ENGINEERING TOMORROW

Operating Guide

# ECL Comfort 310, application P348

## 1.0 Table of Contents

## 1.1 Important safety and product information

### 1.1.1 Important safety and product information

This Operating Guide is associated with the ECL Application Key P348 (code no. 087H3843).

The ECL Application Key P348 contains 3 subtypes: P348.1, P348.2 and P348.3 which control heating circuit(s) and an advanced Domestic Hot Water (DHW) installation.

- P348.1, district heating connection, 2 heating circuits and DHW
- P348.2, district heating connection, 2 heating circuits and DHW, solar connection to buffer tank
- P348.3, boiler-based heating connection, 2 heating circuits and DHW, solar connection to buffer tank

See the Installation Guide for electrical connections.

Described functions are realized in ECL Comfort 310 which also allows M-bus, Modbus and Ethernet (Internet) communication. The Application Key P348 complies with ECL Comfort 310 controllers as of firmware version 1.11. The firmware (controller software) is visible at start-up of the controller and in 'Common controller settings' in 'System'.

Up to two Remote Control Units, ECA 30 or ECA 31, can be connected.

The application P348 works with additional Internal I/O modules:

- The extension module ECA 32 gives 0 - 10 Volt signal for speed control of DHW related charging and circulation pump.
- The extension module ECA 35 gives 0 - 10 Volt signal for speed control of DHW related charging and circulation pump. ECA 35 can also give PWM* signal for speed control of the listed pumps.

A circulation pump can be considered as a circulator too.

The ECL Comfort 310 works with either one ECA 32 or one ECA 35. The Internal I/O module in question is placed in the base part of the ECL Comfort 310.

* PWM = Pulse Width Modulation

Together with the ECL Comfort 310 the additional Internal I/O modules can also be used for extra data communication to SCADA:

- Temperature, Pt 1000 (default)
- 0 - 10 volt signals
- Digital input

The set-up of input type can be done by means of the Danfoss Software "ECL Tool".
Navigation: Danfoss.com > Products & Solutions > Products > District Heating and Cooling > Documentation > Tools & Software > ECL Tool.

The URL is:
*https://www.danfoss.com/en/service-and-support/downloads*

ECL Comfort 310 is available as:

- ECL Comfort 310, 230 volt a.c. (code no. 087H3040)
- ECL Comfort 310B, 230 volt a.c. (code no. 087H3050)
- ECL Comfort 310, 24 volt a.c. (code no. 087H3044)

The B-type has no display and dial.

The B-type is operated by means of the remote control unit ECA 30 / 31:

- ECA 30 (code no. 087H3200)
- ECA 31 (code no. 087H3201)

Internal I/O modules:

- ECA 32 (code no. 087H3202)
- ECA 35 (code no. 087H3205)

Base part for ECL Comfort 310, 230 volt and 24 volt: Code no. 087H3230.

Additional documentation for ECL Comfort 310, modules and accessories is available on *http://danfoss.com/* or *http://store.danfoss.com*.

⚠

**Safety Note**
To avoid injury of persons and damages to the device, it is absolutely necessary to read and observe these instructions carefully.

Necessary assembly, start-up, and maintenance work must be performed by qualified and authorized personnel only.

Local legislations must be respected. This comprises also cable dimensions and type of isolation (double isolated at 230 V).

A fuse for the **ECL Comfort 296 / 210 / 310** installation is max. 10 A typically.
A fuse for the **ECL Comfort 120 / 220** installation is **max. 6 A.**

The ambient temperature ranges for ECL Comfort in operation are:
ECL Comfort 120 / 220: –5–50 °C
ECL Comfort 210 / 310: 0–50 °C
ECL Comfort 296: 0 - 45 °C.
Exceeding the temperature range can result in malfunctions.

Installation must be avoided if there is a risk for condensation (dew).

The warning sign is used to emphasize special conditions that should be taken into consideration.

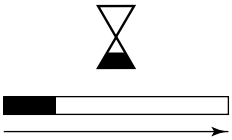
This symbol indicates that this particular piece of information should be read with special attention.

Application keys might be released before all display texts are translated. In this case the text is in English.

**Automatic update of controller software (firmware)**:
The software of the controller is updated automatically when the key is inserted:

- ECL 210 / 310, as of controller version 1.11
- ECL 296, as of controller version 1.58

The following animation will be shown when the software is being updated:



*Progress bar*

During update:

- Do not remove the KEY
  If the key is removed before the hour-glass is shown, you have to start afresh.
- Do not disconnect the power
  If the power is interrupted when the hour-glass is shown, the controller will not work.
- Manual update of controller software (firmware):
  See the section "Automatic / manual update of firmware"

As this Operating Guide covers several system types, special system settings will be marked with a system type. All system types are shown in the chapter: 'Identifying your system type'.

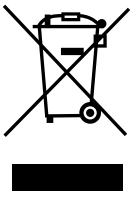
°C (degrees Celsius) is a measured temperature value whereas K (Kelvin) often is used for temperature differences.

The ID no. is unique for the selected parameter.

| Example | First digit | Second digit | Last three digits |
|---|---|---|---|
| 11174 | 1 | 1 | 174 |
| | - | Circuit 1 | Parameter no. |
| 12174 | 1 | 2 | 174 |
| | - | Circuit 2 | Parameter no. |

If an ID description is mentioned more than once, it means that there are special settings for one or more system types. It will be marked with the system type in question (e.g. 12174 - A266.9).

Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.



**Disposal Note**

This symbol on the product indicates that it may not be disposed of as household waste.

It must be handed over to the applicable take-back scheme for the recycling of electrical and electronic equipment.

- Dispose of the product through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

## 2.0 Installation

### 2.1 Before you start

The ECL application key P348 contains 3 subtypes: **P348.1, P348.2 and P348.3.**

The application **P348.1** for heating temperature control and advanced DHW temperature control is very flexible.

The heating circuit:

**P348.1, ex. a** shows two radiator circuits in parallel, each circuit with its own return temperature sensor for monitoring purpose.
**P348.1, ex. b** shows one radiator circuit with its own return temperature sensor for monitoring purpose.
**P348.1, ex. c** shows two radiator circuits in parallel, each circuit with its own return temperature sensor for monitoring purpose.
**P348.1, ex. d** shows one radiator circuit with its own return temperature sensor for monitoring purpose.

**Temperature control of heating circuit:**

The flow temperature is adjusted according to your requirements. The flow temperature sensor S3 is the most important sensor and must be connected. Desired flow temperature at S3 is calculated in the ECL controller, based on the outdoor temperature S1 and the desired room temperature.
In general, the lower the outdoor temperature, the higher the desired flow temperature.

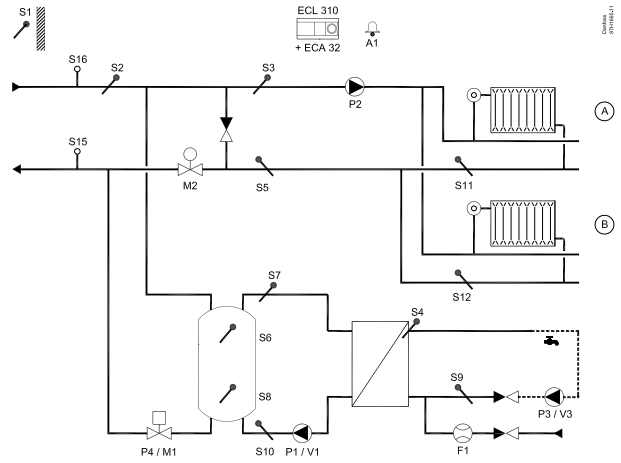
By means of a week schedule, the heating circuit can be in 'Comfort' or 'Saving' mode (two values for the desired room temperature). In Saving mode the heating can be reduced or switched off totally.
The motorized control valve M2 is opened gradually when the flow temperature is lower than the desired flow temperature and vice versa.
The return temperature S5 can be limited, for example not to be too high. If so, the desired flow temperature at S3 can be adjusted (typically to a lower value), which results in a gradual closing of the motorized control valve. Furthermore, the return temperature limitation can be dependent on the outdoor temperature. Typically, the lower the outdoor temperature, the higher the accepted return temperature.
In boiler-based heating supply the return temperature should not be too low (same adjustment procedure as above).

If the measured room temperature (via ECA 30 / 31) does not equal the desired room temperature, the desired flow temperature can be adjusted.

The circulation pump, P2, is ON at heat demand or at frost protection.
The heating can be switched OFF when the outdoor temperature is higher than a selectable value.

Return temperature sensors S11 and S12 are used for monitoring purpose only.
Pressure sensors S15 and S16 are used for monitoring purpose. Furthermore, an alarm can be activated if the pressure gets higher than a set value or lower than another set value.

*P348.1, ex. a, heating (circuits A and B) and DHW temperature control. Pumps in DHW circuit can be 0 – 10 Volt controlled.*




The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32* | *Built-in extension module, 0 - 10 V outputs for pump speed control* |
| *S1* | *Outdoor temperature sensor* |
| *S2* | *Supply temperature sensor* |
| *S3* | *(mandatory) Flow temperature sensor, circuit 1* |
| *S4* | *(mandatory) DHW flow temperature sensor, circuit 2* |
| *S5* | *Return temperature sensor, circuit 1* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Buffer flow temperature sensor* |
| *S8* | *Lower buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Buffer return temperature sensor* |
| *S11* | *Return temperature sensor, circuit 1 A* |
| *S12* | *Return temperature sensor, circuit 1 B* |
| *S15* | *Supply return pressure sensor* |
| *S16* | *Supply flow pressure sensor* |
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW buffer charging pump (ON-OFF controlled)* |
| *V1* | *Speed control of DHW buffer charging pump (0 - 10 V)* |
| *P2* | *Circulation pump (ON-OFF controlled), circuit 1* |
| *P3* | *DHW circulation pump (ON-OFF controlled)* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V)* |
| *M1* | *Motorized control valve (ON-OFF controlled)* |
| *M2* | *Motorized control valve (3-point controlled)* |
| *A1* | *Alarm* |

A connected flow or energy meter based on M-bus signal can limit the flow or energy to a set maximum value. Furthermore, the limitation can be in relation to the outdoor temperature. Typically, the lower the outdoor temperature, the higher the accepted flow / power.

The frost protection mode maintains a selectable flow temperature, for example 10 °C.

The heating circuit can act as master and via the ECL 485 communication bus fulfil the heat demand from slave circuits.

Exercise of circulation pump and control valve in periods without heating demand can be arranged.

The DHW (Domestic Hot Water) circuit:

**P348.1, ex. a and P348.1, ex. b** run with the extension module ECA 32 only. This allows for speed control by means of voltage signal of charging pump P1 / V1 and circulation pump P3 / V3.

**P348.1, ex. c and P348.1, ex. d** can run with the extension module ECA 32 (speed control (by means of voltage signal) of the pumps P1 / V1 and P3 / V3) — or run with the extension module ECA 35 for speed control (by means of voltage or PWM signal) of the pumps P1 / V1 and P3 / V3.

**Temperature control of buffer:**

The desired DHW temperature at S4 determines the buffer charging procedure. The DHW temperature sensor S4 and upper buffer temperature sensor S6 are the most important sensors and must be connected.

The desired buffer temperature at S6 is based on the desired DHW temperature at S4 and a set "Demand offset" (= Charging difference).

P4 has an ON / OFF function. M1 follows P4 to be either fully open or fully closed.

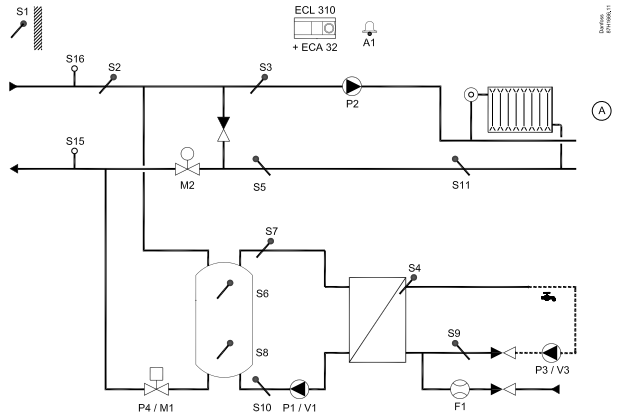
Start buffer charging process:

1. Buffer temperature S6 temperature gets lower than ('Desired DHW temperature' + 'Demand offset' + 'Start diff.').

   An example: 60 °C + 6 K + (-2 K) = 64 °C

2. P4 is switched ON; M1 is commanded to open

*P348.1, ex. b, heating (circuit A) and DHW temperature control. Pumps in DHW circuit can be 0 – 10 Volt controlled.*




The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32* | *Built-in extension module, 0 - 10 V outputs for pump speed control* |
| *S1* | *Outdoor temperature sensor* |
| *S2* | *Supply temperature sensor* |
| *S3* | *(mandatory) Flow temperature sensor, circuit 1* |
| *S4* | *(mandatory) DHW flow temperature sensor, circuit 2* |
| *S5* | *Return temperature sensor, circuit 1* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Buffer flow temperature sensor* |
| *S8* | *Lower buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Buffer return temperature sensor* |
| *S11* | *Return temperature sensor, circuit 1 A* |
| *S15* | *Supply return pressure sensor* |
| *S16* | *Supply flow pressure sensor* |
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW buffer charging pump (ON-OFF controlled)* |
| *V1* | *Speed control of DHW buffer charging pump (0 - 10 V)* |
| *P2* | *Circulation pump (ON-OFF controlled), circuit 1* |
| *P3* | *DHW circulation pump (ON-OFF controlled)* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V)* |
| *M1* | *Motorized control valve (ON-OFF controlled)* |
| *M2* | *Motorized control valve (3-point controlled)* |
| *A1* | *Alarm* |

Stop buffer charging process:

1. a

   S6 connected and 'Stop diff.' has a **negative value**

   Buffer temperature S6 temperature gets higher than ('Desired DHW temperature' + 'Demand offset').

   An example: 60 °C + 6 K = 66 °C

1. b

   S6 connected and 'Stop diff.' has a **positive value:**

   Buffer temperature S6 temperature gets higher than ('Desired DHW temperature' + 'Demand offset' + 'Stop diff.').

   An example: 60 °C + 6 K + 4 K = 70 °C

1. c

   S6 and S8 connected and 'Stop diff.' has a **negative value:**

   Buffer temperature S6 temperature gets higher than ('Desired DHW temperature' + 'Demand offset') **AND** S8 temperature gets higher than ('Desired DHW temperature' + 'Demand offset' + 'Stop diff.').

   An example: S6 higher than (60 °C + 6 K = 66 °C) **AND** S8 higher than (60 °C + 6 K + (-8 K) = 58 °C).

1. d

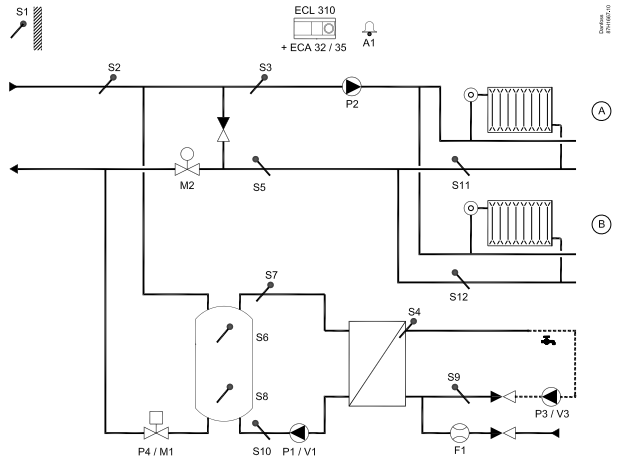
   S6 and S8 connected and 'Stop diff.' has a **positive value:**

   Buffer temperature S6 temperature gets higher than ('Desired DHW temperature' + 'Demand offset') **AND** S8 temperature gets higher than ('Desired DHW temperature' + 'Demand offset' + 'Stop diff.').

   An example: S6 higher than (60 °C + 6 K = 66 °C) **AND** S8 higher than (60 °C + 6 K + (8 K) = 74 °C).

2. P4 is switched OFF; M1 is commanded to close

*P348.1, ex. c, heating (circuits A and B) and DHW temperature control. Pumps in DHW circuit can be 0 – 10 Volt or PWM controlled.*




The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32* | *Built-in extension module, 0 - 10 V outputs for pump speed control* |
| *ECA 35* | *Built-in extension module, 0 - 10 V outputs and PWM outputs for pump speed control* |
| *S1* | *Outdoor temperature sensor* |
| *S2* | *Supply temperature sensor* |
| *S3* | *(mandatory) Flow temperature sensor, circuit 1* |
| *S4* | *(mandatory) DHW flow temperature sensor, circuit 2* |
| *S5* | *Return temperature sensor, circuit 1* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Buffer flow temperature sensor* |
| *S8* | *Lower buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Buffer return temperature sensor* |
| *S11* | *Return temperature sensor, circuit 1 A* |
| *S12* | *Return temperature sensor, circuit 1 B* |
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW buffer charging pump (ON-OFF controlled)* |
| *V1* | *Speed control of DHW buffer charging pump (0 - 10 V)* |
| *P2* | *Circulation pump (ON-OFF controlled), circuit 1* |
| *P3* | *DHW circulation pump (ON-OFF controlled)* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V)* |
| *M1* | *Motorized control valve (ON-OFF controlled)* |
| *M2* | *Motorized control valve (3-point controlled)* |
| *A1* | *Alarm* |

**Temperature control of DHW:**

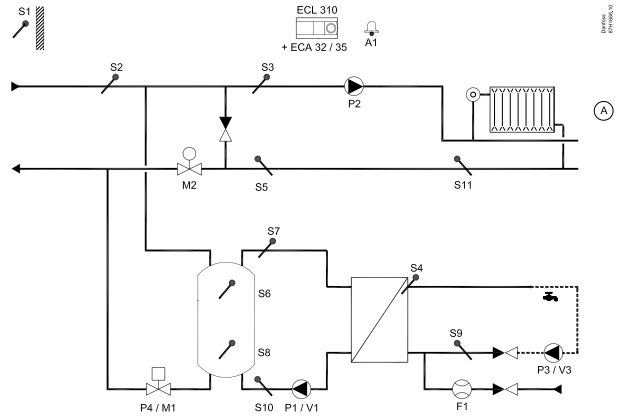
The desired DHW temperature at S4 determines the temperature control.
By means of a week schedule (up to 3 'Comfort' periods / day), the DHW circuit can be in 'Comfort' or 'Saving' mode (two different temperature values for the desired DHW temperature at S4).
The DHW flow temperature sensor S4 and the DHW circulation return temperature sensor S9 are the most important sensors and must be connected. If S4 is not connected, the control pump P1 / V1 will stop. If S9 is not connected, the DHW circulation pump will operate at 100 % speed.

The control pump P1 / V1 is gradually increased in speed when the DHW flow temperature is lower than the desired DHW temperature and vice versa.
The supply temperature S7 is used to compensate the proportional band Xp in order to improve the temperature control at different supply temperatures.

Temperature control of the DHW circulation pipe at S9 ensures the desired temperature by means of speed control of P3 / V3.
A week schedule (up to 3 'Comfort' periods / day) controls the DHW circulation pump to be ON or OFF. If in OFF mode, the DHW temperature control will be disabled.

The cold water flow signal from F1 can be used to override the control valve in order to optimize the DHW temperature control. This pro-active functionality compensates for the delay before the flow temperature sensor S4 measures a change in temperature.
An anti-bacteria function for the DHW circuit is available for activation on selected days of the week. The anti-bacteria function can be set to include the DHW circulation.

*P348.1, ex. d, heating (circuit A) and DHW temperature control. Pumps in DHW circuit can be 0 – 10 Volt or PWM controlled.*




The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32* | *Built-in extension module, 0 - 10 V outputs for pump speed control* |
| *ECA 35* | *Built-in extension module, 0 - 10 V outputs and PWM outputs for pump speed control* |
| *S1* | *Outdoor temperature sensor* |
| *S2* | *Supply temperature sensor* |
| *S3* | *(mandatory) Flow temperature sensor, circuit 1* |
| *S4* | *(mandatory) DHW flow temperature sensor, circuit 2* |
| *S5* | *Return temperature sensor, circuit 1* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Buffer flow temperature sensor* |
| *S8* | *Lower buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Buffer return temperature sensor* |
| *S11* | *Return temperature sensor, circuit 1 A* |
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW buffer charging pump (ON-OFF controlled)* |
| *V1* | *Speed control of DHW buffer charging pump (0 - 10 V)* |
| *P2* | *Circulation pump (ON-OFF controlled), circuit 1* |
| *P3* | *DHW circulation pump (ON-OFF controlled)* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V)* |
| *M1* | *Motorized control valve (ON-OFF controlled)* |
| *M2* | *Motorized control valve (3-point controlled)* |
| *A1* | *Alarm* |

**P348.2**

This subtype for buffer control, heating temperature control and advanced DHW temperature control is very flexible and supports also connection of solar panels.
Master circuit M controls the buffer and solar circuit. DHW circuit 3 and heating circuits 1 and 2 are supplied from buffer circuit.

The heating circuit:

**P348.2, ex. a** shows two radiator heating circuits, 1 and 2. Each are controlled by mixing valves M2 and M3. S15 and S16 (only when using ECA 32) monitor the return temperatures. Common return flow from radiator heating circuits is connected to buffer-low connection. DHW return inlet to buffer is defined by diverting valve X3. Solar system is also connected to buffer, and it is controlled by P4 / V4 and S5. Master circuit can fulfil the heat demand from slave heating circuits 1 and 2.

**P348.2, ex. b** shows two radiator heating circuits, 1 and 2. Each are controlled by mixing valves M2 and M3. S15 and S16 (only when using ECA 32) monitor the return temperatures. Common return flow from radiator heating circuits is connected before connection to return diverting valve X3. Solar system is also connected to buffer and it is controlled by P4 / V4 and S5. Master circuit can fulfil the heat demand from slave heating circuits 1 and 2.

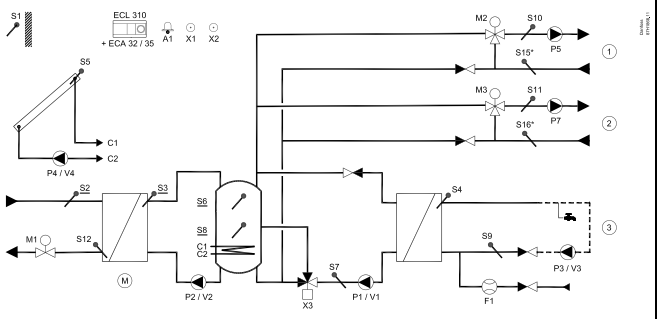
**P348.2, ex. c** shows two radiator heating circuits, 1 and 2. Each are controlled by mixing valves M2 and M3. S15 and S16 (only when using ECA 32) monitor the return temperatures. Common return flow from radiator heating circuits is connected to buffer charging return. DHW return inlet to buffer is defined by diverting valve X3. Solar system is also connected to buffer, and it is controlled by P4 / V4 and S5. Master circuit can fulfil the heat demand from slave heating circuits 1 and 2.

**P348.2, ex. d** shows two radiator heating circuits, 1 and 2. Each are controlled by mixing valves M2 and M3. S15 and S16 (only when using ECA 32) monitor the return temperatures. Common return flow from radiator heating circuits is connected to buffer-low connection. Solar system is also connected to buffer, and it is controlled by P4 / V4 and S5. Master circuit can fulfil the heat demand from slave heating circuits 1 and 2.
Heating and DHW are supplied from buffer, return of heating and DHW are combined and together returned to buffer.

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32 / 35* | *Built-in extension module, three 0-10V outputs and 6 sensor inputs (ECA 32) or three 0-10V outputs and four PWM outputs and 2 sensor inputs (ECA 35)* |
| *S1* | *Outdoor temperature sensor* |
| *S2* | *(mandatory) Supply temperature sensor* |
| *S3* | *(mandatory) Flow temperature sensor, master circuit* |
| *S4* | *DHW flow temperature sensor* |
| *S5* | *Solar panel temperature sensor, master circuit* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Buffer return temperature sensor* |
| *S8* | *(mandatory) Lower buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Flow temperature sensor, circuit 1* |
| *S11* | *Flow temperature sensor, circuit 2* |
| *S12* | *Return temperature sensor, master circuit* |
| *S15* | *Return temperature sensor, circuit 1 (ECA 32 only)* |
| *S16* | *Return temperature sensor, circuit 2 (ECA 32 only)* |

***P348.2, ex. a**, master circuit M, heating circuits 1 and 2 and DHW circuit 3. Pumps P1, P2 and P3 can be 0 – 10 Volt or PWM controlled. P4 can be PWM controlled.*
*Heat from solar collector to buffer can be controlled via P4. Common return flow from radiator heating circuits is connected to buffer return. The return flow from domestic hot water is connected to the buffer via diverting valve (X3).*




*S15*/ S16*: ECL Comfort 310 + ECA 32*
*P4 ( PWM): ECL Comfort 310 + ECA 35*

The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

No safety control function for too high temperature in the buffer!
External safety functions necessary!

*List of components:*

| | |
|---|---|
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW temperature control pump* |
| *V1* | *Speed control of DHW temperature control pump (0 - 10 V or PWM)* |
| *P2* | *Buffer charging pump, master circuit* |
| *V2* | *Speed control of buffer charging pump (0 - 10 V or PWM), master circuit* |
| *P3* | *DHW circulation pump* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V or PWM)* |
| *P4* | *Circulation pump, solar circuit* |
| *V4* | *Speed control of circulation pump, solar circuit (PWM)* |
| *P5* | *Circulation pump, heating circuit 1* |
| *P7* | *Circulation pump, heating circuit 2* |
| *M1* | *Motorized control valve, master circuit (3-point controlled)* |
| *M2* | *Motorized control valve, heating circuit 1 (3-point controlled)* |
| *M3* | *Motorized control valve, heating circuit 2 (3-point controlled)* |
| *A1* | *Alarm* |
| *X1* | *Buffer charging active* |
| *X2* | *Anti-bacteria function active* |
| *X3* | *Change-over valve for return temp. control to buffer* |

**Temperature control of heating circuit:**

The flow temperature is adjusted according to your requirements. The flow temperature sensors S10 / S11 are the most important sensors and must be connected for having control function. Desired flow temperature at S10 / S11 is calculated in the ECL controller, based on the outdoor temperature S1 and the desired room temperature.

In general, the lower the outdoor temperature, the higher the desired flow temperature.

By means of a week schedule, a heating circuit can be in 'Comfort' or 'Saving' mode (two values for the desired room temperature). In Saving mode, the heating can be reduced or switched off totally. The motorized control valves M2 / M3 are opened gradually when the flow temperature is lower than the desired flow temperature and vice versa.

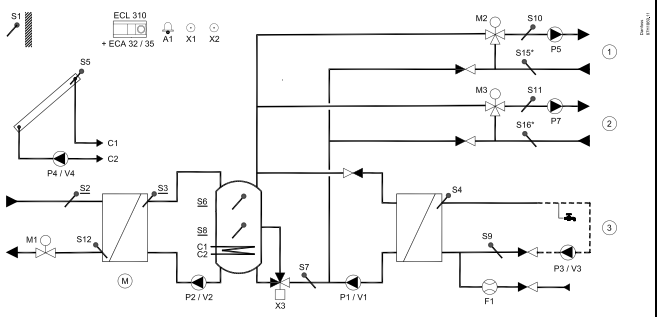
The return temperature can be limited by sensor S12, for example primary return not to be too high. If so, the desired flow temperature at S3 can be adjusted (typically to a lower value), which results in a gradual closing of the motorized control valve. Furthermore, the return temperature limitation can be dependent on the outdoor temperature.
Typically, the lower the outdoor temperature, the higher the accepted return temperature.

The circulation pumps P5 / P7 are ON at heat demand or at frost protection.
The heating can be switched OFF when the outdoor temperature is higher than a selectable value.
Supply temperature for each of the heating circuits is S6.
Return temperature sensors S15 and S16 are used for monitoring purpose only.

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32 / 35* | *Built-in extension module, three 0-10V outputs and 6 sensor inputs (ECA 32) or three 0-10V outputs and four PWM outputs and 2 sensor inputs (ECA 35)* |
| *S1* | *Outdoor temperature sensor* |
| *S2* | *(mandatory) Supply temperature sensor* |
| *S3* | *(mandatory) Flow temperature sensor, master circuit* |
| *S4* | *DHW flow temperature sensor* |
| *S5* | *Solar panel temperature sensor, master circuit* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Buffer return temperature sensor* |
| *S8* | *(mandatory) Lower buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Flow temperature sensor, circuit 1* |
| *S11* | *Flow temperature sensor, circuit 2* |
| *S12* | *Return temperature sensor, master circuit* |
| *S15* | *Return temperature sensor, circuit 1 (ECA 32 only)* |
| *S16* | *Return temperature sensor, circuit 2 (ECA 32 only)* |

***P348.2, ex. b**, master circuit M, heating circuits 1 and 2 and DHW circuit 3. Pumps P1, P2 and P3 can be 0 – 10 Volt or PWM controlled. P4 can be PWM controlled. Common return flow from radiator heating and domestic hot water circuits are connected to buffer via diverting valve (X3). Heat from solar collector to buffer can be controlled via P4 / V4.*




*S15*/ S16*: ECL Comfort 310 + ECA 32*
*P4 ( PWM): ECL Comfort 310 + ECA 35*

The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

No safety control function for too high temperature in the buffer!
External safety functions necessary!

*List of components:*

| | |
|---|---|
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW temperature control pump* |
| *V1* | *Speed control of DHW temperature control pump (0 - 10 V or PWM)* |
| *P2* | *Buffer charging pump, master circuit* |
| *V2* | *Speed control of buffer charging pump (0 - 10 V or PWM), master circuit* |
| *P3* | *DHW circulation pump* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V or PWM)* |
| *P4* | *Circulation pump, solar circuit* |
| *V4* | *Speed control of circulation pump, solar circuit (PWM)* |
| *P5* | *Circulation pump, heating circuit 1* |
| *P7* | *Circulation pump, heating circuit 2* |
| *M1* | *Motorized control valve, master circuit (3-point controlled)* |
| *M2* | *Motorized control valve, heating circuit 1 (3-point controlled)* |
| *M3* | *Motorized control valve, heating circuit 2 (3-point controlled)* |
| *A1* | *Alarm* |
| *X1* | *Buffer charging active* |
| *X2* | *Anti-bacteria function active* |
| *X3* | *Change-over valve for return temp. control to buffer* |

The flow temperature at S3 is controlled via the motorized control valve M1 and the speed control pump V2 in the master circuit.

A connected flow or energy meter based on M-bus signal can limit the flow or energy to a set maximum value.
Furthermore, the limitation can be in relation to the outdoor temperature. Typically, the lower the outdoor temperature, the higher the accepted flow /power.

The frost protection mode maintains a selectable flow temperature, for example 10 °C.

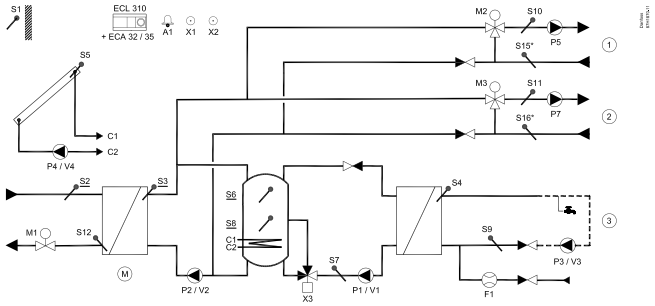
The heating circuits are the circuits 1 and 2. Only the primary master circuit can act as a master and via the ECL 485 communication bus fulfil the heat demand from additional slave circuits!

Exercise of circulation pump and control valve in periods without heating demand can be arranged.

The DHW (Domestic Hot Water) circuit:

**P348.2, ex. a, b, c and d** can run with the extension module ECA 32 / 35 (speed control by means of voltage signal of the pumps P1 / V1, P2 / V2 and P3 / V3)— or with the extension module ECA 35 for speed control (by means of voltage or PWM signal) of the pumps P4 / V4.

***P348.2, ex. c,*** *master circuit M, heating circuits 1 and 2 and DHW circuit 3. Pumps P1, P2 and P3 can be 0 – 10 Volt or PWM controlled. P4 can be PWM controlled. The return flow from domestic hot water is connected to the buffer via diverting valve (X3). Heat from solar collector to buffer can be controlled via P4 / V4.*




*S15*/ S16*: ECL Comfort 310 + ECA 32*
*P4 ( PWM): ECL Comfort 310 + ECA 35*

The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

No safety control function for too high temperature in the buffer!
External safety functions necessary!

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32 / 35* | *Built-in extension module, three 0-10V outputs and 6 sensor inputs (ECA 32) or three 0-10V outputs and four PWM outputs and 2 sensor inputs (ECA 35)* |
| *S1* | *Outdoor temperature sensor* |
| *S2* | *(mandatory) Supply temperature sensor* |
| *S3* | *(mandatory) Flow temperature sensor, master circuit* |
| *S4* | *DHW flow temperature sensor* |
| *S5* | *Solar panel temperature sensor, master circuit* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Buffer return temperature sensor* |
| *S8* | *(mandatory) Lower buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Flow temperature sensor, circuit 1* |
| *S11* | *Flow temperature sensor, circuit 2* |
| *S12* | *Return temperature sensor, master circuit* |
| *S15* | *Return temperature sensor, circuit 1 (ECA 32 only)* |
| *S16* | *Return temperature sensor, circuit 2 (ECA 32 only)* |

*List of components:*

| | |
|---|---|
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW temperature control pump* |
| *V1* | *Speed control of DHW temperature control pump (0 - 10 V or PWM)* |
| *P2* | *Buffer charging pump, master circuit* |
| *V2* | *Speed control of buffer charging pump (0 - 10 V or PWM), master circuit* |
| *P3* | *DHW circulation pump* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V or PWM)* |
| *P4* | *Circulation pump, solar circuit* |
| *V4* | *Speed control of circulation pump, solar circuit (PWM)* |
| *P5* | *Circulation pump, heating circuit 1* |
| *P7* | *Circulation pump, heating circuit 2* |
| *M1* | *Motorized control valve, master circuit (3-point controlled)* |
| *M2* | *Motorized control valve, heating circuit 1 (3-point controlled)* |
| *M3* | *Motorized control valve, heating circuit 2 (3-point controlled)* |
| *A1* | *Alarm* |
| *X1* | *Buffer charging active* |
| *X2* | *Anti-bacteria function active* |
| *X3* | *Change-over valve for return temp. control to buffer* |

**Temperature control of buffer:**

The desired DHW temperature at S4 determines the DHW charging procedure. The temperature sensors S2, S3, S6 and S8 are the most important sensors and must be connected.

The desired buffer temperature at S6 is based on the desired temperature at S4, S10, S11 and a set "Demand offset" (= Charging difference).

S4, S10 and S11 should also be connected, otherwise the circuit will not work — that means if S4 is missing then there will be no domestic hot water.
P4 / V4 has a modulating (PWM) and a relay (on/off) function.

Control of P2 / V2 charging pump operation time can be adjusted and therefore reduce flow and and thus extend charging time.

Start buffer charging process:

1. Buffer temperature S6 temperature gets lower than ('Desired DHW temperature' + 'Demand offset' + 'Start diff.').

   An example: 60 °C + 6 K + (-2 K) = 64 °C

2. P2 / V2 is commanded to start. P2 / V2 have free regulation within V2min and V2max. At the time (S6> Desired buffer temperature - (Start Diff./2), controller will start to reduce V2max and flow will be reduced. Lower flow limit on P2 / V2 is V2min setting.

   If S6 value will fall below "Desired buffer temperature - (Start diff./ 2)", controller will adjust output signal accordingly for P2 / V2 and will increase flow. How quickly pump will react can be adjusted via "Adapt. time" setting or can be turned off if needed.

3. M1 is commanded to open gradualy according to desired charging temperature.

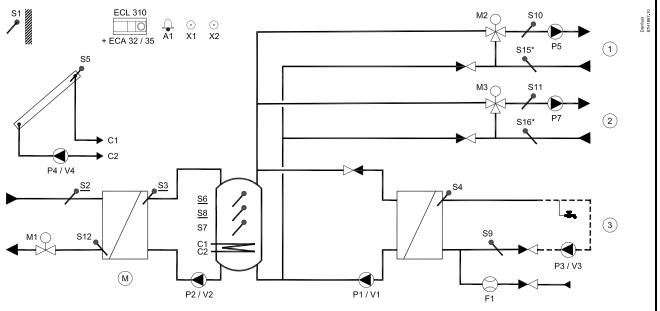
   Signal X1 switches on.

4. P4 is commanded to start via relay R4 or in modulation controlled via V4 according to solar panel temperature sensor S5.

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32 / 35* | *Built-in extension module, three 0-10V outputs and 6 sensor inputs (ECA 32) or three 0-10V outputs and four PWM outputs and 2 sensor inputs (ECA 35)* |
| *S1* | *Outdoor temperature sensor* |
| *S2* | *(mandatory) Supply temperature sensor* |
| *S3* | *(mandatory) Flow temperature sensor, master circuit* |
| *S4* | *DHW flow temperature sensor* |
| *S5* | *Solar panel temperature sensor, master circuit* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Lower buffer temperature sensor* |
| *S8* | *(mandatory) Mid buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Flow temperature sensor, circuit 1* |
| *S11* | *Flow temperature sensor, circuit 2* |
| *S12* | *Return temperature sensor, master circuit* |
| *S15* | *Return temperature sensor, circuit 1 (ECA 32 only)* |
| *S16* | *Return temperature sensor, circuit 2 (ECA 32 only)* |

***P348.2, ex. d**, master circuit M, heating circuits 1 and 2 and DHW circuit 3. Pumps P1, P2 and P3 can be 0 – 10 Volt or PWM controlled and P4 / V4 can be PWM controlled. Common return flow from radiator heating circuits is connected to buffer return. Heat from solar collector to buffer can be controlled via P4 / V4.*




*S15*/ S16*: ECL Comfort 310 + ECA 32*
*P4 ( PWM): ECL Comfort 310 + ECA 35*

The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

No safety control function for too high temperature in the buffer!
External safety functions necessary!

*List of components:*

| | |
|---|---|
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW temperature control pump* |
| *V1* | *Speed control of DHW temperature control pump (0 - 10 V or PWM)* |
| *P2* | *Buffer charging pump, master circuit* |
| *V2* | *Speed control of buffer charging pump (0 - 10 V or PWM), master circuit* |
| *P3* | *DHW circulation pump* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V or PWM)* |
| *P4* | *Circulation pump, solar circuit* |
| *V4* | *Speed control of circulation pump, solar circuit (PWM)* |
| *P5* | *Circulation pump, heating circuit 1* |
| *P7* | *Circulation pump, heating circuit 2* |
| *M1* | *Motorized control valve, master circuit (3-point controlled)* |
| *M2* | *Motorized control valve, heating circuit 1 (3-point controlled)* |
| *M3* | *Motorized control valve, heating circuit 2 (3-point controlled)* |
| *A1* | *Alarm* |
| *X1* | *Buffer charging active* |
| *X2* | *Anti-bacteria function active* |

Stop buffer charging process:

1. S6 and S8 connected and 'Stop diff.' has a **negative value**

   Buffer temperature S6 temperature gets higher than ('Desired temperature' + 'Demand offset').

   S6 and S8 connected and 'Stop diff.' has a **positive value:**

   Buffer temperature S6 temperature gets higher than ('Desired temperature' + 'Demand offset' + 'Stop diff.').

   An example: 60 °C + 6 K + 4 K = 70 °C

2. S6 and S8 connected and 'Stop diff.' has a **negative value or positive value:**

   Buffer temperature S6 temperature gets higher than ('Desired temperature' + 'Demand offset') **AND** S8 temperature gets higher than ('Desired DHW temperature' + 'Demand offset' + 'Stop diff.').

   An example: S6 higher than (60 °C + 6 K = 66 °C) **AND** S8 higher than (60 °C + 6 K + (8 K) = 74 °C).

3. M2 closes and P2 / V2 is decreased and stopped after period of overrun.
4. The solar application stops when the solar panel temperature at S5 gets lower than the chosen buffer temperature.

Solar function:

Solar circuit can be used for charging buffer tank.

Start condition:

Sx can be selected via parameter ID15327 and S6, S7, S8 can be selected.

1. S5 is higher than selected sensor Sx (parameter ID 15327) +dT +3K
2. Pump P4 will be switched ON
3. Pump V4 will be controlled to keep the temperature dT+3K between S5 and S8 temperature

Stop condition:

1. S5 is lower than Sx +3K
2. Pump P4 will we switched OFF. (Post run can be set for P4 in parameter ID 14040)
3. V4 and S5 reference point will be put to standby (- -) until next charging procedure

dT can be adjusted in parameter ID 15575.

Charging hysteresis 3K cannot be changed.

The solar application is not provided with any safety function for the solar circuit and must be installed as a separate safety application.

**P348.3**

This subtype for buffer control, heating temperature control and advanced DHW temperature control is very flexible, and it is prepared for different boiler types as source and connection of solar panels.
Master circuit M controls the buffer and solar circuit. DHW circuit 3, heating circuits 1 and 2 are supplied from buffer circuit.

Primary side before buffer is defined in examples below.

The heating circuit:

**P348.3, ex. a** shows hydraulic connection for older boilers to prevent condensing because of too low return temperature. M1 and P2 / V2 are preventing that the boiler will get too cold return water.

**P348.3, ex. b** shows hydraulic connection of a condensing boiler with external boiler circulation pump P2 / V2 and mixing valve M1 for determining buffer inlet connection.

**P348.3, ex. c** shows hydraulic connection of a condensing boiler with pump P 2 / V2 to prevent a rapid increase in the return temperature.

Boiler can be controlled indirectly through controlling pump P2 / V2 or with V2 signal. Boiler is controlled through analog signal V2, and it represents 2V for 20°C and 10V for 100°C for charge temperature on master circuit at S2. Pump P2 / V2 is activated when charging procedure for buffer starts. Pump is still active after charging of buffer is stopped and it will run for a set time.

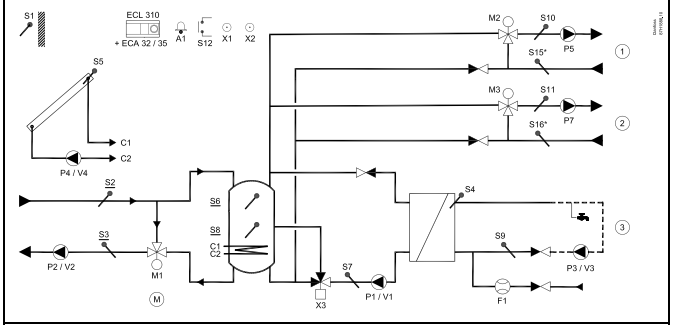
**Temperature control of each of the heating circuits:**

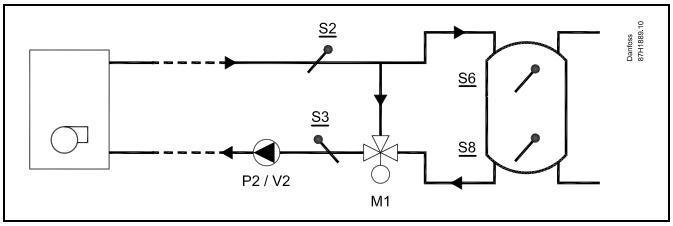
The flow temperature is adjusted according to your requirements.
The flow temperature sensors S10 / S11 are the most important sensors and must be connected for having control function.
Desired flow temperature at S10 / S11 is calculated in the ECL controller, based on the outdoor temperature S1 and the desired room temperature.
In general, the lower the outdoor temperature, the higher the desired flow temperature.
By means of a week schedule, a heating circuit can be in 'Comfort' or 'Saving' mode (two values for the desired room temperature). In Saving mode, the heating can be reduced or switched off totally.
The motorized control valves M2 / M3 are opened gradually when the flow temperature is lower than the desired flow temperature and vice versa.

If the measured room temperature (via ECA 30 / 31) does not equal the desired room temperature, the desired flow temperature can be adjusted to decrease or increase the flow temperature.
The circulation pumps P5 / P7 are ON at heat demand or at frost protection.
The heating can be switched OFF when the outdoor temperature is higher than a selectable value.
Supply temperature for each of the heating circuits is S6.
Return temperature sensors S15 and S16 are used for monitoring purpose only.

The frost protection mode maintains a selectable flow temperature, for example 10 °C.

***P348.3, ex. a**, master circuit M.*
*Pump P2 / V2 can be 0 – 10 Volt or PWM controlled. Heat from solar collector to buffer can be controlled via P4 / V4.*




The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

No safety control function for too high temperature in the buffer!
External safety functions necessary!

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32 / 35* | *Built-in extension module, three 0-10V outputs and 6 sensor inputs (ECA 32) or three 0-10V outputs and four PWM outputs and 2 sensor inputs (ECA 35)* |
| *S1* | *Outdoor temperature sensor* |
| *S2* | *(mandatory) Supply temperature sensor, master circuit* |
| *S3* | *(mandatory) Flow temperature sensor, master circuit* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S8* | *(mandatory) Lower buffer temperature sensor* |
| *P2* | *Buffer charging pump, master circuit* |
| *V2* | *Speed control of buffer charging pump (0 - 10 V or PWM), master circuit* |
| *M1* | *Motorized control valve, master circuit (3-point controlled)* |
| *A1* | *Alarm* |
| *X1* | *Buffer charging active* |
| *X2* | *Anti-bacteria function active* |

The heating circuits are the circuits 1 and 2. The primary master circuit can act as a master and via the ECL 485 communication bus fulfil the heat demand from additional slave circuits!

Exercise of circulation pump and control valve in periods without heating demand can be arranged.

The DHW (Domestic Hot Water) circuit:

**P348.3, ex. a, b and c** can run with the extension module ECA 32 (speed control by means of voltage signal of the pumps P1 / V1, P2 / V2 and P3 / V3)— or with the extension module ECA 35 for speed control (by means of voltage or PWM signal) and additional PWM signal for pump P4 / V4.

