal inputs

A universal input can be configured to act as either an analogue input or as a digital input.

A universal input configured as an analogue input can, depending on the configuration, be used for either PT1000/Ni1000 temperature sensors or for 0…10 V DC analogue input signals, for example from a pressure transmitter.

Universal inputs configured as an analogue input must refer to an Agnd terminal.

A universal input configured as a digital input must, just like other digital inputs refer to C+ on terminal 4. It may only be wired to voltage-free contacts.

## Analogue outputs

Analogue outputs must refer to a Agnd terminal.

All analogue outputs can be individually set to any one of the following output signals:

- ✓ 0…10 V DC
- ✓ 2…10 V DC
- ✓ 10…0 V DC
- ✓ 10…2 V DC

**Caution!** If the controller and its connected actuators share the same transformer, it is essential that the same transformer pole is used as reference for all the equipment. The equipment may otherwise not function as intended and may also suffer damages.

## Digital outputs

Digital outputs should normally refer to $G_{DO}$ on terminal 10. $G_{DO}$ is internally connected to G on terminal 1 and supplies 24 V AC or DC depending on the choice of supply voltage.

All the digital outputs are controlled by MOSFET transistors. The outputs are internally connected with $G_0$ and can deliver max 2 A per output. However, the total power for all the DOs must not exceed 8 A.

A number of different wiring alternatives are possible depending on the type of supply voltage to the controller and the relay type.

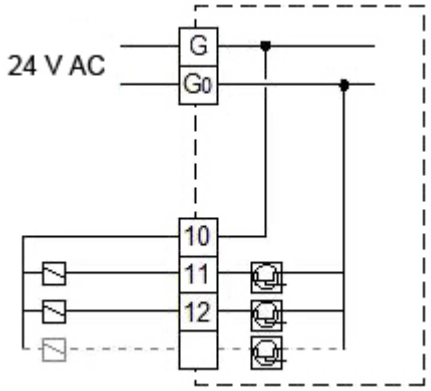



*Figure 4-5 24 V AC supply and 24 V AC relays*

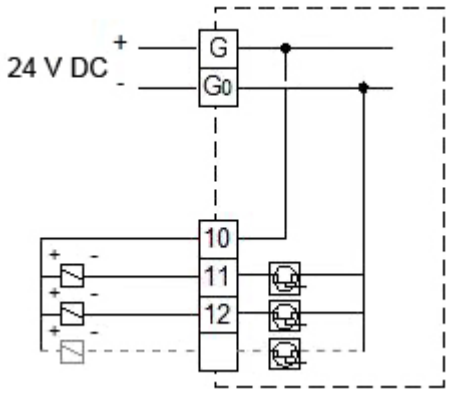



*Figure 4-6 24 V DC supply and 24 V DC relays*

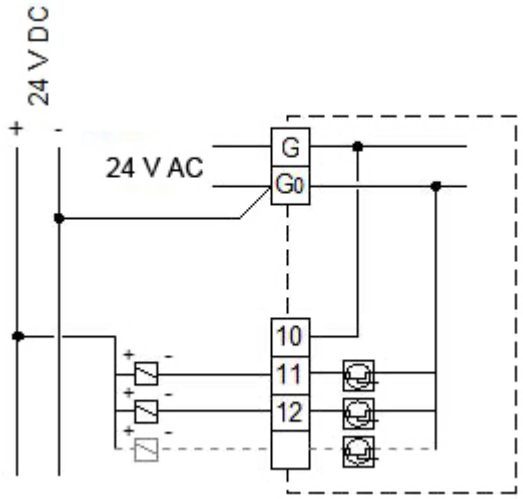



*Figure 4-7 24 V AC supply and 24 V DC relays*

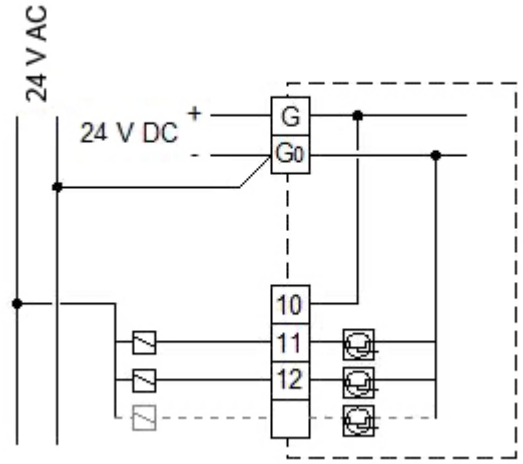



*Figure 4-8 24 V DC supply and 24 V AC relays*

## Inputs and outputs 230 V models (Exigo Vido)

There is a list of input and outputs in *Appendix C Input and output lists* that can be a handy instrument to help you keep track of which inputs and outputs you need to configure.

### Analogue inputs

Analogue inputs must refer to a ⊥ terminal.

Analogue inputs are intended for use with PT1000/Ni1000 sensors as a temperature sensor.

### Digital inputs

Digital inputs must refer to a ⊥ terminal.

### Universal inputs

A universal input can be configured to act as either an analogue input or as a digital input.

A universal input configured as an analogue input can be used with PT1000/Ni1000 temperature sensors.

A universal input configured as an analogue input must refer to a ⊥ terminal.

A universal input configured as a digital input must refer to a ⊥ terminal.

### Universal analogue

Universal analogue I/O:s can be configured as either analogue inputs or analogue outputs.

Analogue outputs must refer to a ⊥ terminal. The outputs can be individually set to any one of the following output signals:

- ✓ 0…10 V DC
- ✓ 2…10 V DC
- ✓ 10…0 V DC
- ✓ 10…2 V DC

### Digital outputs

The relays are voltage-free and must receive power from a single pole for each relay.

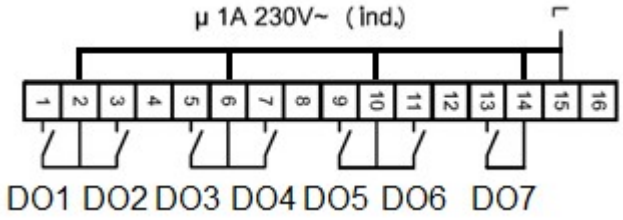



*Figure 4-9 Digital outputs*

## M-Bus meters

This function requires a controller with an M-Bus port. Up to three meters can be connected (heat, energy or water).

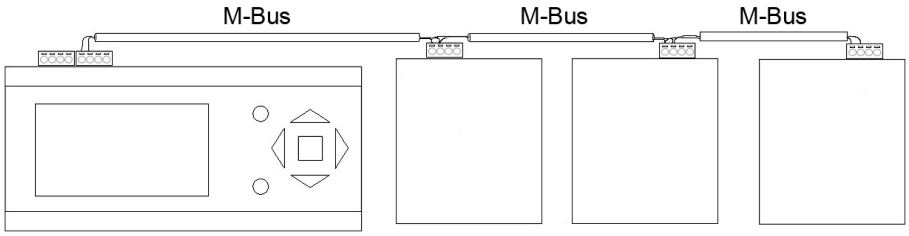



*Figure 4-10 M-Bus meters*

The following variables can be read from the meters:

- ✓ Supply temperature
- ✓ Return temperature
- ✓ Delta temperature
- ✓ Energy
- ✓ Effect
- ✓ Volume
- ✓ Flow

### Expansion units EXOline

The communication between master and expansion units takes place via EXOline. The slave units will be assigned the address 241:1 and 241:2 during initialisation (PLA:ELA).

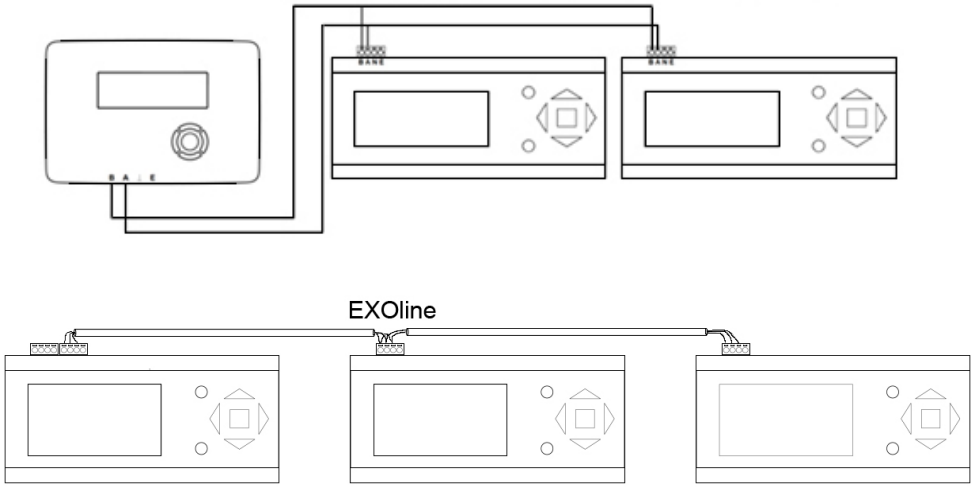



*Figure 4-11 Expansion units EXOline*

## 4.2 Commissioning

Before the controller can be used, inputs and outputs as well as a number of parameters must be configured.

All commissioning can be performed using the display and buttons on the controller, or by using an external display unit.

The easiest way however, is to configure the controller by using Exigo tool, that can be downloaded from http://www.regincontrols.com.

### 4.2.1 Configuration using Exigo tool

Exigo tool is a PC-based configuration program developed to simplify the commissioning of the Exigo controller series.

When using Exigo tool, the whole configuration and all settings can be done on the computer and then be uploaded to the controller. An infinite number of configurations can be stored in the computer memory for later use.

A communication cable is required in order to upload the configuration to the controller. The controller must also be powered up and the application selected in order for it to be configured.

Predefined configurations can be downloaded as htc-files from Regin's website, www.regincontrols.com. These htc-files can be opened in the tool and synchronized to the controller.

For more information, see the Exigo tool manual.

### 4.2.2 Configuration using the built-in display or an external display

1. Power up the controller.
2. On delivery, the heating application is activated. If you need to change the active application, see *Loading the application* below.

3. Log on as **Admin**.
4. Configure all required inputs and outputs. Keep track of which inputs and outputs you will need for the functions you choose to activate. There is a complete list of input and output functions in *Appendix C Input and output lists*.
5. Configure all needed functions. See *chapter 3 Information for the specialist*.
6. Set the time, date and configure the time schedule/holiday schedule in the **Time Settings** menu.
7. Set all the control setpoints for the configured functions.

