ENGINEERING TOMORROW

Operating Guide

ECL Comfort 310, application A390

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 ECL Application Key A390 (order code no. 087H3815).

The ECL Application key A390 contains 6 subtypes, which are:

- A390.1: 3 heating circuits, 3-point control of control valves
- A390.2: 3 heating circuits, analog control of control valves
- A390.3: 3 cooling circuits, 3-point / analog control of control valves
- A390.11: 1 x heating / DHW circuit, 2 heating circuits; 3-point / analog control of control valves
- A390.12: 1 x heating / DHW charging circuit, 2 heating circuits; 3-point / analog control of control valves
- A390.13: 1 x DHW charging circuit, 2 heating circuits; 3-point / analog control of control valves

The A390 application key also contains a Floor (Screed) Drying Program. See separate documentation (In English and German language only).

See the Installation Guide for electrical connections.

The described functions are realized in ECL Comfort 310 for advanced solutions, e.g. M-bus, Modbus and Ethernet (Internet) communication.

The application key A390 complies with ECL Comfort controllers 310 as of software (firmware) version 1.11 (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 and the built-in room temperature sensor can be utilized.

The subtypes A390.2, A390.3, A390.11, A390.12 and A390.13 can work with the Internal I/O module ECA 32 for 0 – 10 Volt control of actuators and P7 control.
ECA 32 is placed in the base part for ECL Comfort 310.

Together with the ECL Comfort 310 the additional Internal I/O module 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. (087H3040)
- ECL Comfort 310B, 230 volt a.c. (087H3050)
- ECL Comfort 310, 24 volt a.c. (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 (087H3200)
- ECA 31 (087H3201)

Internal I/O module:

- ECA 32 (087H3202)

The base part for ECL Comfort 310, 230 volt and 24 volt:

- 087H3230

Additional documentation for ECL Comfort 310, modules and accessories is available on *http://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 installation is max. 10 A typically.

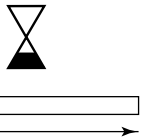
The ambient temperature ranges for ECL Comfort in operation are:
ECL Comfort 210 / 310: 0 - 55 °C
ECL Comfort 296: 0 - 45 °C.
Exceeding the temperature range can result in malfunctions.

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.

Automatic update of controller software (firmware):

The software of the controller is updated automatically when the key is inserted (as of controller version 1.11 (ECL 210 / 310) and version 1.58 (ECL 296)). 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"

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.

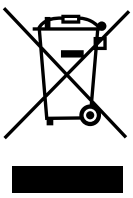
As this Operating Guide covers several system types, special system settings will be marked with a system type. All system types are shown in the chapter: 'Identifying your system type'.

°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 **A390** contains 6 subtypes: A390.1, A390.2, A390.3, A390.11, A390.12 and A390.13. The 6 different applications are heating, cooling and DHW applications in various combinations.

The heating based applications **A390.1, A390.2, A390.11, A390.12 and A390.13** are very flexible.

The basic principles for a heating circuit
(example referring to A390.1, circuit 1)

Typically, the flow temperature is adjusted according to your requirements. The flow temperature sensor (S3) is the most important sensor. The desired flow temperature at S3 is calculated in the ECL controller, based on the outdoor temperature (S1) and the desired room temperature. 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 (M1) 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), thus resulting 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 does not equal the desired room temperature, the desired flow temperature can be adjusted.

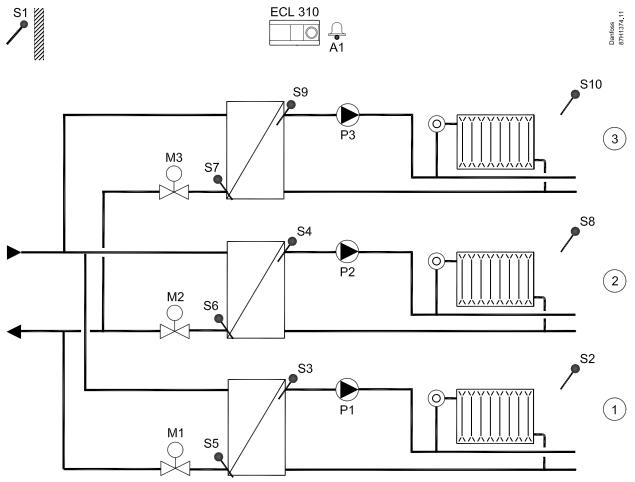
The circulation pump, P1, is ON at heat demand or at frost protection.

The heating can be switched OFF when the outdoor temperature is higher than a selectable value.

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.

Typical A390.1 application:



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	*Electronic controller ECL Comfort 310*
S1	*Outdoor temperature sensor*
S2	*(Optional) Room temperature sensor, circuit 1*
S3	*Flow temperature sensor, circuit 1*
S4	*Flow temperature sensor, circuit 2*
S5	*(Optional) Return temperature sensor, circuit 1*
S6	*(Optional) Return temperature sensor, circuit 2*
S7	*(Optional) Return temperature sensor, circuit 3*
S8	*(Optional) Room temperature sensor, circuit 2*
S9	*Flow temperature sensor, circuit 3*
S10	*(Optional) Room temperature sensor, circuit 3*
P1	*Circulation pump, heating, circuit 1*
P2	*Circulation pump, heating, circuit 2*
P3	*Circulation pump, heating, circuit 3*
M1	*Motorized control valve (3-point controlled), circuit 1 Alternative: Thermo actuator (Danfoss type ABV)*
M2	*Motorized control valve (3-point controlled), circuit 2 Alternative: Thermo actuator (Danfoss type ABV)*
M3	*Motorized control valve (3-point controlled), circuit 3 Alternative: Thermo actuator (Danfoss type ABV)*
A1	*Alarm*

A390.1, A390.2, A390.3, A390.11 and A390.12:
Circuit 1 can act as master and the remaining circuits can act as slaves.

A390.2:
The motorized control valves M1, M2 and M3 are controlled by means of 0 - 10 volt signals. The control signals come from the internal I/O extension module ECA 32. The 3-point outputs in the ECL 310 are disabled.

A390.3, A390.11, A390.12, A390.13
The motorized control valves M1, M2 and M3 are controlled by means of either 3-point or 0 - 10 volt signals. Both types of outputs are active. The 0 – 10 Volt signals come from the internal I/O extension module ECA 32.

A390.11 and A390.13:
Each of the heating circuits can be set to utilize the room temperature sensor S7.
If there is a demand for two separate room temperature sensors, S7 can be used for one of the heating circuits and ECA 30 for the other heating circuit.

A390.11, A390.12 and A390.13:
The heating circuits can be closed during DHW heating (priority).

A390.13:
DHW heating has priority.

A390.1, A390.2, A390.11, A390.12 and A390.13:
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).

Heating related circuits, in general:
Exercise of circulation pumps and control valves in periods without heating demand can be arranged.

Modbus communication to a SCADA system can be established.

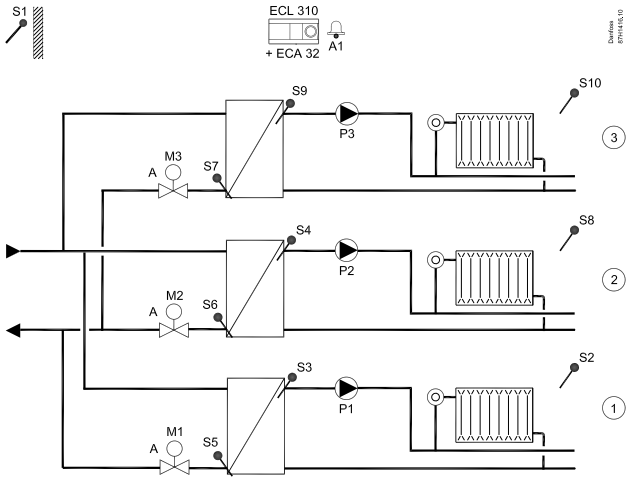
A connected flow or energy meter based on M-bus signal can limit the flow or power to a set maximum value. Furthermore, the limitation can be in relation to the outdoor temperature. Typically, the lower the outdoor temperature, the higher the accepted flow / power.
M-bus data can be transferred to the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

A390, 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.

Unused inputs can, by means of an override switch or relay contact, be used for overriding the schedule to a fixed 'Comfort', 'Saving', 'Frost protection' or 'Constant temperature' mode.

Typical A390.2 application:



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	*Electronic controller ECL Comfort 310*
ECA 32	*Built-in extension module*
S1	*Outdoor temperature sensor*
S2	*(Optional) Room temperature sensor, circuit 1*
S3	*Flow temperature sensor, circuit 1*
S4	*Flow temperature sensor, circuit 2*
S5	*(Optional) Return temperature sensor, circuit 1*
S6	*(Optional) Return temperature sensor, circuit 2*
S7	*(Optional) Return temperature sensor, circuit 3*
S8	*(Optional) Room temperature sensor, circuit 2*
S9	*Flow temperature sensor, circuit 3*
S10	*(Optional) Room temperature sensor, circuit 3*
P1	*Circulation pump, circuit 1*
P2	*Circulation pump, circuit 2*
P3	*Circulation pump, circuit 3*
M1	*Motorized control valve (0 - 10 volt controlled), circuit 1*
M2	*Motorized control valve (0 - 10 volt controlled), circuit 2*
M3	*Motorized control valve (0 - 10 volt controlled), circuit 3*

The cooling application **A390.3** is very flexible.

The basic principles for a cooling circuit
(example referring to A390.3, circuit 1)

Typically, the flow temperature is adjusted according to your requirements. The flow temperature sensor S3 is the most important sensor. The desired flow temperature at S3 is set in the ECL controller. Furthermore, the outdoor temperature S1 can influence the desired flow temperature. The higher the outdoor temperature, the lower the desired flow temperature.

By means of the week schedule, the cooling circuit can be in 'Comfort' or 'Saving' mode (two values for the desired flow temperature).

The week schedule also controls two values ('Comfort' and 'Saving') for the desired room temperature. If the measured room temperature does not equal the desired room temperature, the desired flow temperature can be adjusted.

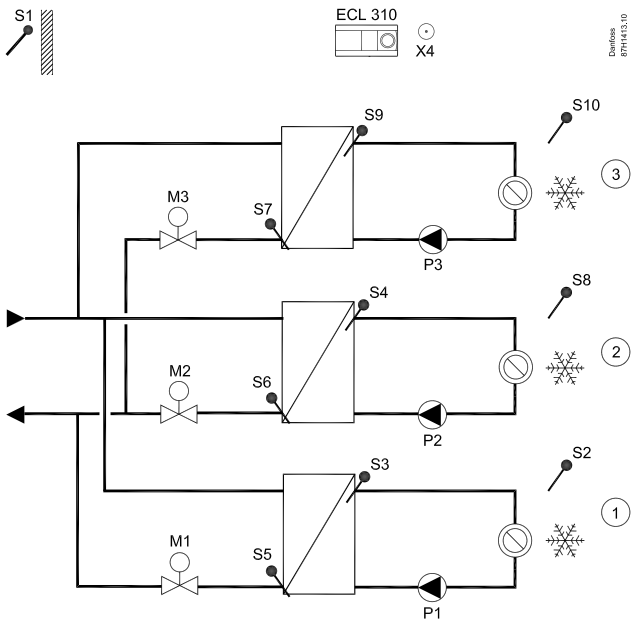
The motorized control valve M1 is opened gradually when the flow temperature is higher than the desired flow temperature and vice versa.
The return temperature S5 to the cooling supply should not be too low. If so, the desired flow temperature can be adjusted (typically to a higher value), thus resulting in a gradual closing of the motorized control valve.

The circulation pump P1 is ON at cooling demand.

A connected flow or energy meter (M-bus) can limit the flow or energy to a set maximum value.

The standby mode maintains a selectable flow temperature, for example 30 °C.

Typical A390.3 application:



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	*Electronic controller ECL Comfort 310*
ECA 32	*(not illustrated) *)*
S1	*Outdoor temperature sensor*
S2	*(Optional) Room temperature sensor, circuit 1*
S3	*Flow temperature sensor, circuit 1*
S4	*Flow temperature sensor, circuit 2*
S5	*(Optional) Return temperature sensor, circuit 1*
S6	*(Optional) Return temperature sensor, circuit 2*
S7	*(Optional) Return temperature sensor, circuit 3*
S8	*(Optional) Room temperature sensor, circuit 2*
S9	*Flow temperature sensor, circuit 3*
S10	*(Optional) Room temperature sensor, circuit 3*
P1	*Circulation pump, circuit 1*
P2	*Circulation pump, circuit 2*
P3	*Circulation pump, circuit 3*
M1	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 1* *Alternative: Thermo actuator (Danfoss type ABV)*
M2	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 2* *Alternative: Thermo actuator (Danfoss type ABV)*
M3	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 3* *Alternative: Thermo actuator (Danfoss type ABV)*
X4	*Extra output (Schedule 4)*
**)*	*Used for 0 - 10 Volt control of motorized control valve.*

The basic principles for a Domestic Hot Water circuit (DHW)
(example referring to A390.11, circuit 4)

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 S6).

The DHW heating temperature sensor S3 is the most important sensor. If the measured DHW temperature (S6) gets lower than the desired DHW temperature, the DHW heating pump (P4) is switched ON and the heating circulation pump P1 is switched OFF.

The motorized control valve M1 is controlled in order to maintain the DHW heating temperature at S3.

The DHW heating temperature is determined by the desired DHW temperature at S6 plus the charging difference.

The DHW charging pump P7 can be switched ON depending on 1) the DHW heating temperature is reached, or 2) a delay.

The DHW heating temperature at S3 is typically 5–10 degrees higher than the desired DHW temperature.

DHW tank with 1 temperature sensor (S6):
When the measured DHW temperature (S6) gets higher than the desired DHW temperature, the DHW heating pump (P4) and the DHW charging pump (P7) are switched OFF. The post-run time can be set individually.

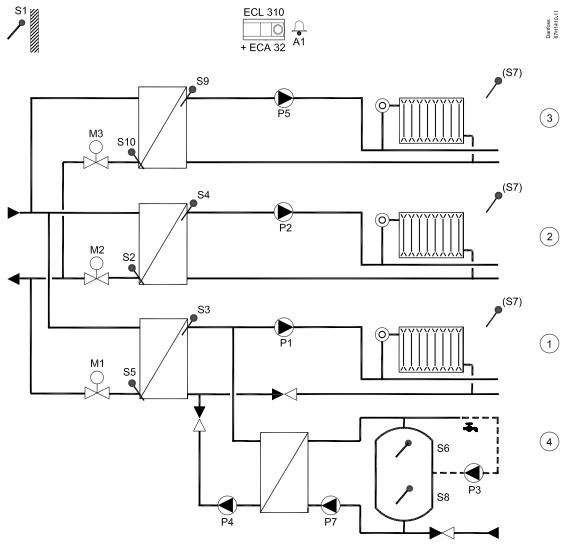
DHW tank with 2 temperature sensors (S6, upper and S8, lower):
When the measured DHW temperature (S6) gets higher than the desired DHW temperature and the temperature at S8 gets higher than the cut-out temperature, the DHW heating pump (P4) and the DHW charging pump (P7) are switched OFF. The post-run time can be set individually.

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), thus resulting in a gradual closing of the motorized control valve.
A flow / power limitation can be arranged by using an M-bus based signal from a flow / heat meter.