**Temperature control of buffer:**

The desired temperature at S4, S10 and S11 determines the buffer charging procedure. The temperature sensors S2, S3, S6 and S8 are the most important sensors and must be connected.
The desired buffer temperature at S6 is based on the desired temperature at S4, S10, S11 and a set "Demand offset" (= Charging difference). S4, S10 and S11 should also be connected, otherwise the circuit will not work — that means if S4 is missing then there will be no domestic hot water.

P4 / V4 has a modulating (PWM) and a relay (on/off) function.

M1 is controlling the buffer charging procedure depending on the S2 and S3 temperature. M1 is preventing to low return temperature when source is boiler. M1 also enables optimal utilization of the solar potential when available.

If S5 is higher than the limit then V2 (PWM) will be decreased. By this S3 will rise and M1 will close.

Start buffer charging process:

1. Buffer temperature S6 temperature gets lower than ('Desired temperature' + 'Demand offset' + 'Start diff.').

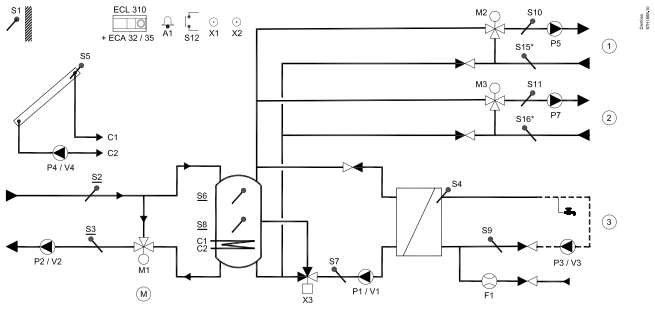
   An example: 60 °C + 6 K + (-2 K) = 64 °C

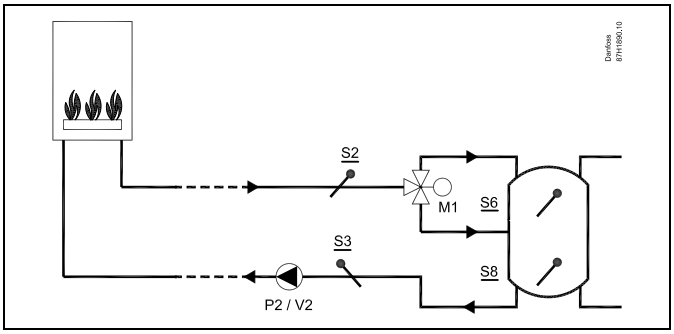
2. The buffer charging is active and the signal X1 switches on.

   P2 / V2 starts and M1 follows S6 to gradualy open or fully closed position.

3. P4 / V4 modulation controlled according to S5 temperature sensor.

***P348.3, ex. b,*** *master circuit M.*
*Pump P2 / V2 can be 0 – 10 Volt or PWM controlled. Heat from solar collector to buffer can be controlled via P4 / V4.*




The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32 / 35* | *Built-in extension module, three 0-10V outputs and 6 sensor inputs (ECA 32) or three 0-10V outputs and four PWM outputs and 2 sensor inputs (ECA 35)* |
| *S1* | *Outdoor temperature sensor* |
| *S2* | *(mandatory) Supply temperature sensor* |
| *S3* | *(mandatory) Flow temperature sensor, master circuit* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S8* | *(mandatory) Lower buffer temperature sensor* |
| *P2* | *Buffer charging pump, master circuit* |
| *V2* | *Speed control of buffer charging pump (0 - 10 V or PWM), master circuit* |
| *M1* | *Motorized control valve, master circuit (3-point controlled)* |
| *A1* | *Alarm* |
| *X1* | *Buffer charging active* |
| *X2* | *Anti-bacteria function active* |

Stop buffer charging process:

1. S6 and S8 connected and 'Stop diff.' has a **negative value**

   Buffer temperature S6 temperature gets higher than ('Desired temperature' + 'Demand offset').

   S6 and S8 connected and 'Stop diff.' has a **positive value:**

   Buffer temperature S6 temperature gets higher than ('Desired temperature' + 'Demand offset' + 'Stop diff.').

   An example: 60 °C + 6 K + 4 K = 70 °C

2. S6 and S8 connected and 'Stop diff.' has a **negative value or positive value:**

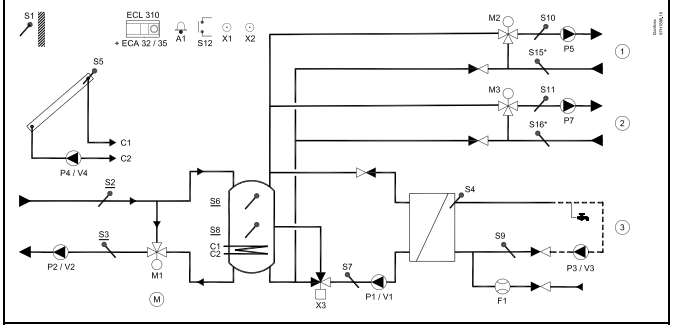
   Buffer temperature S6 temperature gets higher than ('Desired temperature' + 'Demand offset') **AND** S8 temperature gets higher than ('Desired DHW temperature' + 'Demand offset' + 'Stop diff.').

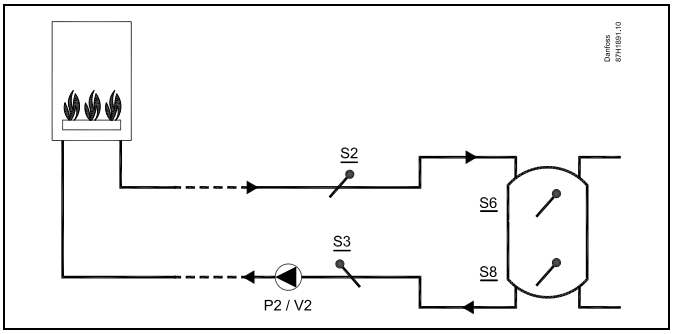
   An example: S6 higher than (60 °C + 6 K = 66 °C) **AND** S8 higher than (60 °C + 6 K + (8 K) = 74 °C).

3. M2 closes and P2 / V2 is decreased and stopped after period of overrun.

4. The solar application stops when the solar panel temperature at S5 gets lower than the chosen buffer temperature.

***P348.3, ex. c**, master circuit M.*
*Pump P2 / V2 can be 0 – 10 Volt or PWM controlled. Heat from solar collector to buffer can be controlled via P4 / V4.*




The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

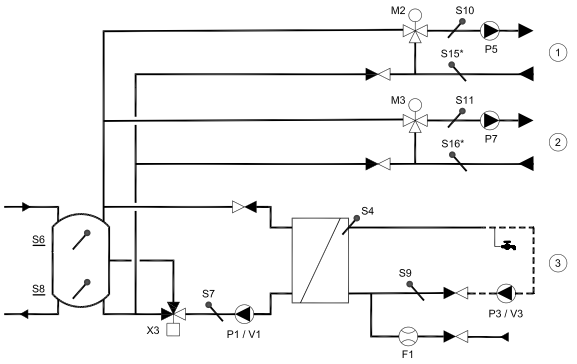
*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32 / 35* | *Built-in extension module, three 0-10V outputs and 6 sensor inputs (ECA 32) or three 0-10V outputs and four PWM outputs and 2 sensor inputs (ECA 35)* |
| *S1* | *Outdoor temperature sensor* |
| *S2* | *(mandatory) Supply temperature sensor* |
| *S3* | *(mandatory) Flow temperature sensor, master circuit* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S8* | *(mandatory) Lower buffer temperature sensor* |
| *P2* | *Buffer charging pump, master circuit* |
| *V2* | *Speed control of buffer charging pump (0 - 10 V or PWM), master circuit* |
| *A1* | *Alarm* |
| *X1* | *Buffer charging active* |
| *X2* | *Anti-bacteria function active* |

The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

***P348.3, ex. 1***
*Heating circuits 1 and 2 and DHW circuit 3.*
*Pumps P1 and P3 can be 0 – 10 Volt or PWM controlled. P4 can be PWM controlled.*
*Heat from solar collector to buffer can be controlled via P4 / V4.*



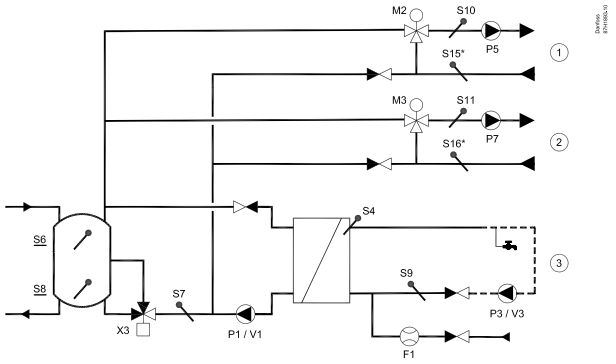

*S15*/ S16*: ECL Comfort 310 + ECA 32*
*P4 ( PWM): ECL Comfort 310 + ECA 35*

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32 / 35* | *Built-in extension module, three 0-10V outputs and 6 sensor inputs (ECA 32) or three 0-10V outputs and four PWM outputs and 2 sensor inputs (ECA 35)* |
| *S1* | *Outdoor temperature sensor* |
| *S4* | *DHW flow temperature sensor* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Lower buffer temperature sensor* |
| *S8* | *(mandatory) Lower buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Flow temperature sensor, circuit 1* |
| *S11* | *Flow temperature sensor, circuit 2* |
| *S15* | *Return temperature sensor, circuit 1 (ECA 32 only)* |
| *S16* | *Return temperature sensor, circuit 2 (ECA 32 only)* |
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW temperature control pump* |
| *V1* | *Speed control of DHW temperature control pump (0 - 10 V or PWM)* |
| *P3* | *DHW circulation pump* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V or PWM)* |
| *P4* | *Circulation pump, solar circuit* |
| *V4* | *Speed control of circulation pump, solar circuit (PWM)* |
| *P5* | *Circulation pump, heating circuit 1* |
| *P7* | *Circulation pump, heating circuit 2* |
| *M2* | *Motorized control valve, heating circuit 1 (3-point controlled)* |
| *M3* | *Motorized control valve, heating circuit 2 (3-point controlled)* |
| *A1* | *Alarm* |
| *X1* | *Buffer charging active* |
| *X2* | *Anti-bacteria function active* |
| *X3* | *Change-over valve for return temp. control to buffer* |

The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

***P348.3, ex. 2***
*Heating circuits 1 and 2 and DHW circuit 3.*
*Pumps P1, P2 and P3 can be 0 – 10 Volt or PWM controlled. P4 can be PWM controlled.*
*Heat from solar collector to buffer can be controlled via P4 / V4.*




*S15*/ S16*: ECL Comfort 310 + ECA 32*
*P4 ( PWM): ECL Comfort 310 + ECA 35*

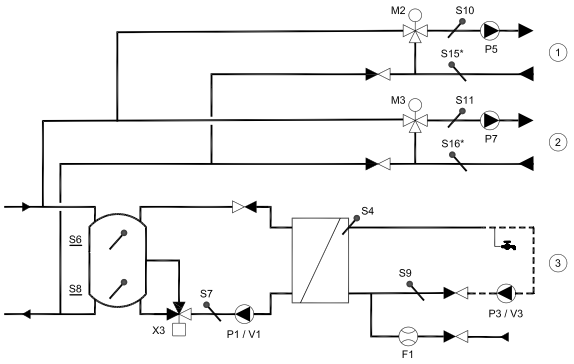
*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32 / 35* | *Built-in extension module, three 0-10V outputs and 6 sensor inputs (ECA 32) or three 0-10V outputs and four PWM outputs and 2 sensor inputs (ECA 35)* |
| *S1* | *Outdoor temperature sensor* |
| *S4* | *DHW flow temperature sensor* |
| *S5* | *Solar panel temperature sensor, master circuit* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Buffer return temperature sensor* |
| *S8* | *(mandatory) Lower buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Flow temperature sensor, circuit 1* |
| *S11* | *Flow temperature sensor, circuit 2* |
| *S15* | *Return temperature sensor, circuit 1 (ECA 32 only)* |
| *S16* | *Return temperature sensor, circuit 2 (ECA 32 only)* |
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW temperature control pump* |
| *V1* | *Speed control of DHW temperature control pump (0 - 10 V or PWM)* |
| *P3* | *DHW circulation pump* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V or PWM)* |
| *P4* | *Circulation pump, solar circuit* |
| *V4* | *Speed control of circulation pump, solar circuit (PWM)* |
| *P5* | *Circulation pump, heating circuit 1* |
| *P7* | *Circulation pump, heating circuit 2* |
| *M2* | *Motorized control valve, heating circuit 1 (3-point controlled)* |
| *M3* | *Motorized control valve, heating circuit 2 (3-point controlled)* |
| *A1* | *Alarm* |
| *X1* | *Buffer charging active* |
| *X2* | *Anti-bacteria function active* |
| *X3* | *Change-over valve for return temp. control to buffer* |

The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

***P348.3, ex. 3***
*Heating circuits 1 and 2 and DHW circuit 3.*
*Pumps P1, P2 and P3 can be 0 – 10 Volt or PWM controlled. P4 can be PWM controlled.*
*Heat from solar collector to buffer can be controlled via P4 / V4.*



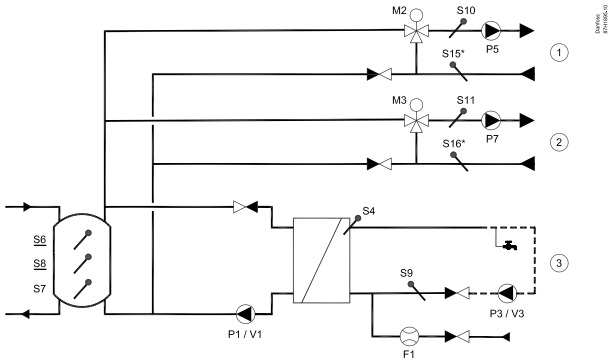

*S15*/ S16*: ECL Comfort 310 + ECA 32*
*P4 ( PWM): ECL Comfort 310 + ECA 35*

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32 / 35* | *Built-in extension module, three 0-10V outputs and 6 sensor inputs (ECA 32) or three 0-10V outputs and four PWM outputs and 2 sensor inputs (ECA 35)* |
| *S1* | *Outdoor temperature sensor* |
| *S4* | *DHW flow temperature sensor* |
| *S5* | *Solar panel temperature sensor, master circuit* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Buffer return temperature sensor* |
| *S8* | *(mandatory) Lower buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Flow temperature sensor, circuit 1* |
| *S11* | *Flow temperature sensor, circuit 2* |
| *S15* | *Return temperature sensor, circuit 1 (ECA 32 only)* |
| *S16* | *Return temperature sensor, circuit 2 (ECA 32 only)* |
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW temperature control pump* |
| *V1* | *Speed control of DHW temperature control pump (0 - 10 V or PWM)* |
| *P3* | *DHW circulation pump* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V or PWM)* |
| *P4* | *Circulation pump, solar circuit* |
| *V4* | *Speed control of circulation pump, solar circuit (PWM)* |
| *P5* | *Circulation pump, heating circuit 1* |
| *P7* | *Circulation pump, heating circuit 2* |
| *M2* | *Motorized control valve, heating circuit 1 (3-point controlled)* |
| *M3* | *Motorized control valve, heating circuit 2 (3-point controlled)* |
| *A1* | *Alarm* |
| *X1* | *Buffer charging active* |
| *X2* | *Anti-bacteria function active* |
| *X3* | *Change-over valve for return temp. control to buffer* |

The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

***P348.3, ex. 4***
*Heating circuits 1 and 2 and DHW circuit 3.*
*Pumps P1, P2 and P3 can be 0 – 10 Volt or PWM controlled. P4 can be PWM controlled.*
*Heat from solar collector to buffer can be controlled via P4 / V4.*




*S15*/ S16*: ECL Comfort 310 + ECA 32*
*P4 ( PWM): ECL Comfort 310 + ECA 35*

*List of components:*

| | |
|---|---|
| *ECL 310* | *ECL Comfort 310 controller* |
| *ECA 32 / 35* | *Built-in extension module, three 0-10V outputs and 6 sensor inputs (ECA 32) or three 0-10V outputs and four PWM outputs and 2 sensor inputs (ECA 35)* |
| *S1* | *Outdoor temperature sensor* |
| *S4* | *DHW flow temperature sensor* |
| *S5* | *Solar panel temperature sensor, master circuit* |
| *S6* | *(mandatory) Upper buffer temperature sensor* |
| *S7* | *Lower buffer temperature sensor* |
| *S8* | *(mandatory) Mid buffer temperature sensor* |
| *S9* | *DHW circulation return temperature sensor* |
| *S10* | *Flow temperature sensor, circuit 1* |
| *S11* | *Flow temperature sensor, circuit 2* |
| *S15* | *Return temperature sensor, circuit 1 (ECA 32 only)* |
| *S16* | *Return temperature sensor, circuit 2 (ECA 32 only)* |
| *F1* | *Flow meter (signal type: Pulse)* |
| *P1* | *DHW temperature control pump* |
| *V1* | *Speed control of DHW temperature control pump (0 - 10 V or PWM)* |
| *P3* | *DHW circulation pump* |
| *V3* | *Speed control of DHW circulation pump (0 - 10 V or PWM)* |
| *P4* | *Circulation pump, solar circuit* |
| *V4* | *Speed control of circulation pump, solar circuit (PWM)* |
| *P5* | *Circulation pump, heating circuit 1* |
| *P7* | *Circulation pump, heating circuit 2* |
| *M2* | *Motorized control valve, heating circuit 1 (3-point controlled)* |
| *M3* | *Motorized control valve, heating circuit 2 (3-point controlled)* |
| *A1* | *Alarm* |
| *X1* | *Buffer charging active* |
| *X2* | *Anti-bacteria function active* |

**P348, in general**

Up to two Remote Control Units, ECA 30 / 31, can be connected to one ECL controller in order to control the ECL controller remotely.

Additional ECL Comfort controllers can be connected via the ECL 485 bus in order to utilize common outdoor temperature signal, time and date signals.
The ECL controllers in the ECL 485 system can work in master - slave system.

When connecting an override switch or a relay contact to an unused input the ECL 310's schedule can be overridden to:

- Comfort mode
- Saving mode
- Frost protection mode or
- Constant temperature mode (keeping a set desired flow temperature).

Modbus communication to a SCADA system can be established.

Heat-meters:
Up to 5 heat-meters can be connected to the M-bus terminals. M-bus data can be transferred to the SCADA system via Modbus and TCP / IP to the ECL Portal.

Alarm A1 (= relay 6) can be activated if:

- The actual flow temperature differs from the desired flow temperature.
- If a temperature sensor or its connection disconnects / short circuits. (See: Common controller settings > System > Raw input overview).

A measured temperature can be offset adjusted, if needed.

**PWM (Pulse Width Modulation)**
A 200 Hz frequency is applied to the PWM controlled pump. The duty cycle (the percentage of the period time) determines the pump speed.

**Pump speed, PWM or 0 – 10 Volt controlled**
Some types of speed controlled pumps are limited to a minimum speed, for example 30 % (PWM or 3.0 Volt). Even if the applied control % gets lower than 30 %, the pump speed remains on the minimum level *.
Furthermore, when the applied control % gets below, for example, 10 %, the pump switches OFF. In order to get the pump switched ON again, the applied control % must exceed 20 %.

This behavior can, at low load or a too big pump, cause unstable temperature regulation. To avoid this, the P348 has a function where the applied control signal is converted into a pulsed signal. The pump is shortly stopped and then started again. The result is a pump speed control also below the minimum speed level.
The parameters "PWM period" (ID 12565) and "Adapt time" (ID 12065) are used for this functionality.

*) See the pump manufacturer's data sheet

**Commissioning**
When the P348 application has been uploaded the ECL Comfort 310 controller starts in Manual mode. This can be used to verify correct connections of temperature, pressure and flow sensors. Also verifying the controlled components for correct functionality can be done.

Depending on system type, it might be necessary to change some factory settings individually in order to optimize the functionality.

The application key must be inserted in order to change settings.

**Important:**

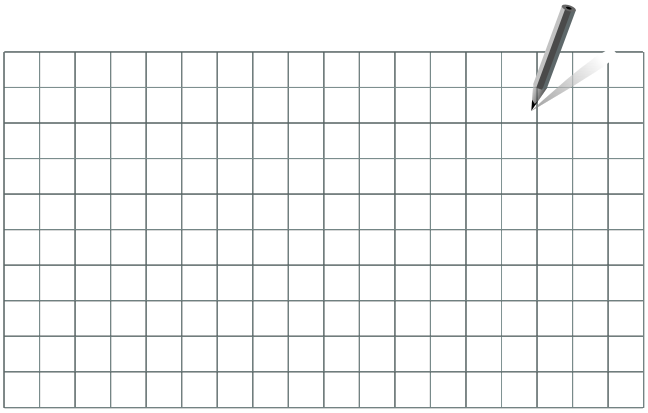
- Set the correct running time "M run" of the Motorized Control Valve M2. (Circuit 1 > MENU > Settings > Control parameters > M run).
- Set a minimum speed of P1 / V1 and ensure that the pump runs constantly. (Circuit 2 > MENU > Settings > Control par. 1 > V out min.). See pump manufacturer's manual.
- Verify if the speed controlled pumps should be reversed controlled. (Circuit 2 / 3 > MENU > Settings > Control par. > Reverse out). See pump manufacturer's manual.



The controller is pre-programmed with factory settings that are shown in the 'Parameter ID overview' appendix.

## 2.2 Identifying the system type

**Sketch your application**



The ECL Comfort controller series is designed for a wide range of heating, domestic hot-water (DHW) and cooling systems with different configurations and capacities. If your system differs from the diagrams shown here, you may want to make a sketch of the system about to be installed. This makes it easier to use the Operating Guide, which will guide you step-by-step from installation to final adjustments before the end-user takes over.

The ECL Comfort controller is a universal controller that can be used for various systems. Based on the shown standard systems, it is possible to configure additional systems. In this chapter you find the most frequently used systems. If your system is not quite as shown below, find the diagram which has the best resemblance with your system and make your own combinations.

See the Installation Guide (delivered with the application key) for application types / sub-types.

## 2.3 Mounting

### 2.3.1 Mounting the ECL Comfort controller

See the Installation Guide which is delivered together with the ECL Comfort controller.

For easy access, you should mount the ECL Comfort controller near the system.

ECL Comfort 210 / 296 / 310 can be mounted

- on a wall
- on a DIN rail (35 mm)

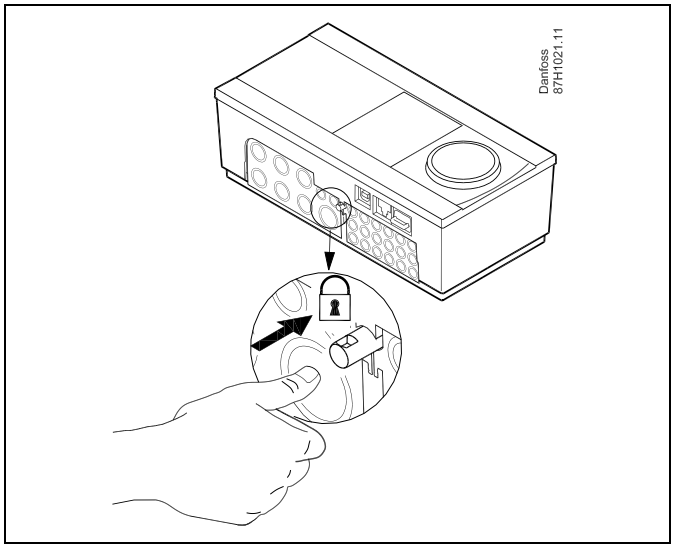
ECL Comfort 296 can be mounted

- in a panel cut-out

ECL Comfort 210 can be mounted in an ECL Comfort 310 base part (for future upgrade).

Screws, PG cable glands and rawlplugs are not supplied.

**Locking the ECL Comfort 210 / 310 controller**
In order to fasten the ECL Comfort controller to its base part, secure the controller with the locking pin.




⚠

To prevent injuries to persons or the controller, the controller has to be securely locked into the base. For this purpose, press the locking pin into the base until a click is heard and the controller no longer can be removed from the base.

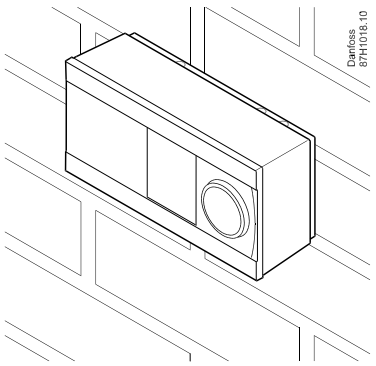
⚠

If the controller is not securely locked into the base part, there is a risk that the controller during operation can unlock from the base and the base with terminals (and also the 230 V a.c. connections) are exposed. To prevent injuries to persons, always make sure that the controller is securely locked into its base. If this is not the case, the controller should not be operated!

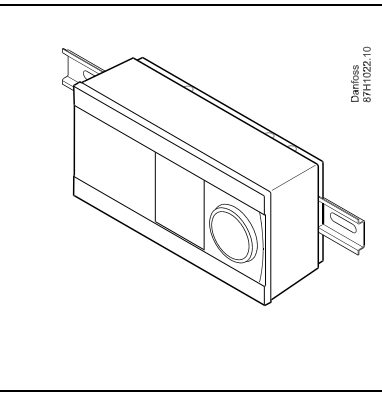
⚠

The easy way to lock the controller to its base or unlock it is to use a screw driver as lever.

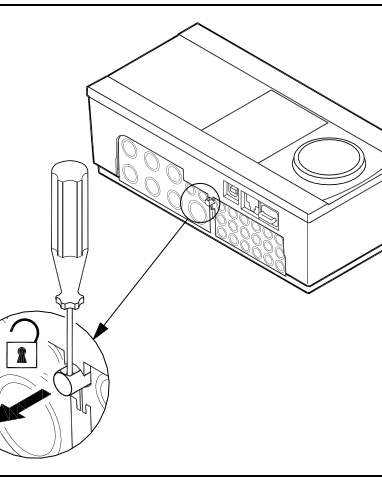
**Mounting on a wall**
Mount the base part on a wall with a smooth surface. Establish the electrical connections and position the controller in the base part. Secure the controller with the locking pin.




**Mounting on a DIN rail (35 mm)**
Mount the base part on a DIN rail. Establish the electrical connections and position the controller in the base part. Secure the controller with the locking pin.




**Dismounting the ECL Comfort controller**
In order to remove the controller from the base part, pull out the locking pin by means of a screwdriver. The controller can now be removed from the base part.




⚠

The easy way to lock the controller to its base or unlock it is to use a screw driver as lever.

⚠

Before removing the ECL Comfort controller from the base part, ensure that the supply voltage is disconnected.

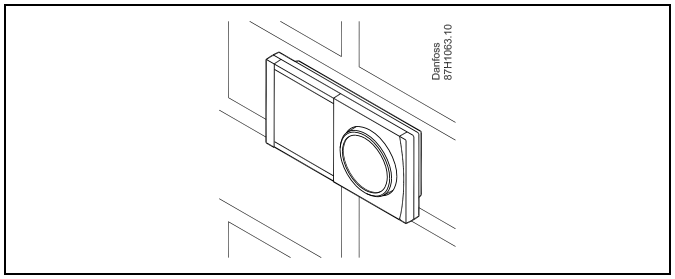
### 2.3.2 Mounting the Remote Control Units ECA 30 / 31

Select one of the following methods:

- Mounting on a wall, ECA 30 / 31
- Mounting in a panel, ECA 30

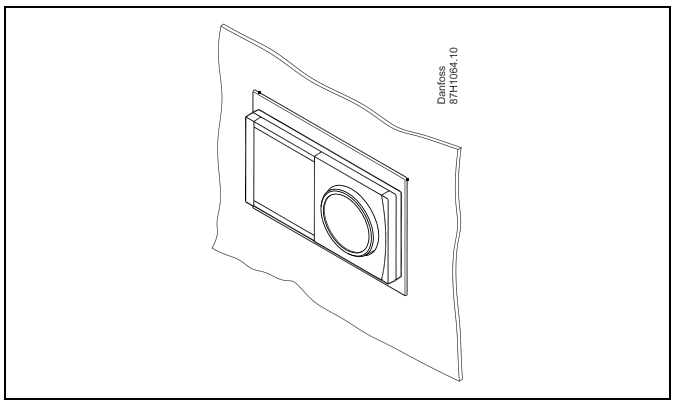
Screws and rawlplugs are not supplied.

**Mounting on a wall**
Mount the base part of the ECA 30 / 31 on a wall with a smooth surface. Establish the electrical connections. Place the ECA 30 / 31 in the base part.



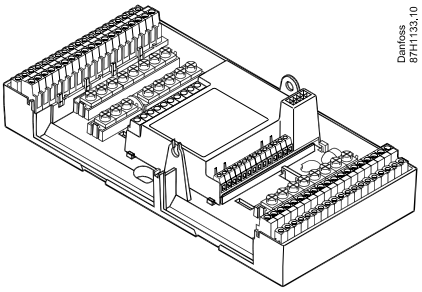

**Mounting in a panel**
Mount the ECA 30 in a panel using the ECA 30 frame kit (order code no. 087H3236). Establish the electrical connections. Secure the frame with the clamp. Place the ECA 30 in the base part. The ECA 30 can be connected to an external room temperature sensor.

The ECA 31 must not be mounted in a panel if the humidity function is to be used.

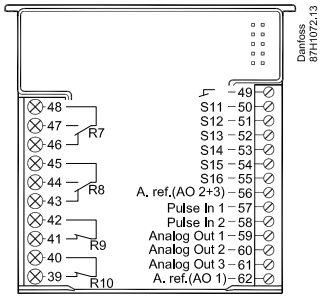


### 2.3.3 Mounting the internal I/O module ECA 32 or ECA 35

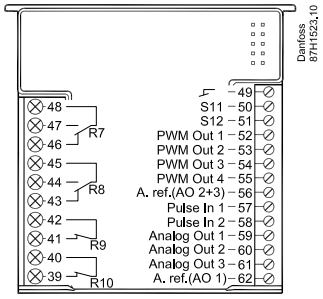
The ECA 32 module (order code no. 087H3202) or ECA 35 module (order code no. 087H3205) can be inserted into the ECL Comfort 310 / 310B base part for additional input and output signals in relevant applications.




**ECA 32**




**ECA 35**



## 2.4 Placing the temperature sensors

### 2.4.1 Placing the temperature sensors

It is important that the sensors are mounted in the correct position in your system.

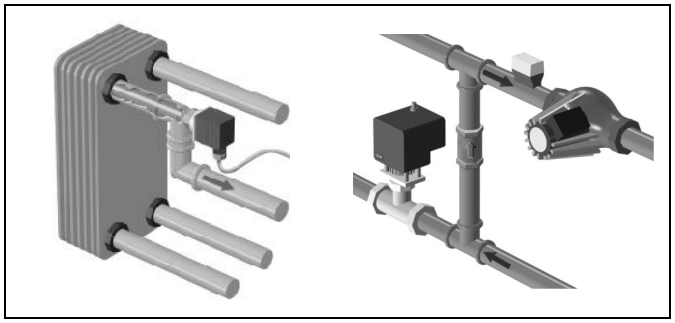
The temperature sensor mentioned below are sensors used for the ECL Comfort 210 / 296 / 310 series which not all will be needed for your application!

**Outdoor temperature sensor (ESMT)**
The outdoor sensor should be mounted on that side of the building where it is less likely to be exposed to direct sunshine. It should not be placed close to doors, windows or air outlets.

**Flow temperature sensor (ESMU, ESM-11 or ESMC)**
Place the sensor max. 15 cm from the mixing point. In systems with heat exchanger, Danfoss recommends that the ESMU-type to be inserted into the exchanger flow outlet.

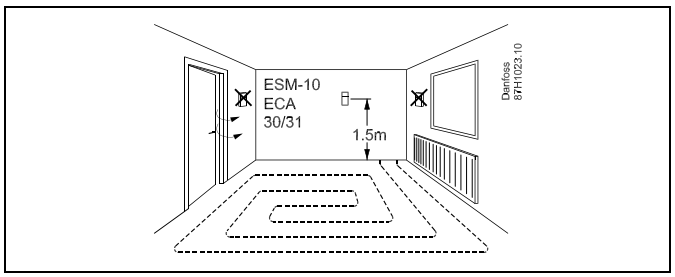
Make sure that the surface of the pipe is clean and even where the sensor is mounted.

**Return temperature sensor (ESMU, ESM-11 or ESMC)**
The return temperature sensor should always be placed so that it measures a representative return temperature.



**Room temperature sensor**
**(ESM-10, ECA 30 / 31 Remote Control Unit)**

Place the room sensor in the room where the temperature is to be controlled. Do not place it on outside walls or close to radiators, windows or doors.




**Boiler temperature sensor (ESMU, ESM-11 or ESMC)**
Place the sensor according to the boiler manufacturer's specification.

**Air duct temperature sensor (ESMB-12 or ESMU types)**
Place the sensor so that it measures a representative temperature.

**DHW temperature sensor (ESMU or ESMB-12)**
Place the DHW temperature sensor according to the manufacturer's specification.

**Slab temperature sensor (ESMB-12)**
Place the sensor in a protection tube in the slab.

ESM-11: Do not move the sensor after it has been fastened in order to avoid damage to the sensor element.

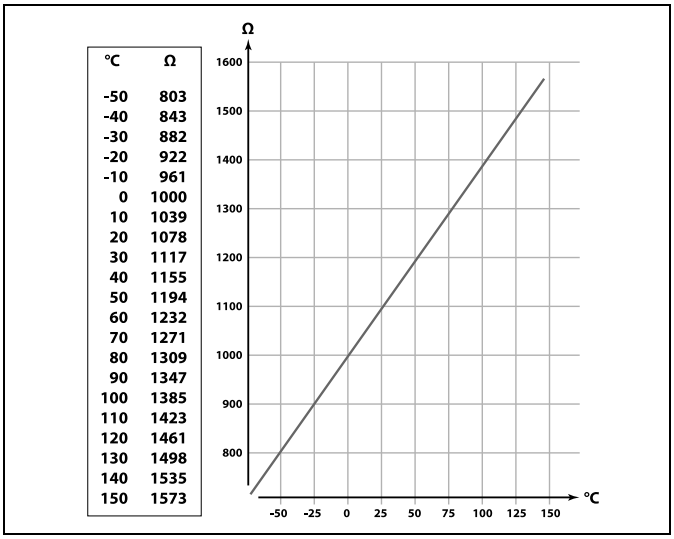
ESM-11, ESMC and ESMB-12: Use heat conducting paste for quick measurement of the temperature.

ESMU and ESMB-12: Using a sensor pocket to protect the sensor will, however, result in a slower temperature measurement.

**Pt 1000 temperature sensor (IEC 751B, 1000 Ω / 0 °C)**

**Relationship between temperature and ohmic value:**

| °C | Ω |
|---|---|
| -50 | 803 |
| -40 | 843 |
| -30 | 882 |
| -20 | 922 |
| -10 | 961 |
| 0 | 1000 |
| 10 | 1039 |
| 20 | 1078 |
| 30 | 1117 |
| 40 | 1155 |
| 50 | 1194 |
| 60 | 1232 |
| 70 | 1271 |
| 80 | 1309 |
| 90 | 1347 |
| 100 | 1385 |
| 110 | 1423 |
| 120 | 1461 |
| 130 | 1498 |
| 140 | 1535 |
| 150 | 1573 |



## 2.5 Electrical connections

### 2.5.1 Electrical connections 230 V a.c.

**Safety Note**
Necessary assembly, start-up, and maintenance work must be performed by qualified and authorized personnel only.

Local legislations must be respected. This comprises also cable size and isolation (reinforced type).

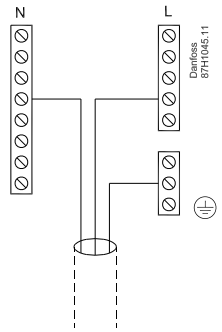
A fuse for the ECL Comfort installation is max. 10 A typically.

The ambient temperature range for the ECL Comfort in operation is 0 - 55 °C. Exceeding this temperature range can result in malfunctions.

Installation must be avoided if there is a risk for condensation (dew).

The common ground terminal is used for connection of relevant components (pumps, motorized control valves).

ECL 210 / 310




See also the Installation Guide (delivered with the application key) for application specific connections.

Wire cross section: 0.5 - 1.5 mm²
Incorrect connection can damage the electronic outputs.
Max. 2 x 1.5 mm² wires can be inserted into each screw terminal.

**Maximum load ratings:**

| | | |
|---|---|---|
| R<br>R | Relay terminals | 4 (2) A / 230 V a.c.<br>(4 A for ohmic load, 2 A for inductive load) |
| Tr | Triac (= electronic relay) terminals | 0,2 A / 230 V a.c. |

**Electrical connections, ECA 32 / ECA 35**

**Connections, in general.**

See also the Installation Guide (delivered with the application key) for application specific connections.

Maximum load ratings:

| Terminals | | |
|---|---|---|
| **ECA 32** | **ECA 35** | |
| | PWM Out 1 (52) | 5 kΩ * |
| | PWM Out 2 (53) | 5 kΩ * |
| | PWM Out 3 (54) | 5 kΩ * |
| | PWM Out 4 (55) | 5 kΩ * |
| | | |
| Analog Out 1 (59) | Analog Out 1 (59) | 47 kΩ * |
| Analog Out 2 (60) | Analog Out 2 (60) | 47 kΩ * |
| Analog Out 3 (61) | Analog Out 3 (61) | 47 kΩ * |
| * The value is a minimum. | | |

### 2.5.2 Electrical connections, Pt 1000 temperature sensors

See the Installation Guide (delivered with the application key) for sensor and input connections.

**P348**

| Sensor | Description | Recommended type |
|---|---|---|
| S1 | Outdoor temperaure sensor | ESMT |
| S2 | Supply temperature sensor | ESM-11 / ESMB / ESMC / ESMU |
| S3 | Flow temperature sensor (heating) * | ESM-11 / ESMB / ESMC / ESMU |
| S4 | Flow temperature sensor (DHW) * | ESMB / ESMU |
| S5 | Return temperature sensor (heating) | ESM-11 / ESMB / ESMC / ESMU |
| S6 | Upper buffer-tank temperature sensor * | ESMB / ESMU |
| S7 | Buffer-tank flow temperature sensor | ESM-11 / ESMB / ESMC / ESMU |
| S8 | Lower buffer-tank temperature sensor | ESMB / ESMU |
| S9 | DHW circulation temperature sensor | ESM-11 / ESMB / ESMC / ESMU |
| S10 | Buffer-tank return temperature sensor | ESM-11 / ESMB / ESMC / ESMU |

Temperature sensors must be connected in order to have the desired functionality.

* If the sensor is not connected or the sensor cable is short-circuited, the motorized control valve or control pump closes / stops (safety function).

**ECA 32**

| Sensor | Description | Recommended type |
|---|---|---|
| S11 | Return temperature sensor, heating circuit A | ESM-11 / ESMB / ESMC / ESMU |
| S12 | Return temperature sensor, heating circuit B | ESM-11 / ESMB / ESMC / ESMU |
| S13 | Not used | |
| S14 | Not used | |
| S15 | Supply return pressure sensor | |
| S16 | Supply return pressure sensor | |

Temperature sensors must be connected in order to have the desired functionality.

**ECA 35**

| Sensor | Description | Recommended type |
|---|---|---|
| S11 | Return temperature sensor, heating circuit A | ESM-11 / ESMB / ESMC / ESMU |
| S12 | Return temperature sensor, heating circuit B | ESM-11 / ESMB / ESMC / ESMU |

Temperature sensors must be connected in order to have the desired functionality.

Wire cross section for sensor connections: Min. 0.4 $mm^2$.
Total cable length: Max. 200 m (all sensors incl. internal ECL 485 communication bus).
Cable lengths of more than 200 m may cause noise sensibility (EMC).

### 2.5.3 Electrical connections, ECA 30 / 31

| Terminal ECL | Terminal ECA 30 / 31 | Description | Type (recomm.) |
|---|---|---|---|
| 30 | 4 | Twisted pair | Cable 2 x twisted pair |
| 31 | 1 | | |
| 32 | 2 | Twisted pair | |
| 33 | 3 | | |
| | 4 | Ext. room temperature sensor* | ESM-10 |
| | 5 | | |

* After an external room temperature sensor has been connected, ECA 30 / 31 must be repowered.

The communication to the ECA 30 / 31 must be set up in the ECL Comfort controller in 'ECA addr.'

The ECA 30 / 31 must be set up accordingly.

After application setup the ECA 30 / 31 is ready after 2–5 min. A progress bar in the ECA 30 / 31 is displayed.

If the actual application contains two heating circuits, it is possible to connect an ECA 30 / 31 to each circuit. The electrical connections are done in parallel.

Max. 2 ECA 30 / 31 can be connected to an ECL Comfort 310 controller or to ECL Comfort 210 / 296 / 310 controllers in a master-slave system.

Setup procedures for ECA 30 / 31: See section 'Miscellaneous'.

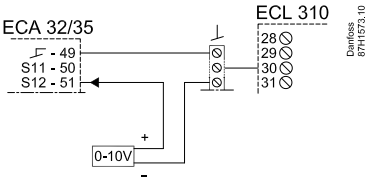
ECA information message:
'Application req. newer ECA':
The software (firmware) of your ECA does not comply with the software (firmware) of your ECL Comfort controller. Please contact your Danfoss sales office.

Some applications do not contain functions related to actual room temperature. The connected ECA 30 / 31 will only function as remote control.

Total cable length: Max. 200 m (all sensors incl. internal ECL 485 communication bus).
Cable lengths of more than 200 m may cause noise sensibility (EMC).

**ECA 32 / 35**
**S12**

Connection of voltage signal (0–10 V) for external control of desired DHW temperature.
The applied voltage must, as a minimum, be 1 Volt.



### 2.5.4 Electrical connections, master / slave systems

The controller can be used as master or slave in master / slave systems via the internal ECL 485 communication bus (2 x twisted pair cable).

The ECL 485 communication bus is not compatible with the ECL bus in ECL Comfort 110, 200, 300 and 301!

| Terminal | Description | Type (recomm.) |
|---|---|---|
| 30 | Common terminal | Cable 2 x twisted pair |
| 31 | +12 V*, ECL 485 communication bus<br>* Only for ECA 30 / 31 and master / slave communication | |
| 32 | B, ECL 485 communication bus | |
| 33 | A, ECL 485 communication bus | |

Total cable length: Max. 200 m (all sensors incl. internal ECL 485 communication bus).
Cable lengths of more than 200 m may cause noise sensibility (EMC).

### 2.5.5 Electrical connections, communication

**Electrical connections, Modbus**

ECL Comfort 210: Non-galvanic isolated Modbus connections
ECL Comfort 296: Galvanic isolated Modbus connections
ECL Comfort 310: Galvanic isolated Modbus connections

### 2.5.6 Electrical connections, communication

**Electrical connections, M-bus**

ECL Comfort 210: Not implemented
ECL Comfort 296: On board, non-galvanic isolated. Max. cable length 50 m.
ECL Comfort 310: On board, non-galvanic isolated. Max. cable length 50 m.

## 2.6 Inserting the ECL Application Key

### 2.6.1 Inserting the ECL Application Key

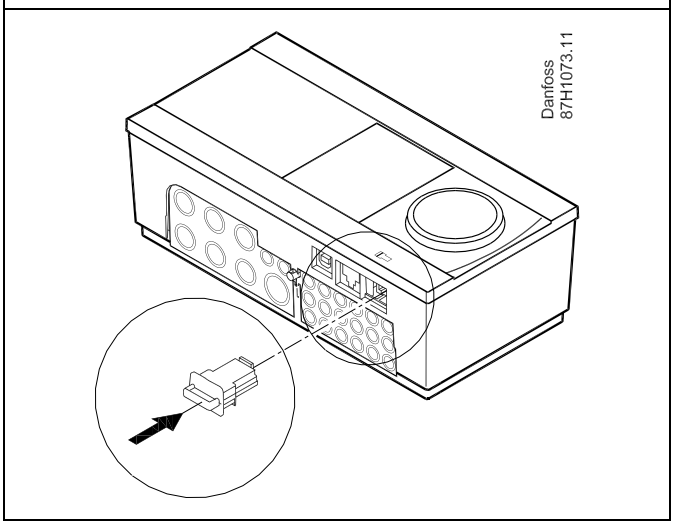
The ECL Application Key contains

- the application and its subtypes,
- currently available languages,
- factory settings: e.g. schedules, desired temperatures, limitation values etc. It is always possible to recover the factory settings,
- memory for user settings: special user / system settings.

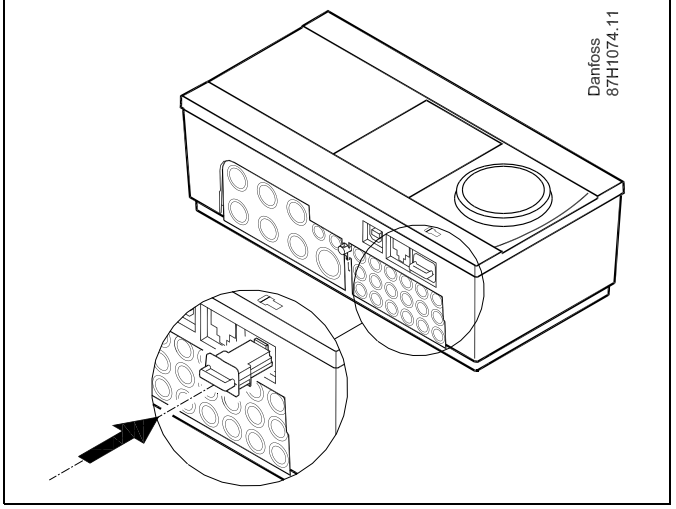
After having powered-up the controller, different situations might be existing:

1. The controller is new from the factory, the ECL Application Key is not inserted.
2. The controller already runs an application. The ECL Application Key is inserted, but the application needs to be changed.
3. A copy of the controllers settings is needed for configuring another controller.