## Loading the application

Reset the controller by pressing the reset button, using for example a paper clip. The initial screen shows the factory application. It contains options for setting up the controller before start-up. Press the **[►]** button to select **Application**:

```
Application
System
Communication
Time/Date
Inputs/Outputs
```

Use the **[▼]** and **[▲]** buttons to move the cursor in the left side of the display to the desired function. Select **Application** and press the **[►]** button.

```
Heating 4.2
Expansion unit 1
Expansion unit 2
```

Move the cursor to the desired application and press the **[▼]** button.

```
Title:
 Heating 4.2

Activate? Yes
```

Press the **[OK]** button and change **No** into **Yes**, then press **[OK]** again.

The most recently loaded application will now be entered into memory. This will take approx. 30 seconds.

To change language, press the **[►]** button 3 times when the start screen for selecting an application is displayed.

## Configuring the inputs and outputs

On delivery, there is no configured inputs and outputs.

Use the **[▼]** and **[▲]** buttons to move the cursor in the left side of the display to the desired function. Select **Configuration** and press the **[►]** button.

```
Time Settings
Alarm Events
Inputs/Outputs
Configuration
```

Use the **[▼]** and **[▲]** buttons to move the cursor in the left side of the display to the desired function. Select **Inputs/Outputs** and press the **[►]** button.

```
AI/UAI
DI/UDI
AO
DO
```

The next display shows the current values of the selected type of IO. The example shows the analogue inputs.

```
AI1 17.6 UAI1 12.1
AI2 23.1 UAI2 27.3
AI3 45.8 UAI3 –5.1
AI4
```

Press the **[►]** button to show the configuration of AI's.

```
AI1 Raw: 17.6
Not Used
Compensation: 0.0°C
Sensor Type:PT1000
```

Press the **[OK]** button and change **Not Used** to the function you want to select.

Press the **[OK]** button again to choose the selected function and jump to the value of the compensation. Finish the configuration of the AI by selecting the type of sensor.

# Appendix A Technical data

## A.1 Exigo Ardo

### A.1.1 General data

| | |
|---|---|
| **Supply voltage** | 24 V AC ± 15%, 50…60 Hz or 21…36 V AC |
| **Power consumption** | See *Appendix B Model overview* |
| **Ambient temperature** | 0…50 °C |
| **Ambient humidity** | Max. 95 % RH |
| **Storage temperature** | -20…70 °C |
| **Protection class** | IP20 |
| **Connection** | Disconnectable terminal strips, 4 $mm^2$ |
| **Memory backup** | Built-in long life battery gives long backup time of all settings incl. real time |
| **Display** | Backlit LCD, 4 rows of 20 characters |
| **Mounting** | DIN-rail or cabinet |
| **Casing** | Standard Euronorm (8.5 modules wide) |
| **Dimensions (WxHxD)** | 149 x 121 x 60 mm incl. terminals |
| **Battery type** | CR2032 replaceable Lithium cell |
| **Battery life** | Min. 5 years |
| **Operating system** | EXOrealC |

### A.1.2 Communication ports

| | |
|---|---|
| **TCP/IP** | EXOline, Modbus, BACnet/IP, CLOUDigo |
| **RS485** | EXOline, Modbus, BACnet MS/TP |
| **M-Bus** | M-Bus communication |

### A.1.3 Inputs & outputs

| | |
|---|---|
| **Analogue inputs (AI)** | For PT1000 sensors (accuracy ± 0.4 °C) or 0…10 V DC (accuracy ± 0.15 % of full output signal). 12 bit resolution in the A/D conversion. |
| **Digital inputs (DI)** | For potential-free contacts. |
| **Universal inputs (UI)** | Can be set to act as either analogue input or digital input with specifications as above. |
| **Analogue inputs/outputs (UAI)** | 0…10 V DC, 1 mA, short-circuit protected. |
| **Digital outputs (DO)** | Mosfet outputs, 24 V AC or DC, 2 A continuous. Max. 8 A in total. |

# A.2 Exigo Vido

## A.2.1 General data

| | |
|---|---|
| **Supply voltage** | 85…265 V AC, 50/60 Hz |
| **Power consumption** | See *Appendix B Model overview* |
| **Ambient temperature** | 0…50 °C |
| **Ambient humidity** | Max. 95 % RH |
| **Storage temperature** | -20…70 °C |
| **Protection class** | IP20, IP40 when mounted in cabinet |
| **Memory backup** | Built-in long life battery gives long backup time of all settings incl. real time |
| **Display** | Backlit LCD, 4 rows of 20 characters |
| **Mounting** | DIN-rail, cabinet or on wall |
| **Dimensions (WxHxD)** | 146.7 x 97.6 x 76.0 mm incl. terminals |
| **Battery type** | CR2032 replaceable Lithium cell |
| **Battery life** | Min. 8 years |
| **Operating system** | EXOrealC |

## A.2.2 Communication ports

| | |
|---|---|
| **TCP/IP** | EXOline, Modbus, BACnet/IP, CLOUDigo |
| **RS485** | EXOline, Modbus, BACnet MS/TP |
| **M-Bus** | M-Bus communication |

## A.2.3 Inputs & outputs

| | |
|---|---|
| **Analogue inputs (AI)** | For PT1000 sensors. 12 bit resolution in the A/D conversion. |
| **Digital inputs (DI)** | For potential-free contacts. |
| **Universal inputs (UI)** | Can be set to act as either analogue input or digital input with specifications as above. |
| **Analogue inputs/outputs (UAI)** | Configurable as output (0…10 V DC, 2…10 V DC, 10…0 V DC or 10…2 V DC, 8 bit D/A short-circuit protected) or input (0…10 V DC). |
| **Digital outputs (DO)** | 7x relay, 230 V AC, 1 A load per relay, max 7 A total. |

# Appendix B Model overview

| Name | Supply voltage | Description |
|---|---|---|
| IO-A15MIXW-3-BEM<br>IO-A28MIXW-3-BEM | 24 V | Ardo Expansion unit with one RS485 port |
| HCA151DW-3<br>HCA281DW-3 | 24 V | Ardo Controller with one TCP/IP port |
| HCA152DW-3<br>HCA282DW-3 | 24 V | Ardo Controller with one RS485 port and one TCP/IP port |
| HCA283DW-3 | 24 V | Ardo Controller with two RS485 ports and one TCP/IP port |
| HCA283DWM-3 | 24 V | Ardo Controller with one RS485 port, one M-Bus port and one TCP/IP port |
| HCV190D-1 | 230 V | Vido Controller without communication ports |
| IO-V19MIXW-1-BEM | 230 V | Vido Expansion unit with one RS485 port |
| HCV192DW-1 | 230 V | Vido Controller with one RS485 port and one TCP/IP port |
| HCV193DWM-1<br>HCV203DWM-1 | 230 V | Vido Controller with one RS485 port, one M-Bus port and one TCP/IP port |
| HCV191DW-1 | 230 V | Vido Controller with one TCP/IP port |

| Name | AI | DI | UI* | AO | DO | RS485 ports | TCP/IP ports | M-Bus ports | Display | Power consumption (VA) |
|---|---|---|---|---|---|---|---|---|---|---|
| IO-A15MiXW-3-BEM | 4 | 4 | - | 3 | 4 | 1 | 1 | - | - | 5 |
| HCA151DW-3 | 4 | 4 | - | 3 | 4 | - | 1 | - | ✓ | 9 |
| HCA152DW-3 | 4 | 4 | - | 3 | 4 | 1 | 1 | - | ✓ | 9 |
| IO-A28MIXW-3-BEM | 4 | 8 | 4 | 5 | 7 | 1 | 1 | - | - | 5 |
| HCA281DW-3 | 4 | 8 | 4 | 5 | 7 | - | 1 | - | ✓ | 9 |
| HCA282DW-3 | 4 | 8 | 4 | 5 | 7 | 1 | 1 | - | ✓ | 9 |
| HCA283DW-3 | 4 | 8 | 4 | 5 | 7 | 2 | 1 | - | ✓ | 9 |
| HCA283DWM-3 | 4 | 8 | 4 | 5 | 7 | 1 | 1 | 1 | ✓ | 9 |
| HCV190D-1 | 4 | 2 | 4 | 2** | 7 | - | - | - | ✓ | 7.5 |
| IO-V19MIXW-1-BEM | 4 | 2 | 4 | 2** | 7 | 1 | 1 | - | - | 7.5 |
| HCV192DW-1 | 4 | 2 | 4 | 2** | 7 | 1 | 1 | - | ✓ | 10 |
| HCV193DWM-1 | 4 | 2 | 4 | 2** | 7 | 1 | 1 | 1 | ✓ | 10.5 |
| HCV203DWM-1 | 4 | 2 | 4 | 2** | 7 | 1 | 1 | 1 | ✓ | 11 |
| HCV191DW-1 | 4 | 2 | 4 | 2** | 7 | - | 1 | - | ✓ | 9.5 |

* Universal inputs can be configured to function as either analogue or digital outputs.

** Universal analogue that can be configured to function as either analogue inputs or analogue outputs (0… 10 V DC).

# Appendix C Input and output lists

The lists below are intended to be used as a memory aid during configuration, in order to help keep track of the desired input and output functions.

The left column contains a description of the in-/output signal, the middle column displays the name of the corresponding signal in Exigo tool and the right column shows the text displayed in the controller.