A390.12:
The DHW heating circuit has a preheating circuit, where the DHW heating temperature at S9 is adapted to the desired DHW charging temperature at S7. If the DHW charging temperature at S7 cannot be reached, the ECL controller gradually increases the desired DHW heating temperature at S9 in order to obtain the DHW charging temperature. A maximum temperature value can be set.

A390.12:
The DHW circulation can be through the DHW tank (connection A) or through the heat-exchanger (connection B). The solution with connection A results in closing of the motorized control valve after the DHW tank charging procedure. The solution with connection B is used to compensate for the heat loss in the DHW circulation pipe. Furthermore, after DHW tank charging, the DHW heating temperature (at S7) is controlled according to the desired DHW temperature.

Typical A390.11 application: (up to 3 x heating, 1 x DHW)



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	*Electronic controller ECL Comfort 310*
ECA 32	*Built-in extension module *)*
S1	*Outdoor temperature sensor*
S2	*(Optional) Return temperature sensor, circuit 2*
S3	*Flow temperature sensor, circuit 1*
S4	*Flow temperature sensor, circuit 2*
S5	*(Optional) Return temperature sensor, circuit 1*
S6	*DHW tank temperature sensor, upper, circuit 4*
S7	*(Optional) Room temperature sensor, circuit 1 / 2 / 3*
S8	*(Optional) DHW tank temperature sensor, lower, circuit 4*
S9	*Flow temperature sensor, circuit 3*
S10	*(Optional) Return temperature sensor, circuit 3*
P1	*Circulation pump, circuit 1*
P2	*Circulation pump, circuit 2*
P3	*DHW circulation pump, circuit 4*
P4	*DHW heating pump, circuit 4*
P5	*Circulation pump, circuit 3*
P7	*DHW charging pump, circuit 4*
M1	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 1* *Alternative: Thermo actuator (Danfoss type ABV)*
M2	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 2* *Alternative: Thermo actuator (Danfoss type ABV)*
M3	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 3* *Alternative: Thermo actuator (Danfoss type ABV)*
A1	*Alarm*
**)*	*Also used for 0 - 10 Volt control of motorized control valve.*

A390.13:
The DHW heating has priority over the heating circuits.
The DHW circuit is considered as the master circuit while the heating circuits are slaves.
Temperature sensor S9 is the most important sensor.
The DHW circulation can be through the DHW tank (connection A) or through the heat-exchanger (connection B).

General information:

The 'Frost protection' mode maintains a selectable temperature, for example 10 °C.
An anti-bacteria function is available for activation on selected days of the week.
The outdoor temperature (S1) is used to protect the circulation circuit against frost.
The DHW circulation pump (P3) has a week schedule for up to 3 ON periods per day.

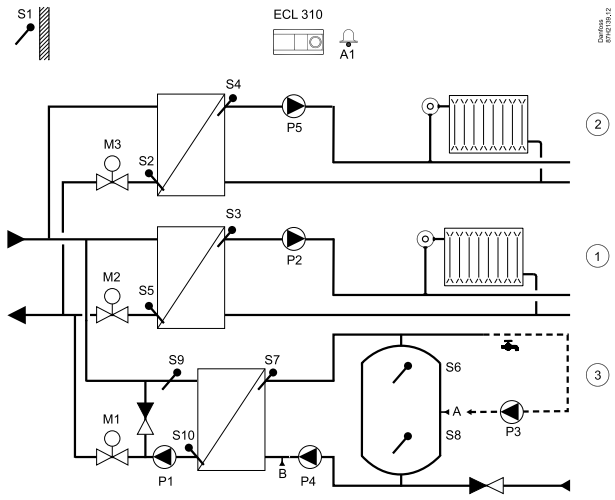
A measured temperature can be offset adjusted, if needed.

When an A390 subtype has been uploaded, the ECL Comfort controller starts in manual mode. This can be used for checking the controlled components for correct functionality.

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

Typical A390.12 application:
(up to 2 x heating, 1 x DHW)

Typical A390.12 application: (up to 2 x heating, 1 x DHW)



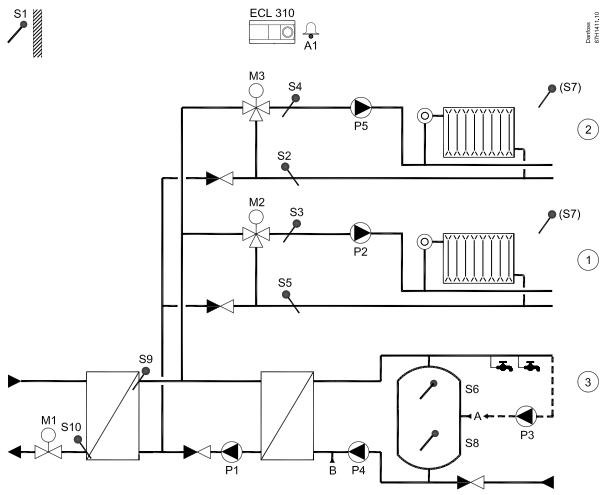
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.
All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*Electronic controller ECL Comfort 310*
ECA 32	*(not illustrated) *)*
S1	*Outdoor temperature sensor*
S2	*(Optional) Return temperature sensor, circuit 2*
S3	*Flow temperature sensor, circuit 1*
S4	*Flow temperature sensor, circuit 2*
S5	*(Optional) Return temperature sensor, circuit 1*
S6	*DHW tank temperature sensor, upper, circuit 3*
S7	*DHW charging temperature sensor, circuit 3*
S8	*(Optional) DHW tank temperature sensor, lower, circuit 3*
S9	*DHW heating temperature sensor, circuit 3*
S10	*(Optional) Return temperature sensor, circuit 3*
P1	*DHW heating pump, circuit 3*
P2	*Circulation pump, circuit 1*
P3	*DHW circulation pump, circuit 3*
P4	*DHW charging pump, circuit 3*
P5	*Circulation pump, circuit 2*
M1	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 3*
M2	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 1* *Alternative: Thermo actuator (Danfoss type ABV)*
M3	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 2* *Alternative: Thermo actuator (Danfoss type ABV)*
A1	*Alarm*
A / B	*Internal / external connections for DHW circulation*
**)*	*Used for 0 - 10 Volt control of motorized control valve.*

Typical A390.13 application:
(1 x DHW, up to 2 x heating)

Typical A390.13 application: (1 x DHW, up to 2 x heating)



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.

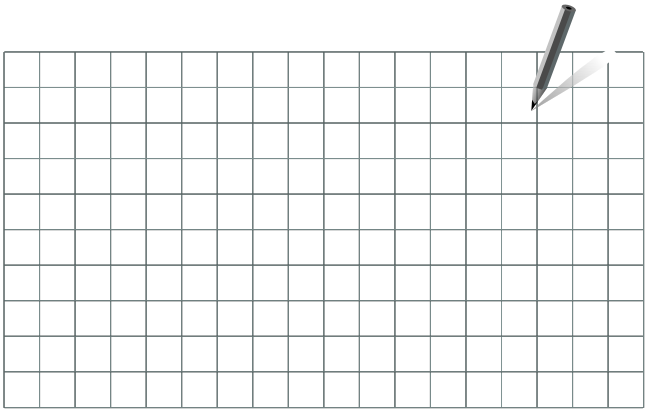
List of components:

ECL 310	*Electronic controller ECL Comfort 310*
ECA 32	*(not illustrated) *)*
S1	*Outdoor temperature sensor*
S2	*(Optional) Return temperature sensor, circuit 2*
S3	*Flow temperature sensor, circuit 1*
S4	*Flow temperature sensor, circuit 2*
S5	*(Optional) Return temperature sensor, circuit 1*
S6	*DHW tank temperature sensor, upper, circuit 3*
S7	*(Optional) Room temperature sensor, circuit 1 / 2*
S8	*(Optional) DHW tank temperature sensor, lower, circuit 3*
S9	*DHW heating temperature sensor, circuit 3*
S10	*(Optional) Return temperature sensor, circuit 3*
P1	*DHW heating pump, circuit 3*
P2	*Circulation pump, circuit 1*
P3	*DHW circulation pump, circuit 3*
P4	*DHW charging pump, circuit 3*
P5	*Circulation pump, circuit 2*
M1	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 3*
M2	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 1* *Alternative: Thermo actuator (Danfoss type ABV)*
M3	*Motorized control valve (3-point and / or 0 - 10 Volt controlled), circuit 2* *Alternative: Thermo actuator (Danfoss type ABV)*
A1	*Alarm*
A / B	*Internal / external connections for DHW circulation*
**)*	*Used for 0 - 10 Volt control of motorized control valve.*

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.

The circulation pump(s) in heating circuit(s) can be placed in the flow as well as the return. Place the pump according to the manufacturer's specification.

Advice for settings:

Factory settings in the subtypes will run the most application examples. Some of the application examples need change of dedicated settings.

See the Installation Guide for applications and subtypes, delivered with the application key.

A390.1, ex. c
A390.11, ex. d

Circuit 1 must be able to receive the heat demand from circuit 2 and / or 3.

Issue:	Navigation:	ID no.:	Recommended setting:
Heating circuit (1): Heat demand	MENU \ Settings \ Application: 'Demand offset'	11017	3 K*

* This value is added to the heat demand value from circuit 2 and / or 3.

Circuit 2 and / or 3 must be able to send the heat demand to circuit 1.

Issue:	Navigation:	ID no.:	Recommended setting:
Heating circuit (2 / 3): Heat demand	MENU \ Settings \ Application: 'Send desired T'	12500 13500	ON ON

A390.3, ex. b

Circuit 1 must be able to receive the cool demand from circuit 2 and / or 3.

Issue:	Navigation:	ID no.:	Recommended setting:
Cooling circuit (1): Cool demand	MENU \ Settings \ Application: 'Demand offset'	11017	-3 K*

This value is added to the cool demand value from circuit 2 and / or 3.

Circuit 2 and / or 3 must be able to send the cool demand to circuit 1.

Issue:	Navigation:	ID no.:	Recommended setting:
Cooling circuit (2 / 3): Cool demand	MENU \ Settings \ Application: 'Send desired T'	12500 13500	ON ON

Advice for settings:

A390.11, ex. c

One pump and change-over valve system:

Issue:	Navigation:	ID no.:	Recommended setting:
DHW circuit (4): Change-over valve	MENU \ Settings \ Application: 'Ch.-o. valve / P'	14051	OFF

A390.11, ex. e

DHW heating connected primarily:

Issue:	Navigation:	ID no.:	Recommended setting:
DHW circuit (4): Change-over valve	MENU \ Settings \ Application: 'Ch.-o. valve / P'	14051	OFF
DHW circuit (4): Tank primarily	MENU \ Settings \ Application: 'Tank, sec./ prim'	14053	ON

A390.12, ex. a
A390.12, ex. b
A390.13, ex. a

DHW circulation pipe can be connected to the DHW tank at 'A' for internal circulation or to the heat-exchanger at 'B' for external circulation.

Issue:	Navigation:	ID no.:	Recommended setting:
DHW circuit (3): Internal DHW circulation	MENU \ Settings \ Application: 'Cont. T control'	13054	OFF
DHW circuit (3): External DHW circulation	MENU \ Settings \ Application: 'Cont. T control'	13054	ON

A390.12, ex. b

Circuit 1 must be able to receive the heat demand from circuit 2.

Issue:	Navigation:	ID no.:	Recommended setting:
Heating circuit (1): Heat demand	MENU \ Settings \ Application: 'Demand offset'	11017	3 K*

* This value is added to the heat demand value from circuit 2.

Circuit 2 must be able to send the heat demand to circuit 1.

Issue:	Navigation:	ID no.:	Recommended setting:
Heating circuit (2): Heat demand	MENU \ Settings \ Application: 'Send desired T'	12500	ON

2.3 Mounting

2.3.1 Mounting the ECL Comfort controller

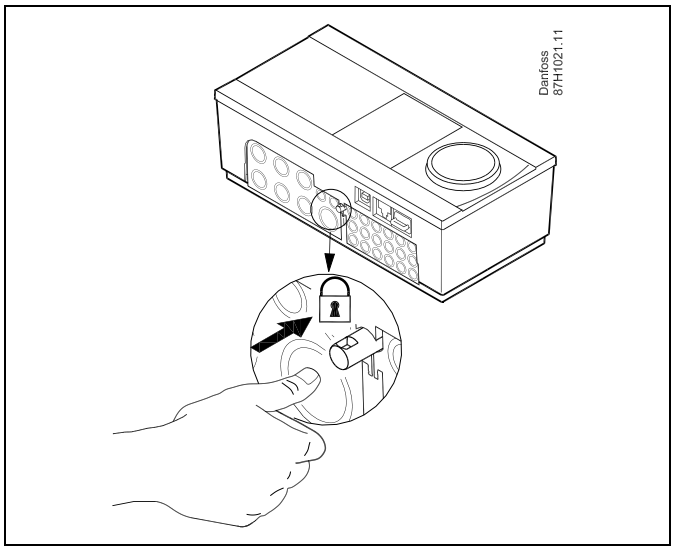
For easy access, you should mount the ECL Comfort controller near the system. Select one of the following methods using the same base part (code no. 087H3230):

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

The ECL Comfort 310 can only be mounted in the ECL Comfort 310 base part.

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.

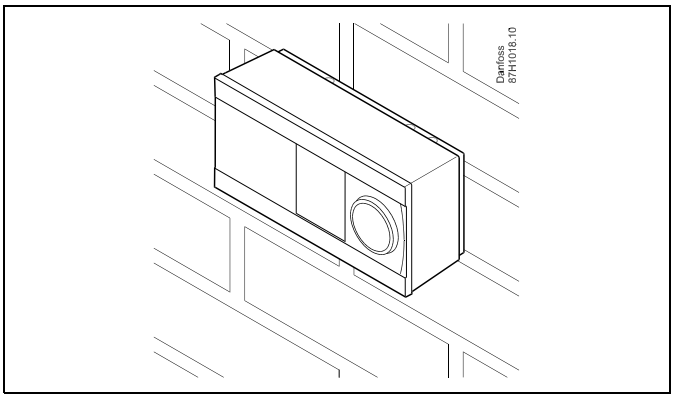
⚠

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!

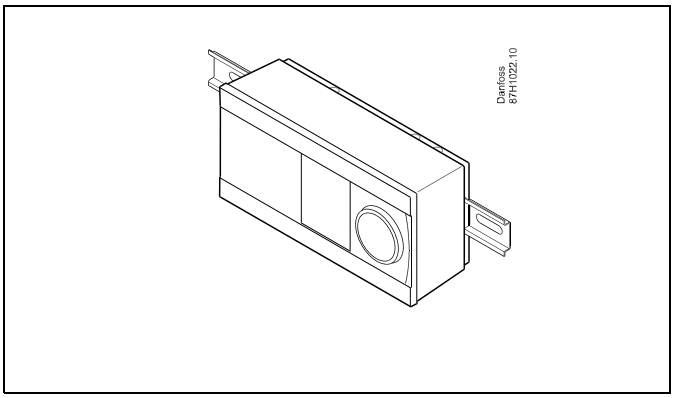
⚠

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

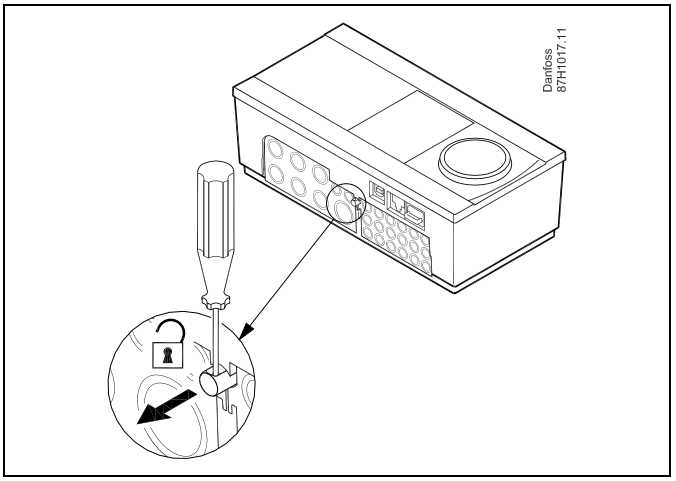
Mounting on a wall
Mount the base part on a wall with a smooth surface. Establish the electrical connections and position the controller in the base part. Secure the controller with the locking pin.