ECL Comfort 210 / 310




ECL Comfort 210 / 310



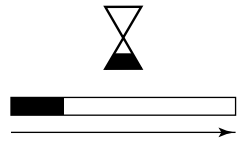

User settings are, among others, desired room temperature, desired DHW temperature, schedules, heat curve, limitation values etc.

System settings are, among others, communication set-up, display brightness etc.

**Automatic update of controller software (firmware)**:
The software of the controller is updated automatically when the key is inserted:

- ECL 210 / 310, as of controller version 1.11
- ECL 296, as of controller version 1.58

The following animation will be shown when the software is being updated:



*Progress bar*

During update:

- Do not remove the KEY
  If the key is removed before the hour-glass is shown, you have to start afresh.
- Do not disconnect the power
  If the power is interrupted when the hour-glass is shown, the controller will not work.
- Manual update of controller software (firmware):
  See the section "Automatic / manual update of firmware"

The “Key overview” does not inform — through ECA 30 / 31 — about the subtypes of the application key.

**Key inserted / not inserted, description:**

ECL Comfort 210 / 310, controller versions lower than 1.36:

- Take out the application key; for 20 minutes settings can be changed.
- Power up the controller **without** the application key inserted; for 20 minutes settings can be changed.

ECL Comfort 210 / 310, controller versions 1.36 and up:

- Take out the application key; for 20 minutes settings can be changed.
- Power up the controller **without** the application key inserted; settings cannot be changed.

ECL Comfort 296, controller versions 1.58 and up:

- Take out the application key; for 20 minutes settings can be changed.
- Power up the controller **without** the application key inserted; settings cannot be changed.

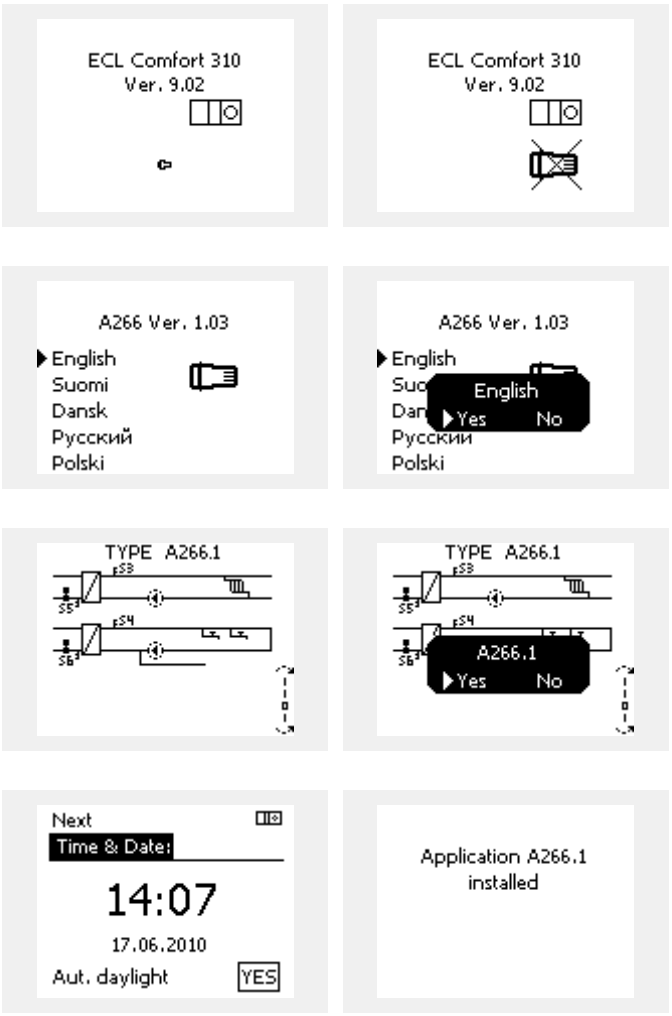
**Application Key: Situation 1**
**The controller is new from the factory, the ECL Application Key is not inserted.**

An animation for the ECL Application Key insertion is displayed. Insert the Application Key .

Application Key name and Version is indicated (example: A266 Ver. 1.03).

If the ECL Application Key is not suitable for the controller, a "cross" is displayed over the ECL Application Key-symbol.

| Action: | Purpose: | Examples: |
|---|---|---|
| | Select language | |
| | Confirm | |
| | Select application (subtype)<br>Some keys have only one application. | |
| | Confirm with 'Yes' | |
| | Set 'Time & Date'<br>Turn and push the dial to select and change 'Hours', 'Minutes', 'Date', 'Month' and 'Year'.<br>Choose "Next" | |
| | Confirm with 'Yes' | |
| | Go to 'Aut. daylight' | |
| | Choose whether 'Aut. daylight´ * should be active or not | YES or NO |




* 'Aut. daylight' is the automatic changeover between summer and winter time.

Depending on the contents of the ECL Application Key, procedure A or B is taking place:

**A**
**The ECL Application key contains factory settings:**
The controller reads / transfers data from the ECL Application Key to ECL controller.

The application is installed, and the controller resets and starts up.

**B**
**The ECL Application key contains changed system settings**:
Push the dial repeatedly.

'NO': Only factory settings from the ECL Application Key will be copied to the controller.
'YES*: Special system settings (differing from the factory settings) will be copied to the controller.

**If the key contains user settings:**
Push the dial repeatedly.

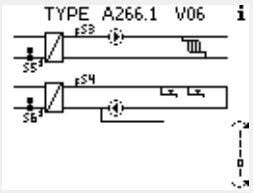
'NO: Only factory settings from the ECL Application Key will be copied to the controller.
'YES*: Special user settings (differing from the factory settings) will be copied to the controller.

* If 'YES' cannot be chosen, the ECL Application Key does not contain any special settings.

Choose 'Start copying' and confirm with 'Yes'.

**(Example):**

The "**i**" in the upper right corner indicates that - besides the factory settings - the subtype also contains special user / systems settings.

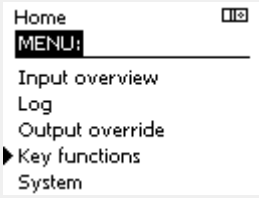



**Application Key: Situation 2**
**The controller already runs an application. The ECL Application Key is inserted, but the application needs to be changed.**

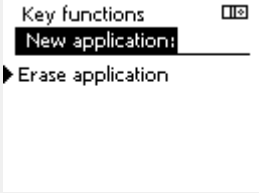
To change to another application on the ECL Application Key, the current application in the controller must be erased (deleted).

Be aware that the Application Key must be inserted.

| Action: | Purpose: | Examples: |
|---|---|---|
| | Choose 'MENU' in any circuit | MENU |
| | Confirm | |
| | Choose the circuit selector at the top right corner in the display | |
| | Confirm | |
| | Choose 'Common controller settings' | |
| | Confirm | |
| | Choose 'Key functions' | |
| | Confirm | |
| | Choose 'Erase application' | |
| | Confirm with 'Yes' | |









The controller resets and is ready to be configured.

Follow the procedure described in situation 1.

**Application Key: Situation 3**
**A copy of the controllers settings is needed for configuring another controller.**

This function is used

- for saving (backup) of special user and system settings
- when another ECL Comfort controller of the same type (210, 296, or 310) must be configured with the same application but user / system settings differ from the factory settings.

How to copy to another ECL Comfort controller:

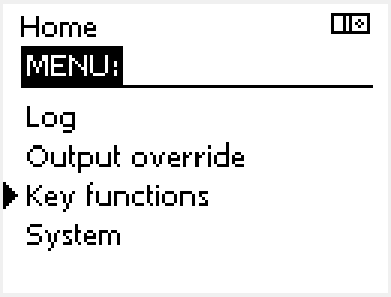
| Action: | Purpose: | Examples: |
|---|---|---|
| | Choose 'MENU' | MENU |
| | Confirm | |
| | Choose the circuit selector at the top right corner in the display | |
| | Confirm | |
| | Choose 'Common controller settings' | |
| | Confirm | |
| | Go to 'Key functions' | |
| | Confirm | |
| | Choose 'Copy' | |
| | Confirm | |
| | Choose 'To'.<br>'ECL' or 'KEY' will be indicated. Choose 'ECL' or KEY' | *<br>'ECL' or 'KEY'. |
| | Push the dial repeatedly to choose copy direction | |
| | Choose 'System settings' or 'User settings' | **<br>'NO' or 'YES' |
| | Push the dial repeatedly to choose 'Yes' or 'No' in 'Copy'. Push to confirm. | |
| | Choose 'Start copying' | |
| | The Application Key or the controller is updated with special system or user settings. | |

*

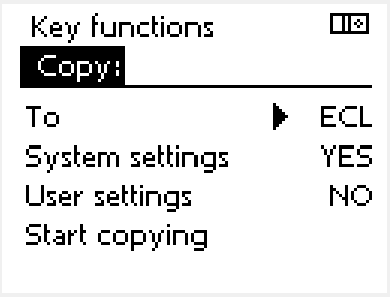
'ECL': Data will be copied from the Application Key to the ECL Controller.
'KEY': Data will be copied from the ECL Controller to the Application Key.

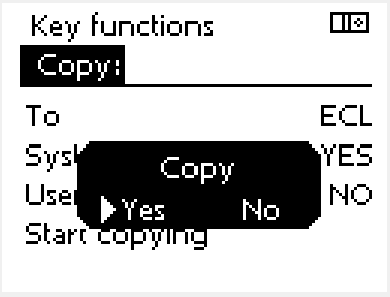
**

'NO': The settings from the ECL controller will not be copied to the Application Key or to the ECL Comfort controller.
'YES': Special settings (differing from the factory settings) will be copied to the Application Key or to the ECL Comfort controller. If YES can not be chosen, there are no special settings to be copied.







### 2.6.2 ECL Application Key, copying data

**General principles**
When the controller is connected and operating, you can check and adjust all or some of the basic settings. The new settings can be stored on the Key.

**How to update the ECL Application Key after settings have been changed?**
All new settings can be stored on the ECL Application Key.

**How to store factory setting in the controller from the Application Key?**
Please read the paragraph concerning Application Key, Situation 1: The controller is new from the factory, the ECL Application Key is not inserted.

**How to store personal settings from the controller to the Key?**
Please read the paragraph concerning Application Key, Situation 3: A copy of the controllers settings is needed for configuring another controller

As a main rule, the ECL Application Key should always remain in the controller. If the Key is removed, it is not possible to change settings.

Factory settings can always be restored.

Make a note of new settings in the 'Settings overview' table.

Do not remove the ECL Application Key while copying. The data on the ECL Application Key can be damaged!

It is possible to copy settings from one ECL Comfort controller to another controller provided that the two controllers are from the same series (210 or 310).
Furthermore, when the ECL Comfort controller has been uploaded with an application key, minimum version 2.44, it is possible to upload personal settings from application keys, minimum version 2.14.

The “Key overview” does not inform — through ECA 30 / 31 — about the subtypes of the application key.

**Key inserted / not inserted, description:**

ECL Comfort 210 / 310, controller versions lower than 1.36:

- Take out the application key; for 20 minutes settings can be changed.
- Power up the controller **without** the application key inserted; for 20 minutes settings can be changed.

ECL Comfort 210 / 310, controller versions 1.36 and up:

- Take out the application key; for 20 minutes settings can be changed.
- Power up the controller **without** the application key inserted; settings cannot be changed.

ECL Comfort 296, controller versions 1.58 and up:

- Take out the application key; for 20 minutes settings can be changed.
- Power up the controller **without** the application key inserted; settings cannot be changed.

## 2.7 Check list

**Is the ECL Comfort controller ready for use?**

- ☐ Make sure that the correct power supply is connected to terminals 9 and 10 (230 V or 24 V).
- ☐ Make sure the correct phase conditions are connected:
  230 V: Live = terminal 9 and Neutral = terminal 10
  24 V: SP = terminal 9 and SN = terminal 10
- ☐ Check that the required controlled components (actuator, pump etc.) are connected to the correct terminals.
- ☐ Check that all sensors / signals are connected to the correct terminals (see 'Electrical connections').
- ☐ Mount the controller and switch on the power.
- ☐ Is the ECL Application Key inserted (see 'Inserting the Application Key').
- ☐ Does the ECL Comfort controller contain an existing application (see 'Inserting the Application Key').
- ☐ Is the correct language chosen (see 'Language' in 'Common controller settings').
- ☐ Is the time & date set correctly (see 'Time & Date' in 'Common controller settings').
- ☐ Is the right application chosen (see 'Identifying the system type').
- ☐ Check that all settings in the controller (see 'Settings overview') are set or that the factory settings comply with your requirements.
- ☐ Choose manual operation (see 'Manual control'). Check that valves open and close, and that required controlled components (pump etc.) start and stop when operated manually.
- ☐ Check that the temperatures / signals shown in the display match the actual connected components.
- ☐ Having completed the manual operation check, choose controller mode (scheduled, comfort, saving or frost protection).

## 2.8 Navigation, ECL Application Key P348

**Navigation, application P348.1, Heating, circuit 1**

| Home MENU | Sub-menu | P348.1 | | |
|---|---|---|---|---|
| | | ID nos. | Function | P348.1 |
| **Schedule** | | | Schedule | ● |
| **Settings** | Flow temperature | | Heat curve | ● |
| | | 11178 | Temp. max. | ● |
| | | 11177 | Temp. min. | ● |
| | | 11004 | Desired T | ● |
| | Room limit | 11182 | Infl. - max. | ● |
| | | 11183 | Infl. - min. | ● |
| | | 11015 | Adapt. time | ● |
| | Return limit | 11031 | High T out X1 | ● |
| | | 11032 | Low limit Y1 | ● |
| | | 11033 | Low T out X2 | ● |
| | | 11034 | High limit Y2 | ● |
| | | 11035 | Infl. - max. | ● |
| | | 11036 | Infl. - min. | ● |
| | | 11037 | Adapt. time | ● |
| | | 11085 | Priority | ● |
| | | 11029 | DHW, ret. T limit | ● |
| | | 11028 | Con. T, ret. T lim. | ● |
| | Flow/ power limit | | Actual | ● |
| | | | Actual limit | ● |
| | | 11119 | High T out X1 | ● |
| | | 11117 | Low limit Y1 | ● |
| | | 11118 | Low T out X2 | ● |
| | | 11116 | High limit Y2 | ● |
| | | 11112 | Adapt. time | ● |
| | | 11113 | Filter constant | ● |
| | | 11109 | Input type | ● |
| | | 11115 | Units | ● |
| | Optimization | 11011 | Auto saving | ● |
| | | 11012 | Boost | ● |
| | | 11013 | Ramp | ● |
| | | 11014 | Optimizer | ● |
| | | 11026 | Pre-stop | ● |
| | | 11020 | Based on | ● |
| | | 11021 | Total stop | ● |
| | | 11179 | Summer, cut-out | ● |

**Navigation, application P348.1, Heating, circuit 1, continued**

| Home MENU | Sub-menu | P348.1 | | |
|---|---|---|---|---|
| | | ID nos. | Function | P348.1 |
| **Settings** | Control par. | 11174 | Motor pr | ● |
| | | 11184 | Xp | ● |
| | | 11185 | Tn | ● |
| | | 11186 | M run | ● |
| | | 11187 | Nz | ● |
| | | 11189 | Min. act. time | ● |
| | Application | 11010 | ECA addr. | ● |
| | | 11017 | Demand offset | ● |
| | | 11050 | P demand | ● |
| | | 11500 | Send desired T | ● |
| | | 11022 | P exercise | ● |
| | | 11023 | M exercise | ● |
| | | 11052 | DHW priority | ● |
| | | 11077 | P frost T | ● |
| | | 11078 | P heat T | ● |
| | | 11040 | P post-run | ● |
| | | 11093 | Frost pr. T | ● |
| | | 11141 | Ext. input | ● |
| | | 11142 | Ext. mode | ● |
| | Heat cut-out | 11393 | Sum. start, day | ● |
| | | 11392 | Sum. start, month | ● |
| | | 11179 | Summer, cut-out | ● |
| | | 11395 | Summer, filter | ● |
| | | 11397 | Winter start, day | ● |
| | | 11396 | Win. start, month | ● |
| | | 11398 | Winter, cut-out | ● |
| | | 11399 | Winter, filter | ● |
| **Holiday** | | | Holiday | ● |
| **Alarm** | Temp. monitor | 11147 | Upper difference | ● |
| | | 11148 | Lower difference | ● |
| | | 11149 | Delay | ● |
| | | 11150 | Lowest temp. | ● |
| | S15 pressure | | Pressure | ● |
| | | 12614 | Alarm high | ● |
| | | 12615 | Alarm low | ● |
| | | 12617 | Alarm time-out | ● |
| | S16 pressure | | Pressure | ● |
| | | 11614 | Alarm high | ● |
| | | 11615 | Alarm low | ● |
| | | 11617 | Alarm time-out | ● |
| | Alarm overview | | | ● |
| **Influence overview** | Des. flow T | | Influence source | ● |

**Navigation, P348.1, circuits 2 and 3 (DHW)**

| **Home** | | | | | **P348.1** | |
|---|---|---|---|---|---|---|
| | | | | | **Circuit** | |
| **MENU** | | **ID nos.** | | **Function** | **2** | **3** |
| **Schedule** | | | | | ● | |
| **Schedule circ. P** | | | | | | ● |
| **Settings** | Tank temperature | 12017 | | Demand offset | ● | |
| | | 12195 | | Start difference | ● | |
| | | 12194 | | Stop difference | ● | |
| | | 12178 | | Temp. max. | ● | |
| | | 12177 | | Temp. min. | ● | |
| | Control par. 1 | | | Xp actual | ● | |
| | | 12185 | | Tn | ● | |
| | | 12187 | | Nz | ● | |
| | | 12165 | | V out max. | ● | |
| | | 12167 | | V out min. | ● | |
| | | 12171 | | Reverse out | ● | |
| | | 12354 | | CW influence | ● | |
| | | 12565 | | PWM period | ● | |
| | | 12065 | | Adapt time | ● | |
| | Flow meter | | | Actual | ● | |
| | | 12114 | | Pulse | ● | |
| | | 12115 | | Units | ● | |
| | Application | 12500 | | Send desired T | ● | |
| | Anti-bacteria | | | | ● | |
| | Control par., P circ. | | 13370 | Max. return T | | ● |
| | | | 13126 | Anti-bac. ret. T | | ● |
| | | | 13184 | Xp | | ● |
| | | | 13185 | Tn | | ● |
| | | | 13187 | Nz | | ● |
| | | | 13165 | V out max. | | ● |
| | | | 13167 | V out min. | | ● |
| | | | 13171 | Reverse out | | ● |
| **Alarm** | Temp. monitor | 12147 | | Upper difference | ● | |
| | | 12148 | | Lower difference | ● | |
| | | 12149 | | Delay | ● | |
| | | 12150 | | Lowest temp. | ● | |
| | Alarm overview | | | | ● | ● |
| **Influence overview** | Des. DHW T | | | Influence source | ● | ● |

**Navigation, P348.1, Common controller settings**

| **Home** | | **Common controller settings** | |
|---|---|---|---|
| **MENU** | | **ID no.** | **Function** |
| **Time & Date** | | | Selectable |
| **Input overview** | | | Outdoor T |
| | | | Outdoor acc. T |
| | | | Heat flow T |
| | | | Heat return T |
| | | | DHW flow T |
| | | | Circ. return T |
| | | | Tank upper T |
| | | | Tank lower T |
| | | | Supply T |
| | | | Charge T |
| | | | DHW return T |
| | | | Return T, A |
| | | | Return T, B |
| | | | S15 pressure |
| | | | S16 pressure |
| **Log** | Outdoor T | | Log today |
| | Heating flow & des. | | Log yesterday |
| | Heat return T & limit | | Log 2 days |
| | DHW flow & des. | | Log 4 days |
| | Tank T up. & des. | | |
| | Tank T up. & low. | | |
| | Circ. return T | | |
| | Supply T | | |
| | Charge T | | |
| | S16 pressure | | |
| **Output override** | | | M2 |
| | | | P2 |
| | | | P4 |
| | | | V1 |
| | | | P1 |
| | | | V3 |
| | | | P3 |
| | | | A1 |

**Navigation, Common controller settings, continued**

| Home | | Common controller settings | |
|---|---|---|---|
| **MENU** | | **ID no.** | **Function** |
| **Key functions** | New application | | Erase application |
| | Application | | |
| | Factory setting | | System settings |
| | | | User settings |
| | | | Go to factory |
| | Copy | | To |
| | | | System settings |
| | | | User settings |
| | | | Start copying |
| | Key overview | | |
| **System** | ECL version | | Code no. |
| | | | Hardware |
| | | | Software |
| | | | Serial no. |
| | | | Production date |
| | Extension | | |
| | Ethernet (ECL Comfort 310 only) | | Address type |
| | Portal config (ECL Comfort 310 only) | | ECL portal |
| | | | Portal status |
| | | | Portal info |
| | M-bus config (ECL Comfort 310 only) | | State |
| | | 5998 | Command |
| | | 5997 | Baud |
| | | 6000 | M-bus address |
| | | 6002 | Scan time |
| | | 6001 | Type |
| | Energy Meters (ECL Comfort 310 only) | | Energy Meter 1....5 |
| | Raw input overview | | S1 - S10 (S1 - S18 when ECA 32 / 35 is installed) |
| | Sensor offset | | S1 - S10 offset |
| | Alarm | 32: | T sensor defect |
| | Display | 60058 | Backlight |
| | | 60059 | Contrast |
| | Communication | 2048 | ECL 485 addr. |
| | | 38 | Modbus addr. |
| | | 39 | Baud |
| | | 2150 | Service pin |
| | | 2151 | Ext. reset |
| | Language | 2050 | Language |

**Navigation, application P348.2, Heating, circuit 1 and 2**

| Home MENU | Sub-menu | P348.2 | | | Circuit | |
|---|---|---|---|---|---|---|
| | | ID nos. | | Function | 1 | 2 |
| **Schedule** | | | | Schedule | ● | ● |
| **Settings** | Flow temperature | | | Heat curve | ● | ● |
| | | 11178 | 12178 | Temp. max. | ● | ● |
| | | 11177 | 12177 | Temp. min. | ● | ● |
| | | 11004 | 12004 | Desired T | ● | ● |
| | Optimization | 11011 | 12011 | Auto saving | ● | ● |
| | | 11012 | 12012 | Boost | ● | ● |
| | | 11013 | 12013 | Ramp | ● | ● |
| | | 11014 | 12014 | Optimizer | ● | ● |
| | | 11026 | 12026 | Pre-stop | ● | ● |
| | | 11021 | 12021 | Total stop | ● | ● |
| | | 11179 | 12179 | Summer, cut-out | ● | ● |
| | Control par. | 11174 | 14174 | Motor pr | ● | ● |
| | | 11184 | 14184 | Xp | ● | ● |
| | | 11185 | 14185 | Tn | ● | ● |
| | | 11186 | 14186 | M run | ● | ● |
| | | 11187 | 14187 | Nz | ● | ● |
| | | 11189 | 14189 | Min. act. time | ● | ● |
| | Application | 11500 | 12500 | Send desired T | ● | ● |
| | | 11022 | 12022 | P exercise | ● | ● |
| | | 11023 | 12023 | M exercise | ● | ● |
| | | 11052 | 12052 | DHW priority | ● | ● |
| | | 11077 | 12077 | P frost T | ● | ● |
| | | 11078 | 12078 | P heat T | ● | ● |
| | | 11040 | 12040 | P post-run | ● | ● |
| | | 11093 | 12093 | Frost pr. T | ● | ● |
| | | 11141 | 12141 | Ext. input | ● | ● |
| | | 11142 | 12142 | Ext. mode | ● | ● |
| | Heat cut-out | 11393 | | Sum. start, day | ● | |
| | | 11392 | | Sum. start, month | ● | |
| | | 11179 | 12179 | Summer, cut-out | ● | ● |
| | | 11395 | 12395 | Summer, filter | ● | ● |
| | | 11397 | | Winter start, day | ● | |
| | | 11396 | | Win. start, month | ● | |
| | | 11398 | 12398 | Winter, cut-out | ● | ● |
| | | 11399 | 12399 | Winter, filter | ● | ● |
| **Holiday** | | | | Holiday | ● | ● |
| **Alarm** | Temp. monitor | 11147 | 12147 | Upper difference | ● | ● |
| | | 11148 | 12148 | Lower difference | ● | ● |
| | | 11149 | 12149 | Delay | ● | ● |
| | | 11150 | 12150 | Lowest temp. | ● | ● |
| | Alarm overview | | | | ● | ● |
| **Influence overview** | Des. flow T | | | Influence source | ● | ● |

**Navigation, P348.2, circuit 3 (DHW)**

| **Home** | | | | **P348.2** |
|---|---|---|---|---|
| | | | | **Circuit** |
| **MENU** | | **ID nos.** | **Function** | **3** |
| **Schedule** | | | | ● |
| **Schedule circ. P** | | | | ● |
| **Settings** | Control par. 1 | 13184 | Xp | ● |
| | | 13185 | Tn | ● |
| | | 13187 | Nz | ● |
| | | 13165 | V out max. | ● |
| | | 13167 | V out min. | ● |
| | | 13171 | Reverse out | ● |
| | | 13354 | CW influence | ● |
| | | 13353 | Level | ● |
| | | 13565 | PWM period | ● |
| | | 13065 | Adapt time | ● |
| | Flow meter | | Actual | ● |
| | | 13114 | Pulse | ● |
| | | 13115 | Units | ● |
| | Control par., P circ. | 17370 | Max. return T | ● |
| | | 17126 | Anti-bac. ret. T | ● |
| | | 17184 | Xp | ● |
| | | 17185 | Tn | ● |
| | | 17187 | Nz | ● |
| | | 17165 | V out max. | ● |
| | | 17167 | V out min. | ● |
| | | 17171 | Reverse out | ● |
| | | 17054 | Cont. T control | ● |
| | Application | 13500 | Send desired T | ● |
| | Anti-bacteria | | | ● |
| **Alarm** | Temp. monitor | 13147 | Upper difference | ● |
| | | 13148 | Lower difference | ● |
| | | 13149 | Delay | ● |
| | | 13150 | Lowest temp. | ● |
| | Anti-bacteria | 17124 | Duration | ● |
| | Alarm overview | | | ● |
| **Influence overview** | Des. DHW T | | Anti-bacteria | ● |

**Navigation, P348.2, circuit M**

| Home | | | | P348.2 |
|---|---|---|---|---|
| | | | | Circuit |
| **MENU** | | **ID nos.** | **Function** | **M** |
| **Settings** | Tank temperature | 14017 | Demand offset | ● |
| | | 14195 | Start difference | ● |
| | | 14194 | Stop difference | ● |
| | | 14178 | Temp. max. | ● |
| | | 14177 | Temp. min. | ● |
| | X3 control | 18195 | Start difference | ● |
| | | 18194 | Stop difference | ● |
| | Return limit | 14030 | Limit | ● |
| | | 14037 | Adapt. time | ● |
| | Flow/ | | Actual | ● |
| | power limit | | Actual limit | ● |
| | | 14119 | High T out X1 | ● |
| | | 14117 | Low limit Y1 | ● |
| | | 14118 | Low T out X2 | ● |
| | | 14116 | High limit Y2 | ● |
| | | 14112 | Adapt. time | ● |
| | | 14113 | Filter constant | ● |
| | | 14109 | Input type | ● |
| | | 14115 | Units | ● |
| | Control par. 1 | 14184 | Xp | ● |
| | | 14185 | Tn | ● |
| | | 14186 | M run | ● |
| | | 14187 | Nz | ● |
| | | 14189 | Min. act. time | ● |
| | | 14330 | Wake up level | ● |
| | Control par. 2 | 18184 | Xp | ● |
| | | 18185 | Tn | ● |
| | | 18187 | Nz | ● |
| | | 18165 | V out max. | ● |
| | | 18167 | V out min. | ● |
| | | 18171 | Reverse out | ● |
| | | 18375 | Reduced des. T | ● |
| | | 18037 | Adapt. time | ● |
| | Pump control | 15184 | Xp | ● |
| | | 15185 | Tn | ● |
| | | 15187 | Nz | ● |
| | | 15165 | V out max. | ● |
| | | 15167 | V out min. | ● |
| | | 15065 | Adapt time | ● |
| | | 15189 | Min. act. time | ● |
| | | 15565 | PWM period | ● |
| | | 15171 | Reverse out | ● |
| | | 15575 | ΔT primary | ● |
| | | 15327 | Input type | ● |
| | | 15040 | P post-run | ● |
| | Application | 18041 | DHW P post-run | ● |
| | | 18371 | Pump start diff. | ● |
| | | 18310 | Retry time | ● |

**Navigation, P348.2, circuit M, continued**

| **Home** | | | | **P348.2** |
|---|---|---|---|---|
| | | | | **Circuit** |
| **MENU** | | **ID nos.** | **Function** | **M** |
| **Alarm** | Temp. monitor | 14147 | Upper difference | ● |
| | | 14148 | Lower difference | ● |
| | | 14149 | Delay | ● |
| | | 14150 | Lowest temp. | ● |
| | Supply T | 14340 | Delay | ● |
| | Alarm overview | | | ● |
| **Influence overview** | Desired T | | Influence source | ● |

**Navigation, P348.2, Common controller settings**

| Home | | Common controller settings | |
|---|---|---|---|
| **MENU** | | **ID no.** | **Function** |
| **Time & Date** | | | Selectable |
| **Input overview (M)** | | | Charge T |
| | | | Return T |
| | | | Supply T |
| | | | Tank upper T |
| | | | Tank lower T |
| | | | Return T sec. |
| | | | Collector T |
| **Input overview 1** | | | Outdoor T |
| | | | Outdoor acc. T |
| | | | Flow T |
| **Input overview 2** | | | Outdoor T |
| | | | Outdoor acc. T |
| | | | Flow T |
| **Input overview 3** | | | DHW flow T |
| | | | Circ. return T |
| **Log (M)** | Charge T & des. | | Log today |
| | Return T & limit | | Log yesterday |
| | Tank T up & des. | | Log 2 days |
| | Supply T | | Log 4 days |
| | Return T sec. | | |
| **Log 1** | Outdoor T | | |
| | Heating flow & des. | | |
| **Log 3** | DHW flow & des. | | |
| | Circ. return T | | |
| **Output override** | | | M1 |
| | | | M2 |
| | | | P5 |
| | | | M3 |
| | | | P7 |
| | | | V1 |
| | | | P1 |
| | | | V2 |
| | | | P2 |
| | | | V3 |
| | | | P3 |
| | | | V4 |
| | | | P4 |
| | | | X1 |
| | | | X2 |
| | | | X3 |
| | | | A1 |

**Navigation, Common controller settings, continued**

| Home | | Common controller settings | |
|---|---|---|---|
| **MENU** | | **ID no.** | **Function** |
| **Key functions** | New application | | Erase application |
| | Application | | |
| | Factory setting | | System settings |
| | | | User settings |
| | | | Go to factory |
| | Copy | | To |
| | | | System settings |
| | | | User settings |
| | | | Start copying |
| | Key overview | | |
| **System** | ECL version | | Code no. |
| | | | Hardware |
| | | | Software |
| | | | Serial no. |
| | | | Production date |
| | Extension | | |
| | Ethernet (ECL Comfort 310 only) | | Address type |
| | Portal config (ECL Comfort 310 only) | | ECL portal |
| | | | Portal status |
| | | | Portal info |
| | M-bus config (ECL Comfort 310 only) | | State |
| | | 5998 | Command |
| | | 5997 | Baud |
| | | 6000 | M-bus address |
| | | 6002 | Scan time |
| | | 6001 | Type |
| | Energy Meters (ECL Comfort 310 only) | | Energy Meter 1....5 |
| | Raw input overview | | S1 - S10 (S1 - S18 when ECA 32 / 35 is installed) |
| | Sensor offset | | S1 - S10 offset |
| | Alarm | 32: | T sensor defect |
| | Display | 60058 | Backlight |
| | | 60059 | Contrast |
| | Communication | 2048 | ECL 485 addr. |
| | | 38 | Modbus addr. |
| | | 39 | Baud |
| | | 2150 | Service pin |
| | | 2151 | Ext. reset |
| | Language | 2050 | Language |

**Navigation, P348.2 and P348.3, Common controller settings, continued**

| Home | | Common controller settings | |
|---|---|---|---|
| **MENU** | | **ID no.** | **Function** |
| **Floor drying** | Functional heating | | Desired Flow T |
| | | 10930 | X1 |
| | | 10931 | X2 |
| | | 10932 | X3 |
| | | 10933 | X4 |
| | Curing heating | | Desired Flow T |
| | | 10934 | X5 |
| | | 10935 | X6 |
| | | 10936 | X7 |
| | | 10937 | X8 |
| | | 10903 | Ramp X5–X6 |
| | | 10904 | Ramp X7–X8 |
| | | 10514 | Max. pwr. fail. |
| | | 10913 | After power failure |
| | | 10512 | Prog. execution |
| | | 10912 | Appl. continue |

**Navigation, application P348.3, Heating, circuit 1 and 2**

| Home MENU | Sub-menu | P348.3 | | | Circuit | |
|---|---|---|---|---|---|---|
| | | ID nos. | | Function | 1 | 2 |
| **Schedule** | | | | Schedule | ● | ● |
| **Settings** | Flow temperature | | | Heat curve | ● | ● |
| | | 11178 | 12178 | Temp. max. | ● | ● |
| | | 11177 | 12177 | Temp. min. | ● | ● |
| | | 11004 | 12004 | Desired T | ● | ● |
| | Optimization | 11011 | 12011 | Auto saving | ● | ● |
| | | 11012 | 12012 | Boost | ● | ● |
| | | 11013 | 12013 | Ramp | ● | ● |
| | | 11014 | 12014 | Optimizer | ● | ● |
| | | 11026 | 12026 | Pre-stop | ● | ● |
| | | 11021 | 12021 | Total stop | ● | ● |
| | | 11179 | 12179 | Summer, cut-out | ● | ● |
| | Control par. | 11174 | 12174 | Motor pr | ● | ● |
| | | 11184 | 12184 | Xp | ● | ● |
| | | 11185 | 12185 | Tn | ● | ● |
| | | 11186 | 12186 | M run | ● | ● |
| | | 11187 | 12187 | Nz | ● | ● |
| | | 11189 | 12189 | Min. act. time | ● | ● |
| | Application | 11500 | 12500 | Send desired T | ● | ● |
| | | 11022 | 12022 | P exercise | ● | ● |
| | | 11023 | 12023 | M exercise | ● | ● |
| | | 11052 | 12052 | DHW priority | ● | ● |
| | | 11077 | 12077 | P frost T | ● | ● |
| | | 11078 | 12078 | P heat T | ● | ● |
| | | 11040 | 12040 | P post-run | ● | ● |
| | | 11093 | 12093 | Frost pr. T | ● | ● |
| | | 11141 | 12141 | Ext. input | ● | ● |
| | | 11142 | 12142 | Ext. mode | ● | ● |
| | Heat cut-out | 11393 | | Sum. start, day | ● | |
| | | 11392 | | Sum. start, month | ● | |
| | | 11179 | 12179 | Summer, cut-out | ● | ● |
| | | 11395 | 12395 | Summer, filter | ● | ● |
| | | 11397 | | Winter start, day | ● | |
| | | 11396 | | Win. start, month | ● | |
| | | 11398 | 12398 | Winter, cut-out | ● | ● |
| | | 11399 | 12399 | Winter, filter | ● | ● |
| **Holiday** | | | | Holiday | ● | ● |
| **Alarm** | Temp. monitor | 11147 | 12147 | Upper difference | ● | ● |
| | | 11148 | 12148 | Lower difference | ● | ● |
| | | 11149 | 12149 | Delay | ● | ● |
| | | 11150 | 12150 | Lowest temp. | ● | ● |
| | Alarm overview | | | | ● | ● |
| **Influence overview** | Des. flow T | | | Influence source | ● | ● |

**Navigation, P348.3, circuit 3 (DHW)**

| **Home** | | | | **P348.3** |
|---|---|---|---|---|
| | | | | **Circuit** |
| **MENU** | | **ID nos.** | **Function** | **3** |
| **Schedule** | | | | ● |
| **Schedule circ. P** | | | | ● |
| **Settings** | Control par. 1 | 13184 | Xp | ● |
| | | 13185 | Tn | ● |
| | | 13187 | Nz | ● |
| | | 13165 | V out max. | ● |
| | | 13167 | V out min. | ● |
| | | 13171 | Reverse out | ● |
| | | 13354 | CW influence | ● |
| | | 13353 | Level | ● |
| | | 13565 | PWM period | ● |
| | | 13065 | Adapt time | ● |
| | Flow meter | | Actual | ● |
| | | 13114 | Pulse | ● |
| | | 13115 | Units | ● |
| | Control par., P circ. | 17370 | Max. return T | ● |
| | | 17126 | Anti-bac. ret. T | ● |
| | | 17184 | Xp | ● |
| | | 17185 | Tn | ● |
| | | 17187 | Nz | ● |
| | | 17165 | V out max. | ● |
| | | 17167 | V out min. | ● |
| | | 17171 | Reverse out | ● |
| | | 17054 | Cont. T control | ● |
| | Application | 13500 | Send desired T | ● |
| | Anti-bacteria | | | ● |
| **Alarm** | Temp. monitor | 13147 | Upper difference | ● |
| | | 13148 | Lower difference | ● |
| | | 13149 | Delay | ● |
| | | 13150 | Lowest temp. | ● |
| | Anti-bacteria | 17124 | Duration | ● |
| | Alarm overview | | | ● |
| **Influence overview** | Des. DHW T | | Anti-bacteria | ● |

**Navigation, P348.3, circuit M**

| **Home** | | | | **P348.3** |
|---|---|---|---|---|
| | | | | **Circuit** |
| **MENU** | | **ID nos.** | **Function** | **M** |
| **Settings** | Tank temperature | 14017 | Demand offset | ● |
| | | 14195 | Start difference | ● |
| | | 14194 | Stop difference | ● |
| | | 14178 | Temp. max. | ● |
| | | 14177 | Temp. min. | ● |
| | X3 control | 18195 | Start difference | ● |
| | | 18194 | Stop difference | ● |
| | Control par. 1 | 14030 | Limit | ● |
| | | 14571 | Charge start diff. | ● |
| | | 14700 | Await time | ● |
| | | 14184 | Xp | ● |
| | | 14185 | Tn | ● |
| | | 14186 | M run | ● |
| | | 14187 | Nz | ● |
| | | 14189 | Min. act. time | ● |
| | Control par. 2 | 18059 | P charge delay | ● |
| | | 18040 | P post-run | ● |
| | | 18184 | Xp | ● |
| | | 18185 | Tn | ● |
| | | 18187 | Nz | ● |
| | | 18165 | V out max. | ● |
| | | 18167 | V out min. | ● |
| | | 18171 | Reverse out | ● |
| | Pump control | 15184 | Xp | ● |
| | | 15185 | Tn | ● |
| | | 15187 | Nz | ● |
| | | 15165 | V out max. | ● |
| | | 15167 | V out min. | ● |
| | | 15065 | Adapt time | ● |
| | | 15189 | Min. act. time | ● |
| | | 15565 | PWM period | ● |
| | | 15171 | Reverse out | ● |
| | | 15575 | ΔT primary | ● |
| | | 15327 | Input type | ● |
| | | 15040 | P post-run | ● |

**Navigation, P348.3, circuit M, continued**

| **Home** | | | | **P348.3** |
|---|---|---|---|---|
| | | | | **Circuit** |
| **MENU** | | **ID nos.** | **Function** | **M** |
| **Alarm** | Temp. monitor | 14147 | Upper difference | ● |
| | | 14148 | Lower difference | ● |
| | | 14149 | Delay | ● |
| | | 14150 | Lowest temp. | ● |
| | Supply T | 14340 | Delay | ● |
| | Digital S12 | 14636 | Alarm value | ● |
| | | 14637 | Alarm time-out | ● |
| | Alarm overview | | | ● |
| **Influence overview** | Desired T | | Influence source | ● |

**Navigation, P348.3, Common controller settings**

| Home | | Common controller settings | |
|---|---|---|---|
| **MENU** | | **ID no.** | **Function** |
| **Time & Date** | | | Selectable |
| **Input overview (M)** | | | Prim. return T |
| | | | Supply T |
| | | | Tank upper T |
| | | | Tank lower T |
| | | | Return T sec. |
| | | | Collector T |
| **Input overview 1** | | | Outdoor T |
| | | | Outdoor acc. T |
| | | | Flow T |
| **Input overview 2** | | | Outdoor T |
| | | | Outdoor acc. T |
| | | | Flow T |
| **Input overview 3** | | | DHW flow T |
| | | | Circ. return T |
| **Log (M)** | Return T & limit | | Log today |
| | Tank T up and des. | | Log yesterday |
| | Supply T | | Log 2 days |
| | Return T sec. | | Log 4 days |
| **Log 1** | Outdoor T | | |
| | Heating flow & des. | | |
| **Log 2** | Heating flow & des. | | |
| **Log 3** | DHW flow & des. | | |
| | Circ. return T | | |
| **Output override** | | | M1<br>M2<br>P5<br>M3<br>P7<br>V1<br>P1<br>V2<br>P2<br>V3<br>P3<br>V4<br>P4<br>X1<br>X2<br>X3 |

**Navigation, P348.2 and P348.3, Common controller settings, continued**

| Home | | Common controller settings | |
|---|---|---|---|
| **MENU** | | **ID no.** | **Function** |
| **Floor drying** | Functional heating | | Desired Flow T |
| | | 10930 | X1 |
| | | 10931 | X2 |
| | | 10932 | X3 |
| | | 10933 | X4 |
| | Curing heating | | Desired Flow T |
| | | 10934 | X5 |
| | | 10935 | X6 |
| | | 10936 | X7 |
| | | 10937 | X8 |
| | | 10903 | Ramp X5–X6 |
| | | 10904 | Ramp X7–X8 |
| | | 10514 | Max. pwr. fail. |
| | | 10913 | After power failure |
| | | 10512 | Prog. execution |
| | | 10912 | Appl. continue |

**Navigation, Common controller settings, continued**

| Home | | Common controller settings | |
|---|---|---|---|
| **MENU** | | **ID no.** | **Function** |
| **Key functions** | New application | | Erase application |
| | Application | | |
| | Factory setting | | System settings |
| | | | User settings |
| | | | Go to factory |
| | Copy | | To |
| | | | System settings |
| | | | User settings |
| | | | Start copying |
| | Key overview | | |
| **System** | ECL version | | Code no. |
| | | | Hardware |
| | | | Software |
| | | | Serial no. |
| | | | Production date |
| | Extension | | |
| | Ethernet (ECL Comfort 310 only) | | Address type |
| | Portal config (ECL Comfort 310 only) | | ECL portal |
| | | | Portal status |
| | | | Portal info |
| | M-bus config (ECL Comfort 310 only) | | State |
| | | 5998 | Command |
| | | 5997 | Baud |
| | | 6000 | M-bus address |
| | | 6002 | Scan time |
| | | 6001 | Type |
| | Energy Meters (ECL Comfort 310 only) | | Energy Meter 1....5 |
| | Raw input overview | | S1 - S10 (S1 - S18 when ECA 32 / 35 is installed) |
| | Sensor offset | | S1 - S10 offset |
| | Alarm | 32: | T sensor defect |
| | Display | 60058 | Backlight |
| | | 60059 | Contrast |
| | Communication | 2048 | ECL 485 addr. |
| | | 38 | Modbus addr. |
| | | 39 | Baud |
| | | 2150 | Service pin |
| | | 2151 | Ext. reset |
| | Language | 2050 | Language |

## 3.0 Daily use

### 3.1 How to navigate

You navigate in the controller by turning the dial left or right to the desired position ( ).

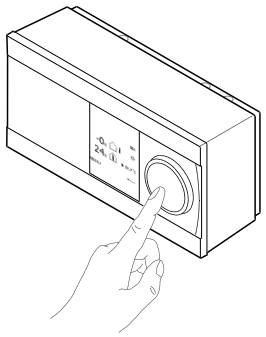
The dial has a built-in accellerator. The faster you turn the dial, the faster it reaches the limits of any wide setting range.

The position indicator in the display ( ) will always show you where you are.

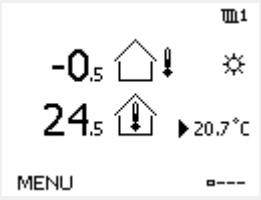
Push the dial to confirm your choices ( ).

The display examples are from a two-circuit application: One heating circuit ( ) and one domestic hot-water (DHW) circuit ( ). The examples might differ from your application.

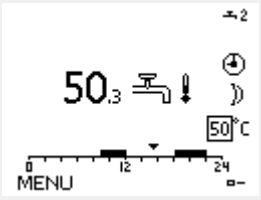
Example shows ECL 210 / 310



*Heating circuit ( ):*




*DHW circuit ( );*




Some general settings which apply to the entire controller are located in a specific part of the controller.

To enter 'Common controller settings':

| Action: | Purpose: | Examples: |
|---|---|---|
| | Choose 'MENU' in any circuit | MENU |
| | Confirm | |
| | Choose the circuit selector at the top right corner in the display | |
| | Confirm | |
| | Choose 'Common controller settings' | |
| | Confirm | |

*Circuit selector*

## 3.2 Understanding the controller display

This section describes the function in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application.

**Choosing a favorite display**
Your favorite display is the display you have chosen as the default display. The favorite display will give you a quick overview of the temperatures or units that you want to monitor in general.

If the dial has not been activated for 20 min., the controller will revert to the overview display you have chosen as favorite.

To shift between displays: Turn the dial until you reach the display selector (▭---) at the bottom right side of the display. Push the dial and turn to choose your favorite overview display. Push the dial again.

**Heating circuit**

Overview display 1 informs about:
actual outdoor temperature, controller mode,
actual room temperature, desired room temperature.

Overview display 2 informs about:
actual outdoor temperature, trend in outdoor temperature, controller mode, max. and min. outdoor temperatures since midnight as well as desired room temperature.

Overview display 3 informs about:
date, actual outdoor temperature, controller mode, time, desired room temperature as well as shows the comfort schedule of the current day.

Overview display 4 informs about:
state of the controlled components, actual flow temperature, (desired flow temperature), controller mode, return temperature (limitation value), influence on desired flow temperature.