## C.1 Analogue inputs

| ✓ | Description | Name in Exigo tool | Name in display |
|---|---|---|---|
| | Inactive input | Not used | Not used |
| | Outdoor temperature sensor | Outdoor temp | Outdoor temp |
| | Outdoor temperature sensor, HS2 | Outdoor temp HS2 | Outdoor temp HS2 |
| | Outdoor temperature sensor, HS3 | Outdoor temp HS3 | Outdoor temp HS3 |
| | Outdoor temperature sensor, HS4 | Outdoor temp HS4 | Outdoor temp HS4 |
| | Supply temperature, HS1 | HS1, supply temp | HS1 supply temp |
| | Room temperature, HS1 | HS1, room temp | HS1 room temp |
| | Return temperature, HS1 | HS1, return temp | HS1 return temp |
| | Universal limitation temperature, HS1 | HS1, univ limit temp | HS1 univ limit temp |
| | Universal limitation shift temperature, HS1 | HS1, univ limit shift temp | HS1 UnivLimShiftTemp |
| | Relative humidity sensor, HS1 | HS1, RH | HS1 RH |
| | Differential pressure, HS1 | HS1, differential pressure | HS1 Diff Pressure |
| | Supply temperature, HS2 | HS2, supply temp | HS2 supply temp |
| | Room temperature, HS2 | HS2, room temp | HS2 room temp |
| | Return temperature, HS2 | HS2, return temp | HS2 return temp |
| | Universal limitation temperature, HS2 | HS2, univ limit temp | HS2 univ limit temp |
| | Universal limitation shift temperature, HS2 | HS2, univ limit shift temp | HS2 UnivLimShiftTemp |
| | Relative humidity sensor, HS2 | HS2, RH | HS2 RH |
| | Differential pressure, HS2 | HS2, differential pressure | HS2 Diff Pressure |
| | Supply temperature, HS3 | HS3, supply temp | HS3 supply temp |
| | Room temperature, HS3 | HS3, room temp | HS3 room temp |
| | Return temperature, HS3 | HS3, return temp | HS3 return temp |
| | Universal limitation temperature, HS3 | HS3, univ limit temp | HS3 univ limit temp |
| | Universal limitation shift temperature, HS3 | HS3, univ limit shift temp | HS3 UnivLimShiftTemp |
| | Relative humidity sensor, HS3 | HS3, RH | HS3 RH |
| | Differential pressure, HS3 | HS3, differential pressure | HS3 Diff Pressure |
| | Supply temperature, HS4 | HS4, supply temp | HS4 supply temp |
| | Room temperature, HS4 | HS4, room temp | HS4 room temp |
| | Return temperature, HS4 | HS4, return temp | HS4 return temp |
| | Universal limitation temperature, HS4 | HS4, univ limit temp | HS4 univ limit temp |
| | Universal limitation shift temperature, HS4 | HS4, univ limit shift temp | HS4 UnivLimShiftTemp |
| | Relative humidity sensor, HS4 | HS4, RH | HS4 RH |
| | Differential pressure, HS4 | HS4, differential pressure | HS4 Diff Pressure |
| | Supply temperature HW1 | HW1, supply temp | HW1 supply temp |
| | Tank temperature middle, HW1 | HW1, tank middle temp | HW1 tank middle temp |

| ✓ | Description | Name in Exigo tool | Name in display |
|---|---|---|---|
| | Tank temperature bottom, HW1 | HW1, tank bottom temp | HW1 tank bottom temp |
| | Solar tank temperature, HW1 | HW1, solar tank temp | HW1 solar tank temp |
| | Limitation temperature, HW1 | HW1, limit temp | HW1 limit temp |
| | Circulation return temperature, HW1 | HW1, circ return temp | HW1 circ return temp |
| | External setpoint, HW1 | HW1, external setpoint | HW1 external setp |
| | Supply temperature HW2 | HW2, supply temp | HW2 supply temp |
| | Tank temperature middle, HW2 | HW2, tank middle temp | HW2 tank middle temp |
| | Tank temperature bottom, HW2 | HW2, tank bottom temp | HW2 tank bottom temp |
| | Solar tank temperature, HW2 | HW2, solar tank temp | HW2 solar tank temp |
| | Limitation temperature, HW2 | HW2, limit temp | HW2 limit temp |
| | Circulation return temperature, HW2 | HW2, circ return temp | HW2 circ return temp |
| | External setpoint, HW2 | HW2, external setpoint | HW2 external setp |
| | Boiler supply temperature | Boiler supply temp | Boiler supply temp |
| | Boiler return temperature | Boiler return temp | Boiler return temp |
| | Supply temperature for boiler 1 | Boiler 1, supply temp | Boiler1 supply temp |
| | Return temperature for boiler 1 | Boiler 1, return temp | Boiler1 return temp |
| | Supply temperature for boiler 2 | Boiler 2, supply temp | Boiler2 supply temp |
| | Return temperature for boiler 2 | Boiler 2, return temp | Boiler2 return temp |
| | Supply temperature for boiler 3 | Boiler 3, supply temp | Boiler3 supply temp |
| | Return temperature for boiler 3 | Boiler 3, return temp | Boiler3 return temp |
| | Supply temperature for boiler 4 | Boiler 4, supply temp | Boiler4 supply temp |
| | Return temperature for boiler 4 | Boiler 4, return temp | Boiler4 return temp |
| | Supply temperature DHS1 | DHS1, supply temp | DHS1 supply temp |
| | Return temperature DHS1 | DHS1, return temp | DHS1 return temp |
| | External demand DHS1 | DHS1, external demand | DHS1 external demand |
| | Tank temperature top, HP1 | HP1, tank temp top | HP1 tank temp top |
| | Tank temperature bottom, HP1 | HP1, tank temp bottom | HP1 tank temp bottom |
| | External demand, HP1 | HP1, external demand | HP1 external demand |
| | Additional heat source, HP1 | HP1, additional heat source | HP1, Add Heat Source |
| | Solar collector temperature, Solar | Solar, collector temp | Solar collector temp |
| | Solar return temperature, Solar | Solar, return temp | Solar return temp |
| | Heating primary, supply temperature | HP supply temp | HP supply temp |
| | Heating primary, return temperature | HP return temp | HP return temp |
| | Cooling primary, supply temperature | CP supply temp | CP supply temp |
| | Cooling primary, return temperature | CP return temp | CP return temp |
| | Input for receiving current heat demand from another Exigo (0…10 V corresponds to 0…100 degrees) | Heat demand temp | Heat demand temp |
| | Wind-speed transmitter, 0…10 V DC | Wind speed | Wind speed |
| | Differential pressure transmitter, 0…10 V DC | Diff pressure | Diff Pressure |
| | System pressure | System pressure | System pressure |
| | Extra temperature sensor 1 | Extra temp sensor 1 | Extra temp sensor1 |
| | Extra temperature sensor 2 | Extra temp sensor 2 | Extra temp sensor2 |
| | Extra temperature sensor 3 | Extra temp sensor 3 | Extra temp sensor3 |

| ✓ | Description | Name in Exigo tool | Name in display |
|---|---|---|---|
| | Extra temperature sensor 4 | Extra temp sensor 4 | Extra temp sensor4 |
| | Extra temperature sensor 5 | Extra temp sensor 5 | Extra temp sensor5 |

# C.2 Digital inputs

| ✓ | Description | Name in Exigo tool | Name in display |
|---|---|---|---|
| | Inactive input | Not used | Not used |
| | HS1 main switch | HS1, main switch | HS1 main switch |
| | Activates HS1 comfort mode | HS1, Extended running | HS1 extended running |
| | HS1, Change-over to cool-mode | HS1, change-over | HS1 change-over |
| | HS1, release of cool-mode | HS1, start cool | HS1 start cool |
| | On/Off-function for the valve, 0 or 100%, HS1 | HS1, thermostat | HS1 thermostat |
| | Run indication/alarm circulation pump, P1A-HS1 | HS1, pump A indication | HS1 pump A ind |
| | Run indication/alarm circulation pump, P1B-HS1 | HS1, pump B indication | HS1 pump B ind |
| | HS1, energy pulse | HS1, energy pulse | HS1 energy pulse |
| | HS1, high supply temperature | HS1, high supply temperature | HS1, high supply temperature |
| | HS1, condensation | HS1, condensation | HS1, condensation |
| | HS1, heating position | HS1, heating position | HS1, heating closed |
| | HS1, cooling position | HS1, cooling position | HS1, cooling closed |
| | HS2 main switch | HS2, main switch | HS2 main switch |
| | Activates HS2 comfort mode | HS2, Extended running | HS2 extended running |
| | HS2, Change-over to cool-mode | HS2, change-over | HS2 change-over |
| | HS2, release of cool-mode | HS2, start cool | HS2 start cool |
| | On/Off-function for the valve, 0 or 100%, HS2 | HS2, thermostat | HS2 thermostat |
| | Run indication/alarm circulation pump, P1A-HS2 | HS2, pump A indication | HS2 pump A ind |
| | Run indication/alarm circulation pump, P1B-HS2 | HS2, pump B indication | HS2 pump B ind |
| | HS2, energy pulse | HS2, energy pulse | HS2 energy pulse |
| | HS2, high supply temperature | HS2, high supply temperature | HS2, high supply temperature |
| | HS2, condensation | HS2, condensation | HS2, condensation |
| | HS2, heating position | HS2, heating position | HS2, heating closed |
| | HS2, cooling position | HS2, cooling position | HS2, cooling closed |
| | HS3 main switch | HS3, main switch | HS3 main switch |
| | Activates HS3 comfort mode | HS3, Extended running | HS3 extended running |
| | HS3, Change-over to cool-mode | HS3, change-over | HS3, change-over |
| | HS3, release of cool-mode | HS3, start cool | HS3 start cool |
| | On/Off-function for the valve, 0 or 100%, HS3 | HS3, thermostat | HS3 thermostat |
| | Run indication/alarm circulation pump, P1A-HS3 | HS3, pump A indication | HS3 pump A ind |
| | Run indication/alarm circulation pump, P1B-HS3 | HS3, pump B indication | HS3 pump B ind |
| | HS3, energy pulse | HS3, energy pulse | HS3 energy pulse |
| | HS3, high supply temperature | HS3, high supply temperature | HS3, high supply temperature |
| | HS3, condensation | HS3, condensation | HS3, condensation |
| | HS3, heating position | HS3, heating position | HS3, heating closed |
| | HS3, cooling position | HS3, cooling position | HS3, cooling closed |
| | HS4 main switch | HS4, main switch | HS4 main switch |