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.

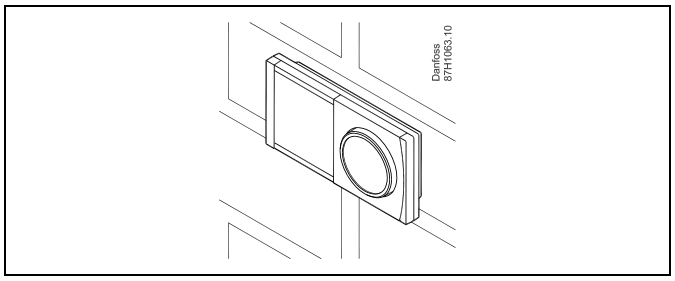
2.3.2 Mounting the Remote Control Units ECA 30 / 31

Select one of the following methods:

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

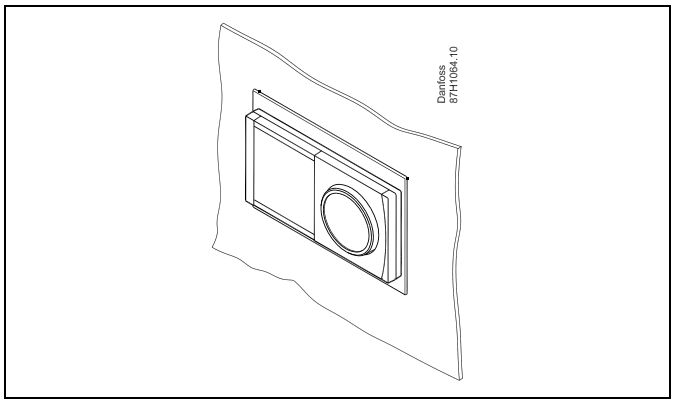
Screws and rawlplugs are not supplied.

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.

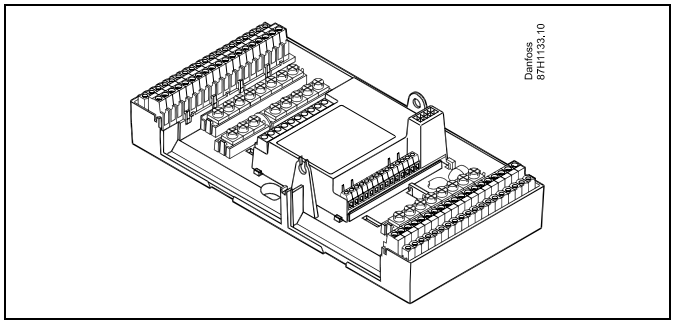
The ECA 31 must not be mounted in a panel if the humidity function is to be used.

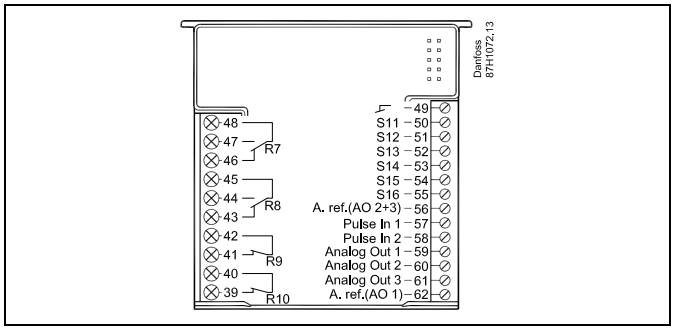


2.3.3 Mounting the internal I/O module ECA 32

Mounting of the internal I/O module ECA 32
The ECA 32 module (order code no. 087H3202) must be inserted into the ECL Comfort 310 / 310B base part for additional input and output signals in relevant applications.

The connection between the ECL Comfort 310 / 310B and ECA 32 is a 10-pole (2 x 5) connector. The connection is automatically established when the ECL Comfort 310 / 310B is placed on the base part.





2.4 Placing the temperature sensors

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

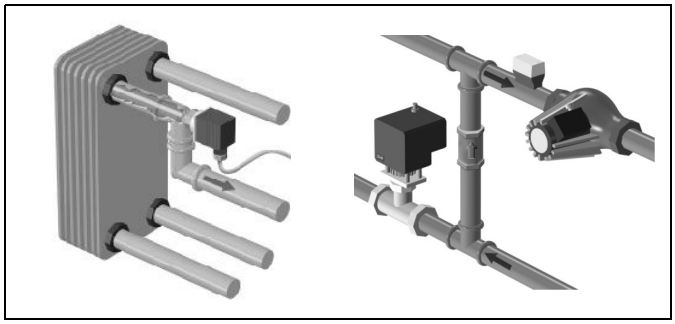
The temperature sensor mentioned below are sensors used for the ECL Comfort 210 / 296 / 310 series which not all will be needed for your application!

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.

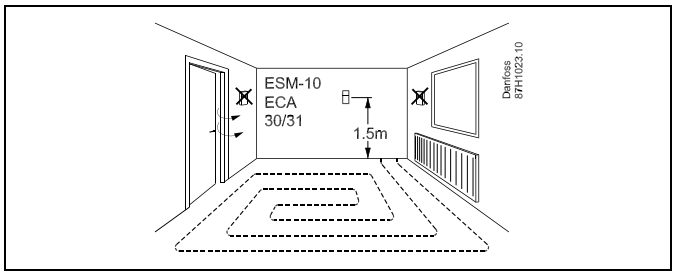
Make sure that the surface of the pipe is clean and even where the sensor is mounted.

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.

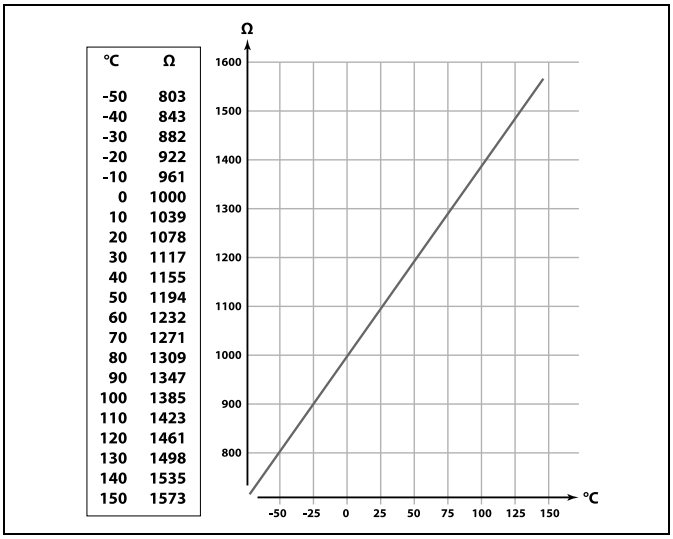
ESM-11, ESMC and ESMB-12: Use heat conducting paste for quick measurement of the temperature.

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.

Warning
Electric conductors on PCB (**P**rinted **C**ircuit **B**oard) for supply voltage, relay contacts and triac outputs do not have mutual safety distance of minimum 6 mm. The outputs are not allowed to be used as galvanic separated (volt free) outputs.
If a galvanic separated output is needed, an auxiliary relay is recommended.

24 Volt controlled units, for example actuators, are to be controlled by means of ECL Comfort 310, 24 Volt version.

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).

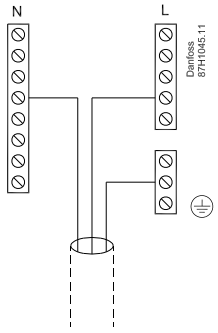
A fuse for the ECL Comfort installation is max. 10 A typically.

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

2.5.2 Electrical connections 24 V a.c.

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

Maximum load ratings:

R R	Relay terminals	4 (2) A / 24 V a.c. (4 A for ohmic load, 2 A for inductive load)
Tr	Triac (= electronic relay) terminals	1 A / 24 V a.c.

⚠

Do not connect 230 V a.c. powered components to a 24 V a.c. power supplied controller directly. Use auxilliary relays (K) to separate 230 V a.c. from 24 V a.c.

Maximum load rating, ECA 32

Max. voltage, relay outputs	250 V a.c.
Max. load on relay outputs	4 A for ohmic load, 2 A for inductive load
Max. load on analogue outputs	2 mA each (min. resistance 5 K Ω)

2.5.3 Electrical connections, safety thermostats, in general

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

When ST is activated by a high temperature, the safety circuit in the motorized control valve closes the valve immediately.

When ST1 is activated by a high temperature (the TR temperature), the motorized control valve is closed gradually. At a higher temperature (the ST temperature), the safety circuit in the motorized control valve closes the valve immediately.

2.5.4 Electrical connections, Pt 1000 temperature sensors and signals

2.5.5 Electrical connections, Pt 1000 temperature sensors

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

A390:

Sensor	Description	Type (recomm.)
S1	Outdoor temp. sensor *	ESMT
S2	A390.1 / 2 / 3: Room temp. sensor **	ESM-10
	A390.11 / 12 / 13: Return temp. sensor	ESM-11 / ESMB / ESMC / ESMU
S3	Flow temp. sensor ***	ESM-11 / ESMB / ESMC / ESMU
S4	Flow temp. sensor ***	ESM-11 / ESMB / ESMC / ESMU
S5	Return temp. sensor ****	ESM-11 / ESMB / ESMC / ESMU
S6	A390.1 / 2 / 3: Return temp. sensor ****	ESM-11 / ESMB / ESMC / ESMU
	A390.11 / 12 / 13: DHW tank temp. sensor, upper ****	ESMB / ESMU
S7	A390.1 / 2 / 3: Return temp. sensor ****	ESM-11 / ESMB / ESMC / ESMU
	A390.11 / 13: Room temp. sensor **	ESM-10
	A390.12: DHW charging temp. sensor ****	ESM-11 / ESMB / ESMC / ESMU
S8	A390.1 / 2 / 3: Room temp. sensor **	ESM-10
	A390.11 / 12 / 13: DHW tank temp. sensor, lower ****	ESMB / ESMU
S9	A390.1 / 2 / 3 / 11 / 13: Flow temp. sensor ***	ESM-11 / ESMB / ESMC / ESMU
	A390.12: DHW charging temp. sensor ****	ESM-11 / ESMB / ESMC / ESMU
S10	A390.1 / 2 / 3: Room temp. sensor **	ESM-10
	A390.11 / 12 / 13: Return temp. sensor ****	ESM-11 / ESMB / ESMC / ESMU

* If the outdoor temperature sensor is not connected or the cable is short-circuited, the controller assumes that the outdoor temperature is 0 (zero) °C.

** Only for room temperature sensor connection. The room temperature signal can also be available from a Remote Control Unit (ECA 30 / 31). See 'Electrical connections, ECA 30 / 31'.

*** The flow temperature sensor must always be connected in order to have the desired functionality. If the sensor is not connected or the cable is short-circuited, the motorized control valve closes (safety function).

**** The temperature sensor must be connected in order to have the desired functionality.

Wire cross section for sensor connections: Min. 0.4 mm².
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).

2.5.6 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.

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.

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

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).

2.5.7 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 * Only for ECA 30 / 31 and master / slave communication	
32	B, ECL 485 communication bus	
33	A, ECL 485 communication bus	

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

2.5.8 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

2.5.9 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

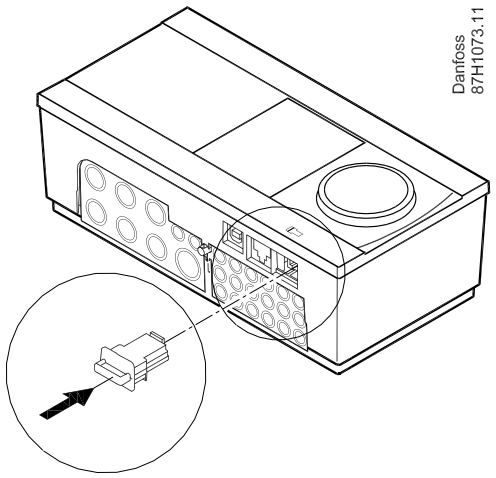
The ECL Application Key contains

- 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.

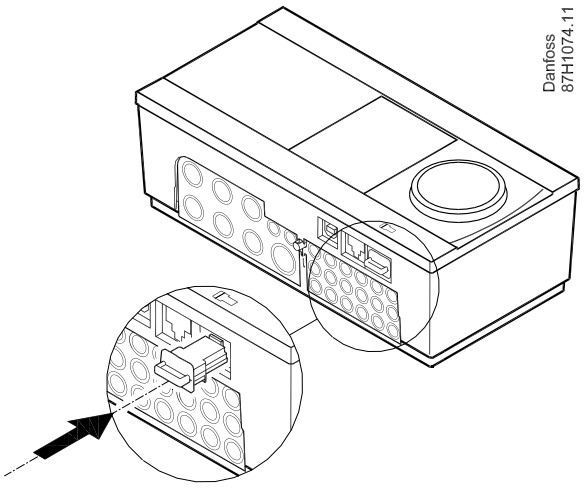
After having powered-up the controller, different situations might be existing:

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.

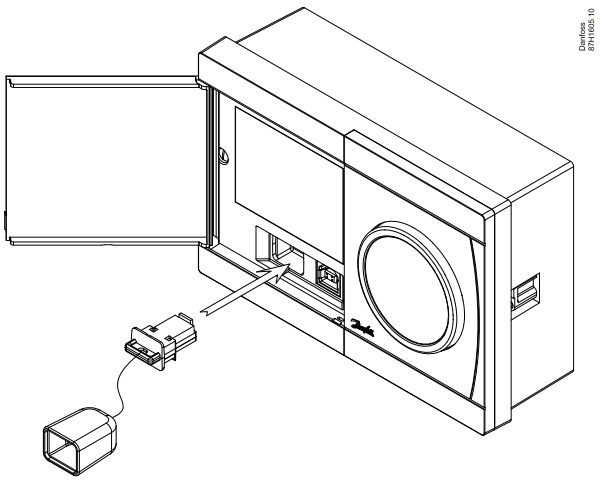
ECL Comfort 210 / 310



ECL Comfort 210 / 310



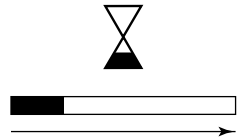
ECL Comfort 296



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 (as of controller version 1.11 (ECL 210 / 310) and version 1.58 (ECL 296)). 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.

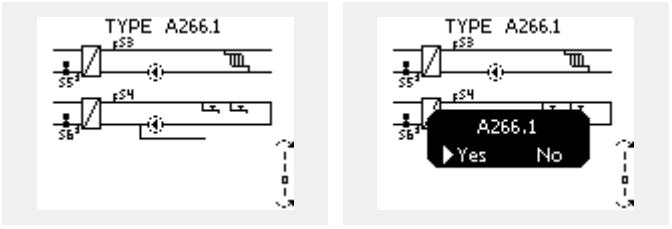
Application Key: Situation 1
The controller is new from the factory, the ECL Application Key is not inserted.