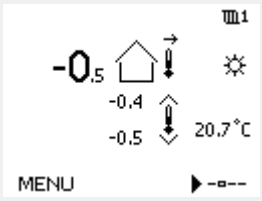
The value above the V2 symbol indicates 0–100% of the analogue signal (0–10 V).

**Note:**
An actual flow temperature value must be present, otherwise the circuit's control valve will close.

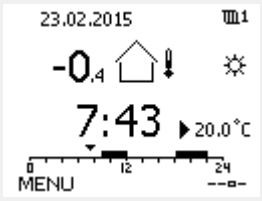
Dependent on the chosen display, the overview displays for the heating circuit inform you about:
- actual outdoor temperature (-0.5)
- controller mode (☼)
- actual room temperature (24.5)
- desired room temperature (20.7 °C)
- trend in outdoor temperature (↗ → ↘)
- min. and max. outdoor temperatures since midnight (◊)
- date (23.02.2010)
- time (7:43)
- comfort schedule of the current day (0 - 12 - 24)
- state of the controlled components (M2, P2)
- actual flow temperature (49 °C), (desired flow temperature (31))
- return temperature (24 °C) (limitation temperature (50))

*Overview display 1:*

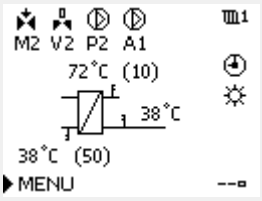

*Overview display 2:*



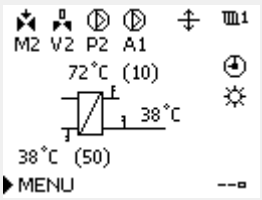

*Overview display 3:*



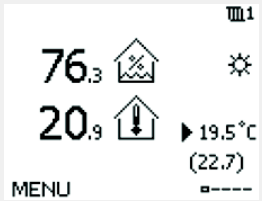

*Overview display 4:*



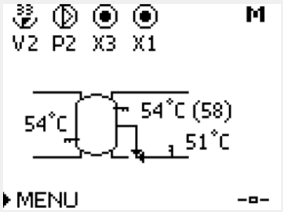

*Example of overview display with Influence indication:*




*Example, favorite display 1 in A230.3, where min. desired room temperature is indicated (22.7):*




*Example of overview display with state of controlled components, actual state of diverting valve X3 on master circuit, limitations, input request, tank temperature. The value above the V2 symbol indicates 0–100% of the analogue signal (0–10 V).*




The setting of the desired room temperature is important even if a room temperature sensor / Remote Control Unit is not connected.

If the temperature value is displayed as

"- -" the sensor in question is not connected.

"- - -" the sensor connection is short-circuited.

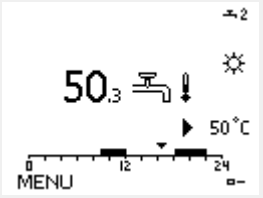
**DHW circuit**

Overview display 1 informs about:
actual DHW temperature, controller mode, desired DHW temperature as well as the comfort schedule of the current day.

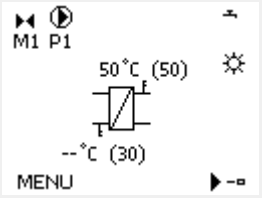
Overview display 2 informs about:
state of the controlled components, actual DHW temperature, (desired DHW temperature), controller mode, return temperature (limitation value), influence on desired DHW temperature.

Dependent on chosen display, the overview displays for the DHW circuit inform you about:
- actual DHW temperature (50.3)
- controller mode (☼)
- desired DHW temperature (50 °C)
- comfort schedule of the current day(0 - 12 - 24)
- state of the controlled components (M1, P1)
- actual DHW temperature (50 °C), (desired DHW temperature (50))
- return temperature (- - °C) (limitation temperature (30))

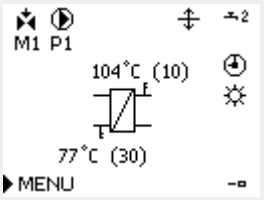
*Overview display 1:*




*Overview display 2:*




*Example of overview display with Influence indication:*



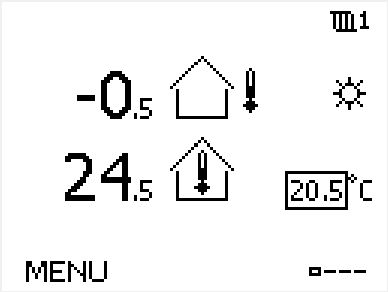

**Setting the desired temperature**

Depending on the chosen circuit and mode, it is possible to enter all daily settings directly from the overview displays (see also the next page concerning symbols).

**Setting the desired room temperature**

The desired room temperature can easily be adjusted in the overview displays for the heating circuit.

| Action: | Purpose: | Examples: |
|---|---|---|
| | Desired room temperature | 20.5 |
| | Confirm | |
| | Adjust the desired room temperature | 21.0 |
| | Confirm | |



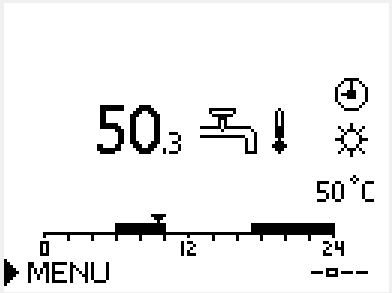

This overview display informs about outdoor temperature, actual room temperature as well as desired room temperature.

The display example is for comfort mode. If you want to change the desired room temperature for saving mode, choose the mode selector and select saving.

The setting of the desired room temperature is important even if a room temperature sensor / Remote Control Unit is not connected.

**Setting the desired DHW temperature**

The desired DHW temperature can easily be adjusted in the overview displays for the DHW circuit.




| Action: | Purpose: | Examples: |
|---|---|---|
| | Desired DHW temperature | 50 |
| | Confirm | |
| | Adjust the desired DHW temperature | 55 |
| | Confirm | |

In addition to the information about desired and actual DHW temperature, the today's schedule is visible.

The display example indicates that the controller is in scheduled operation and in comfort mode.

**Setting the desired room temperature, ECA 30 / ECA 31**

The desired room temperature can be set exactly as in the controller. However, other symbols can be present in the display (please see 'What do the symbols mean?').

With the ECA 30 / ECA 31 you can override the desired room temperature set in the controller temporarily by means of the override functions:

### 3.3 A general overview: What do the symbols mean?

| Symbol | Description | |
|---|---|---|
| | Outdoor temp. | Temperature |
| | Relative humidity indoor | |
| | Room temp. | |
| | DHW temp. | |
| | Position indicator | |
| | Scheduled mode | Mode |
| | Comfort mode | |
| | Saving mode | |
| | Frost protection mode | |
| | Manual mode | |
| | Standby | |
| | Cooling mode | |
| | Active output override | |
| | Optimized start or stop time | |
| | Heating | Circuit |
| | Cooling | |
| | DHW | |
| | Common controller settings | |
| | Pump ON | Controlled component |
| | Pump OFF | |
| | Fan ON | |
| | Fan OFF | |
| | Actuator opens | |
| | Actuator closes | |
| 42 | Actuator, analogue control signal | |
| 45 | Pump / fan speed | |
| | Damper ON | |
| | Damper OFF | |

| Symbol | Description |
|---|---|
| | Alarm |
| | Letter |
| | Event |
| | Monitoring temperature sensor connection |
| | Display selector |
| | Max. and min. value |
| | Trend in outdoor temperature |
| | Wind speed sensor |
| -- | Sensor not connected or not used |
| --- | Sensor connection short-circuited |
| 7-23 | Fixed comfort day (holiday) |
| | Active influence |
| | Heating active (+)<br>Cooling active (-) |
| 1 2 | Number of heat exchangers |

**Additional symbols, ECA 30 / 31:**

| Symbol | Description |
|---|---|
| | ECA Remote Control Unit |
| 15 | Connection address (master: 15, slaves: 1 - 9) |
| | Day off |
| | Holiday |
| | Relaxing (extended comfort period) |
| | Going out (extended saving period) |

In ECA 30 / 31 only the symbols that are relevant to the application in the controller are displayed.

### 3.4 Monitoring temperatures and system components

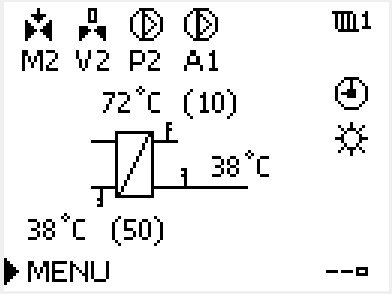
This section describes the function in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application.

**Heating circuit**

The overview display in the heating circuit ensures a quick overview of the actual and (desired) temperatures as well as the actual state of the system components.

Display example:

| | |
|---|---|
| 49 °C | Flow temperature |
| (31) | Desired flow temperature |
| 24 °C | Return temperature |
| (50) | Return temperature limitation |



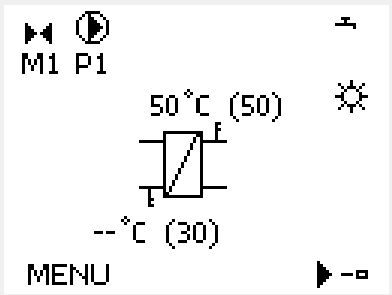

**DHW circuit**

The overview display in the DHW circuit ensures a quick overview of the actual and (desired) temperatures as well as the actual state of the system components.

Display example (heat exchanger):

| | |
|---|---|
| 50 °C | Flow temperature |
| (50) | Desired flow temperature |
| - - | Return temperature: sensor not connected |
| (30) | Return temperature limitation |

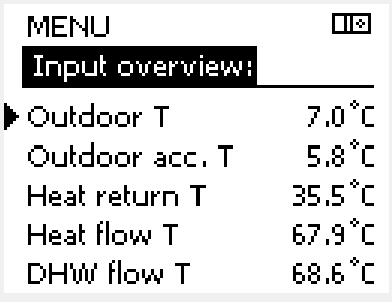
*Display example with heat exchanger:*




**Input overview**

Another option to get a quick overview of measured temperatures is the 'Input overview' which is visible in the common controller settings (how to enter the common controller settings, see 'Introduction to common controller settings'.)

As this overview (see display example) only states the measured actual temperatures, it is read-only.



### 3.5 Influence overview

This section describes the function in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application.

The menu gives an overview of the influences on the desired flow temperature. It differs from application to application which parameters are listed. It can be helpful in a service situation to explain unexpected conditions or temperatures among others.

If the desired flow temperature is influenced (corrected) by one or more parameters, it is indicated by a small line with arrow-down, arrow-up or double-arrow:

Arrow-down:
The parameter in question reduces the desired flow temperature.

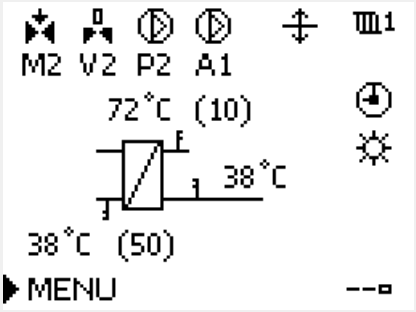
Arrow-up:
The parameter in question increases the desired flow temperature.

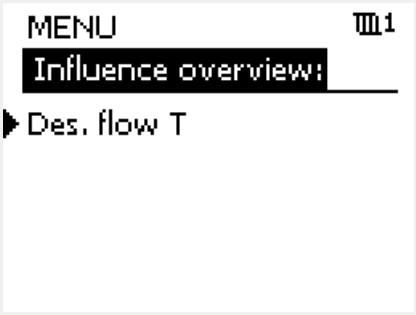
Double-arrow:
The parameter in question creates an override (e.g. Holiday).

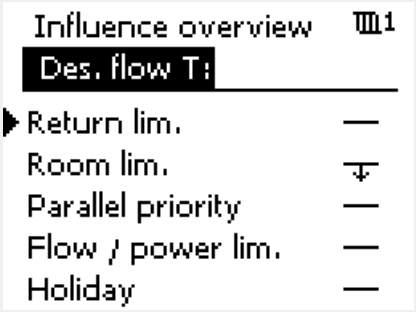
Straight line:
No active influence.

In the example, the arrow in the symbol points downwards for 'Room lim.'. This means that the actual room temperature is higher than the desired room temperature which again results in a decrease of the desired flow temperature.

*Example of overview display with Influence indication:*



### 3.6 Manual control

It is possible to manually control the installed components.

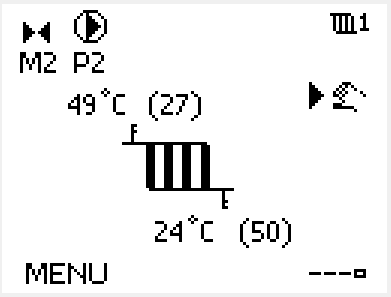
Manual control can only be selected in favorite displays in which the symbols for the controlled components (valve, pump etc.) are visible.

| Action: | Purpose: | Examples: |
|---|---|---|
| | Choose mode selector | |
| | Confirm | |
| | Choose manual mode | |
| | Confirm | |
| | Choose pump | |
| | Confirm | |
| | Switch ON the pump | |
| | Switch OFF the pump. | |
| | Confirm pump mode | |
| | Choose motorized control valve | |
| | Confirm | |
| | Open the valve | |
| | Stop opening the valve | |
| | Close the valve | |
| | Stop closing the valve | |
| | Confirm valve mode | |

To leave manual control, use the mode selector to select the desired mode. Push the dial.

Manual control is typically used when commisioning the installation. The controlled components, valve, pump etc., can be controlled for correct function.

*Controlled components* *Circuit selector*




During manual operation:

- All control functions are deactivated
- Output override is not possible
- Frost protection is not active

When manual control is selected for one circuit, it is automatically selected for all circuits!

**Manual control of 0 – 10 Volt / PWM controlled pump speed:**
The V1, V2 and V3 symbols have a value (in %) which can be changed. The % value is corresponding to a voltage / PWM in the range 0 – 10 Volt / 0 - 100 % PWM.

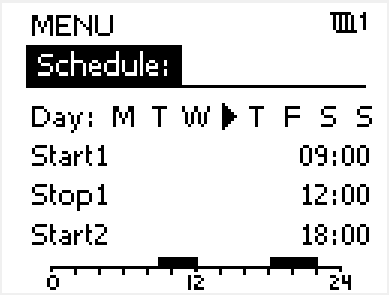
## 3.7 Schedule

### 3.7.1 Set your schedule

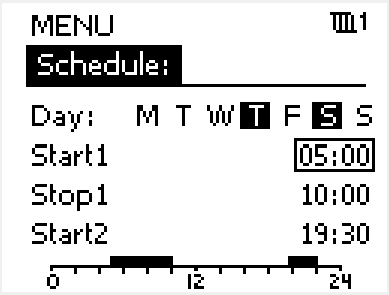
This section describes the schedule in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application. In some applications, however, there might be more than one schedule. Additional schedules can be found in 'Common controller settings'.

The schedule consists of a 7-day week:

M = Monday
T = Tuesday
W = Wednesday
T = Thursday
F = Friday
S = Saturday
S = Sunday

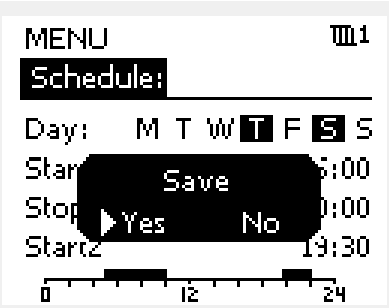



The schedule will day-by-day show you the start and stop times of your comfort periods (heating / DHW circuits).




Changing your schedule:

| Action: | Purpose: | Examples: |
|---|---|---|
| | Choose 'MENU' in any of the overview displays | MENU |
| | Confirm | |
| | Confirm the choice 'Schedule' | |
| | Choose the day to change | ▶ |
| | Confirm* | T |
| | Go to Start1 | |
| | Confirm | |
| | Adjust the time | |
| | Confirm | |
| | Go to Stop1, Start2 etc. etc. | |
| | Return to 'MENU' | MENU |
| | Confirm | |
| | Choose 'Yes' or 'No' in 'Save' | |
| | Confirm | |




* Several days can be marked

The chosen start and stop times will be valid for all the chosen days (in this example Thursday and Saturday).

You can set max. 3 comfort periods a day. You can delete a comfort period by setting start and stop times to the same value.

Each circuit has its own schedule. To change to another circuit, go to 'Home', turn the dial and choose the desired circuit.

The start and stop times can be set in half-hourly (30 min. ) intervals.

## 4.0 Settings overview

For factory settings and setting range, see appendix “Parameter ID overview”.
Parameters indicated with an ID no. like "1x607" mean a universal parameter. x stands for circuit / parameter group.

| Setting | ID | Page | Factory settings in circuit(s) | | |
|---|---|---|---|---|---|
| | | | 1 | 2 | 3 |
| Heat curve | | 78 | | | |
| Actual (actual flow or power) | | 90 | | | |
| Actual limit | | 90 | | | |
| Xp actual | | 101 | | | |
| Actual | | 109 | | | |
| Extended heat cut-out setting | | 121 | | | |
| Extended winter cut-out setting | | 121 | | | |
| Day | | 131 | | | |
| Start time | | 132 | | | |
| Duration | | 132 | | | |
| Desired T | | 132 | | | |
| Desired T (Desired flow temperature) | 1x004 | 79 | | | |
| ECA addr. (ECA address, choice of Remote Control Unit) | 1x010 | 111 | | | |
| Auto saving (saving temp. dependent on outdoor temp.) | 1x011 | 94 | | | |
| Boost | 1x012 | 95 | | | |
| Ramp (reference ramping) | 1x013 | 96 | | | |
| Optimizer (optimizing time constant) | 1x014 | 96 | | | |
| Adapt. time (adaption time) | 1x015 | 81 | | | |
| Demand offset | 1x017 | 111 | | | |
| Demand offset (for tank (buffer) temperature) | 1x017 | 123 | | | |
| Based on (optimization based on room / outdoor temp.) | 1x020 | 97 | | | |
| Total stop | 1x021 | 97 | | | |
| P exercise (pump exercise) | 1x022 | 112 | | | |
| M exercise (valve exercise) | 1x023 | 112 | | | |
| Pre-stop (optimized stop time) | 1x026 | 98 | | | |
| Con.T, re. T lim. (Constant temperature mode, return temperature limitation) | 1x028 | 86 | | | |
| DHW, ret. T limit | 1x029 | 87 | | | |
| Limit (return temp. limitation) | 1x030 | 87 | | | |
| Limit (return temp. limitation) | 1x030 | 101 | | | |
| High T out X1 (return temp. limitation, high limit, X-axis) | 1x031 | 87 | | | |
| Low limit Y1 (return temp. limitation, low limit, Y-axis) | 1x032 | 87 | | | |
| Low T out X2 (return temp. limitation, low limit, X-axis) | 1x033 | 88 | | | |
| High limit Y2 (return temp. limitation, high limit, Y-axis) | 1x034 | 88 | | | |
| Infl. - max. (return temp. limitation - max. influence) | 1x035 | 88 | | | |
| Infl. - min. (return temp. limitation - min. influence) | 1x036 | 88 | | | |
| Adapt. time (adaptation time) | 1x037 | 89 | | | |
| Adapt. time (adaptation time) | 1x037 | 101 | | | |
| P post-run | 1x040 | 101 | | | |

| Setting | ID | Page | Factory settings in circuit(s) | | |
|---|---|---|---|---|---|
| | | | 1 | 2 | 3 |
| P post-run | 1x040 | 113 | | | |
| P post-run | 1x040 | 127 | | | |
| DHW P post-run (DHW pump, post-run) | 1x041 | 113 | | | |
| P demand | 1x050 | 113 | | | |
| DHW priority (closed valve / normal operation) | 1x052 | 114 | | | |
| Cont. T control | 1x054 | 102 | | | |
| P charge delay (Charging pump, delayed start) | 1x059 | 102 | | | |
| Adapt. time (adaptation time) | 1x065 | 102 | | | |
| Adapt. time (adaptation time) | 1x065 | 127 | | | |
| P frost T (circulation pump, frost protection temp.) | 1x077 | 114 | | | |
| P heat T (heat demand) | 1x078 | 114 | | | |
| Priority (priority for return temp. limitation) | 1x085 | 89 | | | |
| Frost pr. T (frost protection temp.) | 1x093 | 115 | | | |
| Input type | 1x109 | 91 | | | |
| Adapt. time (adaptation time) | 1x112 | 91 | | | |
| Filter constant | 1x113 | 91 | | | |
| Pulse | 1x114 | 109 | | | |
| Units | 1x115 | 91 | | | |
| Units | 1x115 | 109 | | | |
| High limit Y2 (flow / power limitation, high limit, Y-axis) | 1x116 | 92 | | | |
| Low limit Y1 (flow / power limitation, low limit, Y-axis) | 1x117 | 92 | | | |
| Low T out X2 (flow / power limitation, low limit, X-axis) | 1x118 | 92 | | | |
| High T out X1 (flow / power limitation, high limit, X-axis) | 1x119 | 92 | | | |
| Anti-bac. ret. T (Anti-bacteria, return temperature) | 1x126 | 103 | | | |
| Ext. input (external override) | 1x141 | 115 | | | |
| Ext. mode (external override mode) | 1x142 | 116 | | | |
| Upper difference | 1x147 | 134 | | | |
| Lower difference | 1x148 | 134 | | | |
| Delay | 1x149 | 135 | | | |
| Lowest temp. | 1x150 | 135 | | | |
| V out max. | 1x165 | 103 | | | |
| V out max. | 1x165 | 127 | | | |
| V out min. | 1x167 | 103 | | | |
| V out min. | 1x167 | 127 | | | |
| Reverse out | 1x171 | 103 | | | |
| Reverse out | 1x171 | 128 | | | |
| Motor pr. (motor protection) | 1x174 | 104 | | | |
| Temp. min. | 1x177 | 80 | | | |
| Temp. min. (Minimum temperature) | 1x177 | 123 | | | |
| Temp. max. | 1x178 | 80 | | | |
| Temp. max. (Maximum temperature) | 1x178 | 123 | | | |
| Summer, cut-out (limit for heating cut-out) | 1x179 | 98 | | | |

| Setting | ID | Page | Factory settings in circuit(s) | | |
|---|---|---|---|---|---|
| | | | 1 | 2 | 3 |
| Infl. - max. (room temp. limitation, max.) | 1x182 | 82 | | | |
| Infl. - min. (room temp. limitation, min.) | 1x183 | 82 | | | |
| Xp (proportional band) | 1x184 | 104 | | | |
| Xp (proportional band) | 1x184 | 128 | | | |
| Tn (integration time constant) | 1x185 | 104 | | | |
| Tn (integration time constant) | 1x185 | 128 | | | |
| M run (running time of the motorized control valve) | 1x186 | 104 | | | |
| M run (running time of the motorized control valve) | 1x186 | 128 | | | |
| Nz (neutral zone) | 1x187 | 105 | | | |
| Nz (neutral zone) | 1x187 | 129 | | | |
| Min. act. time (min. activation time gear motor) | 1x189 | 105 | | | |
| Min. act. time (min. activation time gear motor) | 1x189 | 129 | | | |
| Stop difference | 1x194 | 123 | | | |
| Stop difference | 1x194 | 126 | | | |
| Start difference | 1x195 | 124 | | | |
| Start difference | 1x195 | 126 | | | |
| Retry time | 1x310 | 118 | | | |
| Input type | 1x327 | 129 | | | |
| Wake up level | 1x330 | 105 | | | |
| Delay | 1x340 | 135 | | | |
| Level | 1x353 | 106 | | | |
| CW influence (Cold Water influence) | 1x354 | 106 | | | |
| Max. return T | 1x370 | 106 | | | |
| Pump start diff. | 1x371 | 119 | | | |
| Reduced des. T (Reduced desired temperature) | 1x375 | 106 | | | |
| Send desired T | 1x500 | 119 | | | |
| PWM period | 1x565 | 107 | | | |
| PWM period | 1x565 | 130 | | | |
| Charge start diff. | 1x571 | 107 | | | |
| ΔT primary | 1x575 | 107 | | | |
| Alarm high | 1x614 | 136 | | | |
| Alarm low | 1x615 | 136 | | | |
| Alarm time-out | 1x617 | 136 | | | |
| Alarm value | 1x636 | 136 | | | |
| Alarm time-out | 1x637 | 136 | | | |
| Await time | 1x700 | 107 | | | |

## 5.0 Settings

### 5.1 Introduction to Settings

Descriptions of settings (parameter's functions) are divided into groups as used in the ECL Comfort 210 / 296 / 310 controller's menu structure. Examples: "Flow temperature", "Room limit" and so on. Each group starts with a general explanation.

The descriptions of each parameter are in numeric order, related to the parameter's ID numbers. You might come across differences between the order in this Operating Guide and the ECL Comfort 210 / 296 / 310 controllers.

Some parameter descriptions are related to specific application subtypes. This means that you might not see the related parameter in the actual subtype in the ECL controller.

The note "See Appendix …" refers to the Appendix at the end of this Operating Guide, where parameter's setting ranges and factory settings are listed.

The navigation hints (for example MENU > Settings > Return limit … ) cover multiple subtypes.

Some parameter descriptions refer to Duct or Flow or Inlet temperature because the parameters in question are used in other applications too.

## 5.2 Flow temperature

The ECL Comfort controller determines and controls the flow temperature related to the outdoor temperature. This relationship is called the heat curve.
The heat curve is set by means of 6 coordinate points. The desired flow temperature is set at 6 pre-defined outdoor temperature values.
The shown value for the heat curve is an average value (slope), based on the actual settings.

| Outdoor temp. | Desired flow temp. | | | Your settings |
|---|---|---|---|---|
| | A | B | C | |
| **-30 °C** | 45 °C | **75 °C** | 95 °C | |
| **-15 °C** | 40 °C | **60 °C** | 90 °C | |
| **-5 °C** | 35 °C | **50 °C** | 80 °C | |
| **0 °C** | 32 °C | **45 °C** | 70 °C | |
| **5 °C** | 30 °C | **40 °C** | 60 °C | |
| **15 °C** | 25 °C | **28 °C** | 35 °C | |

**A:** Example for floor heating
**B: Factory settings**
**C:** Example for radiator heating (high demand)

**MENU > Settings > Flow temperature**

| Heat curve | | |
|---|---|---|
| **1** | **0.1 ... 4.0** | **1.0** |

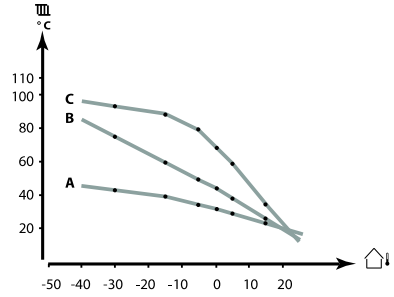
The heat curve can be changed in two ways:

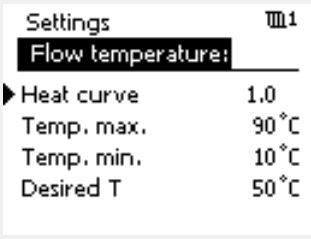
1. The value of the slope is changed (see heat curve examples on next page)
2. The coordinates of the heat curve are changed

**Change the value of the slope:**
Push the dial to enter / change the slope value of the heat curve (example: 1.0).
When the slope of the heat curve is changed by means of the slope value, the common point for all heat curves will be a desired flow temperature = 24.6 °C at an outdoor temperature = 20 °C and a desired room temperature = 20.0 °C.

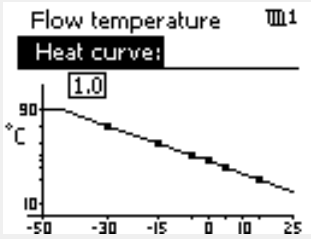
**Change the coordinates:**
Push the dial to enter / change the coordinates of the heat curve (example: -30,75).
The heat curve represents the desired flow temperatures at different outdoor temperatures and at a desired room temperature of 20 °C.
If the desired room temperature is changed, the desired flow temperature also changes:
(Desired room T - 20) × HC × 2.5
where "HC" is the Heat Curve slope and "2.5" is a constant.

*Desired flow temperature*

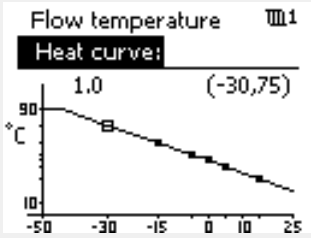



*Slope changes*




*Coordinate changes*




The calculated flow temperature can be influenced by the 'Boost' and 'Ramp' functions etc.

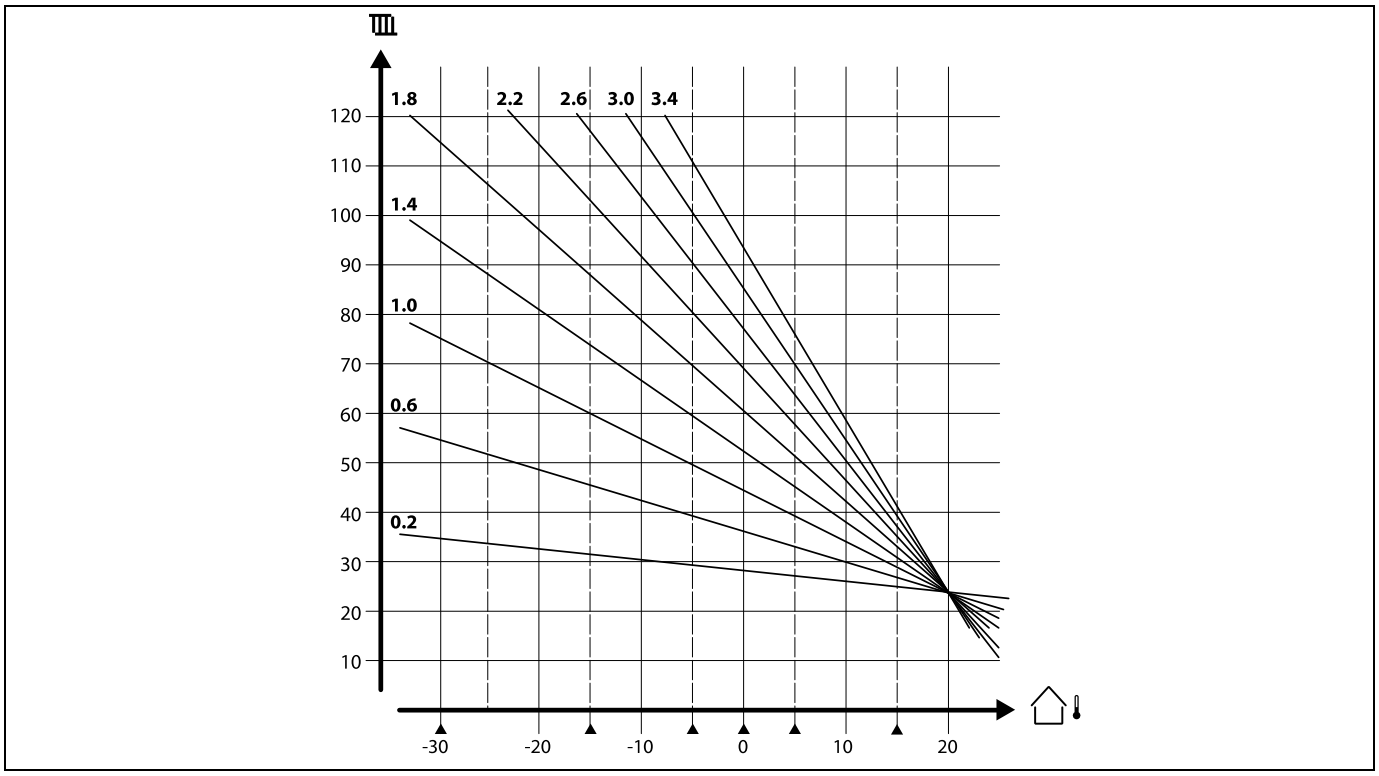
**Example:**

| | |
|---|---|
| Heat curve: | 1.0 |
| Desired flow temp.: | 50 °C |
| Desired room temp.: | 22 °C |
| Calculation (22–20) × 1.0 × 2.5 = | 5 |

Result:

The desired flow temperature will be corrected from 50 °C to 55 °C.

**Choosing a heat curve slope**
The heat curves represent the desired flow temperature at different outdoor temperatures and at a desired room temperature of 20 °C.



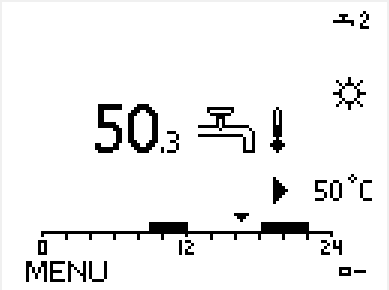

The small arrows (▲) indicate 6 different outdoor temperature values at which you can change the heat curve.

The ECL Comfort 210 / 296 / 310 controls the DHW temperature according to the desired flow temperature for example under the influence of the return temperature.
The desired DHW temperature is set in the overview display.

50.3: Actual DHW temperature

50: Desired DHW temperature

*Actual DHW temp.*




*Desired DHW temp.*

Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

**MENU > Settings > Flow temperature**

| Desired T (Desired flow temperature) | 1x004 |
|---|---|
| *When the ECL Comfort is in override mode, type "Const. T", the desired flow temperature can be set.*<br>*A "Const. T" related return temperature limitation can also be set. See MENU > Settings > Return limit > 'Con. T, ret. T lim.'* | |

See Appendix “Parameter ID overview”

**Override mode**
When ECL Comfort is in Scheduled mode, a contact (switch) signal can be applied to an input in order to override to Comfort, Saving, Frost Protection or Constant temperature. As long as the contact (switch) signal is applied, the override is active.

The "Desired T" value can be influenced by:

- temp. max.
- temp. min.
- room temp. limit
- return temp. limit
- flow / power limit

**MENU > Settings > Flow temperature**

| Temp. min. | 1x177 |
|---|---|

See Appendix “Parameter ID overview”

Set the min. flow temperature for the system. The desired flow temperature will not be lower than this setting. Adjust the factory setting, if required.

‘Temp. min.’ is overruled if 'Total stop' is active in Saving mode or 'Cut-out' is active.
‘Temp. min.’ can be overruled by the influence from the return temperature limitation (see 'Priority').

The setting for ‘Temp. max.’ has higher priority than ‘Temp. min.’.

**MENU > Settings > Flow temperature**

| Temp. max. | 1x178 |
|---|---|

See Appendix “Parameter ID overview”

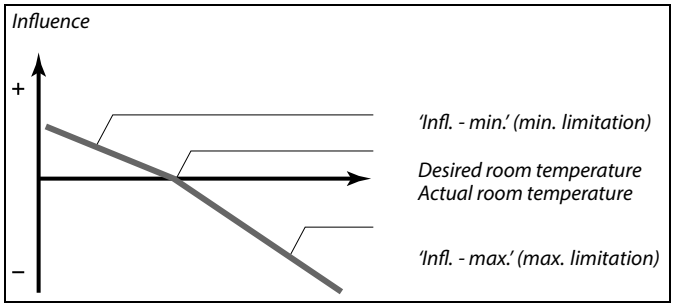
Set the max. flow temperature for the system. The desired temperature will not be higher than this setting. Adjust the factory setting, if required.

The setting of ‘heat curve’ is possible for heating circuits only.

The setting for ‘Temp. max.’ has higher priority than ‘Temp. min.’.

### 5.3 Room limit

This section is only relevant if you have installed a room temperature sensor or a Remote Control Unit.
The controller adjusts the desired flow temperature to compensate for the difference between the desired and the actual room temperature.
If the room temperature is higher than the desired value, the desired flow temperature can be reduced.
The 'Infl. -max.' (Influence, max. room temp.) determines how much the desired flow temperature should be reduced.
Use this influence type to avoid a too high room temperature. The controller will allow for free heat gains, i.e. solar radiation etc.
If the room temperature is lower than the desired value, the desired flow temperature can be increased.
The 'Infl. -min.' (Influence, min. room temperature) determines how much the desired flow temperature should be increased.
Use this influence to avoid a too low room temperature.
A typical setting will be -4.0 for 'Infl. -max.' and 4.0 for 'Infl. -min.'




*The 'Infl. - max.' and 'Infl. - min.' determine how much the room temperature should influence the desired flow temperature.*

If the 'Infl.' factor is too high and / or the 'Adapt. time' too low, there is a risk of unstable control.

**Example 1:**
The actual room temperature is 2 degrees too high.
The 'Infl. - max.' is set to -4.0.
The 'Infl. - min.' is set to 3.0.
Result:
The desired flow temperature is decreased by 2 x -4.0 = 8.0 degrees.

**Example 2:**
The actual room temperature is 3 degrees too low.
The 'Infl. - max.' is set to -4.0.
The 'Infl. - min.' is set to 3.0.
Result:
The desired flow temperature is increased by 3 x 3.0 = 9.0 degrees.

Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

**MENU > Settings > Room limit**

| **Adapt. time (adaption time)** | **1x015** |
|---|---|
| *Controls how fast the actual room temperature adapts to the desired room temperature (I control).* | |

See Appendix “Parameter ID overview”

**OFF:** The control function is not influenced by the 'Adapt. time'.

**Minor value:** The desired room temperature is adapted quickly.

**Major value:** The desired room temperature is adapted slowly.

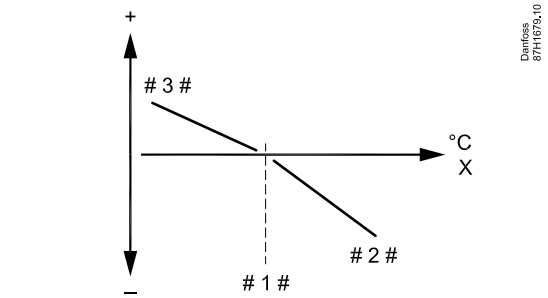
The adaptation function can correct the desired room temperature with max. 8 K x heat curve slope value.

**MENU > Settings > Room limit**

| **Infl. - max. (room temp. limitation, max.)** | **1x182** |
|---|---|
| *Determines how much the desired flow temperature will be influenced (decreased) if the actual room temperature is higher than the desired room temperature (P control).* | |

See Appendix “Parameter ID overview”

**0.0:** No influence
**-2.0:** Minor influence
**-5.0:** Medium influence
**-9.9:** Maximum influence




*X* = *Room temperature*

*# 1#* = *Desired room temperature*

*# 2 #* = *Negative influence (1x082) when actual room temp. gets higher than desired room temp.*

*# 3 #* = *Positive influence (1x083) when actual room temp. gets lower than desired room temp.*

*The ‘Infl. - max.’ and 'Infl. - min.' determine how much the room temperature should influence the desired flow temperature.*

If the ‘Infl.’ factor is too high and / or the ‘Adapt. time’ too low, there is a risk of unstable control.

**Example**
The actual room temperature is 2 degrees too high.
The ‘Infl. - max.’ is set to -4.0.
The heat curve slope is 1.8 (see 'Heat curve' in 'Flow temperature').
Result:
The desired flow temperature is changed by (2 x -4.0 x 1.8)
–14.4 degrees.

In application subtypes, where a heat curve slope value is **not** present, the heat curve slope value is set to 1:
Result:
The desired flow temperature is changed by (2 x -4.0 x 1):
–8.0 degrees.

**MENU > Settings > Room limit**

| **Infl. - min. (room temp. limitation, min.)** | **1x183** |
|---|---|
| *Determines how much the desired flow temperature will be influenced (increased) if the actual room temperature is lower than the desired room temperature (P control).* | |

See Appendix “Parameter ID overview”

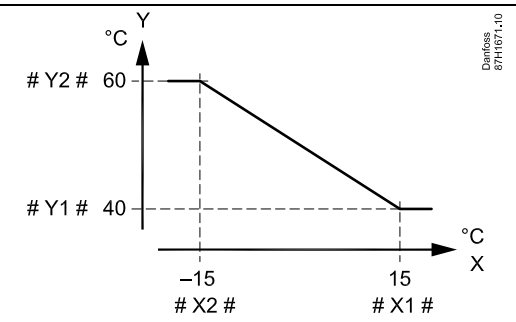
**9.9:** Maximum influence
**5.0:** Medium influence
**2.0:** Minor influence
**0.0:** No influence

**Example**
The actual room temperature is 2 degrees too low.
The ‘Infl. - min.’ is set to 4.0.
The heat curve slope is 1.8 (see 'Heat curve' in 'Flow temperature').
Result:
The desired flow temperature is changed by (2 x 4.0 x 1.8)
14.4 degrees.

In application subtypes, where a heat curve slope value is **not** present, the heat curve slope value is set to 1:
Result:
The desired flow temperature is changed by (2 x 4.0 x 1):
8.0 degrees.

### 5.4 Return limit

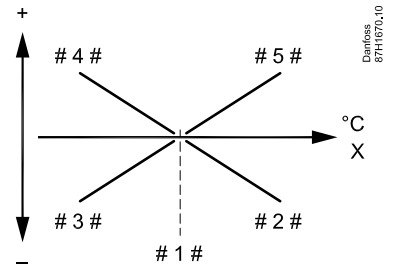
The return temperature limitation is based on the outdoor temperature. Typically in district heating systems a higher return temperature is accepted at a decrease in outdoor temperature. The relationship between the return temperature limits and outdoor temperature is set in two coordinates.
The outdoor temperature coordinates are set in 'High T out X1' and 'Low T out X2'. The return temperature coordinates are set in 'High limit Y2' and 'Low limit Y1'.
The controller automatically changes the desired flow temperature to obtain an acceptable return temperature when the return temperature falls below or gets higher than the calculated limit.
This limitation is based on a PI regulation where P ('Infl.' factor) responds quickly to deviations and I ('Adapt. time') responds slower and over time removes the small offsets between the desired and actual values. This is done by changing the desired flow temperature.




*X = Outdoor temperature*
*Y = Limitation temperature*
*# X1 # = High T out (1x031)*
*# X2 # = Low T out (1x033)*
*# Y1# = Low limit (1x032)*
*# Y2 # = High limit (1x034)*

The calculated limit is shown in brackets ( ) in the monitoring display. See the section "Monitoring temperatures and system components".

**DHW circuit**
The return temperature limitation is based on a constant temperature value.
The controller automatically changes the desired flow temperature to obtain an acceptable return temperature when the return temperature falls below or gets higher than the set limit.
This limitation is based on a PI regulation where P ('Infl.' factor) responds quickly to deviations and I ('Adapt. time') responds slower and over time removes the small offsets between the desired and actual values. This is done by changing the desired flow temperature.

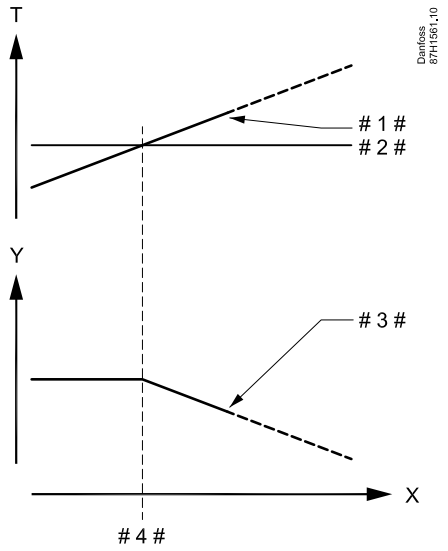



*X = Return temperature*
*# 1 # = Limitation temperature*
*# 2 # = Negative influence (1x035) when return temp. gets higher than limit. temp.*
*# 3 # = Negative influence (1x036) when return temp. gets lower than limit. temp.*
*# 4 # = Positive influence (1x036) when return temp. gets lower than limit. temp.*
*# 5 # = Positive influence (1x035) when return temp. gets higher than limit. temp.*

If the 'Infl.' factor is too high and / or the 'Adapt. time' too low, there is a risk of unstable control.

When the anti-bacteria process is active, the return temperature limitation is disabled.

Example, maximum return temperature limitation; return temperature gets higher than limit




*T* = *Temperature*

*Y* = *Temperature*

*X* = *Time*

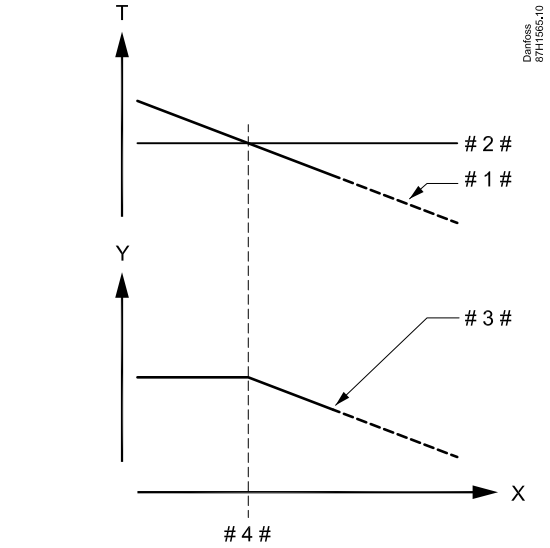
*# 1 #* = *Return temperature*

*# 2 #* = *Return temperature limit*

*# 3 #* = *Desired flow temperature*

*# 4 #* = *Action point*

Example, minimum return temperature limitation;
return temperature gets lower than limit




*T* = *Temperature*

*Y* = *Temperature*

*X* = *Time*

*# 1 #* = *Return temperature*

*# 2 #* = *Return temperature limit*

*# 3 #* = *Desired flow temperature*

*# 4 #* = *Action point*

The return temperature limitation for the DHW circuit is based on the setting in 'Limit (return temp. limitation)'.
The influence factors are set in the heating circuit.

If the return temperature limitation value in the heating circuit is higher than the return temperature limitation value in the DHW circuit, the highest value is used.

Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

**MENU > Settings > Return limit**

| **Con.T, re. T lim. (Constant temperature mode, return temperature limitation)** | **1x028** |
|---|---|
| *The "Con. T, ret. T limit" is the return temperature limitation value when the circuit is set to override mode type "Const. T" (= Constant temperature).* | |

See Appendix “Parameter ID overview”

**Value:** Set the return temperature limitation

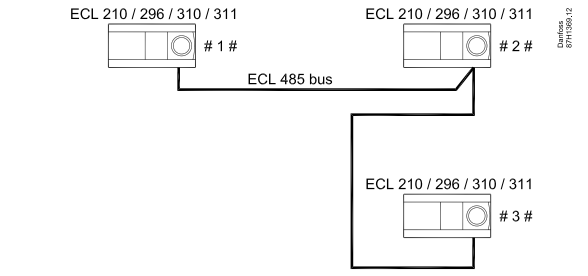
**MENU > Settings > Return limit**

| **DHW, ret. T limit** | **1x029** |
|---|---|
| *When an addressed slave is active in DHW-tank heating / charging, the return temperature limitation in the master can be set.*<br>*Notes:*<br>• *The master circuit must be set to react on the desired flow temperature in the slave(s). See "Demand offset" (ID 11017).*<br>• *The slave(s) must be set to send its / their desired flow temperature to the master. See "Send desired T" (ID 1x500).* | |

See Appendix “Parameter ID overview”

**OFF:** No influence from slaves. The return temperature limitation is related to settings in "Return limit".

**Value:** Return temperature limitation value when slave is in DHW tank heating / charging operation.




*# 1 # = Master, example A266, address 15*
*# 2 # = Slave, example A237, address 9*
*# 3 # = Slave, example A367, address 6*

Some examples of applications with DHW-tank heating / charging are:

- A217, A237, A247, A367, A377

**MENU > Settings > Return limit**

| **Limit (return temp. limitation)** | **1x030** |
|---|---|
| *Set the return temperature value you accept for the system.* | |

See Appendix “Parameter ID overview”

When the return temperature falls below or gets higher than the set value, the controller automatically changes the desired flow / duct temperature to obtain an acceptable return temperature. The influence is set in 'Infl. - max.' and 'Infl. - min.'.

**MENU > Settings > Return limit**

| **High T out X1 (return temp. limitation, high limit, X-axis)** | **1x031** |
|---|---|
| *Set the outdoor temperature value for the low return temperature limitation.* | |

See Appendix “Parameter ID overview”

The corresponding Y coordinate is set in 'Low limit Y1'.

**MENU > Settings > Return limit**

| **Low limit Y1 (return temp. limitation, low limit, Y-axis)** | **1x032** |
|---|---|
| *Set the return temperature limitation referring to the outdoor temperature value set in 'High T out X1'.* | |

See Appendix “Parameter ID overview”

The corresponding X coordinate is set in 'High T out X1'.

**MENU > Settings > Return limit**

| **Low T out X2 (return temp. limitation, low limit, X-axis)** | **1x033** |
|---|---|
| *Set the outdoor temperature value for the high return temperature limitation.* | |

See Appendix “Parameter ID overview”

The corresponding Y coordinate is set in 'High limit Y2'.

**MENU > Settings > Return limit**

| **High limit Y2 (return temp. limitation, high limit, Y-axis)** | **1x034** |
|---|---|
| *Set the return temperature limitation referring to the outdoor temperature value set in 'Low T out X2'.* | |

See Appendix “Parameter ID overview”

The corresponding X coordinate is set in 'Low T out X2'.

**MENU > Settings > Return limit**

| **Infl. - max. (return temp. limitation - max. influence)** | **1x035** |
|---|---|
| *Determines how much the desired flow temperature will be influenced if the return temperature is higher than the calculated limit.* | |

See Appendix “Parameter ID overview”

*Influence higher than 0:*
The desired flow temperature is increased, when the return temperature gets higher than the calculated limit.

*Influence lower than 0:*
The desired flow temperature is decreased, when the return temperature gets higher than the calculated limit.

If the ‘Infl.’ factor is too high and / or the ‘Adapt. time’ too low, there is a risk of unstable control.

**Example**
The return limit is active above 50 °C.
The influence is set to -2.0.
The actual return temperature is 2 degrees too high.
Result:
The desired flow temperature is changed by -2.0 x 2 = -4.0 degrees.

Normally, this setting is lower than 0 in district heating systems to avoid a too high return temperature.
Typically, this setting is 0 in boiler systems because a higher return temperature is acceptable (see also 'Infl. - min.').

**MENU > Settings > Return limit**

| **Infl. - min. (return temp. limitation - min. influence)** | **1x036** |
|---|---|
| *Determines how much the desired flow temperature will be influenced if the return temperature is lower than the calculated limit.* | |

See Appendix "Parameter ID overview"

*Influence higher than 0:*
The desired flow temperature is increased, when the return temperature gets below the calculated limit.

*Influence lower than 0:*
The desired flow temperature is decreased, when the return temperature gets below the calculated limit.

**Example**
The return limit is active below 50 °C.
The influence is set to -3.0.
The actual return temperature is 2 degrees too low.
Result:
The desired flow temperature is changed by -3.0 x 2 = -6.0 degrees.

Normally, this setting is 0 in district heating systems because a lower return temperature is acceptable.
Typically, this setting is higher than 0 in boiler systems to avoid a too low return temperature (see also 'Infl. - max.').

**MENU > Settings > Return limit**

| **Adapt. time (adaptation time)** | **1x037** |
|---|---|
| *Controls how fast the return temperature adapts to the desired return temperature limit (Integration control).* | |

See Appendix "Parameter ID overview"

**OFF:** The control function is not influenced by the 'Adapt. time'.
**Minor value:** The desired temperature is adapted quickly.
**Major value:** The desired temperature is adapted slowly.

The adaptation function can correct the desired flow temperature with max. 8 K.

**MENU > Settings > Return limit**

| **Priority (priority for return temp. limitation)** | **1x085** |
|---|---|
| *Choose whether the return temperature limitation should overrule the set min. flow temperature 'Temp. min.'.* | |

See Appendix "Parameter ID overview"

**OFF:** The min. flow temperature limit is not overruled.
**ON:** The min. flow temperature limit is overruled.

If you have a DHW application:
Please also see 'Parallel operation' (ID 11043).

If you have a DHW application:
When dependent parallel operation is in function:

- Desired flow temperature for the heating circuit will be minimum limited, when "Priority for return temperature" (ID 1x085) is set to OFF.
- Desired flow temperature for the heating circuit will not be minimum limited, when "Priority for return temperature" (ID 1x085) is set to ON.

## 5.5 Flow / power limit

**Heating circuit**

A flow or energy meter can be connected (M-bus signal) to the ECL controller in order to limit the flow or consumed power.

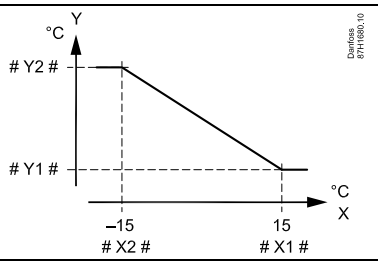
The flow / power limitation can be based on the outdoor temperature. Typically, in district heating systems a higher flow or power is accepted at lower outdoor temperatures.

The relationship between the flow or power limits and the outdoor temperature is set in two coordinates.

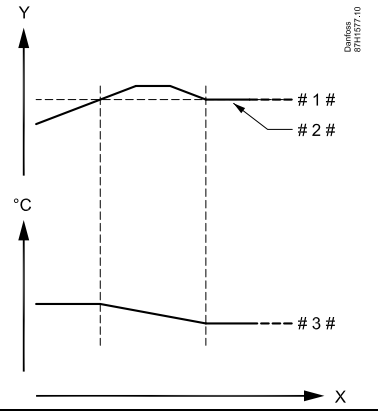
The outdoor temperature coordinates are set in 'High T out X1' and 'Low T out X2'.

The flow or power coordinates are set in 'Low limit Y1' and 'High limit Y2'. Based on these settings, the controller calculates the limitation value.

When the flow / power gets higher than the calculated limit, the controller gradually reduces the desired flow temperature to obtain an acceptable max. flow or power consumption.




| | | |
|---|---|---|
| X | = | Outdoor temperature |
| Y | = | Limitation, flow or power |
| # X1 # | = | High T out (1x119) |
| # X 2 # | = | Low T out (1x118) |
| # Y1 # | = | Low limit (1x117) |
| # Y2 # | = | High limit (1x116) |




| | | |
|---|---|---|
| X | = | Time |
| Y | = | Flow or power |
| # 1 # | = | Flow or power limit |
| # 2 # | = | Actual flow or energy |
| # 3 # | = | Desired flow temperature |

If the 'Adapt. time' is too high, there is a risk of unstable control.

**MENU > Settings > Flow / power limit**

| **Actual (actual flow or power)** |
|---|
| *The value is the actual flow or power based on the signal from flow / energy meter.* |

**MENU > Settings > Flow / power limit**

| **Actual limit** |
|---|
| *The value is the actual flow or power limitation, based on outdoor temperature and the settings in "High T out X1", "Low limit Y1", "Low T out X2" and "High limit Y2".* |

**MENU > Settings > Flow / power limit**

| **Input type** | **1x109** |
|---|---|
| *Choice of input type from flow / energy meter* | |

See Appendix “Parameter ID overview”

**OFF:** No input

**EM1 - EM5:** Flow / energy meter signal from M-bus.

**MENU > Settings > Flow / power limit**

| **Adapt. time (adaptation time)** | **1x112** |
|---|---|
| *Controls how fast the flow / power limitation adapts to the desired limitation.* | |

If the ‘Adapt. time’ is too low, there is a risk of unstable control.

See Appendix “Parameter ID overview”

**OFF:** The control function is not influenced by the ‘Adapt. time’.

**Minor value:** The desired temperature is adapted quickly.

**Major value:** The desired temperature is adapted slowly.

**MENU > Settings > Flow / power limit**

| **Filter constant** | **1x113** |
|---|---|
| *The value of the filter constant determines the dampening of the measured value.*<br>*The higher the value, the more dampening.*<br>*By this, a too quick change of the measured value can be avoided.* | |

See Appendix “Parameter ID overview”

**Minor value:** Lower dampening

**Major value:** Higher dampening

**MENU > Settings > Flow / power limit**

| **Units** | **1x115** |
|---|---|
| *Choice of units for measured values.* | |

See Appendix “Parameter ID overview”

Flow values are expressed as l/h or $m^3/h$
Power values are expressed as kW, MW or GW.

List for setting range of 'Units':
l/h
$m^3/h$
kW
MW
GW

**MENU > Settings > Flow / power limit**

| **High limit Y2 (flow / power limitation, high limit, Y-axis)** | **1x116** |
|---|---|
| *Set the flow / power limitation referring to the outdoor temperature set in 'Low T out X2'.* | |

See Appendix “Parameter ID overview”

The corresponding X coordinate is set in 'Low T out X2'.

**MENU > Settings > Flow / power limit**

| **Low limit Y1 (flow / power limitation, low limit, Y-axis)** | **1x117** |
|---|---|
| *Set the flow / power limitation referring to the outdoor temperature set in 'High T out X1'.* | |

See Appendix “Parameter ID overview”

The corresponding X coordinate is set in 'High T out X1'.

The limitation function can overrule the set 'Temp. min' of the desired flow temperature.

**MENU > Settings > Flow / power limit**

| **Low T out X2 (flow / power limitation, low limit, X-axis)** | **1x118** |
|---|---|
| *Set the outdoor temperature value for the high flow / power limitation.* | |

See Appendix “Parameter ID overview”

The corresponding Y coordinate is set in 'High limit Y2'.

**MENU > Settings > Flow / power limit**

| **High T out X1 (flow / power limitation, high limit, X-axis)** | **1x119** |
|---|---|
| *Set the outdoor temperature value for the low flow / power limitation.* | |

See Appendix “Parameter ID overview”

The corresponding Y coordinate is set in 'Low limit Y1'.

Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

### 5.6 Optimization

The section "Optimization" describes specific application related issues.
The parameters 'Auto saving', 'Boost', 'Optimizer', 'Total stop' are all related to heating mode only.
'Summer, cut-out' determine, at rising outdoor temperature, the stop of heating.

Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

**MENU > Settings > Optimization**

| **Auto saving (saving temp. dependent on outdoor temp.)** | **1x011** |
|---|---|
| *Below the set value for the outdoor temperature, the saving temperature setting has no influence. Above the set value for the outdoor temperature, the saving temperature relates to the actual outdoor temperature. The function is relevant in district heating installations in order to avoid a big change in the desired flow temperature after a saving period.* | |

See Appendix "Parameter ID overview"

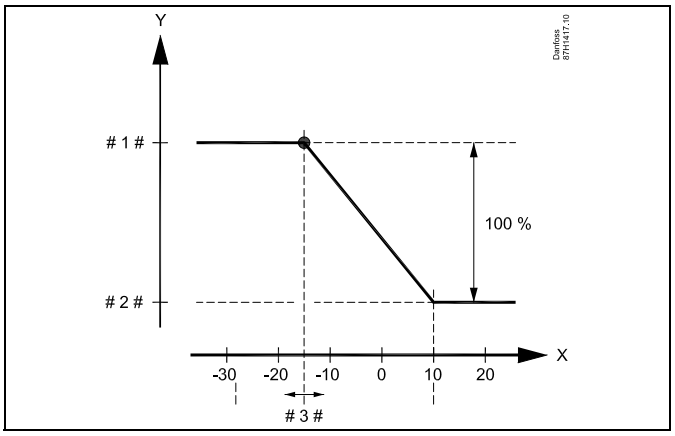
**OFF:** The saving temperature does not depend on the outdoor temperature; the reduction is 100%.

**Value:** The saving temperature depends on the outdoor temperature. When the outdoor temperature is above 10 °C, the reduction is 100%. The lower the outdoor temperature, the less the temperature reduction. Below the set value, the saving temperature setting has no influence.

Comfort temperature: The desired room temperature in Comfort mode

Saving temperature: The desired room temperature in Saving mode

The desired room temperatures for Comfort and Saving modes are set in the display overviews.




X = Outdoor temperature (°C)

Y = Desired room temperature (°C)

# 1 # = Desired room temperature (°C), Comfort mode

# 2 # = Desired room temperature (°C), Saving mode

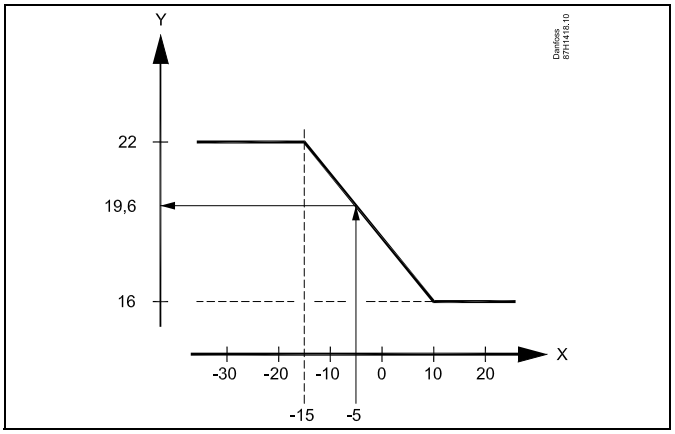
# 3 # = Auto saving temperature (°C), ID 11011

**Example:**

| | |
|---|---|
| Actual outdoor temperature (T.out): | –5 °C |
| Desired room temperature setting in Comfort mode: | 22 °C |
| Desired room temperature setting in Saving mode: | 16 °C |
| Setting in 'Auto saving': | –15 °C |

The condition for the outdoor temperature influence:
**T.out.influence = (10 - T.out) / (10 - setting) =**
**(10 - (-5)) / (10 - (-15)) =**
**15 / 25 = 0,6**

The corrected desired room temperature in Saving mode:
T.room.ref.Saving + (T.out.influence x (T.room.ref.Comfort - T.room.ref.Saving))
16 + (0,6 x (22 - 16)) = 19,6 °C




X = Outdoor temperature (°C)

Y = Desired room temperature (°C)

**MENU > Settings > Optimization**

| **Boost** | **1x012** |
|---|---|
| *Shortens the heating-up period by increasing the desired flow temperature by the percentage you set.* | |

See Appendix "Parameter ID overview"

**OFF:** The boost function is not active.

**Value:** The desired flow temperature is increased temporarily with the set percentage.

In order to shorten the heating-up period after a saving temperature period, the desired flow temperature can be increased temporarily (max. 1 hour). At optimizing the boost is active in the optimization period ('Optimizer').
If a room temperature sensor or an ECA 30 / 31 is connected, the boost stops when the room temperature is reached.

**MENU > Settings > Optimization**

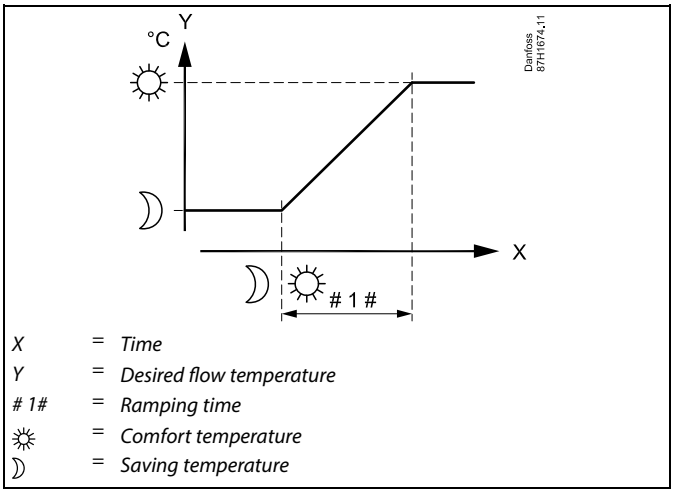
| **Ramp (reference ramping)** | **1x013** |
|---|---|
| *The time (minutes) in which the desired flow temperature increases gradually to avoid load peaks in the heat supply.* | |

See Appendix "Parameter ID overview"

**OFF:** The ramping function is not active.

**Value:** The desired flow temperature is increased gradually with the set minutes.

In order to avoid load peaks in the supply network, the flow temperature can be set to increase gradually after a period with saving temperature. This causes the valve to open gradually.




*X* = *Time*
*Y* = *Desired flow temperature*
*# 1#* = *Ramping time*
☼ = *Comfort temperature*
☽ = *Saving temperature*

**MENU > Settings > Optimization**

| **Optimizer (optimizing time constant)** | **1x014** |
|---|---|
| *Optimizes the start and stop times for the comfort temperature period to obtain the best comfort at the lowest energy consumption.<br>The lower the outdoor temperature, the earlier the heating cut-in. The lower the outdoor temperature, the later the heating cut-out.<br>The optimized heating cut-out time can be automatic or disabled. The calculated start and stop times are based on the setting of the optimizing time constant.* | |

See Appendix "Parameter ID overview"

Adjust the optimizing time constant.

The value consists of a two digit number. The two digits have the following meaning (digit 1 = Table I, digit 2 = Table II).

**OFF:** No optimization. The heating starts and stops at the times set in the schedule.

**10 ... 59:** See tables I and II.

Table I:

| Left digit | Heat accumulation of the building | System type |
|---|---|---|
| 1- | light | Radiator systems |
| 2- | medium | |
| 3- | heavy | |
| 4- | medium | Floor heating systems |
| 5- | heavy | |

Table II:

| Right digit | Dimensioning temperature | Capacity |
|---|---|---|
| -0 | -50 °C | large |
| -1 | -45 °C | · |
| · | · | · |
| -5 | -25 °C | normal |
| · | · | · |
| -9 | -5 °C | small |

**Dimensioning temperature:**
The lowest outdoor temperature (usually determined by your system designer in connection with the design of the heating system) at which the heating system can maintain the designed room temperature.

**Example**
The system type is radiator, and the heat accumulation of the building is medium.
The left digit is 2.
The dimensioning temperature is -25 °C, and the capacity is normal.
The right digit is 5.
Result:
The setting is to be changed to 25.

**MENU > Settings > Optimization**

| **Based on (optimization based on room / outdoor temp.)** | **1x020** |
|---|---|
| *The optimized start and stop time can be based on either room or outdoor temperature.* | |

See Appendix "Parameter ID overview"

**OUT:** Optimization based on outdoor temperature. Use this setting if the room temperature is not measured.

**ROOM:** Optimization based on room temperature, if measured.

**MENU > Settings > Optimization**

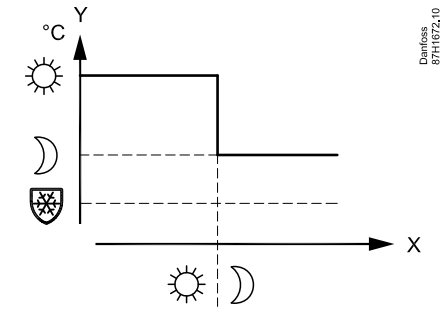
| **Total stop** | **1x021** |
|---|---|
| *Decide whether you want a total stop during the saving temperature period.* | |

See Appendix "Parameter ID overview"

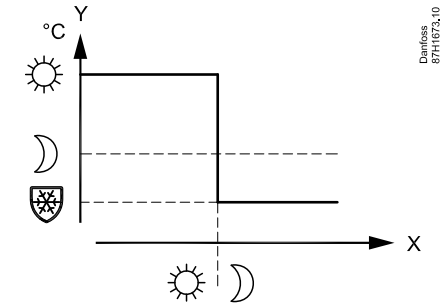
**OFF:** No total stop. The desired flow temperature is reduced according to:
- desired room temperature in saving mode
- auto saving

**ON:** The desired flow temperature is lowered to the set value in 'Frost pr.' The circulation pump is stopped but frost protection is still active, see 'P frost T'.

*Total stop = OFF*




*Total stop = ON*




*X = Time*
*Y = Desired flow temperature*
*= Comfort temperature*
*= Saving temperature*
*= Frost protection*

The min. flow temperature limitation ('Temp. min.') is overruled when 'Total stop' is ON.

**MENU > Settings > Optimization**

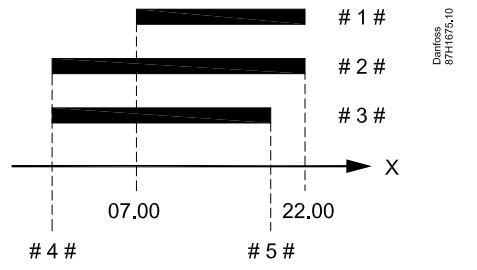
| **Pre-stop (optimized stop time)** | **1x026** |
|---|---|
| *Disable the optimized stop time.* | |

See Appendix "Parameter ID overview"

**OFF:** The optimized stop time is disabled.

**ON:** The optimized stop time is enabled.

*Example: Optimization of Comfort from 07:00 - 22:00*




*X = Time*
*# 1# = Schedule*
*# 2 # = Prestop = OFF*
*# 3 # = Prestop = ON*
*# 4 # = Optimized start*
*# 5 # = Optimized stop*

**MENU > Settings > Optimization**

| | |
|---|---|
| **Summer, cut-out (limit for heating cut-out)** | **1x179** |

See Appendix “Parameter ID overview”

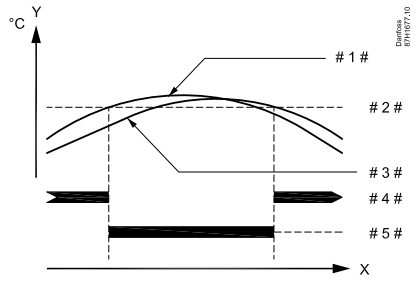
The heating can be switched OFF when the outdoor temperature is higher than the set value. The valve closes and after the post-run time, the heating circulation pump stops. ‘Temp. min.’ will be overruled.

The heating system switches ON again when the outdoor temperature and the accumulated (filtered) outdoor temperature become lower than the set limit.

This function can save energy.

Set the value for outdoor temperature at which you want the heating system to switch OFF.

*Summer, cut-out*




*X* = *Time*

*Y* = *Temperature*

*# 1#* = *Actual outdoor temperature*

*# 2 #* = *Cut-out temperature (1x179)*

*# 3 #* = *Accummulated (filtered) outdoor temperature*

*# 4 #* = *Heating enabled*

*# 5 #* = *Heating disabled*

The heating cut-out is only active when the controller mode is in scheduled operation. When the cut-out value is set to OFF, there is no heating cut-out.

## 5.7 Control parameters

**Control of valves M1 and M2**

The motorized control valves are controlled by means of 3-point control signal.
M1 is an ON / OFF valve.
M2 is a control valve.

The water flow through the control valve is managed by means of an electric actuator. The combination "actuator" and "control valve" is also called motorized control valve. The actuator can in this way gradually increase or decrease the flow in order to change the supplied energy. Different types of actuators are available.

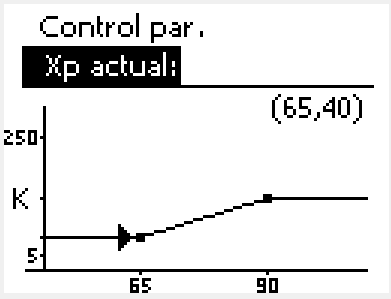
Control valve
The motorized control valve is opened gradually when the flow temperature is lower than the desired flow temperature and vice versa.

3-point controlled actuator:
The electric actuator contains a reversible gear-motor. Electric "open" and "close" signals come from the electronic outputs of the ECL Comfort controller in order to manage the control valve. The signals are in the ECL Comfort controller expressed as "Arrow-up" (open) and "Arrow-down" (close) and displayed at the valve symbol. When the flow temperature (for example at S3) is lower than the desired flow temperature, short open-signals come from the ECL Comfort controller in order to gradually increase the flow. By this, the flow temperature will align with the desired temperature. Oppositely, when the flow temperature is higher than the desired flow temperature, short close-signals come from the ECL Comfort controller in order to gradually reduce the flow. Again, the flow temperature aligns with the desired temperature.
Neither open-signals nor close-signals will come as long as the flow temperature corresponds to the desired temperature.

Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

**MENU > Settings > Control parameters**

| **Xp actual** |
|---|
| *'Xp actual' is the read-out of the actual Xp (proportional band) based on the supply temperature. Xp is determined by settings related to the supply temperature. Typically, the higher the supply temperature, the higher the Xp must be in order to achieve a stable temperature control.* |




| | |
|---|---|
| Xp setting range: | 5 ... 250 K |
| Fixed supply temperature settings: | 65 °C and 90 °C |
| Factory settings: | (65,40) and (90,120) |

This means that the 'Xp' is 40 K at 65 °C supply temperature, and 'Xp' is 120 K at 90 °C.

Set the desired Xp values at the two fixed supply temperatures.

If the supply temperature is not measured (the supply temperature sensor is not connected), the Xp value at the setting 65 °C is used.

**MENU > Settings > Control parameters**

| **Limit (return temp. limitation)** | **1x030** |
|---|---|
| *Set the return temperature value you accept for the system.* | |

See Appendix "Parameter ID overview"

When the return temperature falls below or gets higher than the set value, the controller automatically changes the desired flow / duct temperature to obtain an acceptable return temperature. The influence is set in 'Infl. - max.' and 'Infl. - min.'.

**MENU > Settings > Control parameters**

| **Adapt. time (adaptation time)** | **1x037** |
|---|---|
| *Controls how fast the return temperature adapts to the desired return temperature limit (Integration control).* | |

The adaptation function can correct the desired flow temperature with max. 8 K.

See Appendix "Parameter ID overview"

**OFF:** The control function is not influenced by the 'Adapt. time'.

**Minor value:** The desired temperature is adapted quickly.

**Major value:** The desired temperature is adapted slowly.

**MENU > Settings > Control parameters**

| P post-run | 1x040 |
|---|---|
| ***Heating applications:***<br>*The circulation pump in the heating circuit can be ON for a number of minutes (m) after heating stop. Heating stop is when the desired flow temperature gets lower than the setting in 'P heat T' (ID no. 1x078).*<br>***Cooling applications:***<br>*The circulation pump in the cooling circuit can be ON for a number of minutes (m) after cooling stop. Cooling stop is when the desired flow temperature gets higher than the setting in 'P cool T' (ID no. 1x070).*<br>*This P post-run function can utilize the remaining energy in for example a heat exchanger.* | |

See Appendix "Parameter ID overview"

**0:** The circulation pump stops immediately after heating or cooling stop.

**Value:** The circulation pump is ON for the set time after heating or cooling stop.

**MENU > Settings > Control parameters**

| Cont. T control | 1x054 |
|---|---|
| *The desired DHW heating / charging temperature can be lowered when the DHW heating / charging procedure has elapsed.* | |

See Appendix "Parameter ID overview"

**OFF:** The desired heating / charging temperature is lowered to 10 °C. Typically, the DHW is circulated through the DHW tank.

**ON:** The desired heating / charging temperature is lowered to the desired DHW temperature. Typically, the DHW is circulated through the heat exchanger in order to compensate for the heat loss in the DHW circulation pipe.

**MENU > Settings > Control parameters**

| P charge delay (Charging pump, delayed start) | 1x059 |
|---|---|
| *Conditions for switching the DHW heating / charging pump ON at DHW heating / charging demand.*<br>*Correct setting can avoid discharging.* | |

See Appendix "Parameter ID overview"

**OFF:** DHW heating / charging pump is switched ON when DHW heating / charging temperature is OK.

**0:** DHW heating / charging pump is switched ON.

**Value:** DHW heating / charging pump is switched ON after the set number of minutes.

When the setting "OFF" is selected, the temperature sensor for DHW heating / charging must be placed in the heat-exchanger.

**MENU > Settings > Control parameters**

| **Adapt. time (adaptation time)** | **1x065** |
|---|---|
| *When the pump is controlled at low speed (in pulsed mode) the regulation can be dampened. A too low dampening can result in unstable temperature regulation.* | |

See Appendix “Parameter ID overview”

**Low value:** Low dampening
**High value:** High dampening

**MENU > Settings > Control parameters**

| **Anti-bac. ret. T (Anti-bacteria, return temperature)** | **1x126** |
|---|---|
| *When anti-bacteria mode is active in the DHW circuit, the DHW circulation circuit can run at a set temperature. The setting of 'Anti-bac. ret. T' will not cause a change of the 'Desired T' as anti-bacteria temperature.* | |

See Appendix “Parameter ID overview”

**MENU > Settings > Control parameters**

| **V out max.** | **1x165** |
|---|---|
| *The output voltage can be limited to a maximum value.* | |

See Appendix “Parameter ID overview”

The value in % expresses the maximum voltage for the output in question.

**Example**
A setting of 60% means that the output voltage will be 6 volt as a maximum.

**MENU > Settings > Control parameters**

| **V out min.** | **1x167** |
|---|---|
| *The output voltage can be limited to a minimum value.* | |

See Appendix “Parameter ID overview”

The value in % expresses the minimum voltage for the output in question.

**Example**:
A setting of 20% means that the output voltage will be 2 volt as a minimum.

The setting 'Reverse out' has no influence on the 'V out max’ or ‘V out min' settings.

The 'V out min' setting has higher priority than 'V out max'.

**MENU > Settings > Control parameters**

| Reverse out | 1x171 |
|---|---|
| *The analog output (0-10 volt) can be a rising or a falling voltage for rising heating demand.* | |

See Appendix "Parameter ID overview"

**ON:** The analog output voltage will fall at a rising heating demand.

**OFF:** The analog output voltage will rise at a rising heating demand.

**MENU > Settings > Control parameters**

| Motor pr. (motor protection) | 1x174 |
|---|---|
| *Prevents the controller from unstable temperature control (and resulting actuator oscillations). This can occur at very low load. The motor protection increases the lifetime of all involved components.* | |

See Appendix "Parameter ID overview"

**OFF:** Motor protection is not activated.

**Value:** Motor protection is activated after the set activation delay in minutes.

Recommended for duct systems with variable load.

**MENU > Settings > Control parameters**

| Xp (proportional band) | 1x184 |
|---|---|

See Appendix "Parameter ID overview"

Set the proportional band. A higher value will result in a stable but slow control of the flow temperature.

When using the parameter for pump speed control:
A higher value will result in a stable, but slow control of the speed.

**MENU > Settings > Control parameters**

| Tn (integration time constant) | 1x185 |
|---|---|

See Appendix "Parameter ID overview"

Set a high integration time constant (in seconds) to obtain a slow but stable reaction to deviations.

A low integration time constant will make the controller react fast but with less stability.

When using the parameter for pump speed control:
Set a higher value (in seconds) to obtain a slow, but stable reaction to deviations.
A low integration time constant will make the controller react fast, but with less stability.

**MENU > Settings > Control parameters**

| M run (running time of the motorized control valve) | 1x186 |
|---|---|
| *'M run' is the time in seconds it takes the controlled component to move from fully closed to fully open position.* | |

See Appendix "Parameter ID overview"

Set the 'M run' according to the examples or measure the running time by means of a stop watch.

**How to calculate the running time of a motorized control valve**
The running time of the motorized control valve is calculated using the following methods:

**Seated valves**

Running time = Valve stroke (mm) x actuator speed (sec. / mm)

*Example: 5.0 mm x 15 sec. / mm = 75 sec.*

**Rotating valves**

Running time = Turning degrees x actuator speed (sec. / degr.)

*Example: 90 degr. x 2 sec. / degr. = 180 sec.*

The setting "M run" is not present when the valve is controlled by means of a 0 - 10 volt signal.

**MENU > Settings > Control parameters**

| Nz (neutral zone) | 1x187 |
|---|---|
| *When the actual flow temperature is within the neutral zone, the controller does not activate the motorized control valve.* | |

See Appendix "Parameter ID overview"

Set the acceptable flow temperature deviation.

Set the neutral zone to a high value if you can accept a high variation in flow temperature.

When using the parameter for pump speed control:
Set the acceptable temperature deviation.
When the actual temperature is within the neutral zone, the controller does not change the pump speed.

The neutral zone is symmetrical around the desired flow temperature value, i.e. half the value is above and half the value is below this temperature.

**MENU > Settings > Control parameters**

| Min. act. time (min. activation time gear motor) | 1x189 |
|---|---|
| *The min. pulse period of 20 ms (milliseconds ) for activation of the gear motor.* | |

See Appendix "Parameter ID overview"

| Setting example | Value x 20 ms |
|---|---|
| 2 | 40 ms |
| 10 | 200 ms |
| 50 | 1000 ms |

The setting should be kept as high as acceptable to increase the lifetime of the actuator (gear motor).

**MENU > Settings > Control parameters**

| Wake up level | 1x330 |
|---|---|
| *The %-value reflects how much M1 opens the control valve at Bypass activation.*<br>*The control valve must be opened properly to ensure an acceptable water flow in the supply pipe; readjust the setting, if needed.* | |

See Appendix "Parameter ID overview"

**Value:** Set the %-opening of the control valve.

**MENU > Settings > Control parameters**

| Level | 1x353 |
|---|---|
| *Change in water flow more than set value will make further activation of the control valve.* | |

See Appendix "Parameter ID overview"

**MENU > Settings > Control parameters**

| CW influence (Cold Water influence) | 1x354 |
|---|---|
| *The cold water flow (measured by Cold Water meter F1) can influence the DHW temperature control by overriding the control of the motorized control valve. By this, the temperature control is pro-active and compensates for the delay before the flow temperature sensor S4 measures a change in temperature.*<br>*The value expresses how many % of 100 liters / hour will do an influence on the motorized control valve.* | |

See Appendix "Parameter ID overview"

**Low value:** Minor influence

**High value:** Major influence

**MENU > Settings > Control parameters**

| Max. return T | 1x370 |
|---|---|
| *Setting the maximum return temperature value for the DHW return circulation at S9.*<br>*When the return temperature gets lower than the set value, the speed of the DHW circulation pump can be increased.* | |

See Appendix "Parameter ID overview"

**Value:** Desired max. return temperature.

**MENU > Settings > Control parameters**

| Reduced des. T (Reduced desired temperature) | 1x375 |
|---|---|
| *If the temperature at S3 falls more than set value below the desired charging temperature, the speed of V2 will be reduced.* | |

See Appendix "Parameter ID overview"

**Example:**

| | |
|---|---|
| Desired charging temperature: | 60 °C |
| Reduced des. T: | -2 K |
| Result: | When S3 temperature gets lower than 58 °C, the control valve M1 will gradually open/ the speed of the control pump P1 / V1 will be increased. |

**MENU > Settings > Control parameters**

| PWM period | 1x565 |
|---|---|
| *When the pump is controlled at low speed (in pulsed mode) the set value reflects the reaction time of the pump, the water flow and the temperature sensor. A too low value can result in unstable temperature regulation.* | |

See Appendix "Parameter ID overview"

**Value:** Reaction time

**MENU > Settings > Control parameters**

| Charge start diff. | 1x571 |
|---|---|
| *Setting of temperature difference between S2 and desired temperature at S6.* | |

See Appendix "Parameter ID overview"

Note: Difference should not be less than 2K.

**Value:** 0 - 40 K (2 K)

**MENU > Settings > Control parameters**

| ΔT primary | 1x575 |
|---|---|
| *The pump P4 / V4 will be controlled to keep the difference between S5 and S8 according to ΔT + 3K.* | |

See Appendix "Parameter ID overview"

**Value:** 2 - 50 K (8 K)

**MENU > Settings > Control parameters**

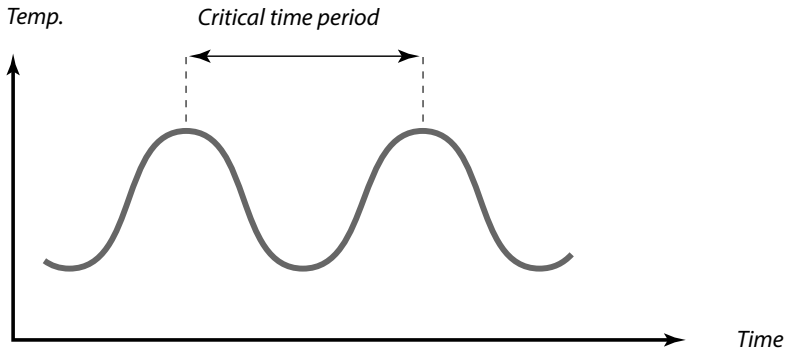
| Await time | 1x700 |
|---|---|
| *Time to be elapsed before stopping pump P2 when S2 is going below limit.* | |

See Appendix "Parameter ID overview"

**Value:** 5 - 250 s (30 s)

**If you want to tune the PI regulation precisely, you can use the following method:**

- Set the 'Tn' (integration time constant) to its max. value (999 sec.).
- Decrease the value for the 'Xp' (proportional band) until the system starts hunting (i.e. gets unstable) with a constant amplitude (it might be necessary to force the system by setting an extreme low value).
- Find the critical time period on the temperature recorder or use a stop watch.




This critical time period will be characteristic for the system, and you can evaluate the settings from this critical period.

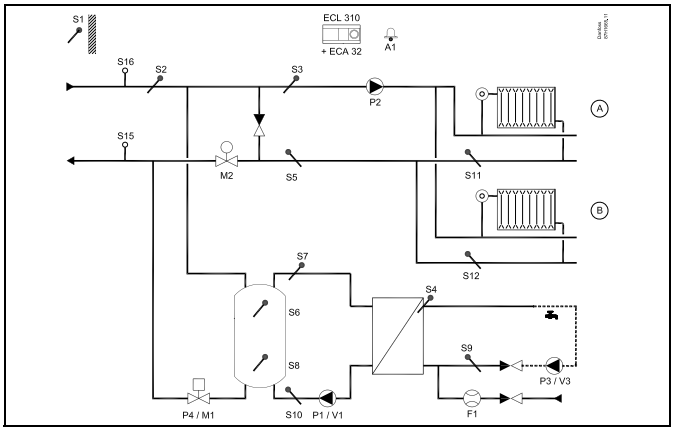
'Tn' = 0.85 x critical time period

'Xp' = 2.2 x proportional band value in the critical time period

If the regulation seems to be too slow, you can decrease the proportional band value by 10%. Make sure there is a consumption when you set the parameters.

## 5.8 Flow meter

A flow meter, F1, measures the Cold Water flow to the heat-exchanger. The signal form is pulses. The pulses are applied to "Pulse in 1" on the ECA 32 / 35 module.
The water flow can be displayed in l / h (liters / hour) or m3 / h (cubic meters / hour).




Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

**MENU > Settings > Flow meter**

| **Actual** |
|---|
| *Actual cold water flow.*<br>*The value is based on the setting "Pulse" (1x114) and applied pulse signal.* |

**MENU > Settings > Flow meter**

| **Pulse** | **1x114** |
|---|---|
| *The value tells how many pulses from the flow meter are related to one ml (milli-liter) or l (liter).*<br>*The setting determines the read-out value in "Actual".*<br>*An example: Value 20 means that 20 pulses represent 1 milli-liter or 1 liter.* | |

**1 - 9999:** Number of pulses to represent one milli-liter or one liter

**MENU > Settings > Flow meter**

| **Units** | **1x115** |
|---|---|
| *Setting the unit (milli-liter or liter) for the pulse basis and desired unit (l/h or m3/h) for the read-out of actual flow.* | |

**Example 1** for "Pulse" and "Unit" settings:

| | |
|---|---|
| Pulse | 75 |
| Units | ml, l/h |
| 75 pulses from flow meter represents 1 ml (milli-liter)<br>Read-out of actual flow will be expressed as l / h (liters per hour)<br>If applied pulses have a frequency of 8 Hz (8 pulses per second) the read-out of actual flow will be:<br>Liter x 3600 x 8 / 75 = 384 l / h | |

**Example 2** for "Pulse" and "Unit" settings:

| | |
|---|---|
| Pulse | 75 |
| Units | l, l/h |
| 75 pulses from flow meter represents 1 l (liter)<br>Read-out of actual flow will be expressed as l / h (liters per hour)<br>If applied pulses have a frequency of 8 Hz (8 pulses per second) the read-out of actual flow will be:<br>Milli-liter x 3600 x 8 / 75 = 384 ml / h = 0.384 l / h | |

**Example 3** for "Pulse" and "Unit" settings:

| | |
|---|---|
| Pulse | 75 |
| Units | ml, m3/h |
| 75 pulses from flow meter represents 1 ml (milli-liter)<br>Read-out of actual flow will be expressed as m3 / h (cubic meters per hour)<br>If applied pulses have a frequency of 8 Hz (8 pulses per second) the read-out of actual flow will be:<br>Milli-liter x 3600 x 8 / 75 = 384 ml / h<br>= 0.384 l / h<br>= 0.000384 m3 / h<br>= 0.0 m3 / h | |

**Example 4** for "Pulse" and "Unit" settings:

| | |
|---|---|
| Pulse | 75 |
| Units | l, m3/h |
| 75 pulses from flow meter represents 1 l (liter)<br>Read-out of actual flow will be expressed as m3 / h (cubic meters per hour)<br>If applied pulses have a frequency of 8 Hz (8 pulses per second) the read-out of actual flow will be:<br>Liter x 3600 x 8 / 75 = 384 l / h<br>= 384 l / h<br>= 0.384 m3 / h<br>= 0.4 m3 / h | |

## 5.9 Application

The section "Application" describes specific application related issues.
Some of the parameter descriptions are universal for different application keys.

Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

**MENU > Settings > Application**

| **ECA addr. (ECA address, choice of Remote Control Unit)** | **1x010** |
|---|---|
| *Decides the room temperature signal transfer and communication with the Remote Control Unit.* | |

See Appendix “Parameter ID overview”

**OFF:** No Remote Control Unit. Only room temperature sensor, if any.

**A:** Remote Control Unit ECA 30 / 31 with address A.

**B:** Remote Control Unit ECA 30 / 31 with address B.

The Remote Control Unit must be set accordingly (A or B).

**MENU > Settings > Application**

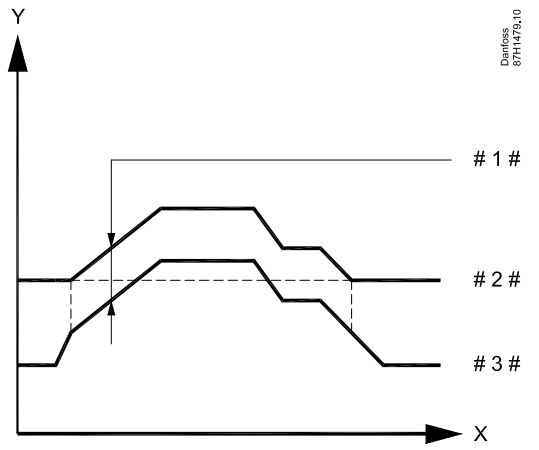
| **Demand offset** | **1x017** |
|---|---|
| *The desired flow temperature in heating circuit 1 can be influenced by the demand for a desired flow temperature from another controller (slave) or another circuit.* | |

See Appendix “Parameter ID overview”

**OFF:** The desired flow temperature in circuit 1 is not influenced by the demand of any other controller (slave or circuit 2).

**Value:** The desired flow temperature is increased by the set value in ‘Demand offset’, if the demand of the slave / circuit 2 is higher.

***Heating application***




*X* = *Time*

*Y* = *Desired flow temperatures*

*# 1 #* = *Demand offset*

*# 2 #* = *Desired flow temperature, master*

*# 3 #* = *Desired flow temperature, slave*

The function of ‘Demand offset’ can compensate for heat losses between master and slave controlled systems.

'Demand offset' with a value is to be used in the Master controller only.

When setting "Demand offset" to a value, the return temperature limitation will react according to the highest limitation value (Heating / DHW).

**MENU > Settings > Application**

| **P exercise (pump exercise)** | **1x022** |
|---|---|
| *Exercises the pump to avoid blocking in periods without heating / cooling demand.* | |

See Appendix “Parameter ID overview”

**OFF:** The pump exercise is not active.

**ON:** The pump is switched ON for 1 minute every third day at noon (12:14 hours).

**MENU > Settings > Application**

| M exercise (valve exercise) | 1x023 |
|---|---|
| *Exercises the valve to avoid blocking in periods without heating / cooling demand.* | |

See Appendix "Parameter ID overview"

**OFF:** The valve exercise is not active.

**ON:** The valve opens for 7 minutes and closes for 7 minutes every third day at noon (12:00 hours).

**MENU > Settings > Application**

| P post-run | 1x040 |
|---|---|
| ***Heating applications:***<br>*The circulation pump in the heating circuit can be ON for a number of minutes (m) after heating stop. Heating stop is when the desired flow temperature gets lower than the setting in 'P heat T' (ID no. 1x078).*<br>***Cooling applications:***<br>*The circulation pump in the cooling circuit can be ON for a number of minutes (m) after cooling stop. Cooling stop is when the desired flow temperature gets higher than the setting in 'P cool T' (ID no. 1x070).*<br>*This P post-run function can utilize the remaining energy in for example a heat exchanger.* | |

See Appendix "Parameter ID overview"

**0:** The circulation pump stops immediately after heating or cooling stop.

**Value:** The circulation pump is ON for the set time after heating or cooling stop.

**MENU > Settings > Application**

| DHW P post-run (DHW pump, post-run) | 1x041 |
|---|---|
| *Set the DHW pump post-run time (minutes). The DHW pump can continue to be switched ON after the DHW heating procedure in order to utilize the remaining heat in the heat exchanger / boiler.* | |

See Appendix "Parameter ID overview"

**Value:** Set the number of minutes for the post-run.

**MENU > Settings > Application**

| P demand | 1x050 |
|---|---|
| *The circulation pump in the master circuit can be controlled in relation to the master circuit's demand or slave circuit's demand.* | |

The circulation pump is always controlled according to frost protection conditions.