| ✓ | Description | Name in Exigo tool | Name in display |
|---|---|---|---|
| | Activates HS4 comfort mode | HS4, Extended running | HS4 extended running |
| | HS4, Change-over to cool-mode | HS4, change-over | HS4, change-over |
| | HS4, release of cool-mode | HS4, start cool | HS4 start cool |
| | On/Off-function for the valve, 0 or 100%, HS4 | HS4, thermostat | HS4 thermostat |
| | Run indication/alarm circulation pump, P1A-HS4 | HS4, pump A indication | HS4 pump A ind |
| | Run indication/alarm circulation pump, P1B-HS4 | HS4, pump B indication | HS4 pump B ind |
| | HS4, energy pulse | HS4, energy pulse | HS4 energy pulse |
| | HS4, high supply temperature | HS4, high supply temperature | HS4, high supply temperature |
| | HS4, condensation | HS4, condensation | HS4, condensation |
| | HS4, heating position | HS4, heating position | HS4, heating closed |
| | HS4, cooling position | HS4, cooling position | HS4, cooling closed |
| | HW1 main switch | HW1, main switch | HW1 main switch |
| | HW1 flow switch for electric heater | HW1, flow switch | HW1 flow switch |
| | Run indication/alarm tank pump A, HW1 | HW1, tankpump A indication | HW1 tankpump A ind |
| | Run indication/alarm tank pump B, HW1 | HW1, tankpump B indication | HW1 tankpump B ind |
| | Run indication/alarm exchanger pump A, HW1 | HW1, exchangerpump A indication | HW1 exchpump A ind |
| | Run indication/alarm exchanger pump B, HW1 | HW1, exchangerpump B indication | HW1 exchpump B ind |
| | Run indication/alarm circulation pump A, HW1 | HW1, circulationpump A indication | HW1 circpump A ind |
| | Run indication/alarm circulation pump B, HW1 | HW1, circulationpump B indication | HW1 circpump B ind |
| | HW1, energy pulse | HW1, energy pulse | HW1 energy pulse |
| | HW1, manual start of thermal disinfection | HW1, start thermal disinfection | HW1 start therm dis |
| | HW2 main switch | HW2, main switch | HW2 main switch |
| | HW2 flow switch for electric heater | HW2, flow switch | HW2 flow switch |
| | Run indication/alarm tank pump A, HW2 | HW2, tankpump A indication | HW2 tankpump A ind |
| | Run indication/alarm tank pump B, HW2 | HW2, tankpump B indication | HW2 tankpump B ind |
| | Run indication/alarm exchanger pump A, HW2 | HW2, exchangerpump A indication | HW2 exchangerpump A ind |
| | Run indication/alarm exchanger pump B, HW2 | HW2, exchangerpump B indication | HW2 exchangerpump B ind |
| | Run indication/alarm circulation pump A, HW2 | HW2, circulationpump A indication | HW2 circulationpump A ind |
| | Run indication/alarm circulation pump B, HW2 | HW2, circulationpump B indication | HW2 circulationpump B ind |
| | HW2, energy pulse | HW2, energy pulse | HW2 energy pulse |
| | HW2, manual start of thermal disinfection | HW2, start thermal disinfection | HW2 start therm dis |
| | Run indication/alarm for boiler 1 | Boiler 1 indication | Boiler 1 indication |
| | Run indication/alarm for pump A/boiler 1 | Boiler 1 pump A indication | Boiler1 pump A ind |
| | Run indication/alarm for pump B/boiler 1 | Boiler 1 pump B indication | Boiler1 pump B ind |
| | Run indication/alarm for return pump/boiler 1 | Boiler 1 return pump indication | Boiler 1 retpump ind |
| | Run indication/alarm for boiler 2 | Boiler 2 indication | Boiler 2 indication |
| | Run indication/alarm for pump A/boiler 2 | Boiler 2 pump A indication | Boiler2 pump A ind |
| | Run indication/alarm for pump B/boiler 2 | Boiler 2 pump B indication | Boiler2 pump B ind |
| | Run indication/alarm for return pump/boiler 2 | Boiler 2 return pump indication | Boiler 2 retpump ind |
| | Run indication/alarm for boiler 3 | Boiler 3 indication | Boiler 3 indication |
| | Run indication/alarm for pump A/boiler 3 | Boiler 3 pump A indication | Boiler3 pump A ind |
| | Run indication/alarm for pump B/boiler 3 | Boiler 3 pump B indication | Boiler3 pump B ind |
| | Run indication/alarm for return pump/boiler 3 | Boiler 3 return pump indication | Boiler 3 retpump ind |
| | Run indication/alarm for boiler 4 | Boiler 4 indication | Boiler 4 indication |
| | Run indication/alarm for pump A/boiler 4 | Boiler 4 pump A indication | Boiler4 pump A ind |

| ✓ | Description | Name in Exigo tool | Name in display |
|---|---|---|---|
| | Run indication/alarm for pump B/boiler 4 | Boiler 4 pump B indication | Boiler4 pump B ind |
| | Run indication/alarm for return pump/boiler 4 | Boiler 4 return pump indication | Boiler 4 retpump ind |
| | Run indication/alarm for the transport pump A | Transport pump A indication | Transport pump A ind |
| | Run indication/alarm for the transport pump B | Transport pump B indication | Transport pump B ind |
| | Boiler alarm | Boiler alarm | Boiler alarm |
| | Pressure switch, expansion vessel | Expansion vessel | Expansion vessel |
| | Boiler control external stop | External stop boiler 1-4 | Ext Stop Boiler 1-4 |
| | Pressure/flow alarm for the boiler circuit | Pressure/flow error | System low pressure |
| | DHS1 main switch | DHS1, main switch | DHS1 main switch |
| | Run indication/alarm circulation pump A, DHS1 | DHS1, pump A indication | DHS1 pump A ind |
| | Run indication/alarm circulation pump B, DHS1 | DHS1, pump B indication | DHS1 pump B ind |
| | DHS1, energy pulse | DHS1, energy pulse | DHS1 energy pulse |
| | HP1 main switch | HP1, main switch | HP1 main switch |
| | Run indication/alarm load pump A, HP1 | HP1, load pump A indication | HP1 load pump A ind |
| | Run indication/alarm load pump B, HP1 | HP1, load pump B indication | HP1 load pump B ind |
| | Run indication/alarm add. heat source pump A, HP1 | HP1 add. heat source pump A indication | HP1 AHS Pump A ind |
| | Run indication/alarm add. heat source pump B, HP1 | HP1 add. heat source pump B indication | HP1 AHS Pump B ind |
| | Solar main switch | Solar, main switch | Solar main switch |
| | Run indication/alarm solar pump A | Solar, pump A indication | Solar pump A ind |
| | Run indication/alarm solar pump B | Solar, pump B indication | Solar pump B ind |
| | Start/Stop HS | Unit shutdown | Unit shutdown |
| | Acknowledge all alarms | Alarm acknowledgement | Alarm acknow |
| | Volume pulses, hot water usage | Water pulse | Water pulse |
| | Energy pulses, heating usage | Energy pulse | Energy pulse |
| | Volume pulse, cold water usage 1 | CW1 pulse | CW1 pulse |
| | Volume pulse, cold water usage 2 | CW2 pulse | CW2 pulse |
| | Energy pulse, electricity meter | Electric pulse | Electric pulse |
| | Run indication/alarm, frequency converters for pressure control | Frequency converter | Frequency converter |
| | Extra alarm 1 | Extra alarm 1 | Extra alarm 1 |
| | Extra alarm 2 | Extra alarm 2 | Extra alarm 2 |
| | Extra alarm 3 | Extra alarm 3 | Extra alarm 3 |
| | Extra alarm 4 | Extra alarm 4 | Extra alarm 4 |
| | Extra alarm 5 | Extra alarm 5 | Extra alarm 5 |
| | Extra alarm 6 | Extra alarm 6 | Extra alarm 6 |
| | Extra alarm 7 | Extra alarm 7 | Extra alarm 7 |
| | Extra alarm 8 | Extra alarm 8 | Extra alarm 8 |
| | Extra alarm 9 | Extra alarm 9 | Extra alarm 9 |
| | Extra alarm 10 | Extra alarm 10 | Extra alarm 10 |

## C.3 Universal inputs

Universal inputs on the controller can be individually configured as either analogue inputs, using any of the analogue inputs in C.*1 Analogue inputs*, or as digital inputs, using any of the digital inputs in C.*2 Digital inputs*.

## C.4 Analogue outputs

| ✓ | Description | Name in Exigo tool | Name in display |
|---|---|---|---|
| | Inactive output | Not used | Not used |
| | Valve actuator, heating system 1, HS1 | HS1, actuator | HS1 actuator |
| | Continuous pump, heating system 1, HS1 | HS1, pump continuous | HS1, pump continuous |
| | Valve actuator, heating system 2, HS2 | HS2, actuator | HS2 actuator |
| | Continuous pump, heating system 2, HS2 | HS2, pump continuous | HS2, pump continuous |
| | Valve actuator, heating system 3, HS3 | HS3, actuator | HS3 actuator |
| | Continuous pump, heating system 3, HS3 | HS3, pump continuous | HS3, pump continuous |
| | Valve actuator, heating system 4, HS4 | HS4, actuator | HS4 actuator |
| | Continuous pump, heating system 4, HS4 | HS4, pump continuous | HS4, pump continuous |
| | Valve actuator, hot water circuit 1, HW1 | HW1, actuator | HW1 actuator |
| | Valve actuator, hot water circuit 2, HW2 | HW2, actuator | HW2 actuator |
| | Burner, boiler 1 | Boiler 1, modulating burner | HB1 mod burner |
| | Burner, boiler 2 | Boiler 2, modulating burner | HB2 mod burner |
| | Burner, boiler 3 | Boiler 3, modulating burner | HB3 mod burner |
| | Burner, boiler 4 | Boiler 4, modulating burner | HB4 mod burner |
| | Valve actuator, return valve boiler 1 | Boiler 1, return temp actuator | HB1 ret temp act |
| | Valve actuator, return valve boiler 2 | Boiler 2, return temp actuator | HB2 ret temp act |
| | Valve actuator, return valve boiler 3 | Boiler 3, return temp actuator | HB3 ret temp act |
| | Valve actuator, return valve boiler 4 | Boiler 4, return temp actuator | HB4 ret temp act |
| | Valve actuator, district heating circuit 1, DHS1 | DHS1, actuator | DHS1 actuator |
| | Solar actuator | Solar pump/valve control | Solar Pump/Valv Ctrl |
| | Highest setpoint for the configured circuits (0...100 degrees corresponds to 0...10 V) | Heat demand temp | Heat Demand Temp |
| | Frequency converter, pressure control | Diff pressure, valve | Diff Pressure Valve |
| | Sequential control of actuator | Seq control of actuator HS1-DHS1 | Seq ctrl HS1-DHS1 |
| | Outdoor temperature | Outdoor temperature | Outdoor temperature |