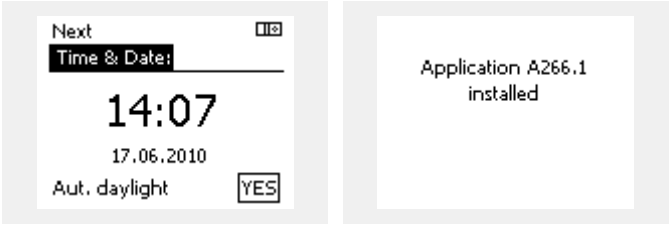
An animation for the ECL Application Key insertion is displayed. Insert the Application Key .

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) Some keys have only one application.	
	Confirm with 'Yes'	
	Set 'Time & Date' Turn and push the dial to select and change 'Hours', 'Minutes', 'Date', 'Month' and 'Year'. Choose "Next"	
	Confirm with 'Yes'	
	Go to 'Aut. daylight'	
	Choose whether 'Aut. daylight´ * should be active or not	YES or NO



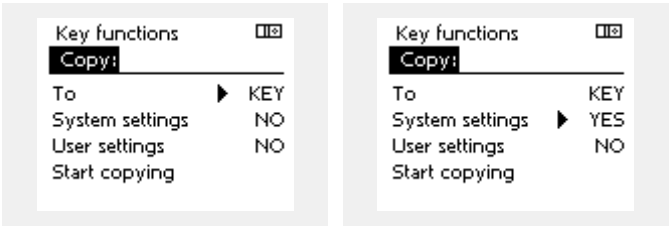


* 'Aut. daylight' is the automatic changeover between summer and winter time.

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

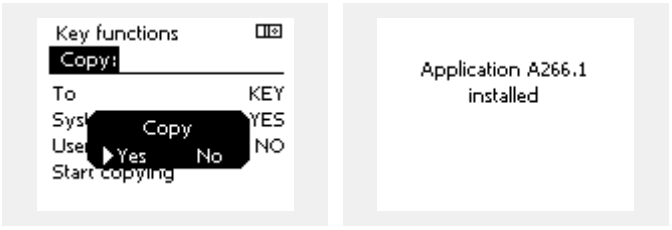
A
The ECL Application key contains factory settings:
The controller reads / transfers data from the ECL Application Key to ECL controller.

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.

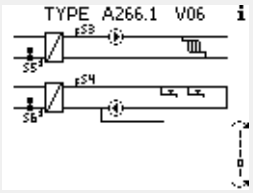
'NO: Only factory settings from the ECL Application Key will be copied to the controller.
'YES*: Special user settings (differing from the factory settings) will be copied to the controller.

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

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

(Example):

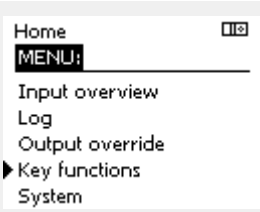
The "**i**" in the upper right corner indicates that - besides the factory settings - the subtype also contains special user / systems settings.

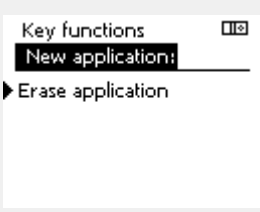


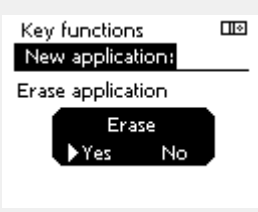
Application Key: Situation 2
The controller already runs an application. The ECL Application Key is inserted, but the application needs to be changed.

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:

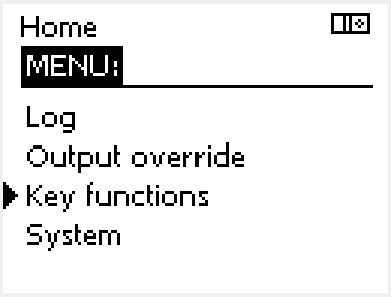
Action:	Purpose:	Examples:
	Choose 'MENU'	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose 'Common controller settings'	
	Confirm	
	Go to 'Key functions'	
	Confirm	
	Choose 'Copy'	
	Confirm	
	Choose 'To'. 'ECL' or 'KEY' will be indicated. Choose 'ECL' or KEY'	* 'ECL' or 'KEY'.
	Push the dial repeatedly to choose copy direction	
	Choose 'System settings' or 'User settings'	** '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.	

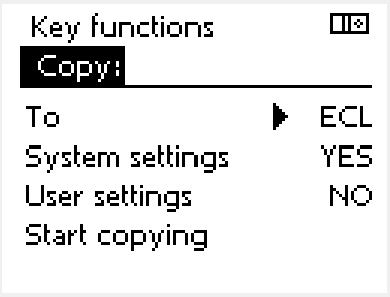
*

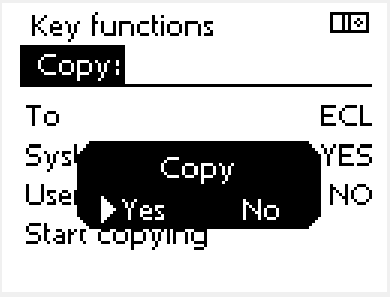
'ECL': Data will be copied from the Application Key to the ECL Controller.
'KEY': Data will be copied from the ECL Controller to the Application Key.

**

'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.







Language

At application upload, a language must be selected.*
If another language than English is selected, the selected language **AND** English will be uploaded into the ECL controller.
This makes service easy for English speaking service people, just because the English language menus can be visible by changing the actual set language into English.
(Navigation: MENU > Common controller > System > Language)

If the uploaded language is not suitable, the application must be erased. User and System settings can be saved on the application key before erasing.
After new upload with preferred language, the existing User and System settings can be uploaded.

*)
(ECL Comfort 310, 24 Volt) If language cannot be selected, the power supply is not a.c. (alternating current).

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 A390

Parameter list, application A390, Heating

Home MENU	Sub-menu	A390						
		ID nos.	Function	A390.1	A390.2	A390.11	A390.12	A390.13
Schedule			Schedule	●	●	●	●	●
Settings	Flow temperature		Heat curve	●	●	●	●	●
		1x178	Temp. max.	●	●	●	●	●
		1x177	Temp. min.	●	●	●	●	●
		1x004	Desired T	●	●	●	●	●
	Room limit	1x182	Infl. - max.	●	●	●	●	●
		1x183	Infl. - min.	●	●	●	●	●
		1x015	Adapt. time	●	●	●	●	●
	Return limit	1x031	High T out X1	●	●	●	●	●
		1x032	Low limit Y1	●	●	●	●	●
		1x033	Low T out X2	●	●	●	●	●
		1x034	High limit Y2	●	●	●	●	●
		1x035	Infl. - max.	●	●	●	●	●
		1x036	Infl. - min.	●	●	●	●	●
		1x037	Adapt. time	●	●	●	●	●
		1x085	Priority	●	●	●	●	●
		11029	DHW, ret. T limit	●	●		●	
		1x028	Con. T, ret. T lim.	●	●	●	●	●
	Flow/ power limit		Actual	●	●	●	●	●
			Actual limit	●	●	●	●	●
		1x119	High T out X1	●	●	●	●	●
		1x117	Low limit Y1	●	●	●	●	●
		1x118	Low T out X2	●	●	●	●	●
		1x116	High limit Y2	●	●	●	●	●
		1x112	Adapt. time	●	●	●	●	●
		1x113	Filter constant	●	●	●	●	●
		1x109	Input type	●	●	●	●	●
		1x115	Units	●	●	●	●	●
	Optimization	1x011	Auto saving	●	●	●	●	●
		1x012	Boost	●	●	●	●	●
		1x013	Ramp	●	●	●	●	●
		1x014	Optimizer	●	●	●	●	●
		1x026	Pre-stop	●	●	●	●	●
		1x020	Based on	●	●	●	●	●
		1x021	Total stop	●	●	●	●	●
		1x179	Summer, cut-out	●	●	●	●	●
		11043	Parallel operation			●		

Parameter list, application A390, Heating, continued

Home MENU	Sub-menu	A390						
		ID nos.	Function	A390.1	A390.2	A390.11	A390.12	A390.13
Settings	Control par.	1x174	Motor pr	●	●	●	●	●
		1x184	Xp	●	●	●	●	●
		1x185	Tn	●	●	●	●	●
		1x186	M run	●		●	●	●
		1x187	Nz	●	●	●	●	●
		1x189	Min. act. time	●		●	●	●
		1x024	Actuator	●		●	●	●
	Application	1x010	ECA addr.	●	●	●	●	●
		11017	Demand offset	●	●	●	●	
		11050	P demand	●	●	●	●	
		1x500	Send desired T	●	●	●	●	●
		1x022	P exercise	●	●	●	●	●
		1x023	M exercise	●	●	●	●	●
		1x052	DHW priority	●	●	●	●	●
		1x077	P frost T	●	●	●	●	●
		1x078	P heat T	●	●	●	●	●
		1x040	P post-run	●	●	●	●	●
		1x093	Frost pr. T	●	●	●	●	●
		1x141	Ext. input	●	●	●	●	●
		1x142	Ext. mode	●	●	●	●	●
	Heat cut-out	11393	Sum. start, day	●	●	●	●	●
		11392	Sum. start, month	●	●	●	●	●
		1x179	Summer, cut-out	●	●	●	●	●
		1x395	Summer, filter	●	●	●	●	●
		11397	Winter start, day	●	●	●	●	●
		11396	Win. start, month	●	●	●	●	●
		1x398	Winter, cut-out	●	●	●	●	●
		1x399	Winter, filter	●	●	●	●	●
Holiday			Holiday	●	●	●	●	●
Alarm	Temp. monitor	1x147	Upper difference	●	●	●	●	●
		1x148	Lower difference	●	●	●	●	●
		1x149	Delay	●	●	●	●	●
		1x150	Lowest temp.	●	●	●	●	●
	Alarm overview			●	●	●	●	●
Influence overview	Des. flow T		Influence source	●	●	●	●	●

Parameter list, application A390, Cooling

Home MENU	Sub-menu	A390		
		ID nos.	Function	A390.3
Schedule			Schedule	●
Settings	Flow temperature	1x018	Des. T comfort	●
		1x019	Des. T saving	●
		1x178	Temp. max.	●
		1x177	Temp. min	●
	Room limit	1x015	Adapt. time	●
		1x182	Infl. - max.	●
		1x183	Infl. - min.	●
	Return limit	1x030	Limit	●
		1x037	Adapt. time	●
		1x035	Infl. - max.	●
		1x036	Infl. - min.	●
	Compensation 1	1x160	Limit	●
		1x061	Adapt. time	●
		1x062	Infl. - max.	●
		1x063	Infl. - min.	●
	Compensation 2	1x164	Limit	●
		1x065	Adapt. time	●
		1x066	Infl. - max.	●
		1x067	Infl. - min.	●
	Flow/ power limit		Actual	●
		1x111	Limit	●
		1x112	Adapt. time	●
		1x113	Filter constant	●
		1x109	Input type	●
		1x115	Units	●
		1x114	Pulse	●
	Control par.	1x174	Motor pr	●
		1x184	Xp	●
		1x185	Tn	●
		1x186	M run	●
		1x187	Nz	●
		1x189	Min. act. time	●
		1x024	Actuator	●

Parameter list, application A390, Cooling, continued

Home MENU	Sub-menu	A390		
		ID nos.	**Function**	**A390.3**
Settings	Application	1x010	ECA addr.	●
		11017	Demand offset	●
		11050	P demand	●
		1x500	Send desired T	●
		1x022	P exercise	●
		1x023	M exercise	●
		1x070	P cool T	●
		1x092	Standby T	●
		1x040	P post-run	●
		1x141	Ext. input	●
		1x142	Ext. mode	●
Holiday			Holiday	●
Influence overview	Des. flow T		Influence source	●

Parameter list, application A390, DHW

Home	Sub-menu	A390				
MENU		ID nos.	Function	A390.11	A390.12	A390.13
Schedule			Schedule	●	●	●
Schedule circ. P			Schedule circ. P	●	●	●
Settings	Tank temperature	13178	Temp. max.			●
		13177	Temp. min.			●
		1x193	Charge difference	●	●	●
		1x195	Start difference	●	●	●
		1x194	Stop difference	●	●	●
		1x152	Max. charge T	●	●	
		13068	Flow T adapt. time		●	
	Return limit	1x030	Limit	●	●	●
		1x035	Infl. - max.		●	●
		1x036	Infl. - min.		●	●
		1x037	Adapt. time		●	●
	Flow / power limit		Actual	●	●	●
		1x111	Limit	●	●	●
		13112	Adapt. time		●	●
		13113	Filter constant		●	●
		13109	Input type		●	●
		13115	Units		●	●
	Contr. par.	1x174	Motor pr		●	●
		1x184	Xp		●	●
		1x185	Tn		●	●
		1x186	M run		●	●
		1x187	Nz		●	●
		1x189	Min. act. time		●	●
	Application	13017	Demand offset			●
		13050	P demand			●
		14051	Ch.-o. valve / P	●		
		14053	Tank, sec. / prim.	●		
		1x055	Circ. P priority	●	●	●
		1x054	Contr. T control		●	●
		1x044	Max. DHW time	●		●
		1x045	DHW deact. time	●		●
		1x041	DHW P post-run	●	●	●
		1x059	P charge delay	●	●	●
		1x042	Char. P post-run	●	●	●
		1x500	Send desired T	●	●	●
		1x076	Circ. P frost T	●	●	●
		1x093	Frost pr. T	●	●	●
		1x141	Ext. input	●	●	●
		1x142	Ext. mode	●	●	●

Parameter list, application A390, DHW, continued

Home MENU	Sub-menu	A390				
		ID nos.	Function	A390.11	A390.12	A390.13
Settings	Anti-bacteria		Day, days	●	●	●
			Start time	●	●	●
			Duration	●	●	●
			Desired T	●	●	●
Holiday			Holiday	●	●	●
Alarm	Temp. monitor	1x147	Upper difference		●	●
		1x148	Lower difference		●	●
		1x149	Delay		●	●
		1x150	Lowest temp.		●	●
	Alarm overview				●	●
Influence overview	Des. flow T		Influence source	●	●	●

Parameter list, application A390, Common controller

Home MENU	Sub-menu	A390							
		ID nos.	Function	A390.1	A390.2	A390.3	A390.11	A390.12	A390.13
	Time & date			●	●	●	●	●	●
	Schedule					●			
	Holiday			●	●	●	●	●	●
	Input overview 1			●	●	●	●	●	●
	Input overview 2			●	●	●	●	●	●
	Input overview 3			●	●	●	●	●	●
	Input overview 4						●		
	Log 1			●	●	●	●	●	●
	Log 2			●	●	●	●	●	●
	Log 3			●	●	●	●	●	●
	Log 4						●		
	Output override			●	●	●	●	●	●
	Key functions		New application	●	●	●	●	●	●
			Application	●	●	●	●	●	●
			Factory setting	●	●	●	●	●	●
			Copy	●	●	●	●	●	●
			Key overview	●	●	●	●	●	●
	System		ECL version	●	●	●	●	●	●
			Extension	●	●	●	●	●	●
			Ethernet	●	●	●	●	●	●
			Portal config.	●	●	●	●	●	●
			M-bus config.	●	●	●	●	●	●
			Energy meters	●	●	●	●	●	●
			Raw input overview	●	●	●	●	●	●
			Alarm	●	●	●	●	●	●
			Display	●	●	●	●	●	●
			Communication	●	●	●	●	●	●
			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 (↻).