See Appendix "Parameter ID overview"

**Heating applications:**

**OFF:** The circulation pump is ON when the desired flow temperature in the heating circuit is higher than the value set in 'P heat T'.

**ON:** The circulation pump is ON when the desired flow temperature from slaves is higher than the value set in 'P heat T'.

**Cooling applications:**

**OFF:** The circulation pump is ON when the desired flow temperature in the cooling circuit is lower than the value set in 'P cool T'.

**ON:** The circulation pump is ON when the desired flow temperature from slaves is lower than the value set in 'P cool T'.

**MENU > Settings > Application**

| DHW priority (closed valve / normal operation) | 1x052 |
|---|---|
| *The heating circuit can be closed when the controller acts as slave and when DHW heating / charging is active in the master.* | |

This setting must be considered if this controller is a slave.

See Appendix "Parameter ID overview"

**OFF:** The flow temperature control remains unchanged during active DHW heating / charging in the master controller.

**ON:** The valve in the heating circuit is closed* during active DHW heating / charging in the master controller.
** The desired flow temperature is set to the value set in 'Frost pr. T'*

**MENU > Settings > Application**

| P frost T (circulation pump, frost protection temp.) | 1x077 |
|---|---|
| *Frost protection, based on the outdoor temperature.*<br>*When the outdoor temperature gets below the set temperature value in 'P frost T', the controller automatically switches ON the circulation pump (for example P1 or X3) to protect the system.* | |

Under normal conditions, your system is not frost protected if your setting is below 0 °C or OFF.
For water-based systems, a setting of 2 °C is recommended.

If the outdoor temperature sensor is not connected and the factory setting has not been changed to 'OFF', the circulation pump is always ON.

See Appendix "Parameter ID overview"

**OFF:** No frost protection.

**Value:** Circulation pump is ON when the outdoor temperature is below the set value.

**MENU > Settings > Application**

| P heat T (heat demand) | 1x078 |
|---|---|
| *When the desired flow temperature is above the set temperature in 'P heat T', the controller automatically switches ON the circulation pump.* | |

See Appendix "Parameter ID overview"

**Value:** The circulation pump is switched ON when the desired flow temperature is above the set value.

The valve is fully closed as long as the pump is not switched on.

**MENU > Settings > Application**

| Frost pr. T (frost protection temp.) | 1x093 |
|---|---|
| *Set the desired flow temperature at temperature sensor S3 to protect the system against frost (at heating cut-out, total stop etc.).*<br>*When the temperature at S3 gets lower than the setting, the motorized control valve opens gradually.* | |

See Appendix "Parameter ID overview"

The frost protection temperature can also be set in your favorite display when the mode selector is in frost protection mode.

**Override mode functions:**

The following settings describe the function in general for the ECL Comfort 210 / 296 / 310 series. The explained modes are typical and not application related. They might differ from the override modes in your application.

**MENU > Settings > Application**

| **Ext. input (external override)** | **1x141** |
|---|---|
| *Choose the input for 'Ext. input' (external override). By means of a switch the controller can be overridden to 'Comfort', 'Saving', 'Frost protection' or 'Constant temperature' mode.* | |

See Appendix "Parameter ID overview"

**OFF:** No inputs have been selected for external override.

**S1 ... S16:** Input selected for external override.

If S1... S6 is chosen as override input, the override switch must have gold-plated contacts.
If S7 ... S16 is chosen as override input, the override switch can be a standard contact.

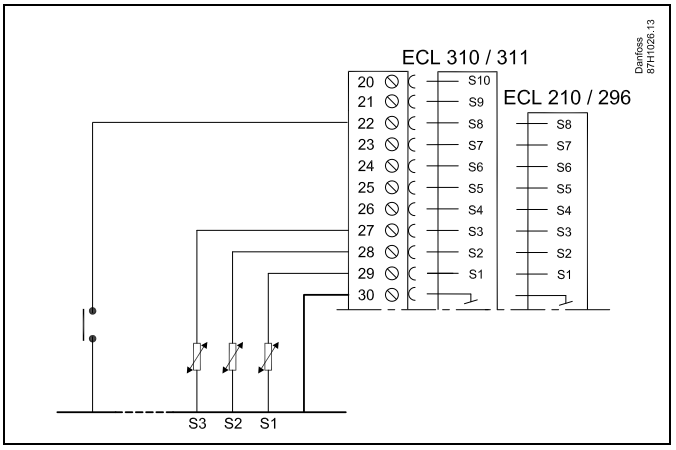
See the drawings for connection examples of override switch and override relay to input S8.

S7...S16 are recommended for override switch.

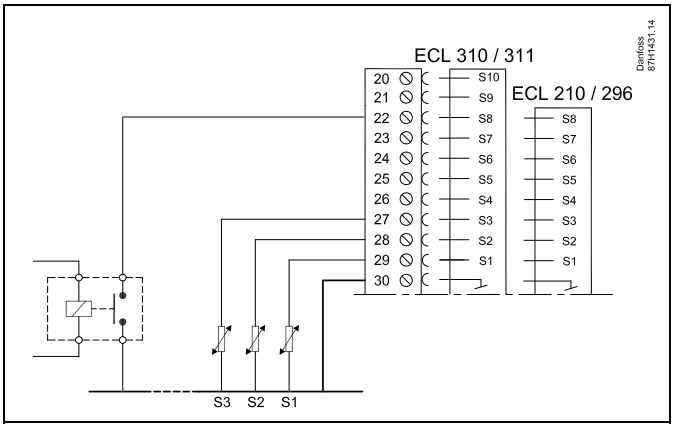
If ECA 32 is mounted, also S11... S16 can be used.

If ECA 35 is mounted, also S11 or S12 can be used.

Example: Connection of an override switch




Example: Connection of an override relay




Choose only an unused input for override. If an already used input is applied for override, the functionality of this input is also neglected.

See also 'Ext. mode'.

**MENU > Settings > Application**

| **Ext. mode (external override mode)** | **1x142** |
|---|---|
| *The mode override can be activated for Saving, Comfort, Frost pr. or Constant T mode.*<br>*For override, the controller mode must be in scheduled mode.* | |

See Appendix “Parameter ID overview”

Choose an override mode:

**SAVING:** The circuit in question is in saving mode when the override switch is closed.

**COMFORT:** The circuit in question is in comfort mode when the override switch is closed.

**FROST PR.:** The heating or DHW circuit closes, but is still frost protected.

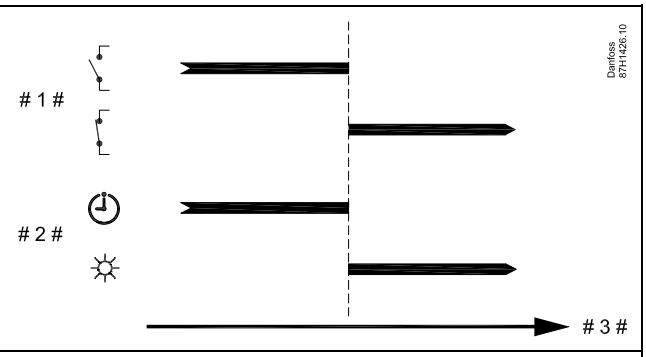
**CONSTANT T:** The circuit in question controls a constant temperature *)

*) See also 'Desired T' (1x004), setting of desired flow temperature (MENU > Settings > Flow temperature)
See also ' Con. T, ret. T lim.' (1x028), setting of return temperature limitation (MENU > Settings > Return limit)

The process diagrams show the functionality.

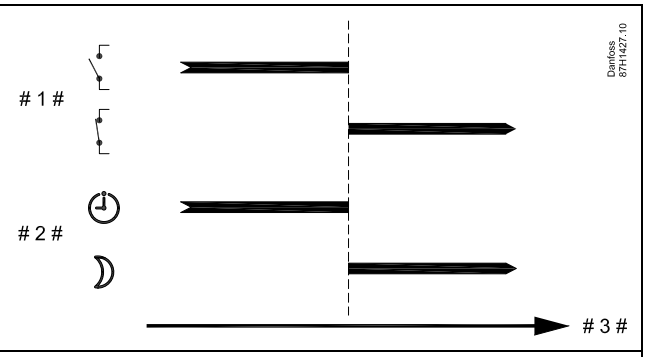
See also ‘Ext. input’.

Example: Override to Comfort mode




# 1 # = Override switch (not activated / activated)
# 2 # = Function mode (Schedule / Comfort)
# 3 # = Time

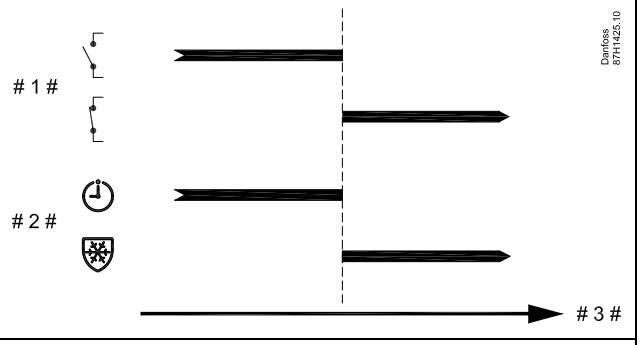
Example: Override to Saving mode




# 1 # = Override switch (not activated / activated)
# 2 # = Function mode (Schedule / Saving)
# 3 # = Time

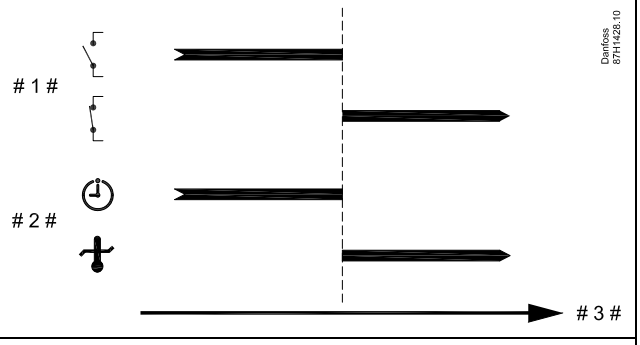
The result of override to 'Saving' mode depends on the setting in 'Total stop'.
Total stop = OFF: Heating reduced
Total stop = ON: Heating stopped

Example: Override to Frost protection mode




# 1 # = Override switch (not activated / activated)
# 2 # = Function mode (Schedule / Frost pr.)
# 3 # = Time

Example: Override to Constant temperature mode




# 1 # = Override switch (not activated / activated)
# 2 # = Function mode (Schedule / Const. T)
# 3 # = Time

The "Const. T" value can be influenced by:

- temp. max.
- temp. min.
- room temp. limit
- return temp. limit
- flow / power limit

**MENU > Settings > Application**

| **Retry time** | **1x310** |
|---|---|
| *If an alarm has been generated for the pump or alarms have been generated for both pumps, this setting will determine the time between the time of the alarm and the retry time for repeated pump start.* | |

See Appendix “Parameter ID overview”

**OFF:** No retry time required after an alarm. The pump or pumps in question will not be restarted.

**1 ... 99:** After an alarm, the pump or pumps will be restarted after the set time.

**MENU > Settings > Application**

| **Pump start diff.** | **1x371** |
|---|---|
| *Charging pump P2 is switched ON when supply temperature S2 gets higher than ('Desired buffer temperature' + 'Pump start diff.').*<br>*Example: 60 °C + 3 K = 63 °C* | |

See Appendix “Parameter ID overview”

**MENU > Settings > Application**

| **Send desired T** | **1x500** |
|---|---|
| *When the controller acts as a slave controller in a master / slave system, information about the desired flow temperature can be sent to the master controller via the ECL 485 bus.*<br>*Stand-alone controller:*<br>*Sub-circuits can send the desired flow temperature to the master circuit.* | |

See Appendix “Parameter ID overview”

**OFF:** Information about the desired flow temperature is not sent to the master controller.

**ON:** Information about the desired flow temperature is sent to the master controller.

In the master controller, 'Demand offset' must be set to a value in order to react on a desired flow temperature from a slave controller.

When the controller acts as a slave, its address must be 1, 2, 3 ... 9 in order to send the desired temperature to the master (see the section ‘Miscellaneous’, ‘Several controllers in the same system’).

### 5.10 Heat cut-out

**MENU > Settings > Heat cut-out**

The setting “Summer cut-out” under “Optimization” for the heating circuit in question determines a heating cut-out when the outdoor temperature exceeds the set value.

A filtering constant for calculating the accumulated outdoor temperature is internally set to a value of "250". This filtering constant represents an average building with solid outer and inner walls (bricks).

An option for differentiated cut-out temperatures, based on a set summer period, can be utilized in order to avoid discomfort at falling outdoor temperature. Furthermore, separate filtering constants can be set.

The factory set values for Summer period start and Winter period start are set to same date: May, 20 (Date = 20, Month = 5).
This means:

- "Differentiated cut-out temperatures" are disabled (not active)
- Separate "Filtering constant" values are disabled (not active)

In order to enable differentiated

- cut-out temperature based on summer / winter period
- filtering constants

the start dates for the periods must be different.

### 5.10.1 Differentiated heat cut-out

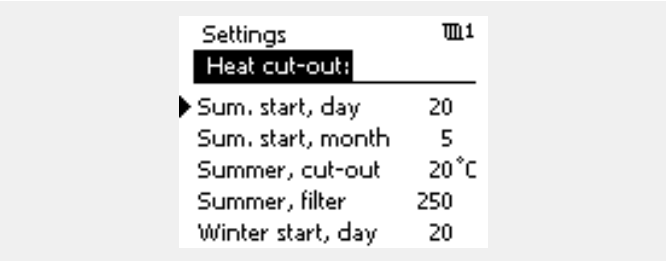
To set differentiated cut-out parameters for a heating circuit for "Summer" and "Winter" go to "Heat cut-out":
(MENU > Settings > Heat cut-out)
This function is active when the dates for "Summer" and "Winter" are different in the "Heat cut-out" menu.

Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

**MENU > Settings > Heat cut-out**

| **Extended heat cut-out setting** | | | |
|---|---|---|---|
| *Parameter* | *ID* | *Setting range* | *Factory setting* |
| **Summer day** | **1x393** | * | * |
| **Summer month** | **1x392** | * | * |
| **Summer cut-out** | **1x179** | * | * |
| **Summer filter** | **1x395** | * | * |

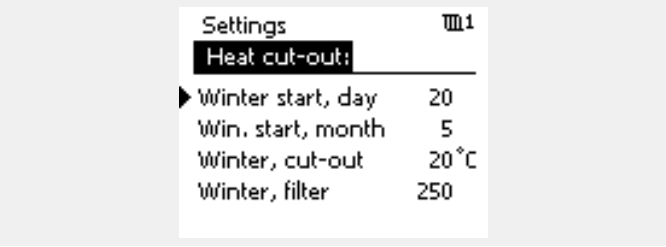
See Appendix "Parameter ID overview"




**MENU > Settings > Heat cut-out**

| **Extended winter cut-out setting** | | | |
|---|---|---|---|
| *Parameter* | *ID* | *Setting range* | *Factory setting* |
| **Winter day** | **1x397** | * | * |
| **Winter month** | **1x396** | * | * |
| **Winter cut-out** | **1x398** | * | * |
| **Winter filter** | **1x399** | * | * |

See Appendix "Parameter ID overview"




The above settings of the dates for the cut-out function are only to be done in the heating circuit 1 and are valid for other heating circuits in the controller as well, if applicable.

The cut-out temperatures as well as the filter constant are to be set individually per heating circuit.

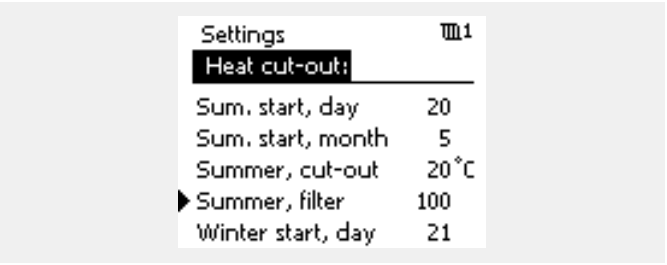
The heating cut-out is only active when the controller mode is in scheduled operation. When the cut-out value is set to OFF, there is no heating cut-out.

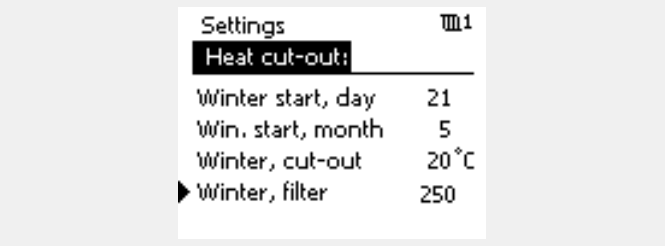
#### 5.10.2 Summer/winter filter constant

The filter constant of 250 is applicable for average buildings. A filter constant of 1 is close switching according to actual outdoor temperature meaning low filtering (very “light” building).

A filter constant of 300 is then to be chosen if a big filtering is needed (very heavy building).

For heating circuits where the heat cut-out is demanded according to the same outdoor temperature for the whole year, but different filtering is wanted, different dates have to be set in the “Heat cut-out” menu enabling a selection of a filter constant different from the factory setting.
These different values have to be set in both the “Summer” and “Winter” menu.



## 5.11 Tank temperature

**MENU > Settings > Tank temperature**

| Demand offset (for tank (buffer) temperature) | 1x017 |
|---|---|
| *The desired tank temperature at S6 is increased with a number of degrees, based on the desired DHW temperature at S4.* | |

See Appendix “Parameter ID overview”

**Value:** Set the number of degrees to increase the desired tank (buffer) temperature.

**MENU > Settings > Tank temperature**

| Temp. min. (Minimum temperature) | 1x177 |
|---|---|
| *Setting the min. tank (buffer) temperature for the system. The desired tank temperature will not be lower than this setting.* | |

See Appendix “Parameter ID overview”

**Value:** Minimum tank (buffer) temperature

**MENU > Settings > Tank temperature**

| Temp. max. (Maximum temperature) | 1x178 |
|---|---|
| *Setting the max. tank (buffer) temperature for the system. The desired tank temperature will not be higher than this setting.* | |

See Appendix “Parameter ID overview”

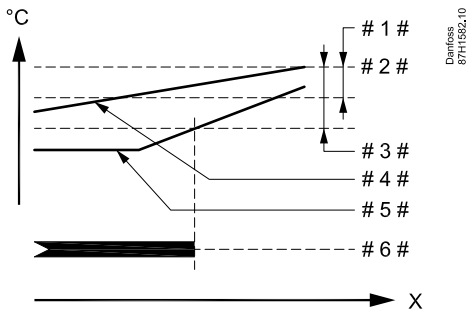
**Value:** Maximum tank (buffer) temperature

**MENU > Settings > Tank temperature**

| **Stop difference** | **1x194** |
|---|---|
| *Setting the number of degrees below the desired tank (buffer) temperature, and measured by the lower tank temperature sensor, that will stop the tank charging.*<br>***NOTE**: When condition for stop, related to the lower tank temperature sensor, is present, the charging stop is done when the upper tank temperature sensor measures a higher temperature than the start difference level.* | |

See Appendix “Parameter ID overview”

**Value:** Difference for charging-stop




*X* = *Time*

*# 1 #* = *Start difference (ID 12195)*

*# 2 #* = *Desired DHW temperature*

*# 3 #* = *Stop difference (ID 12194)*

*# 4 #* = *Actual tank temperature, upper (S6)*

*# 5 #* = *Actual tank temperature, lower (S8)*

*# 6 #* = *Tank charging activity*

**Example:**

| | |
|---|---|
| Desired tank (buffer) temp. = | Desired DHW temp. + 'Demand offset' |
| Desired tank (buffer) temp. = | 55 °C + 4 K = 59 °C |
| Stop difference: | -8 K |

Result:
The tank charging stops when the temperature measured by the lower tank temperature sensor S8 gets higher than 51 °C.

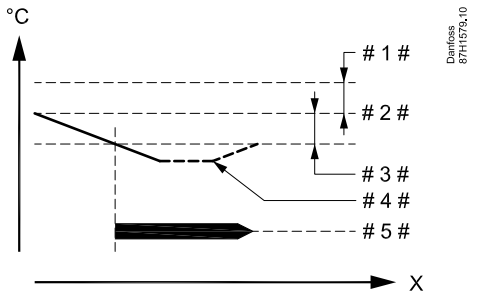
When only one tank temperature sensor (S6) is used, the 'Stop difference' value should typically be a positive value.

**MENU > Settings > Tank temperature**

| **Start difference** | **1x195** |
|---|---|
| *Setting the number of degrees below the desired tank (buffer) temperature, and measured by the upper tank temperature sensor, that will start the tank charging.* | |

See Appendix “Parameter ID overview”

**Value:** Difference for charging-start




*X* = *Time*

*# 1 #* = *Demand offset (ID 12017)*

*# 2 #* = *Desired DHW temperature*

*# 3 #* = *Start difference (ID 12195)*

*# 4 #* = *Actual tank temperature (S6)*

*# 5 #* = *Tank charging activity*

**Example:**

| | |
|---|---|
| Desired tank (buffer) temp. = | Desired DHW temp. + 'Demand offset' |
| Desired tank (buffer) temp. = | 55 °C + 4 K = 59 °C |
| Start difference: | -3 K |

Result:
The tank charging starts when the temperature measured by the tank temperature sensor (upper) is lower than 56 °C.

## 5.12 X3 control

**MENU > Settings > X3 control**

| **Stop difference** | **1x194** |
|---|---|
| *When return temperature S7 gets lower than buffer temperature S8, the water is directed to buffer-bottom.*<br>*The set difference for S7 determines the X3 change-over to buffer-bottom (X3 = OFF).*<br>***Formula:*** *S7 + diff < S8 => X3 goes OFF* | |

See Appendix “Parameter ID overview”

**Value:** Set the difference for X3 direction "Buffer-bottom"

**Example 1**

| | |
|---|---|
| "Stop difference": | 5 K |
| S8 = | 45 °C |
| When (S7 + "Stop difference") gets lower than 45 °C, X3 changes to buffer-bottom.<br>Result: When S7 gets lower than 40 °C, X3 changes to buffer-bottom. | |

**Example 2**

| | |
|---|---|
| "Stop difference": | -2 K |
| S8 = | 45 °C |
| When (S7 + "Stop difference") gets lower than 45 °C, X3 changes to buffer-bottom.<br>Result: When S7 gets lower than 47 °C, X3 changes to buffer-bottom. | |

**MENU > Settings > X3 control**

| **Start difference** | **1x195** |
|---|---|
| *When return temperature S7 gets higher than buffer temperature S8, the water is directed to buffer-mid.*<br>*The set difference for S7 determines the X3 change-over to buffer-mid (X3 = ON).*<br>***Formula:*** *S7 + diff > S8 => X3 goes ON* | |

See Appendix “Parameter ID overview”

**Value:** Set the difference for X3 direction "Buffer-mid"

**Example 1**

| | |
|---|---|
| "Start difference": | -2 K |
| S8 = | 45 °C |
| When (S7 + "Start difference") gets higher than 45 °C, X3 changes to buffer-mid.<br>Result: When S7 gets higher than 47 °C, X3 changes to buffer-mid. | |

**Example 2**

| | |
|---|---|
| "Start difference": | -5 K |
| S8 = | 45 °C |
| When (S7 + "Stop difference") gets lower than 45 °C, X3 changes to buffer-mid.<br>Result: When S7 gets higher than 50 °C, X3 changes to buffer-mid. | |

## 5.13 Pump control

**MENU > Settings > Pump control**

| P post-run | 1x040 |
|---|---|
| ***Heating applications:***<br>*The circulation pump in the heating circuit can be ON for a number of minutes (m) after heating stop. Heating stop is when the desired flow temperature gets lower than the setting in 'P heat T' (ID no. 1x078).*<br>***Cooling applications:***<br>*The circulation pump in the cooling circuit can be ON for a number of minutes (m) after cooling stop. Cooling stop is when the desired flow temperature gets higher than the setting in 'P cool T' (ID no. 1x070).*<br>*This P post-run function can utilize the remaining energy in for example a heat exchanger.* | |

See Appendix "Parameter ID overview"

**0:** The circulation pump stops immediately after heating or cooling stop.

**Value:** The circulation pump is ON for the set time after heating or cooling stop.

**MENU > Settings > Pump control**

| Adapt. time (adaptation time) | 1x065 |
|---|---|
| *When the pump is controlled at low speed (in pulsed mode) the regulation can be dampened. A too low dampening can result in unstable temperature regulation.* | |

See Appendix "Parameter ID overview"

**Low value:** Low dampening

**High value:** High dampening

**MENU > Settings > Pump control**

| V out max. | 1x165 |
|---|---|
| *The output voltage can be limited to a maximum value.* | |

See Appendix "Parameter ID overview"

The value in % expresses the maximum voltage for the output in question.

**Example**
A setting of 60% means that the output voltage will be 6 volt as a maximum.

**MENU > Settings > Pump control**

| V out min. | 1x167 |
|---|---|
| *The output voltage can be limited to a minimum value.* | |

See Appendix "Parameter ID overview"

The value in % expresses the minimum voltage for the output in question.

**Example**:
A setting of 20% means that the output voltage will be 2 volt as a minimum.

The setting 'Reverse out' has no influence on the 'V out max' or 'V out min' settings.

The 'V out min' setting has higher priority than 'V out max'.

**MENU > Settings > Pump control**

| Reverse out | 1x171 |
|---|---|
| *The analog output (0-10 volt) can be a rising or a falling voltage for rising cooling demand.* | |

See Appendix "Parameter ID overview"

**OFF:** The analog output voltage will fall at a rising cooling demand.

**ON:** The analog output voltage will rise at a rising cooling demand.

**MENU > Settings > Pump control**

| Xp (proportional band) | 1x184 |
|---|---|

See Appendix "Parameter ID overview"

Set the proportional band. A higher value will result in a stable but slow control of the flow temperature.

When using the parameter for pump speed control:
A higher value will result in a stable, but slow control of the speed.

**MENU > Settings > Pump control**

| Tn (integration time constant) | 1x185 |
|---|---|

See Appendix "Parameter ID overview"

Set a high integration time constant (in seconds) to obtain a slow but stable reaction to deviations.

A low integration time constant will make the controller react fast but with less stability.

When using the parameter for pump speed control:
Set a higher value (in seconds) to obtain a slow, but stable reaction to deviations.
A low integration time constant will make the controller react fast, but with less stability.

**MENU > Settings > Pump control**

| M run (running time of the motorized control valve) | 1x186 |
|---|---|
| *'M run' is the time in seconds it takes the controlled component to move from fully closed to fully open position.* | |

See Appendix "Parameter ID overview"

Set the 'M run' according to the examples or measure the running time by means of a stop watch.

**How to calculate the running time of a motorized control valve**
The running time of the motorized control valve is calculated using the following methods:

**Seated valves**

Running time = Valve stroke (mm) x actuator speed (sec. / mm)

*Example: 5.0 mm x 15 sec. / mm = 75 sec.*

**Rotating valves**

Running time = Turning degrees x actuator speed (sec. / degr.)

*Example: 90 degr. x 2 sec. / degr. = 180 sec.*

The setting "M run" is not present when the valve is controlled by means of a 0 - 10 volt signal.

**MENU > Settings > Pump control**

| Nz (neutral zone) | 1x187 |
|---|---|
| *When the actual flow temperature is within the neutral zone, the controller does not activate the motorized control valve.* | |

See Appendix "Parameter ID overview"

Set the acceptable flow temperature deviation.

Set the neutral zone to a high value if you can accept a high variation in flow temperature.

When using the parameter for pump speed control:
Set the acceptable temperature deviation.
When the actual temperature is within the neutral zone, the controller does not change the pump speed.

The neutral zone is symmetrical around the desired flow temperature value, i.e. half the value is above and half the value is below this temperature.

**MENU > Settings > Pump control**

| Min. act. time (min. activation time gear motor) | 1x189 |
|---|---|
| *The min. pulse period of 20 ms (milliseconds ) for activation of the gear motor.* | |

See Appendix "Parameter ID overview"

| Setting example | Value x 20 ms |
|---|---|
| 2 | 40 ms |
| 10 | 200 ms |
| 50 | 1000 ms |

The setting should be kept as high as acceptable to increase the lifetime of the actuator (gear motor).

**MENU > Settings > Pump control**

| Input type | 1x327 |
|---|---|
| *Function selection for input S8.* | |

See Appendix "Parameter ID overview"

**OFF:** S8 receives 0 - 10 Volt from a pressure transmitter.

**ON:** S8 receives 0 - 10 Volt as external setting for desired flow temperature.

**MENU > Settings > Pump control**

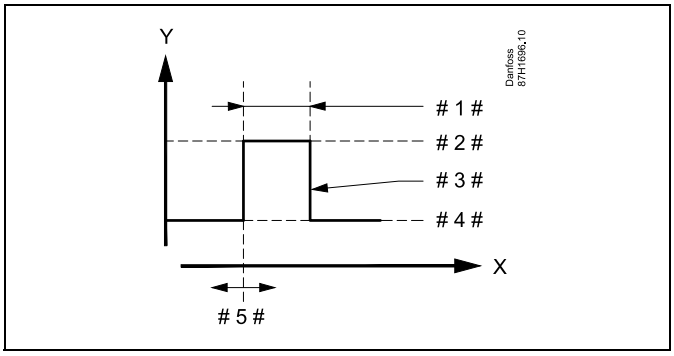
| PWM period | 1x565 |
|---|---|
| *When the pump is controlled at low speed (in pulsed mode) the set value reflects the reaction time of the pump, the water flow and the temperature sensor. A too low value can result in unstable temperature regulation.* | |

See Appendix "Parameter ID overview"

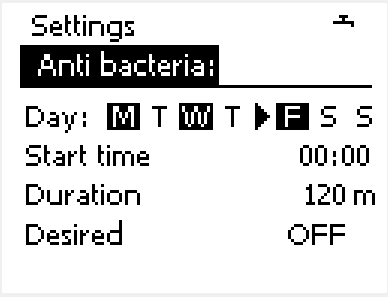
**Value:** Reaction time

### 5.14 Anti-bacteria

On selected days during the week the DHW temperature can be increased in order to neutralize bacteria in the DHW system. The desired DHW temperature 'Desired T' (typically 80 °C) will be present for the selected day(s) and duration.
The anti-bacteria function is not active in frost protection mode.




*X* = *Time*
*Y* = *Desired DHW temperature*
*# 1 #* = *Duration*
*# 2 #* = *Desired Anti-bacteria temperature value*
*# 3 #* = *Desired Anti-bacteria temperature*
*# 4 #* = *Desired DHW temperature value*
*# 5 #* = *Start time*




During the anti-bacteria process, the return temperature limitation is not active.

The DHW circulation circuit can also be set to control an Anti-bacteria temperature. This control is active in parallel to the DHW related Anti-bacteria function.

**MENU > Settings > Anti-bacteria**

| **Day** |
| --- |
| *Select (mark) the day(s) of the week where the anti-bacteria function must be active.* |

M = Monday
T = Tuesday
W = Wednesday
T = Thursday
F = Friday
S = Saturday
S = Sunday

**MENU > Settings > Anti-bacteria**

| **Start time** |
| --- |
| *Set the start time for the anti-bacteria function.* |

**MENU > Settings > Anti-bacteria**

| **Duration** |
| --- |
| *Set the duration (minutes) for the anti-bacteria function.* |

**MENU > Settings > Anti-bacteria**

| **Desired T** |
| --- |
| *Set the desired DHW temperature for the anti-bacteria function.* |

See Appendix “Parameter ID overview”

**OFF:** The anti-bacteria function is not active.

**Value:** Desired DHW temperature during the anti-bacteria function period.

### 5.15 Alarm

The section "Alarm" describes specific application related issues.
Application P348 offers different types of alarms:

| Type: | Description: |
|---|---|
| 1 | Actual flow temperature differs from the desired flow temperature. |
| 1 | Actual pressure at S15 and / or S16 exceeds a set high / low level. |
| 2 | Anti-bacteria temperature is not reached within the "Duration" time. |
| 2 | Disconnection or short-circuiting of a temperature sensor or its connection. |

The alarm functions activate the alarm bell symbol.
The alarm functions activate A1, which is relay 6 in the ECL Comfort 310 controller:

The alarm relay can activate a lamp, a horn, an input to an alarm transmitting device etc.

The alarm symbol / relay is activated:

- (type 1) as long as the alarm reason is present (automatic reset).
- (type 2) even if the alarm reason disappears again (manual reset).

Alarm type 1 (flow temperature):
If the flow temperature deviates more than the set differences from the desired flow temperature, the alarm symbol / relay will be activated after a set delay.
If the flow temperature becomes acceptable, the alarm symbol / relay will be de-activated.

Alarm type 1 (pressure):
If the pressure at S15 and / or S16 goes below or above set levels, the alarm symbol / relay will be activated after a set delay.
If the pressure becomes acceptable, the alarm symbol / relay will be de-activated.

Alarm type 2 (Anti-bacteria):
If the anti-bacteria temperature was not achieved within the "Duration", the alarm symbol / relay will be activated. The alarm must be manually reset.

Alarm type 2 (temperature sensors):
Selected temperature sensors can be monitored.
Should the connection to the temperature sensor be disconnected, short-circuited or the sensor gets defective, the alarm symbol / relay will be activated. In the "Raw input overview" (MENU > Common controller settings > System > Raw input overview) the sensor in question is marked and the alarm can be reset.

**Alarm overview, list:**

| Alarm no.: | Description: | Alarm type: | Sensor ref.: |
|---|---|---|---|
| 2 | Temp. monitor, circuit 1 | 1 | S3 |
| 3 | Temp. monitor, circuit 2 | 1 | S4 |
| 7 | Pressure | 1 | S15 |
| 8 | Anti-bacteria, circuit 3 | 1 | S9 |
| 9 | Pressure | 1 | S16 |
| 32 | T sensor defect | 2 | all |

To find the reason for an alarm:

- select MENU
- select 'Alarm'
- select 'Alarm overview'. A "bell" will be shown at the alarm in question.

Alarm overview (example):
2: Max. temp.
3: Temp. monitor
32: T sensor defect

The numbers in the 'Alarm overview' refer to the alarm number in the Modbus communication.

To reset an alarm:
When the "bell" is present to the right of the alarm line, place the cursor at the alarm line in question and press the dial.

To reset alarm 32:
MENU > Common controller settings > System > Raw input overview: The sensor in question is marked and the alarm can be reset.

**MENU > Settings > Alarm**

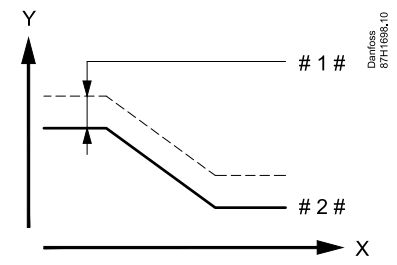
| **Upper difference** | **1x147** |
|---|---|
| *The alarm is activated if the actual flow temperature increases more than the set difference (acceptable temperature difference above the desired flow temperature). See also 'Delay'.* | |

See Appendix "Parameter ID overview"

**OFF:** The related alarm function is not active.

**Value:** The alarm function is active if the actual temperature gets above the acceptable difference.

*Upper difference*




*X* = *Time*
*Y* = *Temperature*
*# 1 #* = *Upper difference*
*# 2 #* = *Desired flow temperature*

**MENU > Settings > Alarm**

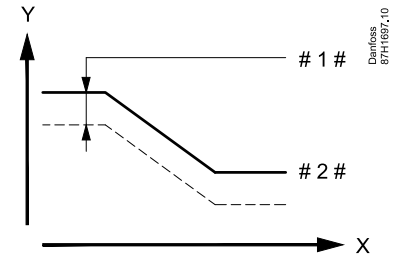
| **Lower difference** | **1x148** |
|---|---|
| *The alarm is activated if the actual flow temperature decreases more than the set difference (acceptable temperature difference below the desired flow temperature). See also 'Delay'.* | |

See Appendix “Parameter ID overview”

**OFF:** The related alarm function is not active.

**Value:** The alarm function is active if the actual temperature gets below the acceptable difference.

*Lower difference*




*X* = *Time*
*Y* = *Temperature*
*# 1 #* = *Lower difference*
*# 2 #* = *Desired flow temperature*

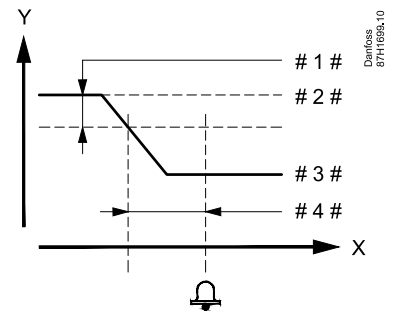
**MENU > Settings > Alarm**

| **Delay** | **1x149** |
|---|---|
| *If an alarm condition from either 'Upper difference' or 'Lower difference' is present for a longer time than the set delay (in minutes), the alarm function is activated.* | |

See Appendix “Parameter ID overview”

**Value:** The alarm function will be activated if the alarm condition remains after the set delay.

*Delay, example*




*X* = *Time*
*Y* = *Temperature*
*# 1 #* = *Lower difference*
*# 2 #* = *Desired flow temperature*
*# 3 #* = *Actual flow temperature*
*# 4 #* = *Delay (ID 1x149)*

**MENU > Settings > Alarm**

| **Lowest temp.** | **1x150** |
|---|---|
| *The alarm function will not be activated if the desired flow temperature is lower than the set value.* | |

See Appendix “Parameter ID overview”

If the cause of the alarm disappears, the alarm indication and output also disappear.

**MENU > Settings > Alarm**

| Delay | 1x340 |
|---|---|
| *The alarm is activated if the supply temperature S2 does not get higher than ('Desired buffer temperature' + 'Pump start diff.').<br>Example: 60 °C + 3 K = 63 °C* | |

See Appendix “Parameter ID overview”

**MENU > Settings > Alarm**

| Alarm high | 1x614 |
|---|---|
| *When the measured value gets higher than the set value, the alarm will be activated.* | |

See Appendix “Parameter ID overview”

**Value:** Set the alarm value

**MENU > Settings > Alarm**

| Alarm low | 1x615 |
|---|---|
| *When the measured value gets lower than the set value, the alarm will be activated.* | |

See Appendix “Parameter ID overview”

**Value:** Set the alarm value

**MENU > Settings > Alarm**

| Alarm time-out | 1x617 |
|---|---|
| *When the alarm input is activated, the set "Alarm time-out" time must elapse before the alarm signal is activated.<br>Furthermore, when the alarm input is de-activated, the alarm signal is active for the set "Alarm time-out" time.* | |

See Appendix “Parameter ID overview”

**Value:** Set the alarm time-out time

**MENU > Settings > Alarm**

| Alarm value | 1x636 |
|---|---|
| *Activation of the alarm input can be done by means of closing or opening a contact.* | |

See Appendix “Parameter ID overview”

**0:** The alarm is activated when the contacts close.

**1:** The alarm is activated when the contacts open.

An active alarm is indicated by a 🔔 in the display.

S8 input status:
MENU > Common controller > System > Raw input overview > S8:
0 = Input activated. 1 = input not activated

See also 'Alarm time-out', parameter 1x637.

**MENU > Settings > Alarm**

| **Alarm time-out** | **1x637** |
|---|---|
| *The alarm is activated when the alarm reason has been present for a longer time (in seconds) than the set value.* | |

See Appendix “Parameter ID overview”

**Value:** Set the alarm time-out

## 5.16 Alarm overview

**MENU > Alarm > Alarm overview**
This menu shows the alarm types, for example:

- "2: Temp. monitor"
- "32: T sensor defect"

The alarm has been activated if the alarm symbol (a bell) (🔔) is present to the right of the alarm type.

**Resetting an alarm, in general:**

MENU > Alarm > Alarm overview:
Look for alarm symbol in specific line.

(Example: "2: Temp. monitor")
Move cursor to the line in question.
Push dial.

**Alarm overview:**

Alarm sources are listed in this overview menu.

Some examples:
"2: Temp. monitor"
"5: Pump 1"
"10: Digital S12"
"32: T sensor defect"

Related to the examples, the numbers 2, 5 and 10 are used in the alarm communication to the BMS / SCADA system.
Related to the examples, "Temp. monitor", "Pump 1" and "Digital S12" are the alarm points.
Related to the examples, "32: T sensor defect" indicates the monitoring of connected sensors.
Alarm numbers and alarm points might differ depending on actual application.

## 6.0 Common controller settings

### 6.1 Introduction to 'Common controller settings'

Some general settings which apply to the entire controller are located in a specific part of the controller.

To enter 'Common controller settings':

| Action: | Purpose: | Examples: |
|---|---|---|
| | Choose 'MENU' in any circuit | MENU |
| | Confirm | |
| | Choose the circuit selector at the top right corner in the display | |
| | Confirm | |
| | Choose 'Common controller settings' | |
| | Confirm | |

*Circuit selector*

### 6.2 Time & Date

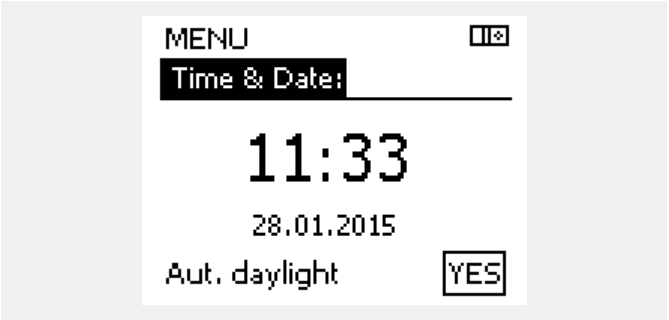
It is only necessary to set the correct date and time in connection with the first use of the ECL Comfort controller or after a power break of more than 72 hours.

The controller has a 24 hour clock.

**Aut. daylight (Daylight saving time changeover)**

**YES:** The controller's built-in clock automatically changes + / - one hour on the standardized days for daylight saving time changeover for Central Europe.

**NO:** You change manually between summer and winter time by setting the clock backward or forward.




When controllers are connected as slaves in a master / slave system (via ECL 485 communication bus), they will receive 'Time & Date' from the master.

How to set time and date:

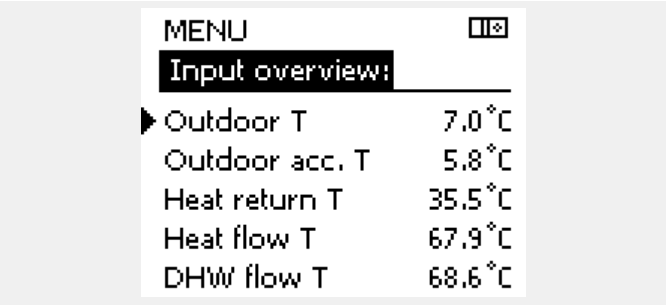
| Action: | Purpose: | Examples: |
|---|---|---|
| | Choose 'MENU' | MENU |
| | Confirm | |
| | Choose the circuit selector at the top right corner in the display | |
| | Confirm | |
| | Choose 'Common controller settings' | |
| | Confirm | |
| | Go to 'Time & Date' | |
| | Confirm | |
| | Place the cursor at the position to be changed | |
| | Confirm | |
| | Enter the desired value | |
| | Confirm | |
| | Move the cursor to the next position to be changed. Continue until 'Time & Date' has been set. | |
| | Finally move the cursor to 'MENU' | |
| | Confirm | |
| | Move the cursor to 'HOME' | |
| | Confirm | |

### 6.3 Input overview

This section describes the function in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application.

The input overview is located in the common controller settings.

This overview will always show you the actual temperatures in the system (read-only).




"Outdoor acc. T" means "Accummulated outdoor temperature" and is a calculated value in the ECL Comfort controller.

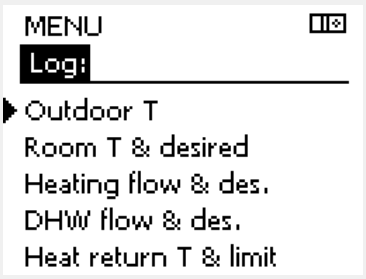
### 6.4 Log

This section describes the function in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application.

The log function (temperature history) allows you to monitor the logs of today, yesterday, the past 2 days as well as the past 4 days for the connected sensors.

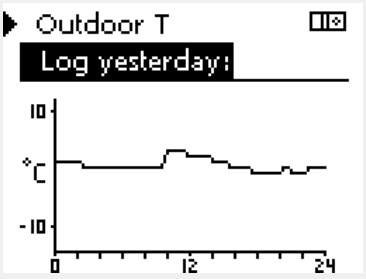
There is a log display for the relevant sensor, showing the measured temperature.

The log function is only available in the 'Common controller settings'.

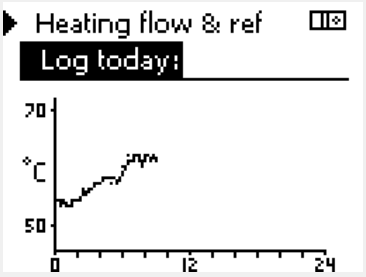




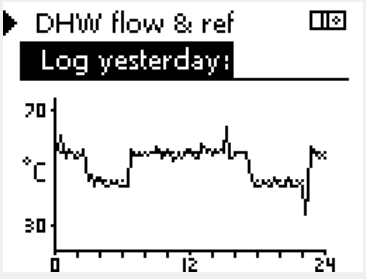
**Example 1:**
1 day log for yesterday showing the development in outdoor temperature during the past 24 hours.