## C.5 Digital outputs

| ✓ | Description | Name in Exigo tool | Name in display |
|---|---|---|---|
| | Inactive output | Not used | Not used |
| | Start/stop pump, P1A-HS1 | HS1, pump A start | HS1 pump A start |
| | Start/stop pump, P1B-HS1 | HS1, pump B start | HS1 pump B start |
| | 3-position actuator HS1, increase | HS1, actuator increase | HS1 actuator increas |
| | 3-position actuator HS1, decrease | HS1, actuator decrease | HS1 actuator decreas |
| | Start/stop dehumidifier, HS1 | HS1, dehumidification | HS1 dehumidification |

| ✓ | Description | Name in Exigo tool | Name in display |
|---|---|---|---|
| | Bypass valve for district cooling system, HS1 | HS1, bypass CV1 | HS1 bypass CV1 |
| | Heating, HS1 | HS1, heating | HS1, heating start |
| | Cooling, HS1 | HS1, cooling | HS1, cooling start |
| | Start/stop pump, P1A-HS2 | HS2, pump A start | HS2 pump A start |
| | Start/stop pump, P1B-HS2 | HS2, pump B start | HS2 pump B start |
| | 3-position actuator HS2, increase | HS2, actuator increase | HS2 actuator increas |
| | 3-position actuator HS2, decrease | HS2, actuator decrease | HS2 actuator decreas |
| | Start/stop dehumidifier, HS2 | HS2, dehumidification | HS2 dehumidification |
| | Bypass valve for district cooling system, HS2 | HS2, bypass CV1 | HS2 bypass CV1 |
| | Heating, HS2 | HS2, heating | HS2, heating start |
| | Cooling, HS2 | HS2, cooling | HS2, cooling start |
| | Start/stop pump, P1A-HS3 | HS3, pump A start | HS3 pump A start |
| | Start/stop pump, P1B-HS3 | HS3, pump B start | HS3 pump B start |
| | 3-position actuator HS3, increase | HS3, actuator increase | HS3 actuator increas |
| | 3-position actuator HS3, decrease | HS3, actuator decrease | HS3 actuator decreas |
| | Start/stop dehumidifier, HS3 | HS3, dehumidification | HS3 dehumidification |
| | Bypass valve for district cooling system, HS3 | HS3, bypass CV1 | HS3 bypass CV1 |
| | Heating, HS3 | HS3, heating | HS3, heating start |
| | Cooling, HS3 | HS3, cooling | HS3, cooling start |
| | Start/stop pump, P1A, HS4 | HS4, pump A start | HS4 pump A start |
| | Start/stop pump, P1B, HS4 | HS4, pump B start | HS4 pump B start |
| | 3-position actuator HS4, increase | HS4, actuator increase | HS4 actuator increas |
| | 3-position actuator HS4, decrease | HS4, actuator decrease | HS4 actuator decreas |
| | Start/stop dehumidifier, HS4 | HS4, dehumidification | HS4 dehumidification |
| | Bypass valve for district cooling system, HS4 | HS4, bypass CV1 | HS4 bypass CV1 |
| | Heating, HS4 | HS4, heating | HS4, heating start |
| | Cooling, HS4 | HS4, cooling | HS4, cooling start |
| | Start/stop tank pump A, HW1 | HW1, tankpump A start | HW1 tankpump A start |
| | Start/stop tank pump B, HW1 | HW1, tankpump B start | HW1 tankpump B start |
| | Start/stop exchanger pump A, HW1 | HW1, exchangerpump A start | HW1 exchpump A start |
| | Start/stop exchanger pump B, HW1 | HW1, exchangerpump B start | HW1 exchpump B start |
| | Start/stop circulation pump A, HW1 | HW1, circulationpump A start | HW1 circpump A start |
| | Start/stop circulation pump B, HW1 | HW1, circulationpump B start | HW1 circpump B start |
| | 3-position actuator HW1, increase | HW1, actuator increase | HW1 actuator increas |
| | 3-position actuator HW1, decrease | HW1, actuator decrease | HW1 actuator decreas |
| | Start/stop thermal disinfection HW1 | HW1, Thermal disinfection, heating | HW1 Thermal DisInf |
| | Start/stop thermal disinfection/cleaning HW1 | HW1, Thermal disinfection / cleaning | HW1 Thermal Dis/Clean |
| | Start/stop tank pump A, HW2 | HW2, tankpump A start | HW2 tankpump A start |
| | Start/stop tank pump B, HW2 | HW2, tankpump B start | HW2 tankpump B start |
| | Start/stop exchanger pump A, HW2 | HW2, exchangerpump A start | HW2 exchpump A start |
| | Start/stop exchanger pump B, HW2 | HW2, exchangerpump B start | HW2 exchpump B start |
| | Start/stop circulation pump A, HW2 | HW2, circulationpump A start | HW2 circpump A start |
| | Start/stop circulation pump B, HW2 | HW2, circulationpump B start | HW2 circpump B start |
| | 3-position actuator HW2, increase | HW2, actuator increase | HW2 actuator increas |

| ✓ | Description | Name in Exigo tool | Name in display |
|---|---|---|---|
| | 3-position actuator HW2, decrease | HW2, actuator decrease | HW2 actuator decreas |
| | Start/stop thermal disinfection HW2 | HW2, Thermal disinfection, heating | HW2 Thermal DisInf |
| | Start/stop thermal disinfection/cleaning HW2 | HW2, Thermal disinfection / cleaning | HW2 Thermal Dis/Clean |
| | Start/stop burner 1 | Boiler 1, burner | HB1 burner |
| | Start/stop burner 1, high effect | Boiler 1, burner (high effect) | HB1 burner (high) |
| | Start/stop pump A, boiler 1 | Boiler 1, pump A start | HB1 pump A start |
| | Start/stop pump B, boiler 1 | Boiler 1, pump B start | HB1 pump B start |
| | Start/stop return pump, boiler 1 | Boiler 1, return pump start | HB1 ret pump start |
| | Start/stop burner 2 | Boiler 2, burner | HB2 burner |
| | Start/stop burner 2, high effect | Boiler 2, burner (high effect) | HB2 burner (high) |
| | Start/stop pump A, boiler 2 | Boiler 2, pump A start | HB2 pump A start |
| | Start/stop pump B, boiler 2 | Boiler 2, pump B start | HB2 pump B start |
| | Start/stop return pump, boiler 2 | Boiler 2, return pump start | HB2 ret pump start |
| | Start/stop burner 3 | Boiler 3, burner | HB3 burner |
| | Start/stop burner 3, high effect | Boiler 3, burner (high effect) | HB3 burner (high) |
| | Start/stop pump A, boiler 3 | Boiler 3, pump A start | HB3 pump A start |
| | Start/stop pump B, boiler 3 | Boiler 3, pump B start | HB3 pump B start |
| | Start/stop return pump, boiler 3 | Boiler 3, return pump start | HB3 ret pump start |
| | Start/stop burner 4 | Boiler 4, burner | HB4 burner |
| | Start/stop burner 4, high effect | Boiler 4, burner (high effect) | HB4 burner (high) |
| | Start/stop pump A, boiler 4 | Boiler 4, pump A start | HB4 pump A start |
| | Start/stop pump B, boiler 4 | Boiler 4, pump B start | HB4 pump B start |
| | Start/stop return pump, boiler 4 | Boiler 4, return pump start | HB4 ret pump start |
| | Start/stop transport pump A | Transport pump A start | Transp pump A start |
| | Start/stop transport pump B | Transport pump B start | Transp pump B start |
| | Start/stop pump A-DHS1 | DHS1, pump A start | DHS1 pump A start |
| | Start/stop pump B-DHS1 | DHS1, pump B start | DHS1 pump B start |
| | 3-position actuator DHS1, increase | DHS1, actuator increase | DHS1 actuator increa |
| | 3-position actuator DHS1, decrease | DHS1, actuator decrease | DHS1 actuator decrea |
| | Start/stop load pump A for storage tank, P1-HP1 | HP1, load pump A start | HP1 pump A start |
| | Start/stop load pump B for storage tank, P1-HP1 | HP1, load pump B start | HP1 pump B start |
| | Additional heat source pump A start | HP1, add. heat source pump A start | HP1, AHS pump A start |
| | Additional heat source pump B start | HP1, add. heat source pump B start | HP1, AHS pump B start |
| | Start/stop pump A, solar | Solar, pump A start | Solar pump A start |
| | Start/stop pump B, solar | Solar, pump B start | Solar pump B start |
| | Connect the solar system to HW or buffer | Solar, HW->buffer | Solar HW->buffer |
| | Solar, Cool down | Solar, Cool down | Solar, Cool down |
| | Sequential control of actuator HS1-DHS1 increase | Seq control of actuator HS1-DHS1 increase | SeqCtrl HS1-DHS1 inc |
| | Sequential control of actuator HS1-DHS1 decrease | Seq control of actuator HS1-DHS1 decrease | SeqCtrl HS1-DHS1 dec |
| | Cooling unit start | Cool unit start | Cool unit start |
| | Start/stop frequency converter, pressure control | Frequency converter start | Freq converter start |
| | Refill | Refill | Refill |
| | Sum alarm A + B + C | Sum alarm | Sum alarm |
| | Sum alarm A | Sum alarm A | Sum alarm A |

| ✓ | Description | Name in Exigo tool | Name in display |
|---|---|---|---|
| | Sum alarm B + C | Sum alarm B/C | Sum alarm B/C |
| | Extra time channel 1 | Time channel 1 | Time channel 1 |
| | Extra time channel 2 | Time channel 2 | Time channel 2 |
| | Extra time channel 3 | Time channel 3 | Time channel 3 |
| | Extra time channel 4 | Time channel 4 | Time channel 4 |
| | Extra time channel 5 | Time channel 5 | Time channel 5 |

# Appendix D Alarm list

The alarm text, priority and delay columns show the factory set values.

## D.1 Heating system 1

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 1 | Malfunction P1A\|B-HS1 | B | 0 s | Malfunction pump P1A or P1B HS1 |
| 2 | Deviation Supply HS1 | A | 60 min | Supply temperature HS1 deviates too much from the setpoint for too long |
| 3 | Deviation Room HS1 | A | 60 min | Room temperature HS1 deviates too much from the setpoint for too long |
| 4 | Malfunction P1A&B-HS1 | A | 0 s | Malfunction in both circulation pumps, P1A and P1B, in HS1 |
| 5 | HS1 manual | C | 0 s | HS1 in manual running mode |
| 6 | HS1 frost | A | 0 s | HS1 frost protection active |
| 7 | HS1 high supply temperature | A | 0 s | HS1 high temperature at supply |
| 8 | HS1 condensation | A | 0 s | HS1 detection of condensation |
| 9 | Sensor error HS1 supply | B | 5 s | Power failure or short-circuit sensor HS1 supply |
| 10 | Sensor error HS1 room | B | 5 s | Power failure or short-circuit sensor HS1 room |
| 11 | Sensor error HS1 return | B | 5 s | Power failure or short-circuit sensor HS1 return |
| 12 | Sensor error HS1 Universal Limit | B | 5 s | Power failure or short-circuit sensor HS1 universal limit |
| 13 | Sensor error HS1 Universal Shift | B | 5 s | Power failure or short-circuit sensor HS1 universal shift |
| 14 | Sensor error HS1 Humidity | B | 5 s | Power failure or short-circuit sensor HS1 humidity |
| 15 | Sensor error HS1 differential pressure | B | 5 s | Power failure or short-circuit sensor HS1 differential pressure |
| 16 | HS1 Screed Drying | A | 5 h | HS1 malfunction screed drying |