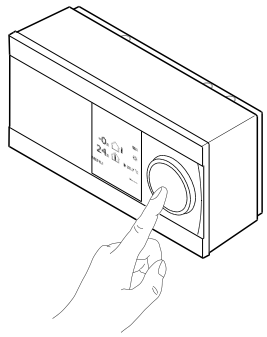
The dial has a built-in accellerator. The faster you turn the dial, the faster it reaches the limits of any wide setting range.

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

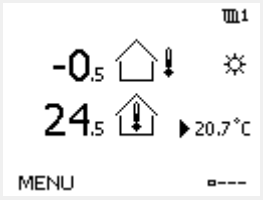
Push the dial to confirm your choices (☝).

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.

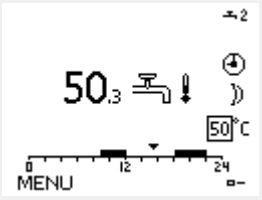
Example shows ECL 210 / 310



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.

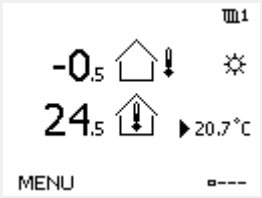
If the dial has not been activated for 20 min., the controller will revert to the overview display you have chosen as favorite.

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.

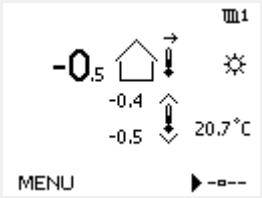
Heating circuit
Overview display 1 informs about:
actual outdoor temperature, controller mode,
actual room temperature, desired room temperature.

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 1:



Overview display 2:



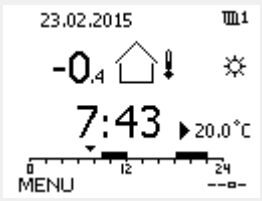
Overview display 3 informs about:
date, actual outdoor temperature, controller mode, time, desired room temperature as well as shows the comfort schedule of the current day.

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.

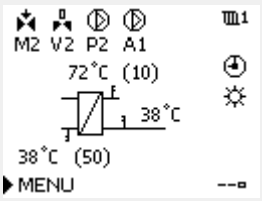
The value above the V2 symbol indicates 0–100% of the analogue signal (0–10 V).

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

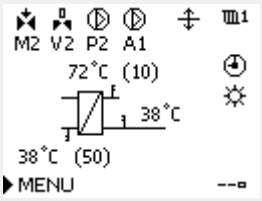
Overview display 3:



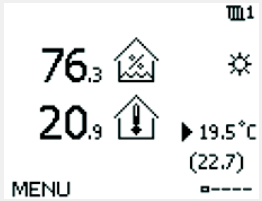
Overview display 4:



Example of overview display with Influence indication:



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



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))

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.

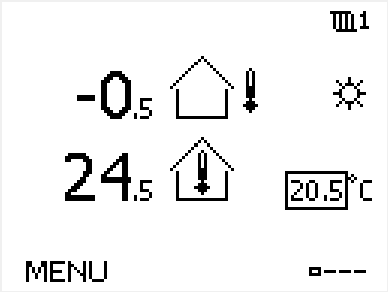
Setting the desired temperature

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.

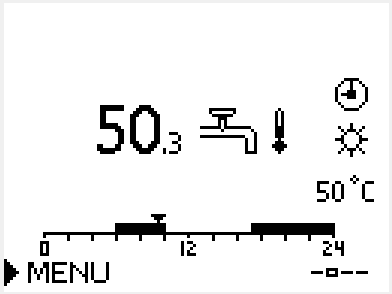
The display example is for comfort mode. If you want to change the desired room temperature for saving mode, choose the mode selector and select saving.

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 (+) 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

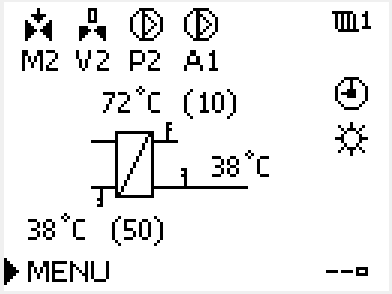
This section describes the function in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application.

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



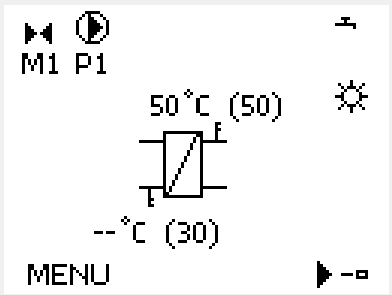
DHW circuit

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

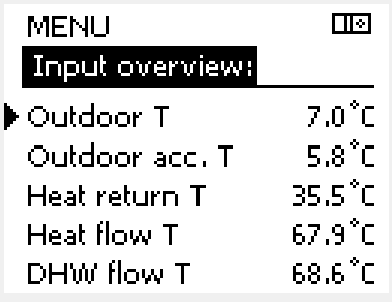
Display example with heat exchanger:



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.

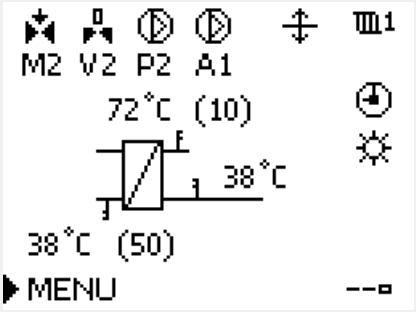
Arrow-up:
The parameter in question increases the desired flow temperature.

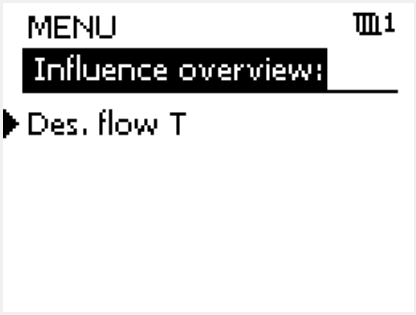
Double-arrow:
The parameter in question creates an override (e.g. Holiday).

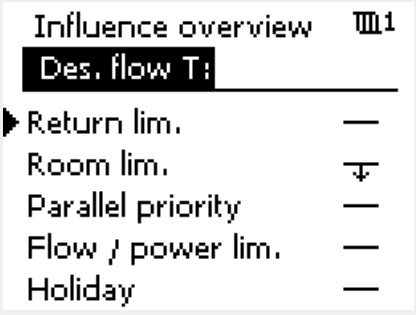
Straight line:
No active influence.

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

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.

It is possible to manually control the installed components.

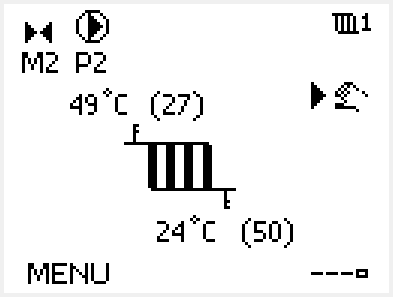
Manual control can only be selected in favorite displays in which the symbols for the controlled components (valve, pump etc.) are visible.

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 controlled actuator:
The actuator symbol has a value (in %) which can be changed. The % value is corresponding to a voltage in the range 0 – 10 volt.

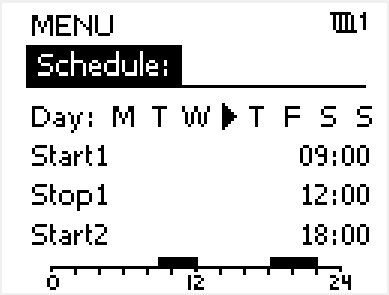
3.7 Schedule

3.7.1 Set your schedule

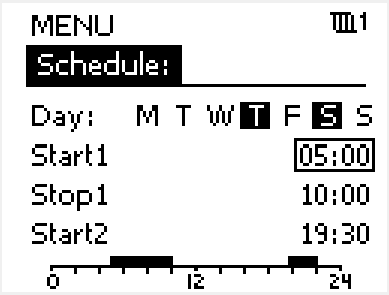
This section describes the schedule in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application. In some applications, however, there might be more than one schedule. Additional schedules can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

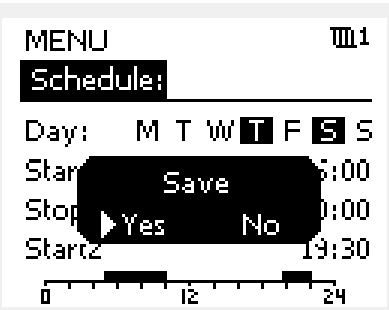


The schedule will day-by-day show you the start and stop times of your comfort periods (heating / DHW circuits).



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		60			
Actual (actual flow or power)		79			
Extended heat cut-out setting		106			
Extended winter cut-out setting		106			
Day		113			
Start time		113			
Duration		114			
Desired T		114			
Desired T (Desired flow temperature)	1x004	61			
ECA addr. (ECA address, choice of Remote Control Unit)	1x010	93			
Auto saving (saving temp. dependent on outdoor temp.)	1x011	82			
Boost	1x012	83			
Ramp (reference ramping)	1x013	84			
Optimizer (optimizing time constant)	1x014	84			
Adapt. time (adaption time)	1x015	64			
Demand offset	1x017	93			
Des. T Comfort	1x018	62			
Des. T Saving	1x019	62			
Based on (optimization based on room / outdoor temp.)	1x020	85			
Total stop	1x021	85			
P exercise (pump exercise)	1x022	95			
M exercise (valve exercise)	1x023	95			
Actuator	1x024	90			
Pre-stop (optimized stop time)	1x026	86			
Con.T, re. T lim. (Constant temperature mode, return temperature limitation)	1x028	69			
DHW, ret. T limit	1x029	70			
Limit (return temp. limitation)	1x030	70			
High T out X1 (return temp. limitation, high limit, X-axis)	1x031	71			
Low limit Y1 (return temp. limitation, low limit, Y-axis)	1x032	71			
Low T out X2 (return temp. limitation, low limit, X-axis)	1x033	71			
High limit Y2 (return temp. limitation, high limit, Y-axis)	1x034	71			
Infl. - max. (return temp. limitation - max. influence)	1x035	71			
Infl. - min. (return temp. limitation - min. influence)	1x036	72			
Adapt. time (adaptation time)	1x037	73			
P post-run	1x040	95			
DHW P post-run (DHW pump, post-run)	1x041	95			
Char. P post-run (DHW charging pump, post-run)	1x042	96			
Parallel operation	1x043	86			

Setting	ID	Page	Factory settings in circuit(s) 1	2	3
Max. DHW time	1x044	96			
DHW deact. time (DHW deactivation time)	1x045	96			
P demand	1x050	96			
Ch.-o. valve / P (changeover valve / pump)	1x051	97			
DHW priority (closed valve / normal operation)	1x052	97			
Tank, sec. / prim. (Tank secondarily or primarily connected)	1x053	97			
Cont. T control	1x054	98			
Circ. P priority	1x055	98			
P charge delay (Charging pump, delayed start)	1x059	98			
Limit (compensation temp., 1. point)	1x060	74			
Adapt. time (adaptation time)	1x061	74			
Infl. - max. (compensation temp., 1. point)	1x062	74			
Infl. - min. (compensation temp., 1. point)	1x063	75			
Limit (compensation temp., 2. point)	1x064	76			
Adapt. time (adaptation time)	1x065	76			
Infl. - max. (compensation temp., 2. point)	1x066	76			
Infl. - min. (compensation temp., 2. point)	1x067	76			
Flow T adapt time (Flow temperature, adaptation time)	1x068	108			
P cool T (cooling demand)	1x070	99			
Circ. P frost T	1x076	99			
P frost T (circulation pump, frost protection temp.)	1x077	99			
P heat T (heat demand)	1x078	99			
Priority (priority for return temp. limitation)	1x085	73			
Standby T	1x092	100			
Frost pr. T (frost protection temp.)	1x093	100			
Input type	1x109	79			
Limit (limitation value)	1x111	79			
Adapt. time (adaptation time)	1x112	80			
Filter constant	1x113	80			
Units	1x115	80			
High limit Y2 (flow / power limitation, high limit, Y-axis)	1x116	80			
Low limit Y1 (flow / power limitation, low limit, Y-axis)	1x117	81			
Low T out X2 (flow / power limitation, low limit, X-axis)	1x118	81			
High T out X1 (flow / power limitation, high limit, X-axis)	1x119	81			
Ext. input (external override)	1x141	100			
Ext. mode (external override mode)	1x142	101			
Upper difference	1x147	116			
Lower difference	1x148	116			
Delay, example	1x149	117			
Lowest temp.	1x150	117			
Max. charge T (maximum heating / charging temperature)	1x152	108			
Motor pr. (motor protection)	1x174	90			

Setting	ID	Page	Factory settings in circuit(s)		
			1	2	3
Temp. min.	1x177	62			
Temp. min.	1x177	108			
Temp. max.	1x178	62			
Temp. max.	1x178	109			
Summer, cut-out (limit for heating cut-out)	1x179	87			
Infl. - max. (room temp. limitation, max.)	1x182	65			
Infl. - min. (room temp. limitation, min.)	1x183	65			
Xp (proportional band)	1x184	91			
Tn (integration time constant)	1x185	91			
M run (running time of the motorized control valve)	1x186	91			
Nz (neutral zone)	1x187	91			
Min. act. time (min. activation time gear motor)	1x189	92			
Charge difference	1x193	109			
Stop difference	1x194	109			
Start difference	1x195	111			
Send desired T	1x500	103			

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**

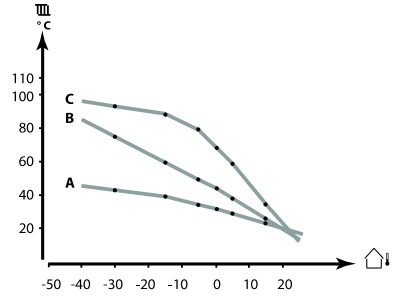
The heat curve can be changed in two ways:

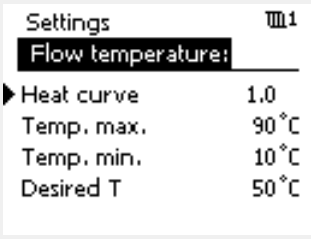
1. The value of the slope is changed (see heat curve examples on next page)
2. The coordinates of the heat curve are changed

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.