**Example 2:**
Today's log for the actual heating flow temperature as well as the desired temperature.




**Example 3:**
Yesterday's log for the DHW flow temperature as well as the desired temperature.



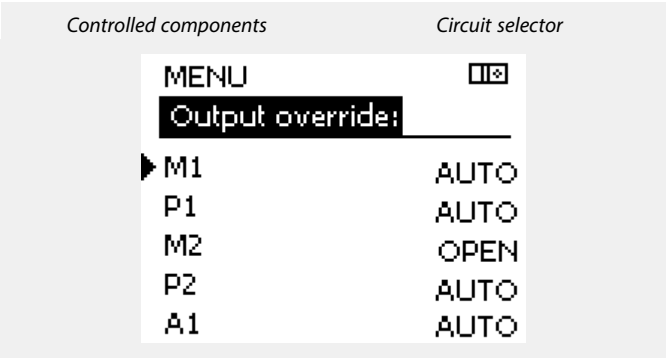
### 6.5 Output override

This section describes the function in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application.

The output override is used to disable one or more of the controlled components. This could among others be useful in a service situation.

| Action: | Purpose: | Examples: |
|---|---|---|
| | Choose 'MENU' in any of the overview displays | MENU |
| | Confirm | |
| | Choose the circuit selector at the top right corner in the display | |
| | Confirm | |
| | Choose common controller settings | |
| | Confirm | |
| | Choose 'Output override' | |
| | Confirm | |
| | Choose a controlled component | M1, P1 etc. |
| | Confirm | |
| | Adjust the status of the controlled component:<br>Motorized control valve: AUTO, STOP, CLOSE, OPEN<br>Pump: AUTO, OFF, ON | |
| | Confirm status change | |

Remember to change the status back again as soon as an override is not required any longer.




"Manual control" has higher priority than "Output override".

When the selected controlled component (output) is not 'AUTO', the ECL Comfort controller does not control the component in question (pump or motorized control valve e.g.). Frost protection is not active.

The speed controlled pumps V1 and V3 are controlled by 0 - 10 Volt (0 - 100%) or PWM signals. Each of them can be set to AUTO or ON.
AUTO: Normal control (0 - 100%)
ON: The 0 - 10 Volt or PWM signal is set to the %-value, set below the indication 'ON'.

When output override of a controlled component is active the symbol ' **!** ' is shown to the right of the mode indicator in the enduser displays.

## 6.6 Key functions

| | |
|---|---|
| **New application** | **Erase application:**<br>Removes the existing application. As soon as the ECL key is inserted, another application can be chosen. |
| **Application** | Gives an overview over the actual application in the ECL controller. Push the dial again to exit the overview. |
| **Factory setting** | **System settings:**<br>System settings are, among others, communication set-up, display brightness etc. |
| | **User settings:**<br>User settings are, among others, desired room temperature, desired DHW temperature, schedules, heat curve, limitation values etc. |
| | **Go to factory:**<br>Restores the factory settings. |
| **Copy** | **To:**<br>Copy direction |
| | **System settings** |
| | **User settings** |
| | **Start copying** |
| **Key overview** | Gives an overview over the inserted ECL key. (Example: A266 Ver. 2.30).<br>Turn the dial to see the subtypes. Push the dial again to exit the overview. |


A more detailed description of how to use the individual 'Key functions' can also be seen in 'Inserting the ECL application key'.

The “Key overview” does not inform — through ECA 30 / 31 — about the subtypes of the application key.

**Key inserted / not inserted, description:**

ECL Comfort 210 / 310, controller versions lower than 1.36:

- Take out the application key; for 20 minutes settings can be changed.
- Power up the controller **without** the application key inserted; for 20 minutes settings can be changed.

ECL Comfort 210 / 310, controller versions 1.36 and up:

- Take out the application key; for 20 minutes settings can be changed.
- Power up the controller **without** the application key inserted; settings cannot be changed.

ECL Comfort 296, controller versions 1.58 and up:

- Take out the application key; for 20 minutes settings can be changed.
- Power up the controller **without** the application key inserted; settings cannot be changed.

## 6.7 System

### 6.7.1 ECL version

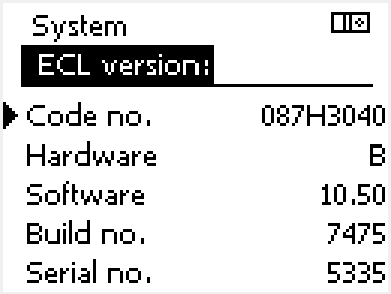
In 'ECL version' you will always be able to find an overview of the data related to your electronic controller.

Please have this information available if you need to contact your Danfoss sales organization concerning the controller.

Information about your ECL Application Key can be found in 'Key functions' and ' Key overview'.

| | |
|---|---|
| **Code no.:** | The Danfoss sales and order no. for the controller |
| **Hardware:** | Hardware version of the controller |
| **Software:** | Software (firmware) version of the controller |
| **Serial no.:** | Unique number for the individual controller |
| **Production week:** | Week no. and year (WW.YYYY) |

*Example, ECL version*




### 6.7.2 Extension

ECL Comfort 310 / 310B:
'Extension' will offer you information about additional modules, if any. An example could be the ECA 32 module.

### 6.7.3 Ethernet

ECL Comfort 296 / 310 / 310B have a Modbus/TCP communication interface that allows the ECL controller to be connected to an Ethernet network. This allows remote access to the ECL 296 / 310 / 310B controller based on standard communication infrastructures.

In 'Ethernet' it is possible to set up the required IP addresses.

### 6.7.4 Portal config

ECL Comfort 296 / 310 / 310B have a Modbus/TCP communication interface that allows the ECL controller to be monitored and controlled via the ECL Portal.

ECL Portal related parameters are set here.

Documentation for ECL Portal: See *https://ecl.portal.danfoss.com*

### 6.7.5 Energy meter and M-bus, general information

**ECL Comfort 296 / 310 / 310B only**

When using the Application Key in the ECL Comfort 296 / 310 / 310B, up to 5 energy meters can be connected to the M-bus connections.

Connection of energy meter can:

- limit the flow
- limit the power
- transfer energy meter data to the ECL Portal, via Ethernet, and / or a SCADA system, via Modbus.

Many applications with control of heating, DHW or cooling circuit have the possibility to react on energy meter data.
To verify if actual application key can be set to react on energy meter data:
See Circuit > MENU > Settings > Flow / power.

The ECL Comfort 296 / 310 / 310B can always be used for monitoring purpose of up to 5 energy meters.

The ECL Comfort 296 / 310 / 310B act as an M-bus master and must be set to communicate with connected energy meter(s).
See MENU > Common controller > System > M-bus config.

**Technical info:**

- The M-bus data are based on standard EN-1434.
- Danfoss recommends AC supplied energy meters in order to avoid battery draining.

Energy meter data acquisition from ECL Portal is possible without setting up the M-bus configuration.

**MENU > Common controller > System > M-bus config.**

| **State** | | **Read-out** |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| - | - | - |
| *Information about the current M-bus activity.* | | |

**IDLE:** Normal state

**INIT:** The command for initialization has been activated

**SCAN:** The command for scanning has been activated

**GATEW:** The command Gateway has been activated

The ECL Comfort 296 / 310 / 310B will return to IDLE when commands have been completed.
Gateway is used for read-out of energy meter via ECL Portal.

**MENU > Common controller > System > M-bus config.**

| **Baud (bits per second)** | | **5997** |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| - | 300 / 600 / 1200 / 2400 | 300 |
| *The communication speed between ECL Comfort 296 / 310 / 310B and the connected energy meter(s).* | | |

Typically, 300 or 2400 baud is used.
If ECL Comfort 296 / 310 / 310B are connected to the ECL Portal, a baud rate of 2400 is recommendable, provided the energy meter allows this.

**MENU > Common controller > System > M-bus config.**

| **Command** | | **5998** |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| - | NONE / INIT / SCAN / GATEW | NONE |
| *The ECL Comfort 296 / 310 / 310B are M-bus masters. In order to verify connected energy meters, different commands can be activated.* | | |

**NONE:** No command activated

**INIT:** Initialization is activated

**SCAN:** Scanning is activated in order to search for connected energy meters. The ECL Comfort 296 / 310 / 310B detect the M-bus addresses of up to 5 connected energy meters and place these automatically in the "Energy meters" section. The verified address is placed after "Energy meter 1 (2, 3, 4, 5)"

**GATEW:** The ECL Comfort 296 / 310 / 310B act as a gateway between energy meters and ECL Portal. Used only for service.

Scan time can take up to 12 minutes.
When all energy meters are found, the command can be changed to INIT or NONE.

**MENU > Common controller > System > M-bus config.**

| **M-bus address**<br>**Energy meter 1 (2, 3, 4, 5)** | | **6000** |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| - | 0 - 255 | 255 |
| *The set or verified address of energy meter 1 (2, 3, 4, 5).* | | |

**0:** Normally not used

**1 - 250:** Valid M-bus addresses

**251 - 254:** Special functions. Use only M-bus address 254 when one energy meter is connected.

**255:** Not used

**MENU > Common controller > System > M-bus config.**

| **Type**<br>**Energy meter 1 (2, 3, 4, 5)** | | **6001** |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| - | 0 - 4 | 0 |
| *Selecting data range from the M-bus telegram..* | | |

**0:** Small data set, small units

**1:** Small data set, large units

**2:** Large data set, small units

**3:** Large data set, large units

**4:** Volume and energy data only (example: HydroPort Pulse)

**Data examples:**

0:
Flow temp., return temp., flow, power, acc. volume, acc. energy.

3:
Flow temp., return temp., flow, power, acc. volume, acc. energy, tariff 1, tariff 2.

See also the "Instructions, ECL Comfort 210 / 310, communication description" for further details.

See also Appendix for detailed description of "Type".

**MENU > Common controller > System > M-bus config.**

| **Scan time**<br>**Energy meter 1 (2, 3, 4, 5)** | | **6002** |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| - | 1 - 3600 sec | 60 sec |
| *Setting the scanning time for acquiring data of connected energy meter(s).* | | |

If the energy meter is battery powered, the scan time should be set to a high value to prevent a too fast battery draining.
Oppositely, if the flow / power limitation function is used in the ECL Comfort 310, the scan time should be set to a low value in order to have quick limitation.

**MENU > Common controller > System > M-bus config.**

| **ID**<br>**Energy meter 1 (2, 3, 4, 5)** | | **Read-out** |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| - | - | - |
| *Information about the energy meter's serial no.* | | |

**MENU > Common controller > System > Energy meters**

| **Energy meter 1 (2, 3, 4, 5)** | | **Read-out** |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| - | 0 - 4 | 0 |
| *Information from actual energy meter about, for example, ID, temperatures, flow / volume, power / energy.*<br>*The shown information depends on the settings made in the "M-bus config." menu.* | | |

### 6.7.6 Raw input overview

Measured temperatures, input status and voltages are displayed.

In addition, a detection of malfunctions can be chosen for activated temperature inputs.

Monitoring the sensors:
Choose the sensor which measures a temperature, for example the S5. When the dial is pressed, a magnifying glass appears in the selected line. The S5 temperature is now being monitored.

Alarm indication:
Should the connection to the temperature sensor be disconnected, short-circuited or the sensor itself be defective, the alarm function is activated.

In the "Raw input overview" an alarm symbol is shown at the defective temperature sensor in question.

Resetting the alarm:
Choose the sensor (S number) for which you want to clear the alarm. Press the dial. The magnifying glass and alarm symbols disappear.

When the dial is pressed again, the monitoring function is reactivated.

The temperature sensor inputs have a measuring range from -60 ... 150 ° C.

If a temperature sensor or its connection breaks, the value indication is " - - ".

If a temperature sensor or its connection is short-circuited, the value indication is " - - - ".

### 6.7.7 Sensor offset (new functionality as from firmware 1.59)

The measured temperature can be offset adjusted in order to compensate for cable resistance or a not-optimum place for the temperature sensor. The adjusted temperature can be seen in "Raw input overview" and "Input overview".

**Common controller > System > Sensor offset**

| **Sensor 1 . . . (temperature sensor)** | | |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| ☐ | * | * |
| *Setting the offset of the measured temperature.* | | |

**Positive offset value:** The temperature value is increased

**Negative offset value:** The temperature value is decreased

### 6.7.8 Display

| **Backlight (display brightness)** | | **60058** |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| ☐ | 0 ... 10 | 5 |
| *Adjust the brightness of the display.* | | |

**0:** Weak backlight.

**10:** Strong backlight.

| **Contrast (display contrast)** | | **60059** |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| ☐ | 0 ... 10 | 3 |
| *Adjust the contrast of the display.* | | |

**0:** Low contrast.

**10:** High contrast.

### 6.7.9 Communication

| **Modbus addr.** | | **38** |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| ☐ | 1 ... 247 | 1 |
| *Set the Modbus address if the controller is part of a Modbus network.* | | |

**1 ... 247:** Assign the Modbus address within the stated setting range.

The Application Key A214 (subtypes A214.1 . . . A214.6 and A314.1 . . . A314.3) is also able to communicate via Modbus to Danfoss ADAP-KOOL® Service Manager.

| ECL 485 addr. (master / slave address) | | 2048 |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| | 0 ... 15 | 15 |
| *This settting is relevant if more controllers are working in the same ECL Comfort system (connected via the ECL 485 communication bus) and / or Remote Control Units (ECA 30 / 31) are connected.* | | |

**0:** The controller works as slave.
The slave receives information about the outdoor temperature (S1), system time, and signal for DHW demand in the master.

**1 ... 9:** The controller works as slave.
The slave receives information about the outdoor temperature (S1), system time, and signal for DHW demand in the master. The slave sends information about the desired flow temperature to the master.

**10 ... 14:** Reserved.

**15:** The ECL 485 communication bus is active.
The controller is master. The master sends information about the outdoor temperature (S1) and system time.
Connected Remote Control Units (ECA 30 / 31) are powered.

The ECL Comfort controllers can be connected via the ECL 485 communication bus to perform a larger system (the ECL 485 communication bus can connect to max. 16 devices).

Each slave must be configured with its own address (1 ... 9).

However, more slaves can have the address 0 if they only have to receive information about outdoor temperature and system time (listeners).

| Service Pin | | 2150 |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| | 0 / 1 | 0 |
| *This setting is only used in connection with set-up of Modbus communication.*<br><br>**Not applicable for the time being and reserved for future use!** | | |

| Ext. reset | | 2151 |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| | 0 / 1 | 0 |
| *This setting is only used in connection with set-up of Modbus communication.* | | |

**0:** Reset not activated.

**1:** Reset.

The total cable length of max. 200 m (all devices incl. the internal ECL 485 communication bus) should not be exceeded.
Cable lengths of more than 200 m may cause noise sensibility (EMC).

In a system with MASTER / SLAVE controllers, only one MASTER controller with address 15 is allowed.

If by mistake more MASTER controllers are present in an ECL 485 communication bus system, decide which controller is to be MASTER. Change the address in the remaining controllers. However, the system will operate but not be stable with more than one MASTER controller.

In the MASTER controller, the address in 'ECL 485 addr. (master / slave address)', ID no. 2048, must always be 15.

### 6.7.10 Language

| Language | | 2050 |
|---|---|---|
| *Circuit* | *Setting range* | *Factory setting* |
| ☐ | English / 'Local' | English |
| *Choose your language.* | | |

Local language is selected during installation. If you want to change to another local language, the application must be reinstalled. However, it is always possible to change between the local language and English.

## 6.8 Floor drying

### 6.8.1 Functional heating

| Desired flow T (Desired flow temperature) | Read-out |
|---|---|
| *Read-out of the desired flow temperature.* | |

**- - - :** The floor drying process is not active

**Value:** The floor drying process is active

Push the dial to:

- select / deselect circuit(s) for floor drying
- enter / change the graph of the "Functional heating" or "Curing heating" process

The desired flow temperature can be set at:

- X1, X2, X3 and X4 (Functional heating)
- X5, X6, X7 and X8 (Curing heating)

**Selection of circuit(s) for floor drying**:

☑ 1 ☑ 2 Circuit number selected

☐ 1 ☐ 2 Circuit number not selected

Important: The desired flow temperature values, set at X4 and X8 are used as controlling temperatures:

- after the floor drying process, if the application is not to be started
- after a power failure

**Examples of graph:**

Times for X1, X2, X3 and X4 are the same (0 h)

Desired temperature at X1 is 20 °C

Desired temperature at X2 is 20 °C

Desired temperature at X3 is 20 °C

Desired temperature at X4 is 20 °C

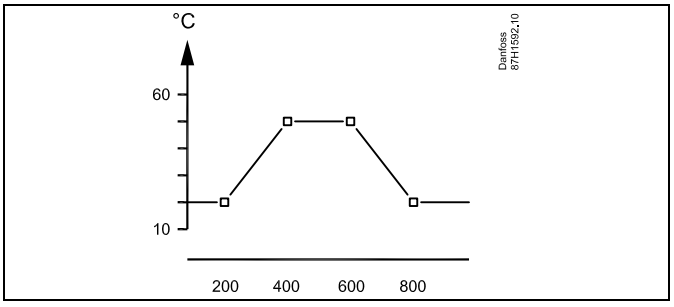

Times for X1, X2, X3 and X4 are different, as shown.

Desired temperature at X1 is 20 °C

Desired temperature at X2 is 50 °C

Desired temperature at X3 is 50 °C

Desired temperature at X4 is 20 °C




Application with one heating circuit:
If the floor drying process is in operation and the circuit, by accident, is changed not to be selected, the floor drying process must be restarted.

Application with two or three heating circuits:
If the floor drying process is in operation for two or three circuits and one of the circuits, by accident, is changed not to be selected, the floor drying process continues. Just select the circuit in question again.

| | |
|---|---|
| **X1 (Start time for period 1)** | **10930** |
| **X2 (Start time for period 2)** | **10931** |
| **X3 (Start time for period 3)** | **10932** |
| **X4 (Start time for period 4)** | **10933** |

*The time that must elapse from process start for controlling the set flow temperature in the **functional heating** period.*

**Values:** Set the times

**Example 1:**

X1 = 50 hours
X2 = 50 hours
X3 = 200 hours
X4 = 200 hours

**Result:**
The desired flow temperature, which will be maintained from process start, is the value, which is indicated / set at X1 in "Desired flow T".
50 hours after process start, the desired flow temperature, which is indicated / set at X2 in "Desired flow T", will be maintained.
200 hours after process start, the desired flow temperature, which is indicated / set at X3 in "Desired flow T", will be maintained.
200 hours after process start, the desired flow temperature, which is indicated / set at X4 in "Desired flow T", will be maintained.

**Example 2:**

X1 = 50 hours
X2 = 100 hours
X3 = 150 hours
X4 = 200 hours

**Result:**
The desired flow temperature, which will be maintained from process start, is the value, which is indicated / set at X1 in "Desired flow T".
50 hours after process start, the desired flow temperature will gradually rise / fall to the value, which is indicated / set at X2 in "Desired flow T".
150 hours after process start, the desired flow temperature will gradually rise / fall to the value, which is indicated / set at X3 in "Desired flow T".
200 hours after process start, the desired flow temperature will gradually rise / fall to the value, which is indicated / set at X4 in "Desired flow T".

If the functional heating period should not be used, X4 can be set 0 h (zero hours).

### 6.8.2 Curing heating

| Desired flow T (Desired flow temperature) | Read-out |
|---|---|
| *Read-out of the desired flow temperature.* | |

**- - - :** The floor drying process is not active

**Value:** The floor drying process is active

Push the dial to:

- select / deselect circuit(s) for floor drying
- enter / change the graph of the "Functional heating" or "Curing heating" process

The desired flow temperature can be set at:

- X1, X2, X3 and X4 (Functional heating)
- X5, X6, X7 and X8 (Curing heating)

**Selection of circuit(s) for floor drying**:

☑ 1 ☑ 2 Circuit number selected

☐ 1 ☐ 2 Circuit number not selected

Important: The desired flow temperature values, set at X4 and X8 are used as controlling temperatures:

- after the floor drying process, if the application is not to be started
- after a power failure

**Examples of graph:**

Times for X1, X2, X3 and X4 are the same (0 h)

Desired temperature at X1 is 20 °C

Desired temperature at X2 is 20 °C

Desired temperature at X3 is 20 °C

Desired temperature at X4 is 20 °C

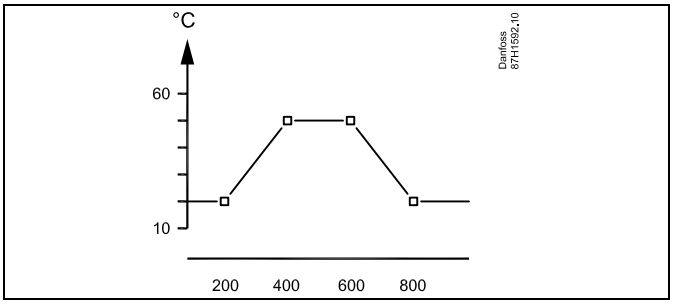

Times for X1, X2, X3 and X4 are different, as shown.

Desired temperature at X1 is 20 °C

Desired temperature at X2 is 50 °C

Desired temperature at X3 is 50 °C

Desired temperature at X4 is 20 °C




Application with one heating circuit:
If the floor drying process is in operation and the circuit, by accident, is changed not to be selected, the floor drying process must be restarted.

Application with two or three heating circuits:
If the floor drying process is in operation for two or three circuits and one of the circuits, by accident, is changed not to be selected, the floor drying process continues. Just select the circuit in question again.

| Prog. execution (Program execution) | 10512 |
|---|---|
| *Start or stop the floor drying process.*<br>*Press and hold the dial for 5 seconds in order to start or stop the process.* | |

If the ECL Comfort controller is set to manual mode, the floor drying process can be started, but will not be active.

**OFF:** The floor drying process is not active

**ON:** The floor drying process is active

If "Prog. execution" is set to ON and returns to OFF after 5 seconds, none of the circuits in the graph (Desired flow T) have been selected for floor drying.

If the parameter "Appl. continue" (ID 10912) is set to STOP, the "Prog. execution" remains ON after elapse of the floor drying process.

| Max. pwr. failure (Max. power failure period acceptance) | 10514 |
|---|---|
| *Setting the max. accepted time for power failure.*<br>*If the ECL Comfort controller is without power for more than the set time, the alarm will be activated when the controller is powered up.* | |

After a power failure, the alarm is indicated / activated.
If the parameter "After power fail." (ID 10913) is set to STOP, the desired flow temperature is maintained at the value, set in X1.

**Value:** Set the accepted time

The alarm can be reset (MENU > Alarm > Alarm overview)

To restart the floor drying process:
If the parameter "After power fail." (ID 10913) is set to STOP, the "Prog. execution" must be set to OFF and then to ON.

| **Ramp X5 - X6 (Temperature ramping from time X5 to X6)**<br>**Ramp X7 - X8 (Temperature ramping from time X7 to X8)** | **10903**<br>**10904** |
|---|---|
| *Setting the number of steps for the change of the desired flow temperature in selected period.* | |

**OFF:** The stepwise change is disabled

**Value:** The period is divided in the number of steps

**Example:**
"X5" time is set to 100
"X5" temperature is set to 25 °C

"X6" time is set to 150
"X6" temperature is set to 35 °C

"Ramp X5 - X6" is set to 5

**Result:**
Period between X5 and X6 is 50 hours. Temperature change is 10 K. The process will be:
Start temperature: 25 °C, after 10 hours the temperature changes to 27 °C. After further 10 hours the temperature changes to 29 °C and so on.

| **Appl. continue (Application continue)** | **10912** |
|---|---|
| *Selection how the ECL Comfort controller must continue after having finished the floor drying process.* | |

**OFF:** The desired flow temperature will be the value set at "X8" time

**ON:** The controller continues with the selected application and the set mode of the function selector

When using only "Functional heating" and no demand for control after the floor drying process, it is important to set the desired temperature at X8.
(Common controller > MENU > Floor drying > Curing heating > "Desired flow T" > Graph's right point).

| **After power fail. (After power failure)** | **10913** |
|---|---|
| *Selection how the ECL Comfort controller must continue after a power failure (power has been away for more than accepted time, set in "Max. pwr. failure", ID 10514).*<br><br>*If power failure happens in "Functional heating" process, the floor drying can be restarted according to time and temperature setting for X1 or stopped. If stopped, the desired flow temperature is maintained at the value, set for X1.*<br><br>*If power failure happens in "Curing heating" process, the floor drying can be restarted according to time and temperature setting for X4. If stopped the desired flow temperature is maintained at the value, set for X1.* | |

**STOP:** The controller stops the floor drying process and maintains the temperature, set at X1

**START:** The controller starts the floor drying process from settings in X1 or X4

To restart the floor drying process:
If the parameter "After power fail." (ID 10913) is set to STOP, the "Prog. execution" must be set to OFF and then to ON.

After a power failure, the alarm is indicated.
The alarm can be reset.

| | |
|---|---|
| **X5 (Start time for period 5)** | **10934** |
| **X6 (Start time for period 6)** | **10935** |
| **X7 (Start time for period 7)** | **10936** |
| **X8 (Start time for period 8)** | **10937** |

*The time that must elapse from time X4 for controlling the set flow temperature in the **curing heating** period.*

**Values:** Set the times

If the temperature values, set at X4 and X5, are different, the desired flow temperature changes gradually from the X4 value to the X5 value.

When X5 is set to a time value, the desired flow temperature starts with the value, set at X4.

If the curing heating period should not be used, X8 can be set 0 h (zero hours).

## 7.0 Miscellaneous

### 7.1 ECA 30 / 31 setup procedures

ECA 30 (code no. 087H3200) is a remote control unit with built-in room temperature sensor.

ECA 31 (code no. 087H3201) is a remote control unit with built-in room temperature sensor and humidity sensor (relative humidity).

An external room temperature sensor can be connected to both types to substitute the built-in sensor.
An external room temperature sensor will be recognized at ECA 30 / 31 power-up.

Connections: See the section 'Electrical connections'.

Max. two ECA 30 / 31 can be connected to one ECL controller or a system (master-slave) consisting of several ECL controllers connected on the same ECL 485 bus. In the master-slave system only one of the ECL controllers is master. The ECA 30 / 31 can, among others, be set to:

- monitor and set the ECL controller remotely
- measure the room temperature and (ECA 31) humidity
- extend comfort / saving period temporarily

After application upload in the ECL Comfort controller, the remote control unit ECA 30 / 31 will after approx. one minute ask to 'Copy application'.
Confirm this in order to upload the application to the ECA 30 / 31.

**Menu structure**

The menu structure of ECA 30 / 31 is an "ECA MENU" and the ECL menu, copied from the ECL Comfort controller.

The ECA MENU contains:

- ECA settings
- ECA system
- ECA factory

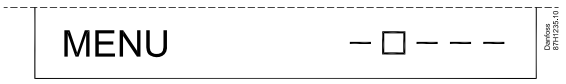
ECA settings: Offset adjustment of the measured room temperature.

Offset adjustment of relative humidity (ECA 31 only).

ECA system: Display, communication, override settings and version info.

ECA factory: Erase of all applications in the ECA 30 / 31, restore to factory settings, reset of ECL address and firmware update.

*Part of the ECA 30 / 31 display in ECL mode:*




*Part of the ECA 30 / 31 display in ECA mode:*


If only the "ECA MENU" is shown, it can indicate that the ECA 30 / 31 is not having correct communication address.
See ECA MENU > ECA system > ECA communication: ECL address.
In most cases the ECL address setting must be "15".

Regarding ECA settings:
When ECA 30 / 31 is not used as remote unit, the offset adjustments menu(s) are not present.

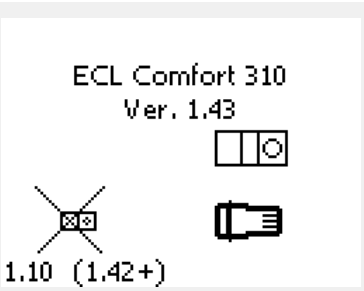
The ECL menus are as described for the ECL controller.

Most of the settings done directly in the ECL controller can be done via the ECA 30 / 31 too.

All settings can be seen even if the application key is not inserted in the ECL controller.
For changing settings, the application key must be inserted.

The Key overview (MENU > 'Common controller settings' > 'Key functions') does not show the applications of the key.

The ECA 30 / 31 will display this information (an X on the ECA 30 / 31 symbol) if the application in the ECL controller does not comply with the ECA 30 / 31:




In the example 1.10 is current version and 1.42 is desired version.

Display part of ECA 30 / 31:


This display indicates that an application has not been uploaded or the communication to the ECL controller (master) is not working properly. An X on the ECL controller symbol indicates wrong setup of communication addresses.

Display part of ECA 30 / 31:

Newer versions of ECA 30 / 31 indicate the address number of the connected ECL Comfort controller.
Address number can be changed in the ECA MENU.
A stand-alone ECL Controller has the address 15.

When ECA 30 / 31 is in ECA MENU mode, the date and measured room temperature is displayed.

**ECA MENU > ECA settings > ECA sensor**

| **Room T Offset** | |
|---|---|
| *Setting range* | *Factory setting* |
| –10.0 ... 10.0 K | 0.0 K |
| *The measured room temperature can be corrected with a number of Kelvin. The corrected value is used by the heating circuit in the ECL controller.* | |

**Minus value:** The indicated room temperature is lower.

**0.0 K:** No correction of the measured room temperature.

**Plus value:** The indicated room temperature is higher.

**Example:**

| | |
|---|---|
| Room T offset: | 0.0 K |
| Displayed room temperature: | 21.9 °C |
| Room T offset: | 1.5 K |
| Displayed room temperature: | 23.4 °C |

**ECA MENU > ECA settings > ECA sensor**

| **RH offset (ECA 31 only)** | |
|---|---|
| *Setting range* | *Factory setting* |
| –10.0 ... 10.0 % | 0.0 % |
| *The measured relative humidity can be corrected with a number of %-values. The corrected value is used by the application in the ECL controller.* | |

**Minus value:** The indicated relative humidity is lower.

**0.0 %:** No correction of the measured relative humidity.

**Plus value:** The indicated relative humidity is higher.

**Example:**

| | |
|---|---|
| RH offset: | 0.0 % |
| Displayed relative humidity: | 43.4 % |
| RH offset: | 3.5 % |
| Displayed relative humidity: | 46.9 % |

**ECA MENU > ECA system > ECA display**

| **Backlight (display brightness)** | |
|---|---|
| *Setting range* | *Factory setting* |
| 0 ... 10 | 5 |
| *Adjust the brightness of the display.* | |

**0:** Weak backlight.

**10:** Strong backlight.

**ECA MENU > ECA system > ECA display**

| **Contrast (display contrast)** | |
|---|---|
| *Setting range* | *Factory setting* |
| 0 ... 10 | 3 |
| *Adjust the contrast of the display.* | |

**0:** Low contrast.

**10:** High contrast.

**ECA MENU > ECA system > ECA display**

| **Use as remote** | |
|---|---|
| *Setting range* | *Factory setting* |
| OFF / ON | *) |
| *ECA 30 / 31 can act as a simple or normal remote control for the ECL controller.* | |

**OFF:** Simple remote control, no room temperature signal.

**ON:** Remote control, room temperature signal is available.

***):** Differently, depending on chosen application.

When set to OFF: The ECA menu shows date and time.

When set to ON: The ECA menu shows date and room temperature (and for ECA 31 relative humidity).

**ECA MENU > ECA system > ECA communication**

| **Slave addr. (Slave address)** | |
|---|---|
| *Setting range* | *Factory setting* |
| A / B | A |
| *The setting of 'Slave addr.' is related to the setting 'ECA address' in the ECL controller. In the ECL controller it is selected from which ECA 30 / 31 unit the room temperature signal is received.* | |

**A:** The ECA 30 / 31 has the address A.

**B:** The ECA 30 / 31 has the address B.

For installation of an application in an ECL Comfort 210 / 296 / 310 controller the 'Slave addr.' must be A.

If two ECA 30 / 31 are connected in the same ECL 485 bus system, the 'Slave addr.' must be "A" in the one ECA 30 / 31 unit and "B" in the other.

**ECA MENU > ECA system > ECA communication**

| **Connection addr. (Connection address)** | |
|---|---|
| *Setting range* | *Factory setting* |
| 1 … 9 / 15 | 15 |
| *Setting of the address to which ECL controller the communication must run.* | |

**1 .. 9:** Slave controllers.

**15:** Master controller.

An ECA 30 / 31 can in an ECL 485 bus system (master – slave) be set to communicate, one by one, with all addressed ECL controllers.

**Example:**

| | |
|---|---|
| Connection addr. = 15: | The ECA 30 / 31 communicates with the ECL master controller. |
| Connection addr. = 2: | The ECA 30 / 31 communicates with the ECL controller with address 2. |

There must be a master controller present in order to broadcast time and date information.

An ECL Comfort controller 210 / 310, type B (without display and dial) cannot be assigned to the address 0 (zero).

**ECA MENU > ECA system > ECA override**

| **Override addr. (Override address)** | |
|---|---|
| *Setting range* | *Factory setting* |
| OFF / 1 … 9 / 15 | OFF |
| *The feature 'Override' (to extended comfort or saving period or holiday) must be addressed to the ECL controller in question.* | |

**OFF:** Override not possible.

**1 .. 9:** Address of slave controller for override.

**15:** Address of master controller for override.

| | | |
|---|---|---|
| Override functions: | Extended saving mode: |  |
| | Extended comfort mode: |  |
| | Holiday away from home: |  |
| | Holiday at home: |  |

Override by means of settings in ECA 30 / 31 are cancelled if the ECL Comfort controller goes into holiday mode or is changed to another mode than scheduled mode.

The circuit in question for override in the ECL controller must be in scheduled mode.
See also the parameter 'Override circuit'.

**ECA MENU > ECA system > ECA override**

| **Override circuit** | |
|---|---|
| *Setting range* | *Factory setting* |
| OFF / 1 … 4 | OFF |
| *The feature 'Override' (to extended comfort or saving period or holiday) must be addressed to the heating circuit in question.* | |

**OFF:** No heating circuit is selected for override.

**1 … 4:** The heating circuit number in question.

The circuit in question for override in the ECL controller must be in scheduled mode.
See also the parameter 'Override addr.'.

**Example 1:**

| (One ECL controller and one ECA 30 / 31) | | |
|---|---|---|
| Override of heating circuit 2: | Set 'Connection addr.' to 15 | Set 'Override circuit' to 2 |

**Example 2:**

| (Several ECL controllers and one ECA 30 / 31) | | |
|---|---|---|
| Override of heating circuit 1 in ECL controller with the address 6: | Set 'Connection addr.' to 6 | Set 'Override circuit' to 1 |

Quick guide "ECA 30 / 31 to override mode":

1. Go to ECA MENU
2. Move cursor to "Clock" symbol
3. Select the "Clock" symbol
4. Choose and select one of 4 override functions
5. Below the override symbol: Set hours or date
6. Below hours / date: Set desired room temperature for the override period

**ECA MENU > ECA system > ECA version**

| **ECA version (read-out only), examples** | |
|---|---|
| Code no. | 087H3200 |
| Hardware | A |
| Software | 1.42 |
| Build no. | 5927 |
| Serial no. | 13579 |
| Production week | 23.2012 |

The ECA version information is useful in service situations.

**ECA 30 / 31:**

 15 Connection address (master: 15, slaves: 1 - 9)

**ECA MENU > ECA factory > ECA clear apps.**

| **Erase all apps. (Erase all applications)** |
|---|
| *Erase all applications which are in the ECA 30 / 31.*<br>*After erasing, the application can be uploaded again.* |

**NO:** The erase procedure is not done.

**YES:** The erase procedure is done (await 5 sec.).

After the erase procedure, a pop-up in the display indicates "Copy application". Choose "Yes".
Hereafter the application is uploaded from the ECL controller. An upload bar is shown.

**ECA MENU > ECA factory > ECA default**

| **Restore factory** |
|---|
| *The ECA 30 / 31 is set back to factory settings.* |
| Affected settings by the restore procedure:<br>• Room T offset<br>• RH offset (ECA 31)<br>• Backlight<br>• Contrast<br>• Use as remote<br>• Slave addr.<br>• Connection addr.<br>• Override addr.<br>• Override circuit<br>• Override mode<br>• Override mode end time |

**NO:** The restore procedure is not done.

**YES:** The restore procedure is done.

**ECA MENU > ECA factory > Reset ECL addr.**

| **Reset ECL addr. (Reset ECL address)** |
|---|
| *If none of the connected ECL Comfort controllers has the address 15, the ECA 30 / 31 can set all connected ECL controllers on the ECL 485 bus back to address 15.* |

**NO:** The reset procedure is not done.

**YES:** The reset procedure is done (await 10 sec.).

The ECL 485 bus related address of the ECL controller is found: MENU > 'Common controller settings' > 'System' > 'Communication' > 'ECL 485 addr.'

The "Reset ECL addr." cannot be activated if one or more of the connected ECL Comfort controllers has the address 15.

In a system with MASTER / SLAVE controllers, only one MASTER controller with address 15 is allowed.

If by mistake more MASTER controllers are present in an ECL 485 communication bus system, decide which controller is to be MASTER. Change the address in the remaining controllers. However, the system will operate but not be stable with more than one MASTER controller.

**ECA MENU > ECA factory > Update firmware**

| **Update firmware** |
|---|
| *The ECA 30 / 31 can be updated with new firmware (software). The firmware comes with the ECL application key, when the key version is at least 2.xx. If no new firmware is available, a symbol of the application key is displayed with an X.* |

**NO:** The updating procedure is not done.

**YES:** The updating procedure is done.

The ECA 30 / 31 automatically verifies if a new firmware is present on the application key in the ECL Comfort controller.
The ECA 30 / 31 is automatically updated at new application upload in the ECL Comfort controller.
The ECA 30 / 31 is not automatically updated when connected to an ECL Comfort controller with uploaded application. A manual update is always possible.

Quick guide "ECA 30 / 31 to override mode":

1. Go to ECA MENU
2. Move cursor to "Clock" symbol
3. Select the "Clock" symbol
4. Choose and select one of 4 override functions
5. Below the override symbol: Set hours or date
6. Below hours / date: Set desired room temperature for the override period

### 7.2 Override function

The ECL 210 / 296 / 310 controllers can receive a signal in order to override the existing schedule. The override signal can be a switch or a relay contact.

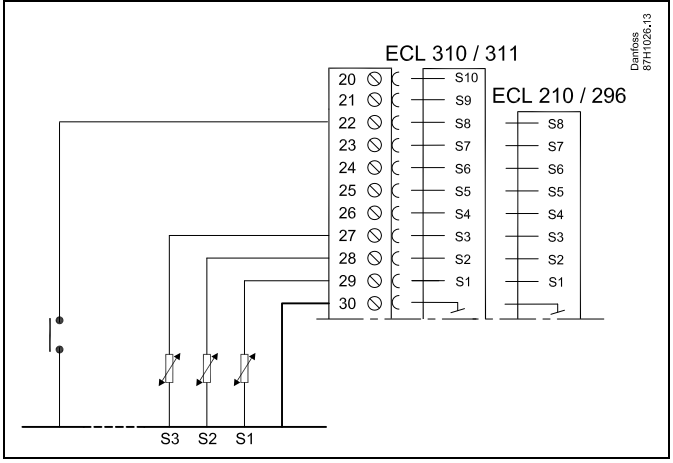
Different override modes can be selected, depending on application key type.

Override modes: Comfort, Saving, Constant temperature and Frost protection.

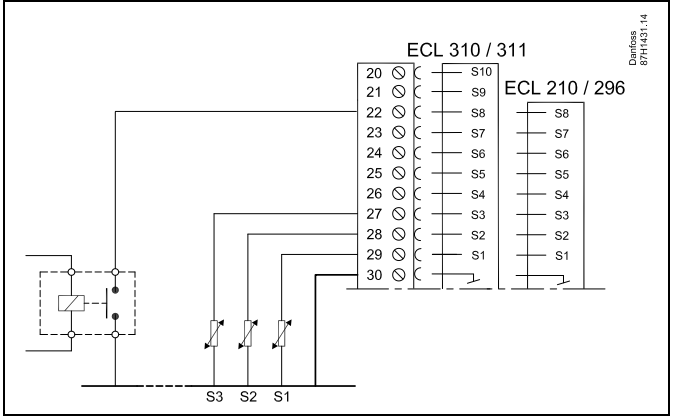
"Comfort" is also called normal heating temperature.
"Saving" can be reduced heating or heating stopped.
"Constant temperature" is a desired flow temperature, set in the menu "Flow temperature".
"Frost protection" stops the heating totally.

Override by means of override switch or relay contact is possible when the ECL 210 / 296 / 310 is in scheduled mode (clock).

*Example, override switch connected to S8:*




*Example, override relay connected to S8:*



**Example 1**

ECL in Saving mode, but in Comfort mode at override.

Choose an unused input, for example S8. Connect the override switch or override relay contact.

Settings in ECL:

1. Select circuit > MENU > Settings > Application > Ext. input:

   Select the input S8 (the wiring example)
2. Select circuit > MENU > Settings > Application > Ext. mode:

   Select COMFORT
3. Select circuit > MENU > Schedule:

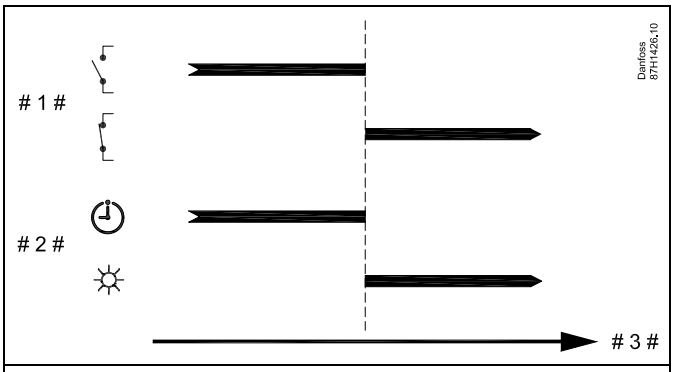
   Select all weekdays

   Set "Start1" to 24.00 (this disables Comfort mode)

   Exit menu and confirm by "Save"
4. Remember to set the circuit in question in scheduled mode ("clock").

Result: When the override switch (or the relay contact) is ON, the ECL 210 / 296 / 310 will operate in Comfort mode.

When the override switch (or the relay contact) is OFF, the ECL 210 / 296 / 310 will operate in Saving mode.




# 1 # = Override switch or relay contact (not activated / activated)
# 2 # = Function mode (Schedule / Comfort)
# 3 # = Time

**Example 2**

ECL in Comfort mode, but in Saving mode at override.

Choose an unused input, for example S8. Connect the override switch or override relay contact.

Settings in ECL:

1. Select circuit > MENU > Settings > Application > Ext. input:

   Select the input S8 (the wiring example)
2. Select circuit > MENU > Settings > Application > Ext. mode:

   Select SAVING
3. Select circuit > MENU > Schedule:

   Select all weekdays

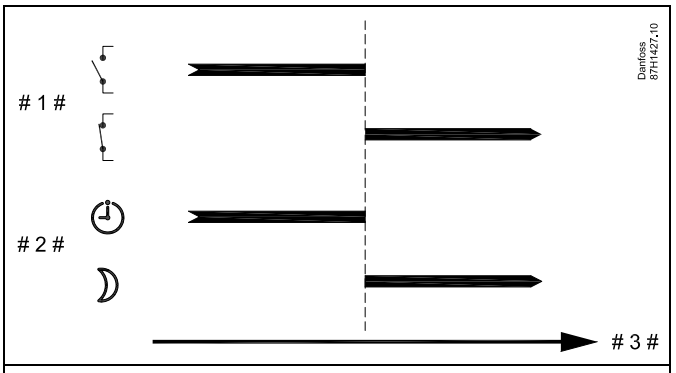
   Set "Start1" to 00.00

   Set "Stop1" to 24.00

   Exit menu and confirm by "Save"
4. Remember to set the circuit in question in scheduled mode ("clock").

Result: When the override switch (or the relay contact) is ON, the ECL 210 / 296 / 310 will operate in Saving mode.

When the override switch (or the relay contact) is OFF, the ECL 210 / 296 / 310 will operate in Comfort mode.




# 1 # = Override switch or relay contact (not activated / activated)
# 2 # = Function mode (Schedule / Saving)
# 3 # = Time

**Example 3**

The week schedule for the building is set with comfort periods Monday - Friday: 07.00 - 17.30. Sometimes, a team meeting takes place in the evening or in the week-end.

An override switch is installed and heating must be ON (Comfort mode) as long as the switch is ON.

Choose an unused input, for example S8. Connect the override switch.

Settings in ECL:

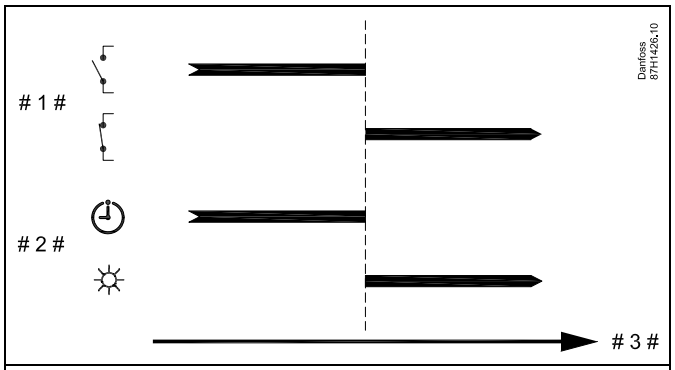
1. Select circuit > MENU > Settings > Application > Ext. input:

   Select the input S8 (the wiring example)
2. Select circuit > MENU > Settings > Application > Ext. mode:

   Select COMFORT
3. Remember to set the circuit in question in scheduled mode ("clock").

Result: When the override switch (or a relay contact) is ON, the ECL 210 / 296 / 310 will operate in Comfort mode.

When the override switch is OFF, the ECL 210 / 296 / 310 will operate according to the schedule.