## D.2 Heating system 2

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 17 | Malfunction P1A\|B-HS2 | B | 0 s | Malfunction pump P1A or P1B HS2 |
| 18 | Deviation Supply HS2 | A | 60 min | Supply temperature HS2 deviates too much from the setpoint for too long |
| 19 | Deviation Room HS2 | A | 60 min | Room temperature HS2 deviates too much from the setpoint for too long |
| 20 | Malfunction P1A&B-HS2 | A | 0 s | Malfunction in both circulation pumps, P1A and P1B, in HS2 |
| 21 | HS2 manual | C | 0 s | HS2 in manual running mode |
| 22 | HS2 frost | A | 0 s | HS2 frost protection active |
| 23 | HS2 high supply temperature | A | 0 s | HS2 high temperature at supply |
| 24 | HS2 condensation | A | 0 s | HS2 detection of condensation |
| 25 | Sensor error HS2 supply | B | 5 s | Power failure or short-circuit sensor HS2 supply |
| 26 | Sensor error HS2 room | B | 5 s | Power failure or short-circuit sensor HS2 room |
| 27 | Sensor error HS2 return | B | 5 s | Power failure or short-circuit sensor HS2 return |
| 28 | Sensor error HS2 Universal Limit | B | 5 s | Power failure or short-circuit sensor HS2 universal limit |

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 29 | Sensor error HS2 Universal Shift | B | 5 s | Power failure or short-circuit sensor HS2 universal shift |
| 30 | Sensor error HS2 Humidity | B | 5 s | Power failure or short-circuit sensor HS2 humidity |
| 31 | Sensor error HS2 differential pressure | B | 5 s | Power failure or short-circuit sensor HS2 differential pressure |
| 32 | HS2 Screed Drying | A | 5 h | HS2 malfunction screed drying |

## D.3 Heating system 3

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 33 | Malfunction P1A\|B-HS3 | B | 0 s | Malfunction pump P1A or P1B HS3 |
| 34 | Deviation Supply HS3 | A | 60 min | Supply temperature HS3 deviates too much from the setpoint for too long |
| 35 | Deviation Room HS3 | A | 60 min | Room temperature HS3 deviates too much from the setpoint for too long |
| 36 | Malfunction P1A&B-HS3 | A | 0 s | Malfunction in both circulation pumps, P1A and P1B, in HS3 |
| 37 | HS3 manual | C | 0 s | HS3 in manual running mode |
| 38 | HS3 frost | A | 0 s | HS3 frost protection active |
| 39 | HS3 high supply temperature | A | 0 s | HS3 high temperature at supply |
| 40 | HS3 condensation | A | 0 s | HS3 detection of condensation |
| 41 | Sensor error HS3 supply | B | 5 s | Power failure or short-circuit sensor HS3 supply |
| 42 | Sensor error HS3 room | B | 5 s | Power failure or short-circuit sensor HS3 room |
| 43 | Sensor error HS3 return | B | 5 s | Power failure or short-circuit sensor HS3 return |
| 44 | Sensor error HS3 Universal Limit | B | 5 s | Power failure or short-circuit sensor HS3 universal limit |
| 45 | Sensor error HS3 Universal Shift | B | 5 s | Power failure or short-circuit sensor HS3 universal shift |
| 46 | Sensor error HS3 Humidity | B | 5 s | Power failure or short-circuit sensor HS3 humidity |
| 47 | Sensor error HS3 differential pressure | B | 5 s | Power failure or short-circuit sensor HS3 differential pressure |
| 48 | HS3 Screed Drying | A | 5 h | HS3 malfunction screed drying |

## D.4 Heating system 4

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 49 | Malfunction P1A\|B-HS4 | B | 0 s | Malfunction pump P1A or P1B HS4 |
| 50 | Deviation Supply HS4 | A | 60 min | Supply temperature HS4 deviates too much from the setpoint for too long |
| 51 | Deviation Room HS4 | A | 60 min | Room temperature HS4 deviates too much from the setpoint for too long |
| 52 | Malfunction P1A&B-HS4 | A | 0 s | Malfunction in both circulation pumps, P1A and P1B, in HS4 |
| 53 | HS4 manual | C | 0 s | HS4 in manual running mode |
| 54 | HS4 frost | A | 0 s | HS4 frost protection active |
| 55 | HS4 high supply temperature | A | 0 s | HS4 high temperature at supply |
| 56 | HS4 condensation | A | 0 s | HS4 detection of condensation |
| 57 | Sensor error HS4 supply | B | 5 s | Power failure or short-circuit sensor HS4 supply |

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 58 | Sensor error HS4 room | B | 5 s | Power failure or short-circuit sensor HS4 room |
| 59 | Sensor error HS4 return | B | 5 s | Power failure or short-circuit sensor HS4 return |
| 60 | Sensor error HS4 Universal Limit | B | 5 s | Power failure or short-circuit sensor HS4 universal limit |
| 61 | Sensor error HS4 Universal Shift | B | 5 s | Power failure or short-circuit sensor HS4 universal shift |
| 62 | Sensor error HS4 Humidity | B | 5 s | Power failure or short-circuit sensor HS4 humidity |
| 63 | Sensor error HS4 differential pressure | B | 5 s | Power failure or short-circuit sensor HS4 differential pressure |
| 64 | HS4 Screed Drying | A | 5 h | HS4 malfunction screed drying |

## D.5 Hot water 1

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 65 | Malfunction Tank-P1A\|B-HW1 | B | 0 s | Malfunction Tank pump P1A or P1B HW1 |
| 66 | Malfunction Exchanger-P1A\|B-HW1 | B | 0 s | Malfunction Exchanger pump P1A or P1B HW1 |
| 67 | Malfunction Circulation-P1A\|B-HW1 | B | 0 s | Malfunction Circulation pump P1A or P1B HW1 |
| 68 | Deviation Supply HW1 | A | 60 min | Supply temperature HW1 deviates too much from the setpoint for too long |
| 69 | Deviation Tank HW1 | A | 60 min | Tank temperature HW1 deviates too much from the setpoint for too long |
| 70 | Malfunction Tank P1A&B-HW1 | A | 0 s | Malfunction in both tank pumps, P1A and P1B, in HW1 |
| 71 | Malfunction Exchanger P1A&B-HW1 | A | 0 s | Malfunction in both exchanger pumps, P1A and P1B, in HW1 |
| 72 | Malfunction CirculationP1A&B-HW1 | A | 0 s | Malfunction in both circulation pumps, P1A and P1B, in HW1 |
| 73 | HW1 manual | C | 0 s | HW1 in manual running mode |
| 74 | Frost HW1 | A | 0 s | HW1 frost protection active |
| 75 | High temp HW1 | B | 300 s | HW1 temperature too high |
| 76 | Sensor error HW1 supply | B | 0 s | Power failure or short-circuit sensor HW1 supply |
| 77 | Sensor error HW1 Tank Middle | B | 0 s | Power failure or short-circuit sensor HW1 tank middle |
| 78 | Sensor error HW1 Tank Bottom | B | 0 s | Power failure or short-circuit sensor HW1 tank bottom |
| 79 | Sensor error HW1 Tank Solar | B | 0 s | Power failure or short-circuit sensor HW1 tank solar |
| 80 | Sensor error HW1 limitation | B | 0 s | Power failure or short-circuit sensor HW1 limitation |
| 81 | Sensor error HW1 Circulation Return Temp | B | 0 s | Power failure or short-circuit sensor HW1 circulation return |
| 82 | HW1 Alarm Disinfection | A | 0 s | HW1 alarm thermal disinfection |
| 83 | HW1 Flow switch | A | 0 s | HW1 no flow detected |

## D.6 Hot water 2

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 84 | Malfunction Tank-P1A\|B-HW2 | B | 0 s | Malfunction Tank pump P1A or P1B HW2 |
| 85 | Malfunction Exchanger-P1A\|B-HW2 | B | 0 s | Malfunction Exchanger pump P1A or P1B HW2 |
| 86 | Malfunction Circulation-P1A\|B-HW2 | B | 0 s | Malfunction Circulation pump P1A or P1B HW2 |

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 87 | Deviation Supply HW2 | A | 60 min | Supply temperature HW2 deviates too much from the setpoint for too long |
| 88 | Deviation Tank HW2 | A | 60 min | Tank temperature HW2 deviates too much from the setpoint for too long |
| 89 | Malfunction Tank P1A&B-HW2 | A | 0 s | Malfunction in both tank pumps, P1A and P1B, in HW2 |
| 90 | Malfunction Exchanger P1A&B-HW2 | A | 0 s | Malfunction in both exchanger pumps, P1A and P1B, in HW2 |
| 91 | Malfunction CirculationP1A&B-HW2 | A | 0 s | Malfunction in both circulation pumps, P1A and P1B, in HW2 |
| 92 | HW2 manual | C | 0 s | HW2 in manual running mode |
| 93 | Frost HW2 | A | 0 s | HW2 frost protection active |
| 94 | High temp HW2 | B | 300 s | HW2 temperature too high |
| 95 | Sensor error HW2 supply | B | 0 s | Power failure or short-circuit sensor HW2 supply |
| 96 | Sensor error HW2 Tank Middle | B | 0 s | Power failure or short-circuit sensor HW2 tank middle |
| 97 | Sensor error HW2 Tank Bottom | B | 0 s | Power failure or short-circuit sensor HW2 tank bottom |
| 98 | Sensor error HW2 Tank Solar | B | 0 s | Power failure or short-circuit sensor HW2 tank solar |
| 99 | Sensor error HW2 limitation | B | 0 s | Power failure or short-circuit sensor HW2 limitation |
| 100 | Sensor error HW2 Circulation Return Temp | B | 0 s | Power failure or short-circuit sensor HW2 circulation return |
| 101 | HW2 Alarm Disinfection | A | 0 s | HW2 alarm thermal disinfection |
| 102 | HW2 Flow switch | A | 0 s | HW2 no flow detected |

## D.7 District heating

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 103 | Malfunction P1A\|B-DHS1 | B | 0 s | Malfunction pump P1A or P1B DHS1 |
| 104 | Deviation Supply DHS1 | A | 60 min | Supply temperature DHS1 deviates too much from the setpoint for too long |
| 105 | Malfunction P1A&B-DHS1 | A | 0 s | Malfunction both circulation pumps, P1A and P1B, in DHS1 |
| 106 | DHS1 manual | C | 0 s | DHS1 in manual running mode |
| 107 | Frost DHS1 | A | 0 s | DHS1 frost protection active |
| 108 | Sensor error DHS1 supply | B | 5 s | Power failure or short-circuit, supply temperature sensor DHS1 |
| 109 | Sensor error DHS1 return | B | 5 s | Power failure or short-circuit, return temperature sensor DHS1 |
| 110 | Sensor error DHS1 external demand | B | 5 s | Power failure or short-circuit, external demand sensor DHS1 |
| 111 | DHS1 high supply temp | A | 300 s | DHS1 high supply temp |