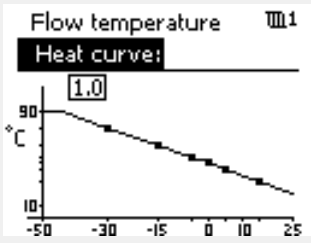
Change the coordinates:
Push the dial to enter / change the coordinates of the heat curve (example: -30,75).
The heat curve represents the desired flow temperatures at different outdoor temperatures and at a desired room temperature of 20 °C.
If the desired room temperature is changed, the desired flow 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

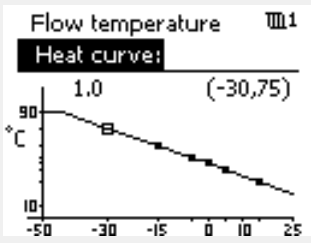




Slope changes



Coordinate changes



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

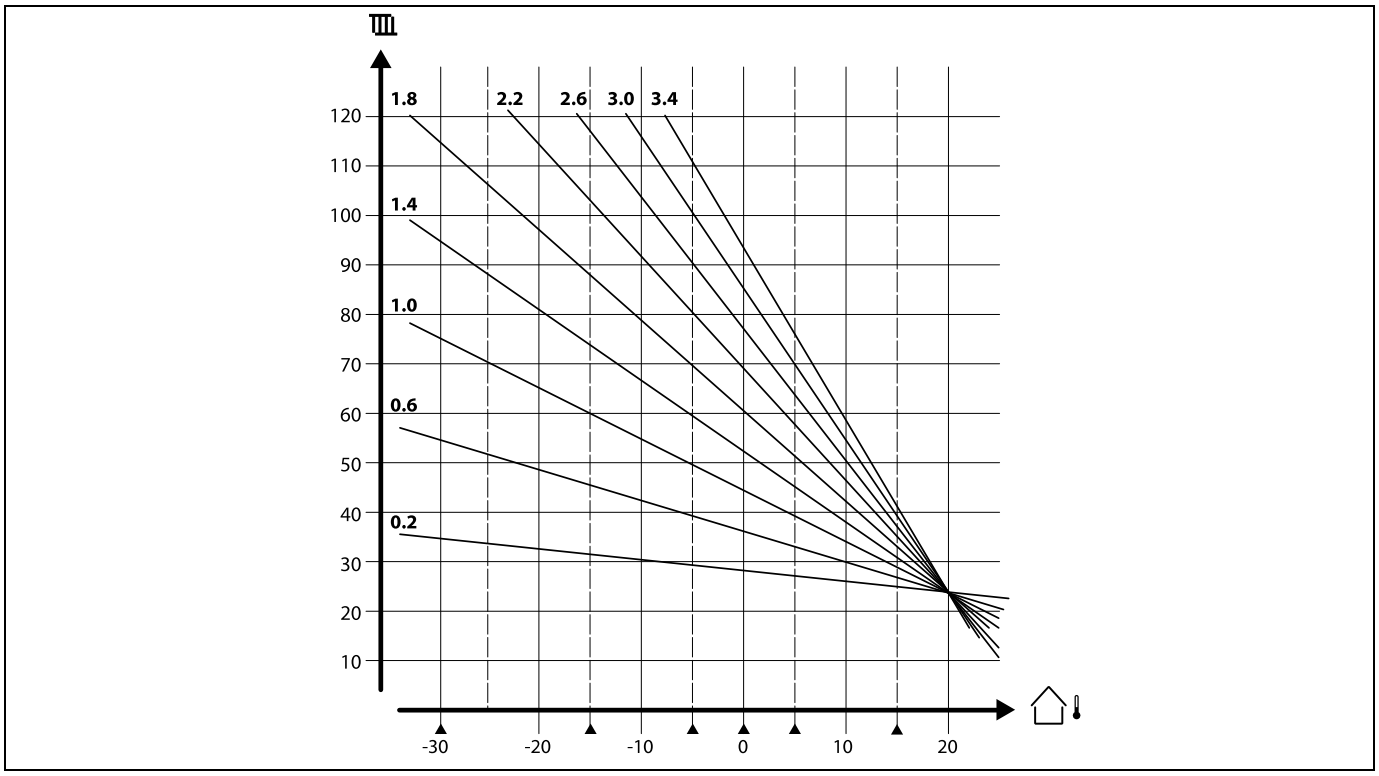
Example:

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.



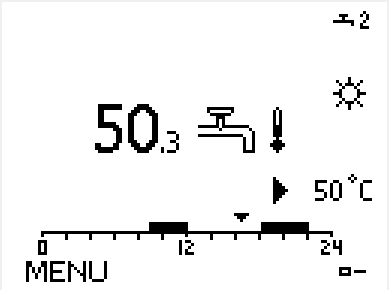
The small arrows (▲) indicate 6 different outdoor temperature values at which you can change the heat curve.

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. 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

Des. T Comfort	1x018
Setting of desired flow temperature when the ECL controller is in comfort mode.	

See Appendix “Parameter ID overview”

This setting has no influence if the controller receives an external value for the desired flow temperature.

MENU > Settings > Flow temperature

Des. T Saving	1x019
Setting of desired flow temperature when the ECL controller is in saving mode.	

See Appendix “Parameter ID overview”

This setting has no influence if the controller receives an external value for the desired flow temperature.

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”

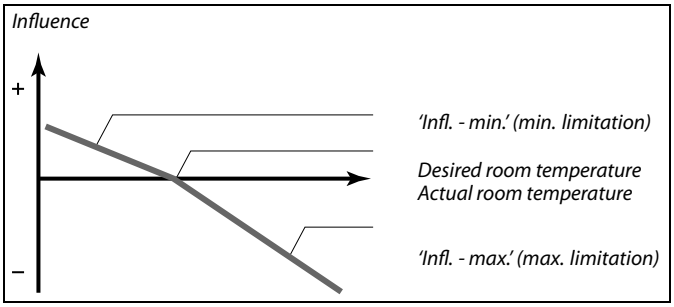
Set the max. flow temperature for the system. The desired temperature will not be higher than this setting. Adjust the factory setting, if required.

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.

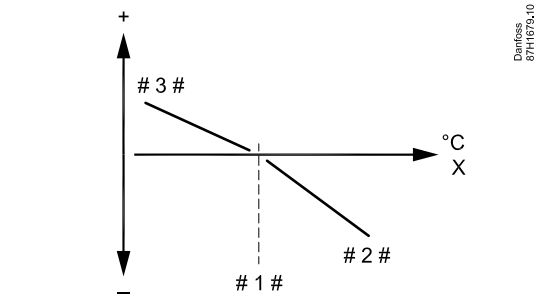
The adaptation function can correct the desired room temperature with max. 8 K x heat curve slope value.

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”

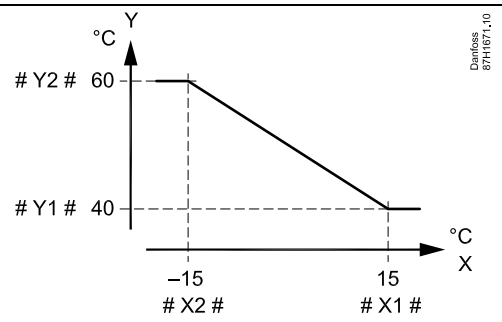
9.9: Maximum influence
5.0: Medium influence
2.0: Minor influence
0.0: No influence

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

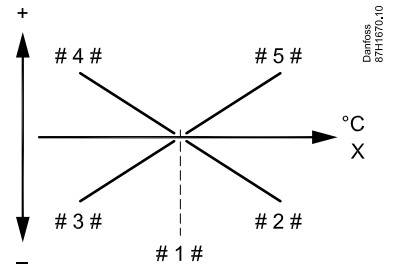
The return temperature limitation is based on the outdoor temperature. Typically in district heating systems a higher return temperature is accepted at a decrease in outdoor temperature. The relationship between the return temperature limits and outdoor temperature is set in two coordinates.
The outdoor 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".

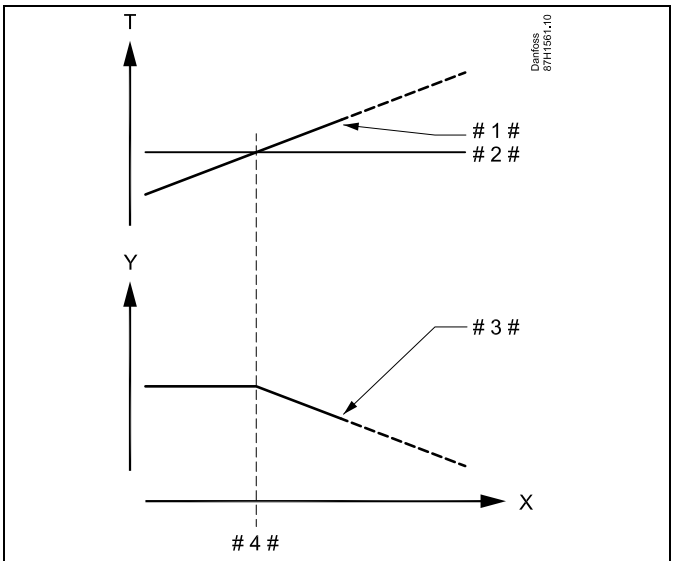
DHW circuit
The return temperature limitation is based on a constant temperature value.
The controller automatically changes the desired flow temperature to obtain an acceptable return temperature when the return temperature falls below or gets higher than the set limit.
This limitation is based on a 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.

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



T = *Temperature*

Y = *Temperature*

X = *Time*

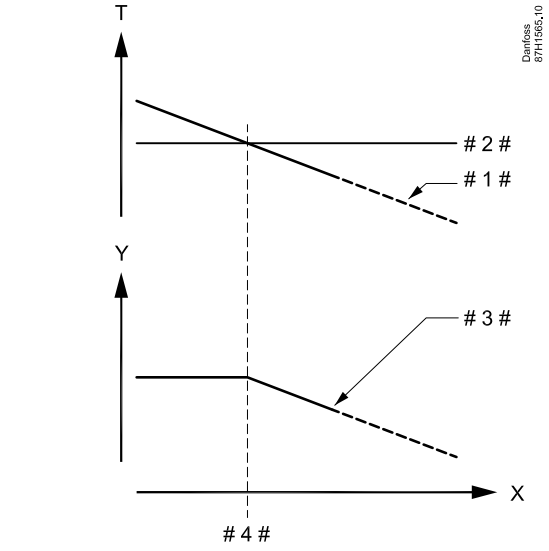
 # 1 # = *Return temperature*

 # 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

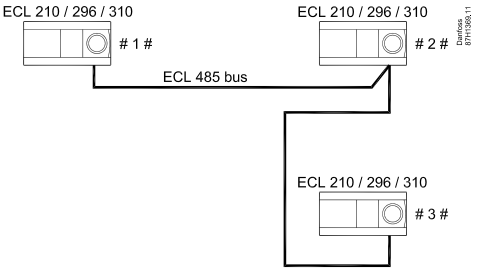
MENU > Settings > Return limit

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. *Notes:* • *The master circuit must be set to react on the desired flow temperature in the slave(s). See "Demand offset" (ID 11017).* • *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.'.

The return temperature limitation for the DHW circuit is based on the setting in 'Limit (return temp. limitation)'.
The influence factors are set in heating circuit 1.

If the return temperature limitation value in heating circuit 1 is higher than the return temperature limitation value in the DHW circuit, the highest value is used.

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'.

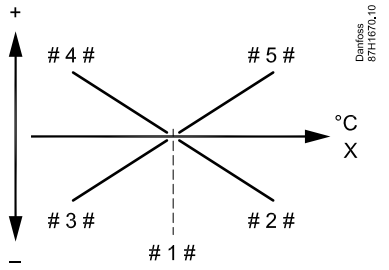
MENU > Settings > Return limit

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.



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.

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 Compensation 1

A limit value for the compensation temperature makes it possible to change the desired flow / duct temperature.
The influence from the compensation temperature can result in an increase or a decrease desired flow / duct temperature. The compensation temperature is often the outdoor temperature but could for example be a room temperature.
This application contains 2 compensation temperature limits: Compensation 1 (Comp. 1) and Compensation 2 (Comp. 2).
In the parameter descriptions "Sx"is used for the compensation temperature.

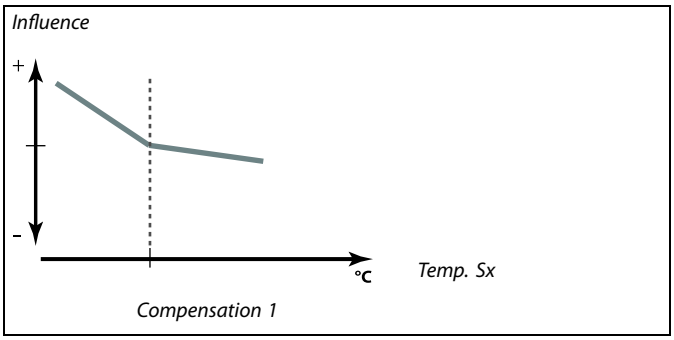
Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

MENU > Settings > Compensation 1

Limit (compensation temp., 1. point)	**1x060**
Set the compensation temperature limit point 1.	

See Appendix “Parameter ID overview”

When the compensation temperature measured by Sx falls below or gets higher than the set value, the controller automatically changes the desired flow / duct temperature. The influence is set in 'Infl. - max.' and 'Infl. - min.'.



Compensation 1

MENU > Settings > Compensation 1

Adapt. time (adaptation time)	**1x061**
Controls how fast the compensation / surface temperature influences the desired flow / duct temperature.	

See Appendix “Parameter ID overview”

OFF: The control function is not influenced by the ‘Adapt. time’.
Minor value: The desired flow / duct temperature is adapted quickly.
Major value: The desired flow / duct temperature is adapted slowly.
Value: Set the adaptation time

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

MENU > Settings > Compensation 1

Infl. - max. (compensation temp., 1. point)	**1x062**
Determines how much the desired flow / duct temperature will be influenced if the compensation temperature is higher than the set limit.	

See Appendix "Parameter ID overview"

Influence higher than 0:
The desired flow / duct temperature is increased, when the compensation temperature gets above the set limit.

Influence lower than 0:
The desired flow / duct temperature is decreased, when the compensation temperature gets above the set limit.

Example
The limit value is set to 5 °C.
'Infl. max.' is set to -1.5.
The actual compensation temperature is 7°C (2 degrees above the limit value).
Result:
The desired flow / duct temperature is changed by -1.5 x 2 = -3.0 degrees.

MENU > Settings > Compensation 1

Infl. - min. (compensation temp., 1. point)	**1x063**
Determines how much the desired flow / duct temperature will be influenced if the compensation temperature is lower than the set limit.	

See Appendix "Parameter ID overview"

Influence higher than 0:
The desired flow / duct temperature is increased, when the compensation temperature gets below the set limit.

Influence lower than 0:
The desired flow / duct temperature is decreased, when the compensation temperature gets below the set limit.

Example
The limit value is set to 5 °C.
'Infl. min.' is set to 2.5.
The actual compensation temperature is 2°C (3 degrees below the limit value).
Result:
The desired flow / duct temperature is changed by 2.5 x 3 = 7.5 degrees.

5.6 Compensation 2

This extra compensation temperature limit setting makes it possible to change the desired flow / duct temperature in relation to a second temperature limitation point. The measured compensation temperature is the same as in section "Compensation 1".
In the parameter descriptions "Sx"is used for the compensation temperature.

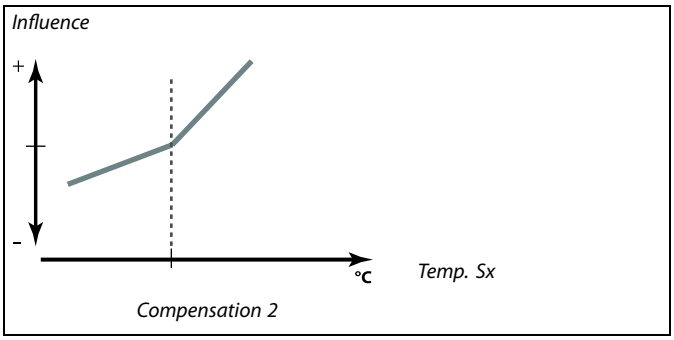
Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

MENU > Settings > Compensation 2

Limit (compensation temp., 2. point)	**1x064**
Set the compensation temperature limit point 2.	