# 1 # = Override switch (not activated / activated)
# 2 # = Function mode (Schedule / Comfort)
# 3 # = Time

**Example 4**

The week schedule for the building is set with comfort periods all weekdays: 06.00 - 20.00. Sometimes, the desired flow temperature must be constant on 65 °C.

An override relay is installed and the flow temperature must be 65 °C as long as the override relay is activated.

Choose an unused input, for example S8. Connect the contacts of the override relay.

Settings in ECL:

1. Select circuit > MENU > Settings > Application > Ext. input:

   Select the input S8 (the wiring example)
2. Select circuit > MENU > Settings > Application > Ext. mode:

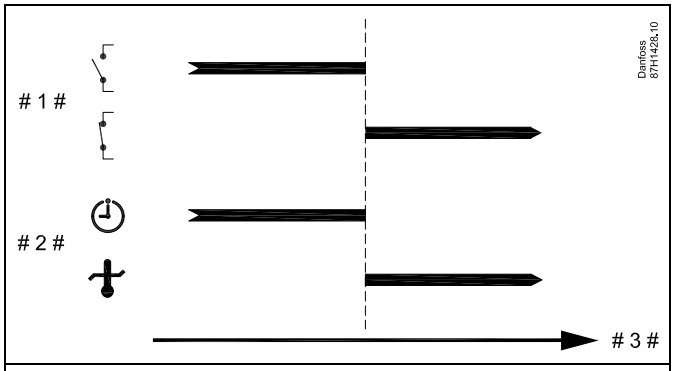
   Select CONST. T
3. Select circuit > MENU > Settings > Flow temperature >

   Desired T (ID 1x004):

   Set to 65 °C
4. Remember to set the circuit in question in scheduled mode ("clock").

Result: When the override relay is activated, the ECL 210 / 296 / 310 will operate in Const. temp. mode and control a flow temperature of 65 °C.

When the override relay is not activated, the ECL 210 / 296 / 310 will operate according to the schedule.




# 1 # = Override switch (not activated / activated)
# 2 # = Function mode (Schedule / Const. temp.)
# 3 # = Time

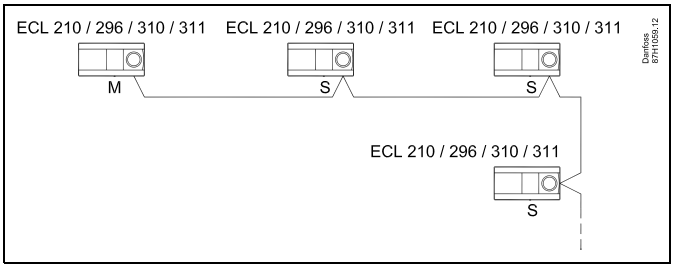
### 7.3 Several controllers in the same system

When ECL Comfort controllers are interconnected by means of the ECL 485 communication bus (cable type: 2 x twisted pair), the master controller will broadcast the following signals to the slave controllers:

- Outdoor temperature (measured by S1)
- Time and date
- DHW tank heating / charging activity

Furthermore, the master controller can receive information about:

- the desired flow temperature (demand) from slave controllers
- and (as from ECL controller version 1.48) DHW tank heating / charging activity in slave controllers




Situation 1:
**SLAVE controllers: How to make use of the outdoor temperature signal sent from the MASTER controller**

The slave controllers only receive information about outdoor temperature and date / time.

SLAVE controllers:
Change the factory set address from 15 to address 0.

- In ☐⊙, go to System > Communication > ECL 485 addr.

| **ECL 485 addr. (master / slave address)** | | **2048** |
|---|---|---|
| Circuit | Setting range | **Choose** |
| ☐⊙ | 0 ... 15 | **0** |

**ECL 485 bus cable**
Maximum recommended length of the ECL 485 bus is calculated like this:

Subtract "Total length of all input cables of all ECL controllers in the master - slave system" from 200 m.

Simple example for total length of all input cables, 3 x ECL:

| | | |
|---|---|---|
| 1 x ECL | Outdoor temp. sensor: | 15 m |
| 3 x ECL | Flow temp. sensor: | 18 m |
| 3 x ECL | Return temp. sensor: | 18 m |
| 3 x ECL | Room temp. sensor: | 30 m |
| Total: | | 81 m |

Maximum recommended length of the ECL 485 bus:
200 - 81 m = 119 m

In a system with MASTER / SLAVE controllers, only one MASTER controller with address 15 is allowed.

If by mistake more MASTER controllers are present in an ECL 485 communication bus system, decide which controller is to be MASTER. Change the address in the remaining controllers. However, the system will operate but not be stable with more than one MASTER controller.

In the MASTER controller, the address in 'ECL 485 addr. (master / slave address)', ID no. 2048, must always be 15.
Navigation:

- In ☐⊙, go to System > Communication > ECL 485 addr.

SLAVE controllers must be set to another address than 15:
Navigation:

- In ☐⊙, go to System > Communication > ECL 485 addr.

'Demand offset' with a value is to be used in the Master controller only.

Situation 2:
**SLAVE controller: How to react on a DHW tank heating / charging activity sent from the MASTER controller**

The slave receives information about a DHW tank heating / charging activity in the master controller and can be set to close the selected heating circuit.

ECL controller versions 1.48 (as from August 2013):
The master receives information about DHW tank heating / charging activity in the master controller itself and also slaves in the system.
This status is broadcasted to all ECL controllers in the system and each heating circuit can be set to close the heating.

SLAVE controller:
Set the desired function:

- In circuit 1 / circuit 2, go to 'Settings' > 'Application' >'DHW priority':

| **DHW priority (closed valve / normal operation)** | | **11052 / 12052** |
|---|---|---|
| Circuit | Setting range | **Choose** |
| 1 / 2 | OFF / ON | **OFF / ON** |

**OFF:** The flow temperature control remains unchanged during active DHW heating / charging in the master / slave system.

**ON:** The valve in the heating circuit is closed during active DHW heating / charging in the master / slave system.

Situation 3:
**SLAVE controller: How to make use of the outdoor temperature signal and send information about the desired flow temperature back to the MASTER controller**

The slave controller receives information about outdoor temperature and date / time. The master controller receives information about the desired flow temperature from slave controllers with an address from 1 ... 9:

SLAVE controller:

- In ⊡⊙, go to System > Communication > ECL 485 addr.
- Change the factory set address from 15 to an address (1 ... 9). Each slave must be configured with its own address.

| **ECL 485 addr. (master / slave address)** | | **2048** |
|---|---|---|
| Circuit | Setting range | **Choose** |
| ⊡⊙ | 0 ... 15 | **1 ... 9** |

Furthermore, each slave can send information about the desired flow temperature (demand) in each circuit back to the master controller.

SLAVE controller:

- In the circuit in question, go to Settings > Application > Send desired T
- Choose ON or OFF.

| **Send desired T** | | **11500 / 12500** |
|---|---|---|
| Circuit | Setting range | **Choose** |
| 1 / 2 | OFF / ON | **ON or OFF** |

**OFF:** Information about the desired flow temperature is not sent to the master controller.

**ON:** Information about the desired flow temperature is sent to the master controller.

In the MASTER controller, the address in 'ECL 485 addr. (master / slave address)', ID no. 2048, must always be 15.

### 7.4 Frequently asked questions

The definitions apply to the ECL Comfort 210 / 296 / 310 series. Consequently, you might come across expressions that are not mentioned in your guide.

**Circulation pump (heating) does not stop as expected**
It is in operation at frost protection (outdoor temperature lower than "P frost T" value) and at heat demand (desired flow temperature higher than "P heat T" value)

**The time shown in the display is one hour off?**
See 'Time and Date'.

**The time shown in the display is not correct?**
The internal clock may have been reset, if there has been a power break for more than 72 hours.
Go to the 'Common controller settings' and 'Time & Date' to set the correct time.

**The ECL Application Key is lost?**
Switch the power off and on again to see the ECL controller type, version code (e.g. 1.52), code no. and application (e.g. A266.1) or go to 'Common controller settings' >'Key functions' > 'Application'. The system type (e.g. TYPE A266.1) and the system diagram is displayed.
Order a replacement from your Danfoss representative (e.g. ECL Application Key A266).
Insert the new ECL Application Key and copy your personal settings from the controller to the new ECL Application Key, if required.

**The room temperature is too low?**
Make sure that the radiator thermostat does not limit the room temperature.
If you still cannot obtain the desired room temperature by adjusting the radiator thermostats, the flow temperature is too low. Increase the desired room temperature (display with desired room temperature). If this does not help, adjust the 'Heat curve' ('Flow temp.').

**The room temperature is too high during saving periods?**
Make sure that the min. flow temperature limitation ('Temp. min.') is not too high.

**The temperature is unstable?**
Check that the flow temperature sensor is correctly connected and in the right place. Adjust the control parameters ('Control par.').
If the controller has a room temperature signal, see 'Room limit'.

**The controller does not operate and the control valve is closed?**
Check that the flow temperature sensor is measuring the correct value, see 'Daily use' or 'Input overview'.
Check the influence from other measured temperatures.

**How to make an extra comfort period in the schedule?**
You can set an additional comfort period by adding new 'Start' and 'Stop' times in 'Schedule'.

**How to remove a comfort period in the schedule?**
You can remove a comfort period by setting start and stop times to the same value.

**How to restore your personal settings?**
Please read the chapter concerning 'Inserting the ECL Application Key'.

**How to restore the factory settings?**
Please read the chapter concerning 'Inserting the ECL Application Key'.

**Why can't the settings be changed?**
The ECL Application Key has been removed.

**Why can't an application be selected when inserting the ECL application key into the controller?**
The actual application in the ECL Comfort controller must be deleted before a new application (subtype) can be selected.

**How to react on alarms?**
An alarm indicates that the system is not operating satisfactorily. Please contact your installer.

**What does P and PI control mean?**
P control: Proportional control.
By using a P control, the controller will change the flow temperature proportional to the difference between a desired and an actual temperature, e.g. a room temperature.
A P control will always have an offset which not will disappear over time.

PI control: Proportional and Integrating control.
A PI control does the same as a P control, but the offset will disappear over time.
A long 'Tn' will give a slow but stable control, and a short 'Tn' will result in a fast control but with a higher risk of unstability.

**What does the "i" in the upper right corner of the display mean?**
When uploading an application (subtype) from the application key into the ECL Comfort controller, the "**i**" in the upper right corner indicates that - besides the factory settings - the subtype also contains special user / systems settings.

**Why can't the ECL 485 Bus (used in ECL 210 / 296 / 310) and the ECL Bus (used in ECL 100 / 110 / 200 / 300) communicate?**
These two communication busses (Danfoss proprietary) are different in connection form, telegram form and speed.

**Why can't I select a language when uploading an application?**
Reason can be that the ECL 310 is powered with 24 Volt d.c.

## 7.5 Definitions

The definitions apply to the ECL Comfort 210 / 296 / 310 series. Consequently, you might come across expressions that are not mentioned in your guide.

**Accumulated temperature value**
A filtered (dampened) value, typically for room and outdoor temperatures. Is calculated in the ECL controller and is used to express the heat stored in the walls of the house. The accumulated value does not change so rapidly as the actual temperature.

**Air duct temperature**
Temperature measured in the air duct where the temperature is to be controlled.

**Alarm function**
Based on the alarm settings, the controller can activate an output.

**Anti-bacteria function**
For a defined period, the DHW temperature is increased in order to neutralize dangerous bacteria, e.g. Legionella.

**Balance temperature**
This setpoint is the basis for the flow / air duct temperature. The balance temperature can be adjusted by the room temperature, the compensation temperature and the return temperature. The balance temperature is only active if a room temperature sensor is connected.

**BMS**
Building Management System. A supervisory system for remote control and monitoring.

**Comfort operation**
Normal temperature in the system controlled by the schedule. During heating the flow temperature in the system is higher to maintain the desired room temperature. During cooling the flow temperature in the system is lower to maintain the desired room temperature.

**Comfort temperature**
Temperature maintained in the circuits during comfort periods. Normally during daytime.

**Compensation temperature**
A measured temperature influencing the flow temperature reference / balance temperature.

**Desired flow temperature**
Temperature calculated by the controller on basis of the outdoor temperature and influences from the room and / or return temperatures. This temperature is used as a reference for the control.

**Desired room temperature**
Temperature which is set as the desired room temperature. The temperature can only be controlled by the ECL Comfort controller if a room temperature sensor is installed.
If a sensor is not installed, the set desired room temperature however still influences the flow temperature.
In both cases the room temperature in each room is typically controlled by radiator thermostats / valves.

**Desired temperature**
Temperature based on a setting or a controller calculation.

**Dew point temperature**
Temperature at which the humidity in the air condensates.

**DHW circuit**
The circuit for heating the domestic hot water (DHW).

**Duct temperature**
Temperature measured in the air duct where the temperature is to be controlled.

**ECL 485 Bus**
This communication bus is Danfoss proprietary and used for internal communication between ECL 210, ECL 210B, ECL 296, ECL 310, ECL 310B, ECA 30 and ECA 31.
Communication with "ECL Bus", used in ECL 100, ECL 110, ECL 200, ECL 300 and ECL 301, is not possible.

**ECL Portal**
A supervisory system for remote control and monitoring, locally and via Internet.

**EMS**
Energy Management System. A supervisory system for remote control and monitoring.

**Factory settings**
Settings stored on the ECL Application Key to simplify the set up of your controller the first time.

**Firmware**
is used by the ECL Comfort controller and ECA 30 / 31 to manage display, dial and program execution.

**Flow temperature**
Temperature measured in the water flow where the temperature is to be controlled.

**Flow temperature reference**
Temperature calculated by the controller on basis of the outdoor temperature and influences from the room and / or return temperatures. This temperature is used as a reference for the control.

**Heat curve**
A curve showing the relationship between actual outdoor temperature and desired flow temperature.

**Heating circuit**
The circuit for heating the room / building.

**Holiday schedule**
Selected days can be programmed to be in comfort, saving or frost protection mode. Besides this, a day schedule with comfort period from 07.00 to 23.00 can be selected.

**Humidistat**
A device, which reacts on the air's humidity. A switch can go ON if the measured humidity gets above a set point.

**Humidity, relative**
This value (stated in %) refers to the indoor moisture content compared to the max. moisture content. The relative humidity is measured by the ECA 31 and is used for the calculation of the dew point temperature.

**Inlet temperature**
Temperature measured in the inlet air flow where the temperature is to be controlled.

**Limitation temperature**
Temperature that influences the desired flow / balance temperature.

**Log function**
The temperature history is displayed.

**Master / slave**
Two or more controllers are interconnected on the same bus, the master sends out e.g. time, date and outdoor temperature. The slave receives data from master and sends e.g. desired flow temperature value.

**Modulating control (0 - 10 V control)**
Positioning (by means of a 0 - 10 V control signal) of the actuator for the motorized control valve in order to control the flow.

**Optimization**
The controller optimizes the start time of the scheduled temperature periods. Based on the outdoor temperature, the controller automatically calculates when to start in order to reach the comfort temperature at the set time. The lower the outdoor temperature, the earlier the start time.

**Outdoor temperature trend**
The arrow indicates the tendency, i.e. whether the temperature rises or falls.

**Override mode**
When ECL Comfort is in Scheduled mode, a switch or contact signal can be applied to an input in order to override to Comfort, Saving, Frost protection or Constant temperature. As long as the switch or contact signal is applied, the override is active.

**Pt 1000 sensor**
All sensors used with the ECL Comfort controller are based on the Pt 1000 type (IEC 751B). The resistance is 1000 ohm at 0 °C and it changes with 3.9 ohm / degree.

**Pump control**
One circulation pump is working and the other is the spare circulation pump. After a set time, the roles are exchanged.

**Refill water function**
If the measured pressure in the heating system is too low (e.g. due to a leakage), water can be supplemented.

**Return temperature**
The temperature measured in the return influences the desired flow temperature.

**Room temperature**
Temperature measured by the room temperature sensor or the Remote Control Unit. The room temperature can only be controlled directly if a sensor is installed. The room temperature influences the desired flow temperature.

**Room temperature sensor**
Temperature sensor placed in the room (reference room, typically the living room) where the temperature is to be controlled.

**Saving temperature**
Temperature maintained in the heating / DHW circuit during saving temperature periods. Typically, the Saving temperature is lower than the Comfort temperature in order to save energy.

**SCADA**
Supervisory Control And Data Acquisition. A supervisory system for remote control and monitoring.

**Schedule**
Schedule for periods with comfort and saving temperatures. The schedule can be made individually for each week day and may consist of up to 3 comfort periods per day.

**Software**
is used in the ECL Comfort controller to do the application related processes.

**Weather compensation**
Flow temperature control based on the outdoor temperature. The control is related to a user-defined heat curve.

**2-point control**
ON / OFF control, e.g. circulation pump, ON / OFF valve, change-over valve or damper control.

**3-point control**
Actuator positioning by means of Opening, Closing or No-action signals for the motorized control valve in order to control the flow. No-action means that the actuator remains in its current position.

### 7.6 Type (ID 6001), overview

| | Type 0 | Type 1 | Type 2 | Type 3 | Type 4 |
|---|---|---|---|---|---|
| **Address** | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Type** | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Scan time** | ✓ | ✓ | ✓ | ✓ | ✓ |
| **ID / Serial** | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Reserved** | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Flow temp. [0.01 °C]** | ✓ | ✓ | ✓ | ✓ | - |
| **Return temp. [0.01 °C]** | ✓ | ✓ | ✓ | ✓ | - |
| **Flow [0.1 l/h]** | ✓ | ✓ | ✓ | ✓ | - |
| **Power [0.1 kW]** | ✓ | ✓ | ✓ | ✓ | - |
| **Acc. Volume** | [0.1 m3] | [0.1 m3] | [0.1 m3] | [0.1 m3] | - |
| **Acc. Energy** | [0.1 kWh] | [0.1 MWh] | [0.1 kWh] | [0.1 MWh] | - |
| **Tariff1 Acc. Energy** | - | - | [0.1 kWh] | [0.1 MWh] | - |
| **Tariff2 Acc. Energy** | - | - | [0.1 kWh] | [0.1 MWh] | - |
| **Up time [days]** | - | - | ✓ | ✓ | - |
| **Current time [M-bus defined structure]** | - | - | ✓ | ✓ | ✓ |
| **Error status [energy meter defined bitmask]** | - | - | ✓ | ✓ | - |
| **Acc. Volume** | - | - | - | - | [0.1 m3] |
| **Acc. Energy** | - | - | - | - | [0.1 kWh] |
| **Acc. Volume2** | - | - | - | - | [0.1 m3] |
| **Acc. Energy2** | - | - | - | - | [0.1 kWh] |
| **Acc. Volume3** | - | - | - | - | [0.1 m3] |
| **Acc. Energy3** | - | - | - | - | [0.1 kWh] |
| **Acc. Volume4** | - | - | - | - | [0.1 m3] |
| **Acc. Energy4** | - | - | - | - | [0.1 kWh] |
| **Flow MAX** | [0.1 l/h] | [0.1 l/h] | [0.1 l/h] | [0.1 l/h] | - |
| **Power MAX** | [0.1 kW] | [0.1 kW] | [0.1 kW] | [0.1 kW] | - |
| **Max T forward** | ✓ | ✓ | ✓ | ✓ | - |
| **Max T return** | ✓ | ✓ | ✓ | ✓ | - |
| **Storage * Acc. Energy** | [0.1 kWh] | [0.1 kWh] | [0.1 kWh] | [0.1 kWh] | - |

### 7.7 Parameter ID overview

P348.x — **x** refers to the subtypes listed in the column.

| ID | Parameter Name | P348.x | Setting range | Factory | Unit | Own settings | |
|---|---|---|---|---|---|---|---|
| 10512 | Prog. execution | 2, 3 | OFF ; ON | OFF | | | |
| 10514 | Max. pwr. failure | 2, 3 | 5 ... 3000 | 30 | Min | | |
| 10903 | Ramp X5-X6 | 2, 3 | OFF, 1 ... 20 | 5 | | | |
| 10904 | Ramp X7-X8 | 2, 3 | OFF, 1 ... 20 | 5 | | | |
| 10912 | Appl. continue | 2, 3 | OFF ; ON | OFF | | | |
| 10913 | After power fail. | 2, 3 | STOP ; START | OFF | | | |
| 10930 | X1 | 2, 3 | 0 ... 1200 | 0 | h | | |
| 10931 | X2 | 2, 3 | 0 ... 1200 | 0 | h | | |
| 10932 | X3 | 2, 3 | 0 ... 1200 | 0 | h | | |
| 10933 | X4 | 2, 3 | 0 ... 1200 | 0 | h | | |
| 10934 | X5 | 2, 3 | 0 ... 1200 | 0 | h | | |
| 10935 | X6 | 2, 3 | 0 ... 1200 | 360 | h | | |
| 10936 | X7 | 2, 3 | 0 ... 1200 | 720 | h | | |
| 10937 | X8 | 2, 3 | 0 ... 1200 | 1080 | h | | |
| 11004 | Desired T | 1, 2, 3 | 5 ... 150 | 50 | °C | | 79 |
| 11010 | ECA addr. | 1 | OFF ; A ; B | OFF | | | 111 |
| 11011 | Auto saving | 1, 2, 3 | OFF, -29 ... 10 | -15 | °C | | 94 |
| 11012 | Boost | 1, 2, 3 | OFF, 1 ... 99 | OFF | % | | 95 |
| 11013 | Ramp | 1, 2, 3 | OFF, 1 ... 99 | OFF | Min | | 96 |
| 11014 | Optimizer | 1, 2, 3 | OFF, 10 ... 59 | OFF | | | 96 |
| 11015 | Adapt. time | 1 | OFF, 1 ... 50 | OFF | Sec | | 81 |
| 11017 | Demand offset | 1 | OFF, 1 ... 20 | OFF | K | | |
| 11020 | Based on | 1 | OUT ; ROOM | OUT | | | 97 |
| 11021 | Total stop | 1, 2, 3 | OFF ; ON | OFF | | | 97 |
| 11022 | P exercise | 1, 2, 3 | OFF ; ON | ON | | | 112 |
| 11023 | M exercise | 1, 2, 3 | OFF ; ON | OFF | | | 112 |
| 11026 | Pre-stop | 1, 2, 3 | OFF ; ON | ON | | | 98 |
| 11028 | Con. T, ret. T lim. | 1 | 10 ... 110 | 70 | °C | | 86 |
| 11029 | DHW, ret. T limit | 1 | OFF, 10 ... 110 | OFF | °C | | 87 |
| 11031 | High T out X1 | 1 | -60 ... 20 | 15 | °C | | 87 |
| 11032 | Low limit Y1 | 1 | 10 ... 150 | 50 | °C | | 87 |
| 11033 | Low T out X2 | 1 | -60 ... 20 | -15 | °C | | 88 |
| 11034 | High limit Y2 | 1 | 10 ... 150 | 60 | °C | | 88 |
| 11035 | Infl. - max. | 1 | -9.9 ... 9.9 | -2.0 | | | 88 |
| 11036 | Infl. - min. | 1 | -9.9 ... 9.9 | 0.0 | | | 88 |
| 11037 | Adapt. time | 1 | OFF, 1 ... 50 | 25 | Sec | | |
| 11040 | P post-run | 1, 2, 3 | 0 ... 99 | 3 | Min | | |
| 11050 | P demand | 1 | OFF ; ON | OFF | | | 113 |
| 11052 | DHW priority | 1, 2, 3 | OFF ; ON | OFF | | | 114 |

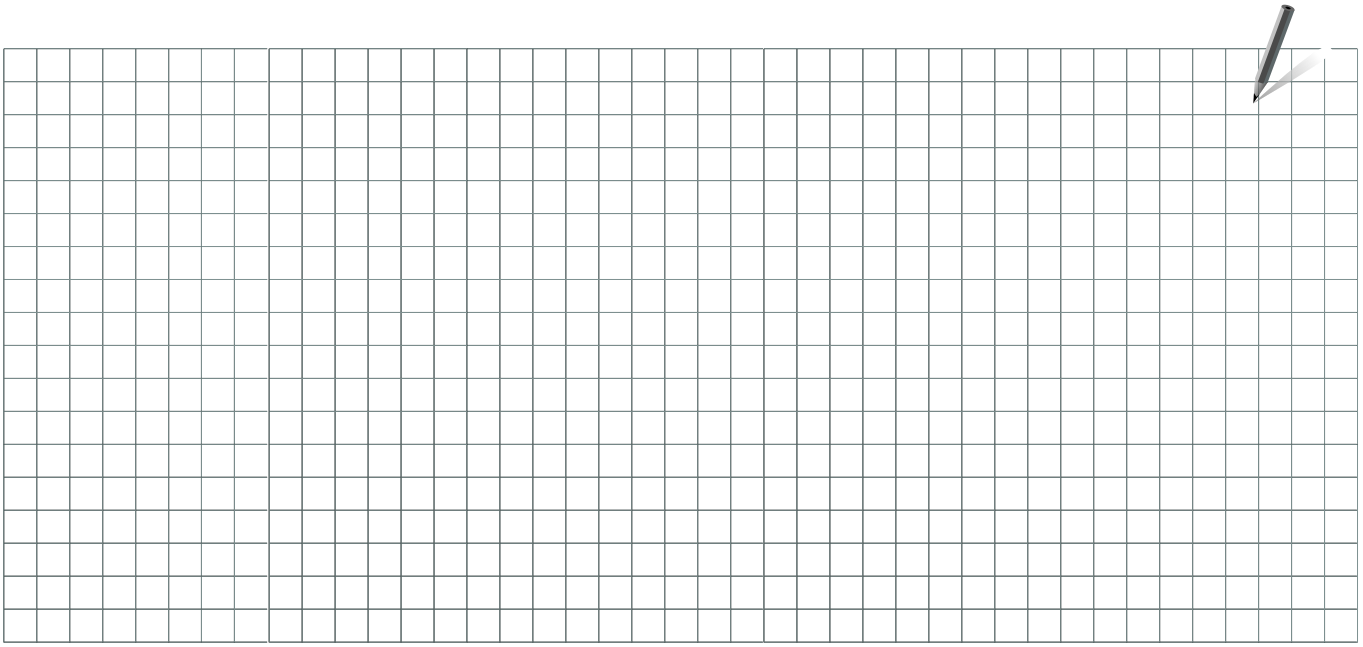
| ID | Parameter Name | P348.x | Setting range | Factory | Unit | Own settings | |
|---|---|---|---|---|---|---|---|
| 11077 | P frost T | 1, 2, 3 | OFF, -10 ... 20 | 2 | °C | | 114 |
| 11078 | P heat T | 1, 2, 3 | 5 ... 40 | 20 | °C | | 114 |
| 11085 | Priority | 1 | OFF ; ON | OFF | | | 89 |
| 11093 | Frost pr. T | 1, 2, 3 | 5 ... 40 | 10 | °C | | 115 |
| 11109 | Input type | 1 | EM1 ; EM2 ; EM3 ; EM4 ; EM5 ; OFF | OFF | | | 91 |
| 11112 | Adapt. time | 1 | OFF, 1 ... 50 | OFF | Sec | | 91 |
| 11113 | Filter constant | 1 | 1 ... 50 | 10 | | | 91 |
| 11115 | Units | 1 | ml, l/h ; l, l/h ; ml, m3/h ; l, m3/h ; Wh, kW ; kWh, kW ; kWh, MW ; MWh, MW ; MWh, GW ; GWh, GW | ml, l/h | | | |
| 11116 | High limit Y2 | 1 | 0.0 ... 999.9 | 999.9 | | | 92 |
| 11117 | Low limit Y1 | 1 | 0.0 ... 999.9 | 999.9 | | | 92 |
| 11118 | Low T out X2 | 1 | -60 ... 20 | -15 | °C | | 92 |
| 11119 | High T out X1 | 1 | -60 ... 20 | 15 | °C | | 92 |
| 11141 | Ext. input | 1, 2, 3 | OFF ; S1 ; S2 ; S3 ; S4 ; S5 ; S6 ; S7 ; S8 ; S9 ; S10 ; S11 ; S12 ; S13 ; S14 ; S15 ; S16 | OFF | | | 115 |
| 11142 | Ext. mode | 1, 2, 3 | COMFORT ; SAVING ; FROST PR. ; CONST. T | COMFORT | | | 116 |
| 11147 | Upper difference | 1, 2, 3 | OFF, 1 ... 30 | OFF | K | | 134 |
| 11148 | Lower difference | 1, 2, 3 | OFF, 1 ... 30 | OFF | K | | 134 |
| 11149 | Delay | 1, 2, 3 | 1 ... 99 | 10 | Min | | 135 |
| 11150 | Lowest temp. | 1, 2, 3 | 10 ... 50 | 30 | °C | | 135 |
| 11174 | Motor pr. | 1, 2, 3 | OFF, 10 ... 59 | OFF | Min | | 104 |
| 11177 | Temp. min. | 1, 2, 3 | 10 ... 150 | 10 | °C | | |
| 11178 | Temp. max. | 1, 2, 3 | 10 ... 150 | 90 | °C | | |
| 11179 | Summer, cut-out | 1, 2, 3 | OFF, 1 ... 50 | 21 | °C | | |
| 11182 | Infl. - max. | 1 | -9.9 ... 0.0 | 0.0 | | | 82 |
| 11183 | Infl. - min. | 1 | 0.0 ... 9.9 | 0.0 | | | 82 |
| 11184 | Xp | 1, 2, 3 | 5 ... 250 | 120 | K | | |
| 11185 | Tn | 1, 2, 3 | 1 ... 999 | 50 | Sec | | |
| 11186 | M run | 1, 2, 3 | 5 ... 250 | 60 | Sec | | |
| 11187 | Nz | 1, 2, 3 | 1 ... 9 | 3 | K | | |
| 11189 | Min. act. time | 1, 2, 3 | 2 ... 50 | 10 | | | |
| 11392 | Sum. start, month | 1, 2, 3 | 1 ... 12 | 5 | | | 121 |
| 11393 | Sum. start, day | 1, 2, 3 | 1 ... 31 | 20 | | | 121 |
| 11395 | Summer, filter | 1, 2, 3 | OFF, 1 ... 300 | 250 | | | 121 |
| 11396 | Win. start, month | 1, 2, 3 | 1 ... 12 | 5 | | | 121 |
| 11397 | Winter start, day | 1, 2, 3 | 1 ... 31 | 20 | | | 121 |
| 11398 | Winter, cut-out | 1, 2, 3 | OFF, 1 ... 50 | 21 | °C | | 121 |
| 11399 | Winter, filter | 1, 2, 3 | OFF, 1 ... 300 | 250 | | | 121 |

| ID | Parameter Name | P348.x | Setting range | Factory | Unit | Own settings | |
|---|---|---|---|---|---|---|---|
| 11500 | Send desired T | 1, 2, 3 | OFF ; ON | ON | | | 119 |
| 11614 | Alarm high | 1 | 0.0 ... 25.0 | 25.0 | Bar | | 136 |
| 11615 | Alarm low | 1 | 0.0 ... 25.0 | 0.0 | Bar | | 136 |
| 11617 | Alarm time-out | 1 | 0 ... 250 | 10 | Sec | | 136 |
| 11910 | Circuit, Estrich. | 2, 3 | OFF ; ON | OFF | | | |
| 12004 | Desired T | 2, 3 | 5 ... 150 | 50 | °C | | 79 |
| 12011 | Auto saving | 2, 3 | OFF, -29 ... 10 | -15 | °C | | 94 |
| 12012 | Boost | 2, 3 | OFF, 1 ... 99 | OFF | % | | 95 |
| 12013 | Ramp | 2, 3 | OFF, 1 ... 99 | OFF | Min | | 96 |
| 12014 | Optimizer | 2, 3 | OFF, 10 ... 59 | OFF | | | 96 |
| 12017 | Demand offset | 1 | 1 ... 50 | 6 | K | | |
| 12021 | Total stop | 2, 3 | OFF ; ON | OFF | | | 97 |
| 12022 | P exercise | 2, 3 | OFF ; ON | ON | | | 112 |
| 12023 | M exercise | 2, 3 | OFF ; ON | OFF | | | 112 |
| 12026 | Pre-stop | 2, 3 | OFF ; ON | ON | | | 98 |
| 12040 | P post-run | 2, 3 | 0 ... 99 | 3 | Min | | |
| 12052 | DHW priority | 2, 3 | OFF ; ON | OFF | | | 114 |
| 12065 | Adapt. time | 1 | 1 ... 100 | 4 | Sec | | |
| 12077 | P frost T | 2, 3 | OFF, -10 ... 20 | 2 | °C | | 114 |
| 12078 | P heat T | 2, 3 | 5 ... 40 | 20 | °C | | 114 |
| 12093 | Frost pr. T | 2, 3 | 5 ... 40 | 10 | °C | | 115 |
| 12114 | Pulse | 1 | 1 ... 9999 | 81 | | | 109 |
| 12115 | Units | 1 | ml, l/h ; l, l/h ; ml, m3/h ; l, m3/h | l, m3/h | | | |
| 12122 | Day: | 1 | 0 ... 127 | 0 | | | |
| 12123 | Start time | 1 | 0 ... 47 | 0 | | | |
| 12124 | Duration | 1 | 10 ... 600 | 120 | Min | | |
| 12125 | Desired T | 1 | OFF, 10 ... 110 | OFF | °C | | |
| 12141 | Ext. input | 2, 3 | OFF ; S1 ; S2 ; S3 ; S4 ; S5 ; S6 ; S7 ; S8 ; S9 ; S10 ; S11 ; S12 ; S13 ; S14 ; S15 ; S16 | OFF | | | 115 |
| 12142 | Ext. mode | 2, 3 | COMFORT ; SAVING ; FROST PR. ; CONST. T | COMFORT | | | 116 |
| 12147 | Upper difference | 1, 2, 3 | OFF, 1 ... 30 | OFF | K | | 134 |
| 12148 | Lower difference | 1, 2, 3 | OFF, 1 ... 30 | OFF | K | | 134 |
| 12149 | Delay | 1, 2, 3 | 1 ... 99 | 10 | Min | | 135 |
| 12150 | Lowest temp. | 1, 2, 3 | 10 ... 50 | 30 | °C | | 135 |
| 12165 | V out max. | 1 | 0 ... 100 | 100 | % | | |
| 12167 | V out min. | 1 | 0 ... 100 | 30 | % | | |
| 12171 | Reverse out | 1 | NO ; YES | NO | | | |
| 12174 | Motor pr. | 2, 3 | OFF, 10 ... 59 | OFF | Min | | 104 |
| 12177 | Temp. min. | 1 | 10 ... 110 | 10 | °C | | |

| ID | Parameter Name | P348.x | Setting range | Factory | Unit | Own settings | |
|---|---|---|---|---|---|---|---|
| | -\|\|- | 2, 3 | 10 ... 150 | 10 | °C | | |
| 12178 | Temp. max. | 1 | 10 ... 110 | 80 | °C | | |
| | -\|\|- | 2, 3 | 10 ... 150 | 90 | °C | | |
| 12179 | Summer, cut-out | 2, 3 | OFF, 1 ... 50 | 21 | °C | | |
| 12184 | Xp | 1 | 5 ... 250 | 80 | K | | |
| | -\|\|- | 2, 3 | 5 ... 250 | 120 | K | | |
| 12185 | Tn | 1 | 1 ... 999 | 60 | Sec | | |
| | -\|\|- | 2, 3 | 1 ... 999 | 50 | Sec | | |
| 12186 | M run | 2, 3 | 5 ... 250 | 60 | Sec | | |
| 12187 | Nz | 1 | 0 ... 9 | 1 | K | | |
| | -\|\|- | 2, 3 | 1 ... 9 | 3 | K | | |
| 12189 | Min. act. time | 2, 3 | 2 ... 50 | 10 | | | |
| 12194 | Stop difference | 1 | -50 ... 50 | -6 | K | | |
| 12195 | Start difference | 1 | -50 ... -1 | -2 | K | | |
| 12354 | CW influence | 1 | OFF, 0.1 ... 100.0 | OFF | % | | 106 |
| 12395 | Summer, filter | 2, 3 | OFF, 1 ... 300 | 250 | | | 121 |
| 12398 | Winter, cut-out | 2, 3 | OFF, 1 ... 50 | 21 | °C | | 121 |
| 12399 | Winter, filter | 2, 3 | OFF, 1 ... 300 | 250 | | | 121 |
| 12500 | Send desired T | 1, 2, 3 | OFF ; ON | ON | | | 119 |
| 12565 | PWM period | 1 | 0.2 ... 10.0 | 8.0 | Sec | | |
| 12614 | Alarm high | 1 | 0.0 ... 25.0 | 25.0 | Bar | | 136 |
| 12615 | Alarm low | 1 | 0.0 ... 25.0 | 0.0 | Bar | | 136 |
| 12617 | Alarm time-out | 1 | 0 ... 250 | 10 | Sec | | 136 |
| 12910 | Circuit, Estrich. | 2, 3 | OFF ; ON | OFF | | | |
| 13065 | Adapt. time | 2, 3 | OFF, 1 ... 100 | 4 | Sec | | |
| 13114 | Pulse | 2, 3 | 1 ... 9999 | 81 | | | 109 |
| 13115 | Units | 2, 3 | ml, l/h ; l, l/h ; ml, m3/h ; l, m3/h | l, m3/h | | | |
| 13122 | Day: | 2, 3 | 0 ... 127 | 0 | | | |
| 13123 | Start time | 2, 3 | 0 ... 47 | 0 | | | |
| 13124 | Duration | 2, 3 | 10 ... 600 | 120 | Min | | |
| 13125 | Desired T | 2, 3 | OFF, 10 ... 110 | OFF | °C | | |
| 13126 | Anti-bac. ret. T | 1 | 10 ... 110 | 60 | °C | | 103 |
| 13147 | Upper difference | 2, 3 | OFF, 1 ... 30 | OFF | K | | 134 |
| 13148 | Lower difference | 2, 3 | OFF, 1 ... 30 | OFF | K | | 134 |
| 13149 | Delay | 2, 3 | 1 ... 99 | 10 | Min | | 135 |
| 13150 | Lowest temp. | 2, 3 | 10 ... 50 | 30 | °C | | 135 |
| 13165 | V out max. | 1, 2, 3 | 0 ... 100 | 100 | % | | |
| 13167 | V out min. | 1 | 0 ... 100 | 20 | % | | |
| | -\|\|- | 2 | 0 ... 100 | 30 | % | | |
| | -\|\|- | 3 | 0 ... 100 | 15 | % | | |

| ID | Parameter Name | P348.x | Setting range | Factory | Unit | Own settings | |
|---|---|---|---|---|---|---|---|
| 13171 | Reverse out | 1, 2, 3 | NO ; YES | NO | | | |
| 13184 | Xp | 1, 2, 3 | 5 ... 250 | 80 | K | | |
| 13185 | Tn | 1 | 1 ... 999 | 20 | Sec | | |
| | -\|\|- | 2, 3 | 1 ... 999 | 60 | Sec | | |
| 13187 | Nz | 1 | 1 ... 9 | 1 | K | | |
| | -\|\|- | 2, 3 | 0 ... 9 | 1 | K | | |
| 13353 | Level | 2, 3 | 0 ... 500 | 50 | l/h | | 106 |
| 13354 | CW influence | 2, 3 | OFF, 0.1 ... 100.0 | OFF | % | | 106 |
| 13370 | Max. return T | 1 | 5 ... 90 | 56 | °C | | 106 |
| 13500 | Send desired T | 2, 3 | OFF ; ON | ON | | | 119 |
| 13565 | PWM period | 2, 3 | 0.2 ... 10.0 | 8.0 | Sec | | |
| 14017 | Demand offset | 2, 3 | OFF, 1 ... 50 | 6 | K | | |
| 14030 | Limit | 2 | 10 ... 110 | 40 | °C | | |
| | -\|\|- | 3 | OFF, 1 ... 110 | 30 | °C | | |
| 14037 | Adapt. time | 2 | OFF, 1 ... 999 | OFF | Sec | | |
| 14109 | Input type | 2 | EM1 ; EM2 ; EM3 ; EM4 ; EM5 ; OFF | OFF | | | 91 |
| 14112 | Adapt. time | 2 | OFF, 1 ... 999 | OFF | Sec | | 91 |
| 14113 | Filter constant | 2 | 1 ... 50 | 10 | | | 91 |
| 14115 | Units | 2 | ml, l/h ; l, l/h ; ml, m3/h ; l, m3/h ; Wh, kW ; kWh, kW ; kWh, MW ; MWh, MW ; MWh, GW ; GWh, GW | ml, l/h | | | |
| 14116 | High limit Y2 | 2 | 0.0 ... 999.9 | 999.9 | | | 92 |
| 14117 | Low limit Y1 | 2 | 0.0 ... 999.9 | 999.9 | | | 92 |
| 14118 | Low T out X2 | 2 | -60 ... 20 | -15 | °C | | 92 |
| 14119 | High T out X1 | 2 | -60 ... 20 | 15 | °C | | 92 |
| 14147 | Upper difference | 2, 3 | OFF, 1 ... 30 | OFF | K | | 134 |
| 14148 | Lower difference | 2, 3 | OFF, 1 ... 30 | OFF | K | | 134 |
| 14149 | Delay | 2, 3 | 1 ... 99 | 10 | Min | | 135 |
| 14150 | Lowest temp. | 2, 3 | 10 ... 50 | 30 | °C | | 135 |
| 14177 | Temp. min. | 2, 3 | 10 ... 150 | 10 | °C | | |
| 14178 | Temp. max. | 2, 3 | 10 ... 150 | 90 | °C | | |
| 14184 | Xp | 2, 3 | 5 ... 250 | 120 | K | | |
| 14185 | Tn | 2, 3 | 1 ... 999 | 50 | Sec | | |
| 14186 | M run | 2, 3 | 5 ... 250 | 60 | Sec | | |
| 14187 | Nz | 2, 3 | 1 ... 9 | 3 | K | | |
| 14189 | Min. act. time | 2, 3 | 2 ... 50 | 10 | | | |
| 14194 | Stop difference | 2, 3 | -50 ... 50 | -6 | K | | |
| 14195 | Start difference | 2, 3 | -50 ... -1 | -2 | K | | |
| 14330 | Wake up level | 2 | 0 ... 100, ON | ON | % | | 105 |
| 14340 | Delay | 2, 3 | OFF, 1 ... 50 | 5 | Min | | 135 |

| ID | Parameter Name | P348.x | Setting range | Factory | Unit | Own settings | |
|---|---|---|---|---|---|---|---|
| 14571 | Charge start diff. | 3 | 0 ... 40 | 2 | K | | 107 |
| 14636 | Alarm value | 3 | 0 ... 1 | 0 | | | 136 |
| 14637 | Alarm time-out | 3 | 0 ... 200 | 10 | Sec | | 136 |
| 14700 | Await time | 3 | 5 ... 250 | 30 | Sec | | 107 |
| 15040 | P post-run | 2, 3 | 0 ... 99 | 1 | Min | | |
| 15065 | Adapt. time | 2, 3 | OFF, 1 ... 100 | OFF | Sec | | |
| 15165 | V out max. | 2, 3 | 0 ... 100 | 100 | % | | |
| 15167 | V out min. | 2, 3 | 0 ... 100 | 20 | % | | |
| 15171 | Reverse out | 2, 3 | NO ; YES | NO | | | |
| 15184 | Xp | 2, 3 | 5 ... 250 | 80 | K | | |
| 15185 | Tn | 2, 3 | 1 ... 999 | 20 | Sec | | |
| 15187 | Nz | 2, 3 | 1 ... 9 | 1 | K | | |
| 15189 | Min. act. time | 2, 3 | 0.1 ... 5.0 | 0.2 | Sec | | |
| 15327 | Input type | 2, 3 | S6 ; S7 ; S8 | S6 | | | 129 |
| 15565 | PWM period | 2, 3 | 0.2 ... 10.0 | 8.0 | Sec | | |
| 15575 | ΔT primary | 2, 3 | 2 ... 50 | 8 | K | | 107 |
| 17054 | Cont. T control | 2, 3 | NO ; YES | YES | | | 102 |
| 17124 | Duration | 2, 3 | 5 ... 250 | 12 | Min | | |
| 17126 | Anti-bac. ret. T | 2, 3 | 10 ... 110 | 60 | °C | | 103 |
| 17165 | V out max. | 2, 3 | 0 ... 100 | 100 | % | | |
| 17167 | V out min. | 2, 3 | 0 ... 100 | 20 | % | | |
| 17171 | Reverse out | 2, 3 | NO ; YES | NO | | | |
| 17184 | Xp | 2, 3 | 5 ... 250 | 80 | K | | |
| 17185 | Tn | 2, 3 | 1 ... 999 | 20 | Sec | | |
| 17187 | Nz | 2, 3 | 1 ... 9 | 1 | K | | |
| 17370 | Max. return T | 2, 3 | 5 ... 90 | 50 | °C | | 106 |
| 18037 | Adapt. time | 2 | OFF, 1 ... 100 | OFF | Sec | | |
| 18040 | P post-run | 3 | 0 ... 250 | 0 | Sec | | |
| 18041 | DHW P post-run | 2 | 0 ... 250 | 10 | Sec | | 113 |
| 18059 | P charge delay | 3 | 0 ... 99 | 0 | Min | | 102 |
| 18165 | V out max. | 2, 3 | 0 ... 100 | 100 | % | | |
| 18167 | V out min. | 2, 3 | 0 ... 100 | 20 | % | | |
| 18171 | Reverse out | 2, 3 | NO ; YES | NO | | | |
| 18184 | Xp | 2, 3 | 5 ... 250 | 80 | K | | |
| 18185 | Tn | 2, 3 | 1 ... 999 | 20 | Sec | | |
| 18187 | Nz | 2, 3 | 0 ... 9 | 1 | K | | |
| 18194 | Stop difference | 2, 3 | -30 ... 30 | 4 | K | | |
| 18195 | Start difference | 2, 3 | -30 ... 30 | -2 | K | | |
| 18310 | Retry time | 2 | OFF, 1 ... 99 | OFF | Min | | 118 |
| 18371 | Pump start diff. | 2 | 0 ... 40 | 4 | K | | 119 |
| 18375 | Reduced des. T | 2 | -10 ... 0 | -2 | K | | 106 |



Installer:

By:

Date: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