## D.8 Boiler circuit

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 112 | Boiler alarm | A | 0 s | Boiler alarm |
| 113 | Boiler manual | C | 0 s | Boiler in manual running mode |
| 114 | Sensor error boiler supply | B | 5 s | Power failure or short-circuit, boiler supply sensor |
| 115 | Sensor error boiler return | B | 5 s | Power failure or short-circuit sensor boiler return |
| 116 | High boiler temp | A | 0 s | Boiler temperature is too high |
| 117 | Low boiler temp | A | 0 s | Boiler temperature is too low |

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 118 | Low boiler return temp | C | 0 s | Return temperature from boiler is too low |
| 119 | Pressure/flow error | B | 20 s | Pressure or flow error in the boiler circuit |
| 120 | Malfunction P1A\|B transport pump | B | 0 s | Malfunction in boiler transport pump P1A or P1B |
| 121 | Malfunction P1A&B-transport pump | A | 0 s | Malfunction in both transport pumps, P1A and P1B |

## D.9 Boiler 1

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 122 | Malfunction P1A\|B-Boiler 1 | B | 0 s | Malfunction in pump P1A or P1B Boiler 1 |
| 123 | Malfunction P1A&P1B-Boiler 1 | A | 0 s | Malfunction in both pumps, P1A and P1B, in Boiler 1 |
| 124 | Malfunction Boiler 1 | B | 0 s | Malfunction in Boiler 1 |
| 125 | Boiler 1 manual | C | 0 s | Boiler 1 in manual mode |
| 126 | Sensor error Boiler 1 supply | B | 5 s | Power failure or short-circuit, Boiler 1 supply sensor |
| 127 | Sensor error Boiler 1 return | B | 5 s | Power failure or short-circuit, Boiler 1 return sensor |
| 128 | Boiler 1 high supply temp | B | 0 s | High supply temperature, Boiler 1 |
| 129 | Boiler 1 low return temp | C | 0 s | Return temperature from Boiler 1 is too low |
| 130 | Malfunction P-return Boiler 1 | B | 0 s | Malfunction in pump P-return Boiler 1 |

## D.10 Boiler 2

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 131 | Malfunction P1A\|B-Boiler 2 | B | 0 s | Malfunction in pump P1A or P1B Boiler 2 |
| 132 | Malfunction P1A&P1B-Boiler 2 | A | 0 s | Malfunction in both pumps, P1A and P1B, in Boiler 2 |
| 133 | Malfunction Boiler 2 | B | 0 s | Malfunction in Boiler 2 |
| 134 | Boiler 2 manual | C | 0 s | Boiler 2 in manual mode |
| 135 | Sensor error Boiler 2 supply | B | 5 s | Power failure or short-circuit, Boiler 2 supply sensor |
| 136 | Sensor error Boiler 2 return | B | 5 s | Power failure or short-circuit, Boiler 2 return sensor |
| 137 | Boiler 2 high supply temp | B | 0 s | High supply temperature, Boiler 2 |
| 138 | Boiler 2 low return temp | C | 0 s | Return temperature from Boiler 2 is too low |
| 139 | Malfunction P-return Boiler 2 | B | 0 s | Malfunction in pump P-return Boiler 2 |

## D.11 Boiler 3

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 140 | Malfunction P1A\|B-Boiler 3 | B | 0 s | Malfunction in pump P1A or P1B Boiler 3 |
| 141 | Malfunction P1A&P1B-Boiler 3 | A | 0 s | Malfunction in both pumps, P1A and P1B, in Boiler 3 |
| 142 | Malfunction Boiler 3 | B | 0 s | Malfunction in Boiler 3 |
| 143 | Boiler 3 manual | C | 0 s | Boiler 3 in manual mode |
| 144 | Sensor error Boiler 3 supply | B | 5 s | Power failure or short-circuit, Boiler 3 supply sensor |
| 145 | Sensor error Boiler 3 return | B | 5 s | Power failure or short-circuit, Boiler 3 return sensor |
| 146 | Boiler 3 high supply temp | B | 0 s | High supply temperature, Boiler 3 |

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 147 | Boiler 3 low return temp | C | 0 s | Return temperature from Boiler 3 is too low |
| 148 | Malfunction P-return Boiler 3 | B | 0 s | Malfunction in pump P-return Boiler 3 |

## D.12 Boiler 4

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 149 | Malfunction P1A\|B-Boiler 4 | B | 0 s | Malfunction in pump P1A or P1B in Boiler 4 |
| 150 | Malfunction P1A&P1B-Boiler 4 | A | 0 s | Malfunction in both pumps, P1A and P1B, in Boiler 4 |
| 151 | Malfunction Boiler 4 | B | 0 s | Malfunction in Boiler 4 |
| 152 | Boiler 4 manual | C | 0 s | Boiler 4 in manual mode |
| 153 | Sensor error Boiler 4 supply | B | 5 s | Power failure or short-circuit, Boiler 4 supply sensor |
| 154 | Sensor error Boiler 4 return | B | 5 s | Power failure or short-circuit, Boiler 4 return sensor |
| 155 | Boiler 4 high supply temp | B | 0 s | High supply temperature, Boiler 4 |
| 156 | Boiler 4 low return temp | C | 0 s | Return temperature from Boiler 4 is too low |
| 157 | Malfunction P-return Boiler 4 | B | 0 s | Malfunction in pump P-return Boiler 4 |

## D.13 Buffer

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 158 | Malfunction P1A\|B-HP1 | B | 0 s | Malfunction in pump P1A or P1B HP1 |
| 159 | Malfunction P1A & P1B-HP1 | A | 0 s | Malfunction in both pumps, P1A and P1B, in HP1 |
| 160 | Malfunction P1A\|B-HP1 add heat source | B | 0 s | Malfunction pump P1A or P1B HP1 add heat source |
| 161 | Malfunction P1A & P1B-HP1 add heat source | A | 0 s | Malfunction both pumps P1A and P1B in HP1 add heat source |
| 162 | HP1 manual | C | 0 s | HP1 in manual running mode |
| 163 | HP1 Alarm max temp buffer | A | 300 s | Buffer temperature is too high |
| 164 | Sensor error HP1 Tank Top | B | 5 s | Power failure or short-circuit sensor HP1 tank top |
| 165 | Sensor error HP1 Tank Bottom | B | 5 s | Power failure or short-circuit sensor HP1 tank bottom |
| 166 | Sensor error HP1 external demand | B | 5 s | Power failure or short-circuit, external demand sensor HP1 |
| 167 | Sensor error HP1 add. heat source | B | 5 s | Power failure or short-circuit, additional heat source sensor HP1 |

## D.14 Solar

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 168 | Malfunction P1A\|B-SO1 | B | 0 s | Malfunction in pump P1A or P1B SO1 |
| 169 | Malfunction P1A & P1B-SO1 | A | 0 s | Malfunction in both pumps, P1A and P1B, in SO1 |
| 170 | SO1 manual | C | 0 s | SO1 in manual running mode |
| 171 | High temp collector SO1 | A | 0 s | High temperature collector SO1 |
| 172 | Frost collector SO1 | A | 0 s | Frost collector SO1 |
| 173 | Sensor error SO1 Collector | B | 5 s | Power failure or short-circuit, SO1 collector sensor |
| 174 | Sensor error SO1 Return | B | 5 s | Power failure or short-circuit, SO1 collector return sensor |

## D.15 Differential pressure

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 175 | Pressure manual | C | 0 s | Pressure control in manual running mode |
| 176 | Sensor error pressure | B | 5 s | Incorrect signal pressure transmitter |

## D.16 Consumption

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 177 | High cold water consumption/ day | B | 0 s | 24 hour cold water usage higher than limit |
| 178 | High energy usage | B | 0 s | 24 hour energy usage higher than set limit |
| 179 | High cold water consumption/h | B | 0 s | Cold water usage/hour higher than set limit |

## D.17 Refill

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 180 | Pressure low | B | 0 s | Pressure lower than normal, but still high enough |
| 181 | Pressure very low | B | 0 s | Very low pressure |
| 182 | Pressure critical low | A | 0 s | Critical low pressure |

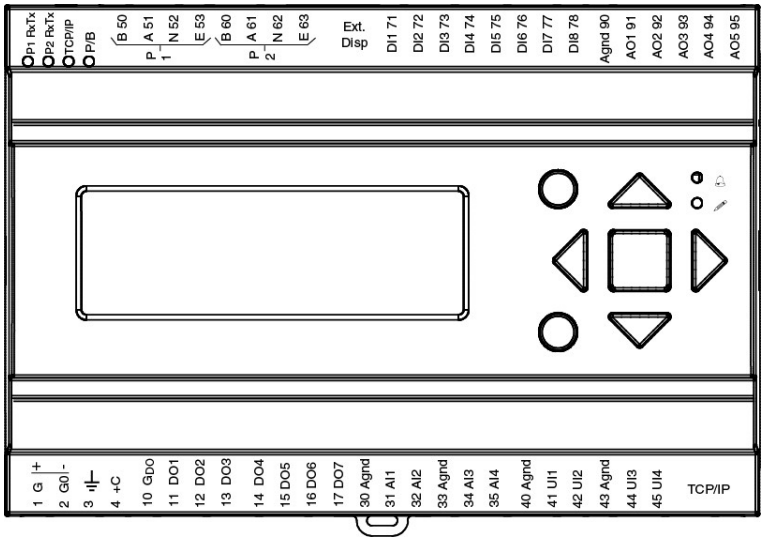
## D.18 Miscellaneous

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 183 | Sensor error outdoor temp | B | 5 s | Sensor error outdoor temp |
| 184 | Sensor error outdoor temp HS2 | B | 5 s | Power failure or short-circuit, outdoor temperature sensor HS2 |
| 185 | Sensor error outdoor temp HS3 | B | 5 s | Power failure or short-circuit, outdoor temperature sensor HS3 |
| 186 | Sensor error outdoor temp HS4 | B | 5 s | Power failure or short-circuit, outdoor temperature sensor HS4 |
| 187 | Sensor error extra sensor 1 | B | 5 s | Power failure or short-circuit extra sensor 1 |
| 188 | Sensor error extra sensor 2 | B | 5 s | Power failure or short-circuit extra sensor 2 |
| 189 | Sensor error extra sensor 3 | B | 5 s | Power failure or short-circuit extra sensor 3 |
| 190 | Sensor error extra sensor 4 | B | 5 s | Power failure or short-circuit extra sensor 4 |
| 191 | Sensor error extra sensor 5 | B | 5 s | Power failure or short-circuit extra sensor 5 |
| 192 | Sensor error wind | B | 5 s | Incorrect signal wind speed transmitter |
| 193 | Sensor error HP supply | B | 5 s | Power failure or short-circuit sensor HP supply |
| 194 | Sensor error HP return | B | 5 s | Power failure or short-circuit sensor HP return |
| 195 | Sensor error CP supply | B | 5 s | Power failure or short-circuit sensor CP supply |
| 196 | Sensor error CP return | B | 5 s | Power failure or short-circuit sensor CP return |
| 197 | Malfunction frequency converter | B | 0 s | Malfunction frequency converter |
| 198 | Expansion vessel | A | 60 s | Malfunction expansion vessel |
| 200 | P1-freq manual | C | 0 s | P1-frequency controlled in manual running mode |
| 201 | Internal battery error | B | 0 s | Internal battery needs replacing |
| 202 | Communication error expansion unit 1 | B | 0 s | Communication interrupted between expansion unit 1 and master controller |