See Appendix “Parameter ID overview”

When the compensation temperature measured by Sx falls below or gets higher than the set value, the controller automatically changes the desired flow / duct temperature. The influence is set in 'Infl. - max.' and 'Infl. - min.'.



Compensation 2

MENU > Settings > Compensation 2

Adapt. time (adaptation time)	**1x065**
Controls how fast the compensation temperature influences the desired flow / duct temperature.	

See Appendix “Parameter ID overview”

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

Minor value: The desired flow / duct temperature is adapted quickly.

Major value: The desired flow / duct temperature is adapted slowly.

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

MENU > Settings > Compensation 2

Infl. - max. (compensation temp., 2. point)	**1x066**
Determines how much the desired flow / duct temperature will be influenced if the compensation temperature is higher than the set limit.	

See Appendix “Parameter ID overview”

Influence higher than 0:
The desired flow / duct temperature is increased, when the compensation temperature gets above the set limit.

Influence lower than 0:
The desired flow / duct temperature is decreased, when the compensation temperature gets above the set limit.

Example
The limit value is set to 25 °C.
‘Infl. max.' is set to 2.5.
The actual compensation temperature is 28 °C (3 degrees above limit value).
The desired flow / duct temperature is changed by 2.5 x 3 = 7.5 degrees.

MENU > Settings > Compensation 2

Infl. - min. (compensation temp., 2. point)		**1x067**
Circuit	*Setting range*	*Factory setting*
Determines how much the desired flow / duct temperature will be influenced if the compensation temperature is lower than the set limit.		

See Appendix "Parameter ID overview"

Influence higher than 0:
The desired flow / duct temperature is increased, when the compensation temperature gets below the set limit.

Influence lower than 0:
The desired flow / duct temperature is decreased, when the compensation temperature gets below the set limit.

Example
The limit value is set to 25 °C.
'Infl. min.' is set to 0.5.
The actual compensation temperature is 23 °C (2 degrees below the limit value).
Result:
The desired flow / duct temperature is changed by 0.5 x 2= 1.0 degree.

5.7 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.

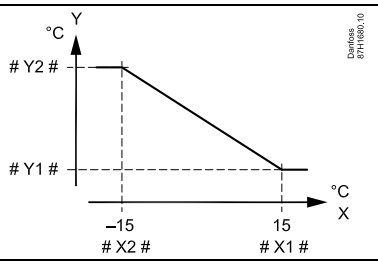
The flow / power limitation can be based on the outdoor temperature. Typically, in district heating systems a higher flow or power is accepted at lower outdoor temperatures.

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

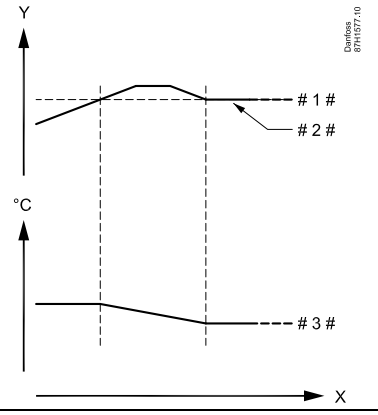
The outdoor temperature coordinates are set in 'High T out X1' and 'Low T out X2'.

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)

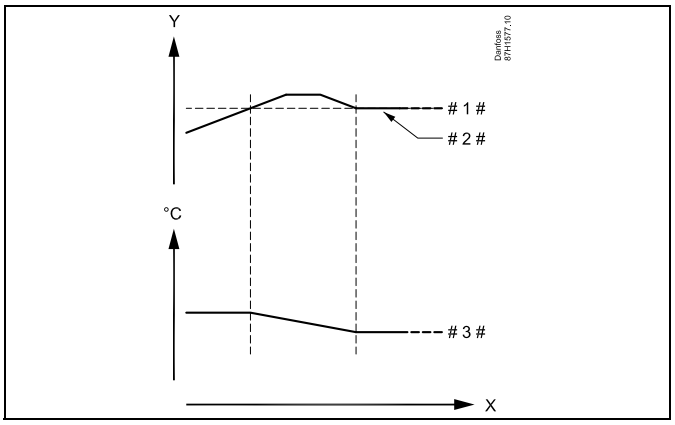


X	=	Time
Y	=	Flow or power
# 1 #	=	Flow or power limit
# 2 #	=	Actual flow or energy
# 3 #	=	Desired flow temperature

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

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



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

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

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

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

Limit (limitation value)	1x111
This value is in some applications a calculated limitation value, based on the actual outdoor temperature. In other applications the value is a selectable limitation value.	

See Appendix "Parameter ID overview"

MENU > Settings > Flow / power limit

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

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.

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

MENU > Settings > Flow / power limit

Filter constant	1x113
The value of the filter constant determines the dampening of the measured value. The higher the value, the more dampening. 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'.

5.8 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"

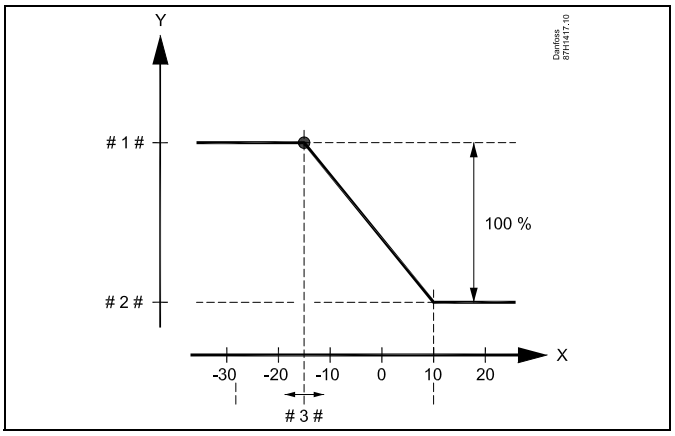
OFF: The saving temperature does not depend on the outdoor temperature; the reduction is 100%.

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

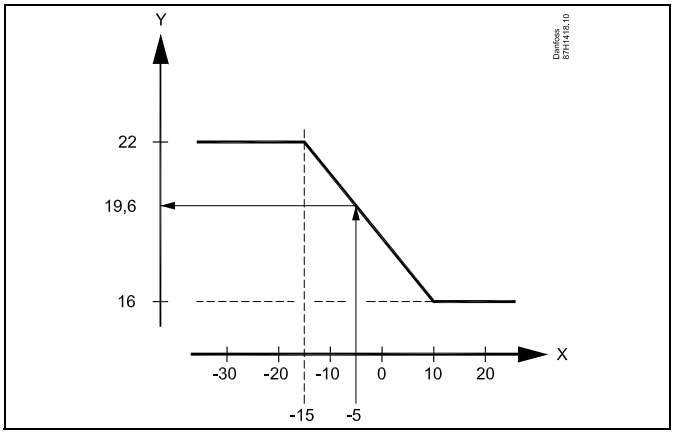
3 # = Auto saving temperature (°C), ID 11011

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

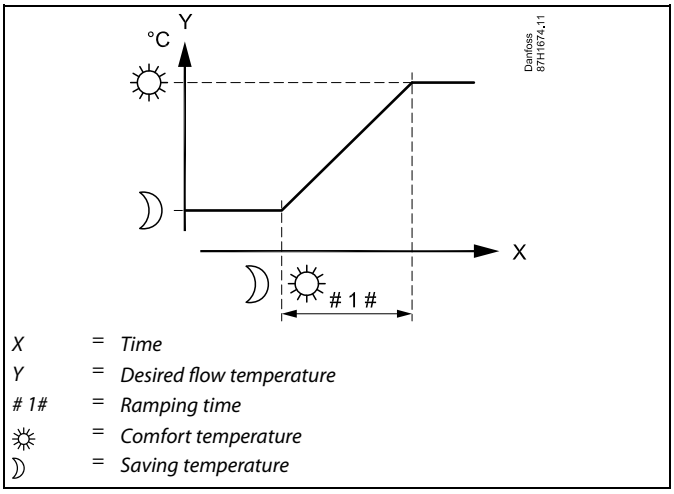
Ramp (reference ramping)	**1x013**
The time (minutes) in which the desired flow temperature increases gradually to avoid load peaks in the heat supply.	

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. The lower the outdoor temperature, the earlier the heating cut-in. The lower the outdoor temperature, the later the heating cut-out. 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

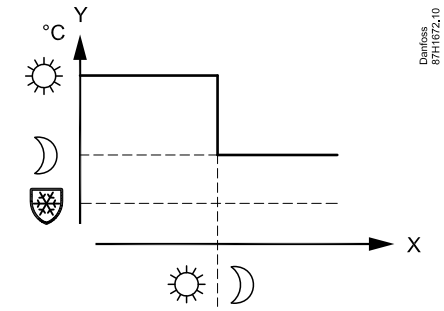
Total stop	**1x021**
Decide whether you want a total stop during the saving temperature period.	

See Appendix “Parameter ID overview”

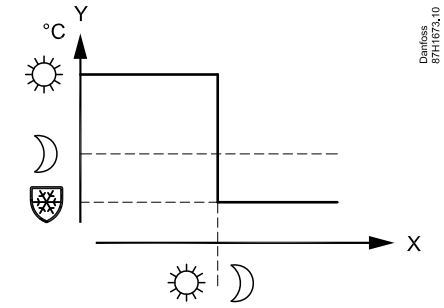
OFF: No total stop. The desired flow temperature is reduced according to:
- desired room temperature in saving mode
- auto saving

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

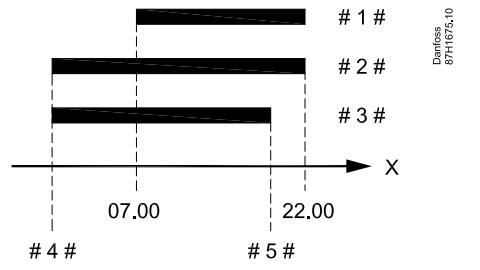
Pre-stop (optimized stop time)	**1x026**
Disable the optimized stop time.	

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

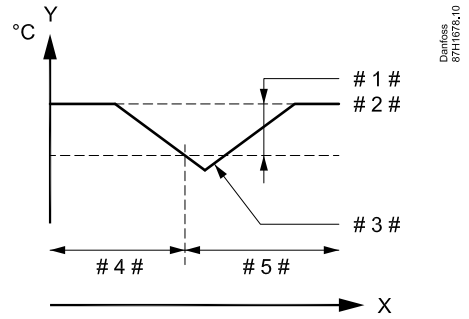
Parallel operation	**1x043**
Choose whether the heating circuit is to operate parallel to the DHW circuit.	

See Appendix "Parameter ID overview"

OFF: DHW heating has 100% priority. The heating circuit circulation pump is OFF during DHW heating.

1 ... 99 K: Dependent parallel operation. The heating circuit circulation pump is ON if the difference between DHW heating temperature (charging temperature) and desired flow temperature is less than the set value.

ON: Parallel operation. The heating circuit circulation pump is ON during DHW heating.



X = Time

Y = Temperature

 # 1# = Acceptable deviation (Parallel operation, 1x043)

 # 2 # = Desired DHW heating temperature

 # 3 # = Actual DHW heating temperature

 # 4 # = 100% parallel operation

 # 5 # = 100% DHW priority

MENU > Settings > Optimization

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

See Appendix "Parameter ID overview"

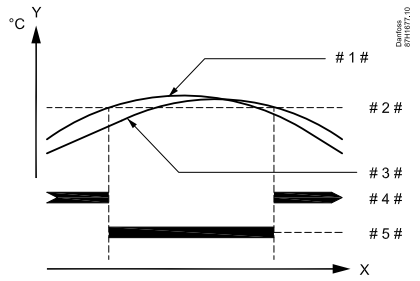
The heating can be switched OFF when the outdoor temperature is higher than the set value. The valve closes and after the post-run time, the heating circulation pump stops. 'Temp. min.' will be overruled.

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.

5.9 Control parameters

Control of valves
The motorized control valves are controlled by means of either 3-point control or a 0 - 10 volt control signal or a mix of these.
Valve control (heating):
The motorized control valve is opened gradually when the flow temperature is lower than the desired flow temperature and vice versa.
Valve control (cooling):
The motorized control valve is operated oppositely in relation to heating application.
The following explanations for actuator types are related to heating applications.
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.

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.

0 - 10 volt controlled actuator
This electric actuator contains a reversible gear-motor. A control voltage between 0 and 10 volt comes from the extension module ECA 32 in order to manage the control valve. The voltage in the ECL Comfort controller is expressed as a % value and displayed at the valve symbol. Example: 45 % corresponds to 4.5 volt.
When the flow temperature (for example at S3) is lower than the desired flow temperature, the control voltage is gradually increased in order to gradually increase the flow. By this, the flow temperature will align with the desired temperature.
The control voltage remains on a constant value as long as the flow temperature corresponds to the desired temperature.
Oppositely, when the flow temperature is higher than the desired flow temperature, the control voltage is gradually reduced in order to reduce the flow. Again, the flow temperature aligns with the desired temperature.

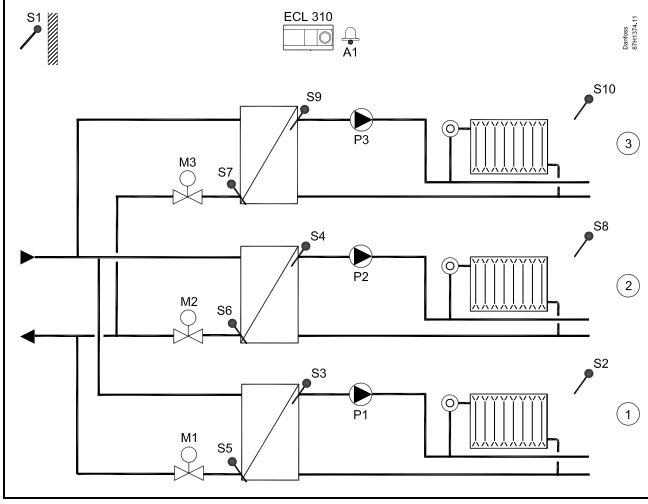
Thermo-actuator, Danfoss type ABV
Danfoss thermo-actuator type ABV is a slow acting valve actuator. Inside the ABV an electric heat coil will heat a thermostatic element when an electric signal is applied. When heating the thermostatic element it expands in order to manage the control valve.
Two basic types are available: ABV NC (Normal Closed) and ABV NO (normal open). For example, ABV NC keeps a 2-port control valve closed when no open-signals are applied.
Electric open-signals come from the electronic output of the ECL Comfort controller in order to manage the control valve. When open-signals are applied to the ABV NC, the valve gradually opens. Open-signals are in the ECL Comfort controller expressed as "Arrow-up" (open) and displayed at the valve symbol.
When the flow temperature (for example at S3) is lower than the desired flow temperature, relatively long open-signals come from the ECL Comfort controller in order to increase the flow. By this, the flow temperature will over time be aligned with the desired temperature.
Oppositely, when the flow temperature is higher than the desired flow temperature, relatively short open-signals come from the ECL Comfort controller in order to reduce the flow. Again, the flow temperature aligns, over time, with the desired temperature.
The control of the Danfoss thermo-actuator type ABV uses a unique designed algorithm and is based on the PWM principle (Pulse Width Modulation), where the duration of the pulse determines the management of the control valve. The pulses are repeated each 10 sec.
As long as the flow temperature corresponds to the desired temperature, the duration of the open-signals will remain constant.