| No | Alarm text | Prio | Delay | Description |
|---|---|---|---|---|
| 203 | Communication error expansion unit 2 | B | 0 s | Communication interrupted between expansion unit 2 and master controller |
| 204 | Communication error M-Bus HM HS1 | B | 0 s | M-Bus communication fault between master and heat meter HS1 |
| 205 | Communication error M-Bus HM HS2 | B | 0 s | M-Bus communication fault between master and heat meter HS2 |
| 206 | Communication error M-Bus HM HS3 | B | 0 s | M-Bus communication fault between master and heat meter HS3 |
| 207 | Communication error M-Bus HM HS4 | B | 0 s | M-Bus communication fault between master and heat meter HS4 |
| 208 | Communication error M-Bus HM HW1 | B | 0 s | M-Bus communication fault between master and heat meter HW1 |
| 209 | Communication error M-Bus HM HW2 | B | 0 s | M-Bus communication fault between master and heat meter HW2 |
| 210 | Communication error M-Bus HM DHS1 | B | 0 s | M-Bus communication fault between master and heat meter DHS1 |
| 211 | Communication error M-Bus HM WM1 | B | 0 s | M-Bus communication fault between master and water meter 1 |
| 212 | Communication error M-Bus HM WM2 | B | 0 s | M-Bus communication fault between master and water meter 2 |
| 213 | Communication error wireless sensors | B | 0 s | M-Bus communication fault between master and wireless sensors |
| 214 | Communication error Modbus pump 1 | B | 0 s | Communication fault between master and Modbus pump 1 |
| 215 | Communication error Modbus pump 2 | B | 0 s | Communication fault between master and Modbus pump 2 |
| 216 | Communication error Modbus pump 3 | B | 0 s | Communication fault between master and Modbus pump 3 |
| 217 | Communication error Modbus pump 4 | B | 0 s | Communication fault between master and Modbus pump 4 |
| 218 | Communication error Modbus pump 5 | B | 0 s | Communication fault between master and Modbus pump 5 |
| 219 | Communication error Modbus pump 6 | B | 0 s | Communication fault between master and Modbus pump 6 |
| 220 | Communication error Modbus pump 7 | B | 0 s | Communication fault between master and Modbus pump 7 |
| 221 | Communication error Modbus pump 8 | B | 0 s | Communication fault between master and Modbus pump 8 |
| 222 | Communication error Modbus pump 9 | B | 0 s | Communication fault between master and Modbus pump 9 |
| 223 | Communication error Modbus pump 10 | B | 0 s | Communication fault between master and Modbus pump 10 |
| 224 | Extra alarm 1 | B | 0 s | Extra alarm 1 |
| 225 | Extra alarm 2 | B | 0 s | Extra alarm 2 |
| 226 | Extra alarm 3 | B | 0 s | Extra alarm 3 |
| 227 | Extra alarm 4 | B | 0 s | Extra alarm 4 |
| 228 | Extra alarm 5 | B | 0 s | Extra alarm 5 |
| 229 | Extra alarm 6 | B | 0 s | Extra alarm 6 |
| 230 | Extra alarm 7 | B | 0 s | Extra alarm 7 |
| 231 | Extra alarm 8 | B | 0 s | Extra alarm 8 |
| 232 | Extra alarm 9 | B | 0 s | Extra alarm 9 |
| 233 | Extra alarm 10 | B | 0 s | Extra alarm 10 |

# Appendix E Terminal lists

## E.1 Exigo Ardo (24 V models)

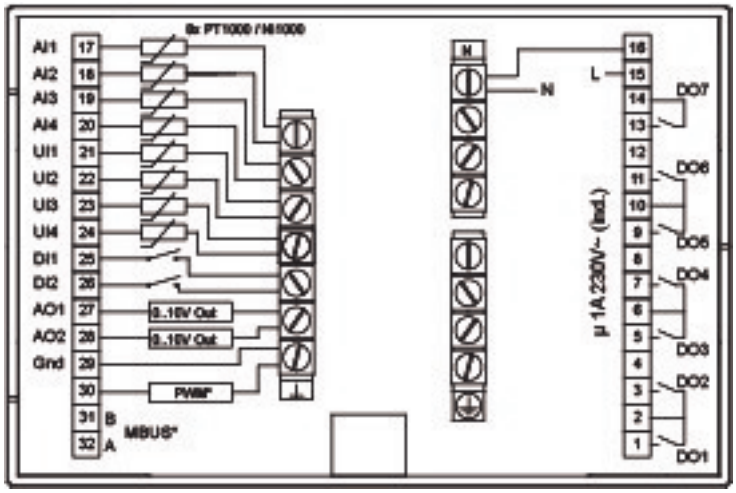



| Terminal | I/O | Hardware model | | Notes |
|---|---|---|---|---|
| | | A15 | A28 | |
| 1 | Power supply G+ | ✓ | ✓ | |
| 2 | Power supply G0- | ✓ | ✓ | |
| 3 | Earth | ✓ | ✓ | |
| 4 | DI common +C | ✓ | ✓ | |
| 10 | DO common GDO | ✓ | ✓ | |
| 11 | DO1 | ✓ | ✓ | |
| 12 | DO2 | ✓ | ✓ | |
| 13 | DO3 | ✓ | ✓ | |
| 14 | DO4 | ✓ | ✓ | |
| 15 | DO5 | - | ✓ | |
| 16 | DO6 | - | ✓ | |
| 17 | DO7 | - | ✓ | |
| 30 | Analogue ground | ✓ | ✓ | |
| 31 | AI1 | ✓ | ✓ | |
| 32 | AI2 | ✓ | ✓ | |
| 33 | Analagoue ground | ✓ | ✓ | |
| 34 | AI3 | ✓ | ✓ | |
| 35 | AI4 | ✓ | ✓ | |
| 40 | Analogue ground | ✓ | ✓ | |
| 41 | UAI1 | - | ✓ | |
| 42 | UAI2 | - | ✓ | |
| 43 | Analogue ground | ✓ | ✓ | |
| 44 | UAI3 | - | ✓ | |
| 45 | UAI4 | - | ✓ | |
| 50 | Port 1 B | ✓* | ✓* | |
| 51 | Port 1 A | ✓* | ✓* | |
| 52 | Port 1 N | ✓* | ✓* | |
| 53 | Port 1 E | ✓* | ✓* | |

| | | | | |
|---|---|---|---|---|
| 60 | Port 2 B | ✓* | ✓* | |
| 61 | Port 2 A | ✓* | ✓* | |
| 62 | Port 2 N | ✓* | ✓* | |
| 63 | Port 2 E | ✓* | ✓* | |
| 71 | DI1 | ✓ | ✓ | |
| 72 | DI2 | ✓ | ✓ | |
| 73 | DI3 | ✓ | ✓ | |
| 74 | DI4 | ✓ | ✓ | |
| 75 | DI5 | - | ✓ | |
| 76 | DI6 | - | ✓ | |
| 77 | DI7 | - | ✓ | |
| 78 | DI8 | - | ✓ | |
| 80 | Analogue ground | ✓ | ✓ | |
| 81 | AO1 | ✓ | ✓ | |
| 82 | AO2 | ✓ | ✓ | |
| 83 | AO3 | ✓ | ✓ | |
| 84 | AO4 | - | ✓ | |
| 85 | AO5 | - | ✓ | |

* depending on model

## E.2 Exigo Vido (230 V models)




| Terminal | I/O | Hardware model | | Notes |
|---|---|---|---|---|
| | | A15 | A28 | |
| 1 | DO1 | ✓ | ✓ | |
| 2 | Common DO1/DO2 | ✓ | ✓ | |
| 3 | DO2 | ✓ | ✓ | |
| 4 | - | - | - | |
| 5 | DO3 | ✓ | ✓ | |
| 6 | Common DO3/DO4 | ✓ | ✓ | |
| 7 | DO4 | ✓ | ✓ | |
| 8 | - | - | - | |
| 9 | DO5 | ✓ | ✓ | |
| 10 | Common DO5/DO6 | ✓ | ✓ | |
| 11 | DO6 | ✓ | ✓ | |

| | | | | |
|---|---|---|---|---|
| 12 | - | - | - | |
| 13 | DO7 | ✓ | ✓ | |
| 14 | Common DO7 | ✓ | ✓ | |
| 15 | Power supply L | ✓ | ✓ | |
| 16 | Power supply N | ✓ | ✓ | |
| 17 | AI1 | ✓ | ✓ | |
| 18 | AI2 | ✓ | ✓ | |
| 19 | AI3 | ✓ | ✓ | |
| 20 | AI4 | ✓ | ✓ | |
| 21 | UAI1 | ✓ | ✓ | |
| 22 | UAI2 | ✓ | ✓ | |
| 23 | UAI3 | ✓ | ✓ | |
| 24 | UAI4 | ✓ | ✓ | |
| 25 | DI1 | ✓ | ✓ | |
| 26 | DI2 | ✓ | ✓ | |
| 27 | UA1 | ✓ | ✓ | |
| 28 | UA2 | ✓ | ✓ | |
| 29 | Analogue ground | ✓ | ✓ | |
| 30 | AO3 | - | ✓ | |
| 31 | MBUS A | ✓* | ✓ | |
| 32 | MBUS B | ✓* | ✓ | |

* depending on model

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