The application A390.1 controls the motorized control valves by means of 3-point control.

The application A390.2 controls the motorized control valves by means of a 0 - 10 volt control signal.

The applications A390.3, A390.11, A390.12 and A390.13 can control the motorized control valves by means of 3-point control and 0 – 10 Volt. Both output types are active.

Application example, A390.1



Please see 'Settings in all heating circuits' section 'Control parameters'.

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

MENU > Settings > Control parameters

Actuator		**1x024**
	ABV / GEAR	**GEAR**

Selection of valve actuator type.

ABV: Danfoss type ABV (thermo actuator).

GEAR: Gear motor based actuator.

When selecting "ABV", the control parameters:

- Motor protection (ID 1x174)
- Xp (ID 1x184)
- Tn (ID 1x185)
- M run (ID 1x186)
- Nz (ID 1x187)
- Min. act. time (ID 1x189)

are not considered.

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.

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.

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.	

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.

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.

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.	

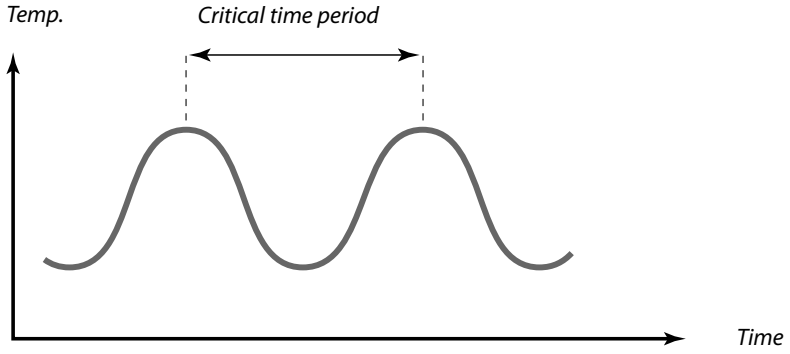
See Appendix "Parameter ID overview"

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).

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.

5.10 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 the master circuit can be influenced by the demand for a desired flow temperature in another controller (slave) or another circuit. *The 'Demand offset' can compensate for heating or cooling losses between master and slave controlled systems.* *Circuit 1 is the master circuit in most applications.*	

See Appendix "Parameter ID overview"

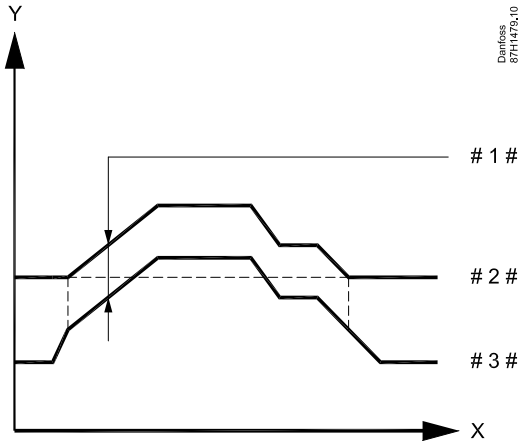
* heating applications: OFF / 1 . . . 20 K
cooling applications: - 20 . . . -1 K / OFF

** heating applications: OFF
cooling applications: OFF

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

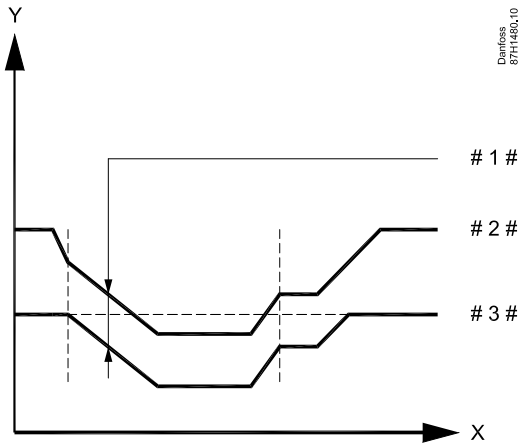
Value: The desired flow temperature is increased (heating) or decreased (cooling) by the set value in 'Demand offset'.

Heating application



X = Time
Y = Desired flow temperatures
 # 1 # = Demand offset
 # 2 # = Desired flow temperature, master
 # 3 # = Desired flow temperature, slave

Cooling application



X = Time
Y = Desired flow temperatures
 # 1 # = Demand offset
 # 2 # = Desired flow temperature, slave
 # 3 # = Desired flow temperature, master

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

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: *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).* ***Cooling applications:*** *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).* *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

Char. P post-run (DHW charging pump, post-run)	1x042
Set the DHW charging pump post-run time (minutes). The DHW charging pump can continue to be switched ON after the DHW heating procedure in order to utilize the remaining heat in the heat exchanger.	

See Appendix "Parameter ID overview"

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

MENU > Settings > Application

Max. DHW time	1x044
Set the max DHW heating time (minutes). When DHW heating is active and the set 'Max. DHW time' expires, DHW heating is deactivated.	

See Appendix "Parameter ID overview"

OFF: If the DHW temperature is lower than the DHW charging cut-in temperature, the DHW charging remains active for unlimited period of time. If the DHW temperature is higher than the DHW charging cut-in temperature, the charging is deactivated after 35 minutes.

Value: The DHW heating / charging is deactivated when the set 'Max. DHW time' (in minutes) expires.

MENU > Settings > Application

DHW deact. time (DHW deactivation time)	1x045
Set the time (minutes) that must elapse after a DHW heating period before a new DHW heating period can be started.	

See Appendix "Parameter ID overview"

Value: When the DHW heating / charging time has reached its maximum, DHW can only be heated / charged again after the set deactivation time (in minutes) has expired.

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

Ch.-o. valve / P (changeover valve / pump)	1x051
Choose whether the DHW heating control is based on a changeover valve or a pump.	

When the changeover valve is chosen, pump P1 is ON at heating as well as at DHW heating demand.

See Appendix "Parameter ID overview"

OFF: Changeover valve

ON: Pump

When the pump is chosen, pump P1 is ON at heating and OFF at DHW heating demand.
A parallel option (heating and DHW heating in parallel) exists, based on the setting 'Parallel operation'.

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

Tank, sec. / prim. (Tank secondarily or primarily connected)	**1x053**
Choose whether the heating of the DHW tank is dependent on the flow temperature at S3.	

See Appendix "Parameter ID overview"

OFF: The DHW tank is placed on the secondary side of the heat exchanger and the S3 temperature determines the DHW heating.

ON: The DHW tank is placed on the primary side of the heat exchanger and the S3 temperature has no influence on the DHW heating.

MENU > Settings > Application

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 > Application

Circ. P priority	**1x055**
Choose whether the DHW circulation pump should be ON during DHW heating.	

See Appendix "Parameter ID overview"

OFF: The DHW circulation pump is switched OFF during DHW heating.

ON: The DHW circulation pump is not switched OFF during DHW heating.

When the 'Circ. P priority' is set to OFF, the schedule for the DHW circulation pump is overruled.

MENU > Settings > Application

P charge delay (Charging pump, delayed start)	1x059
Conditions for switching the DHW heating / charging pump ON at DHW heating / charging demand. 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 > Application

P cool T (cooling demand)	1x070
When the desired flow temperature is below the set temperature in ‘P cool 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 below the set value.

The valve is fully closed as long as the pump is not switched on.

MENU > Settings > Application

Circ. P frost T	1x076
Set the outdoor temperature value at which the DHW circulation pump is to be active to protect the DHW circuit against frost.	

See Appendix “Parameter ID overview”

OFF: The DHW circulation pump is not active.

Value: The DHW circulation pump is active when the outdoor temperature is lower than the set value.

MENU > Settings > Application

P frost T (circulation pump, frost protection temp.)	1x077
Frost protection, based on the outdoor temperature. 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.	

See Appendix “Parameter ID overview”

OFF: No frost protection.

Value: Circulation pump is ON when the outdoor temperature is below the set value.

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.

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

Standby T	1x092
Set the desired flow temperature for the controller when it is in standby mode.	

See Appendix "Parameter ID overview"

Value: Desired flow temperature at standby.

MENU > Settings > Application

Frost pr. T (frost protection temp.)	1x093
Set the desired flow temperature at the flow temperature sensor S3 to protect the system against frost (at heating cut-out, total stop etc.). When the flow temperature 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.

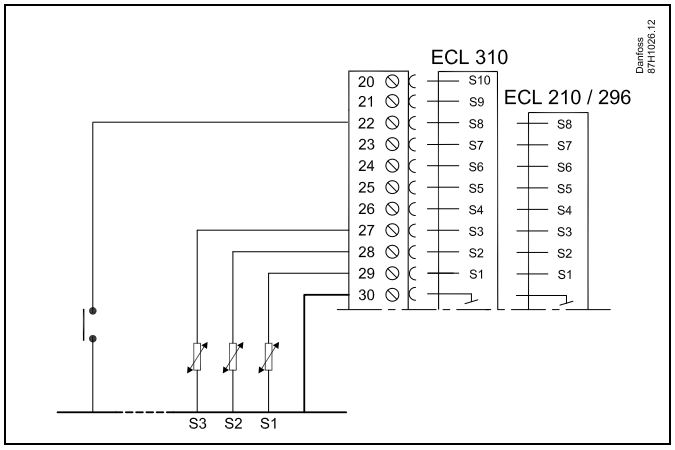
See the drawings for connection examples of override switch and override relay to input S8.

S7...S16 are recommended for override switch.

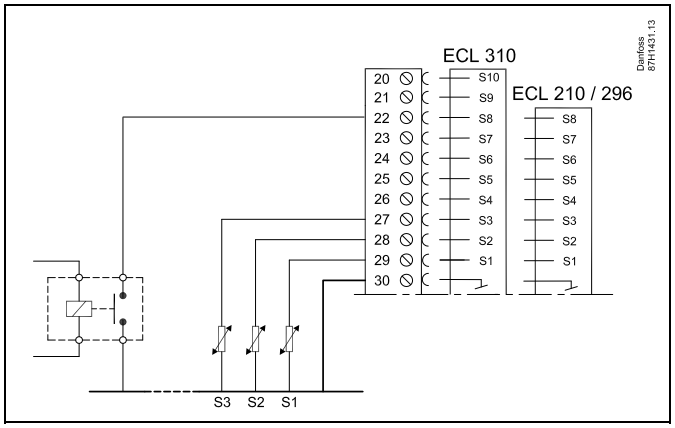
If ECA 32 is mounted, also S11... S16 can be used.

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. *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.

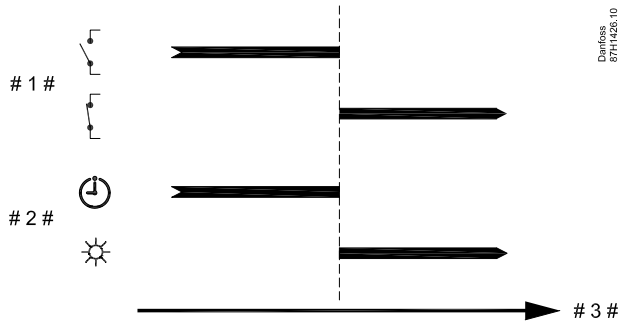
CONSTANT T: The circuit in question controls a constant temperature *)

*) 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.

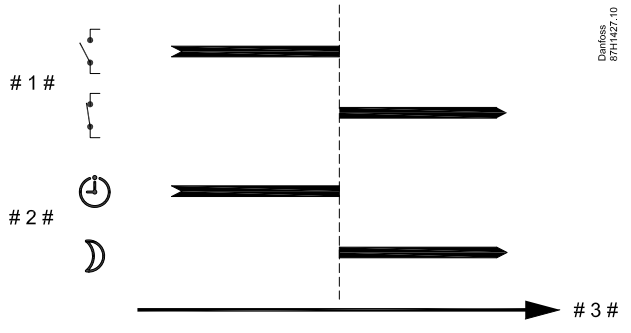
See also ‘Ext. input’.

Example: Override to Comfort mode



1 # = Override switch (not activated / activated)
2 # = Function mode (Schedule / Comfort)
3 # = Time

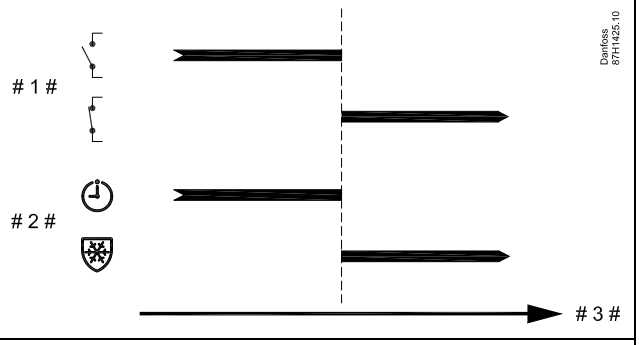
Example: Override to Saving mode



1 # = Override switch (not activated / activated)
2 # = Function mode (Schedule / Saving)
3 # = Time

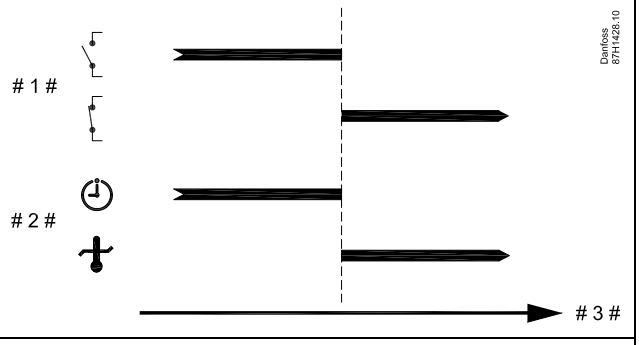
The result of override to 'Saving' mode depends on the setting in 'Total stop'.
Total stop = OFF: Heating reduced
Total stop = ON: Heating stopped

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

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. *Stand-alone controller:* *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’).

5.11 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.

5.11.1 Differentiated heat cut-out

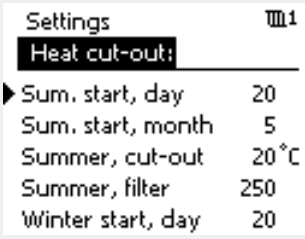
To set differentiated cut-out parameters for a heating circuit for "Summer" and "Winter" go to "Heat cut-out":
(MENU > Settings > Heat cut-out)
This function is active when the dates for "Summer" and "Winter" are different in the "Heat cut-out" menu.

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**	*	*

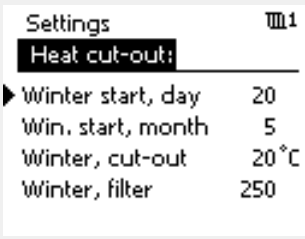
See Appendix "Parameter ID overview"



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.

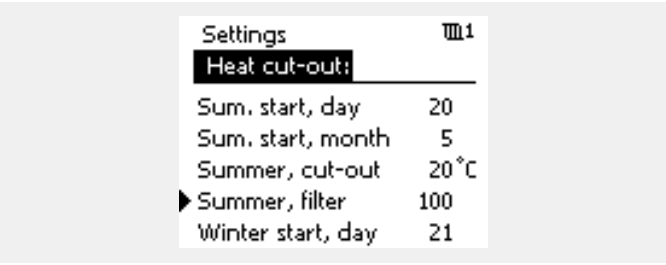
The heating cut-out is only active when the controller mode is in scheduled operation. When the cut-out value is set to OFF, there is no heating cut-out.

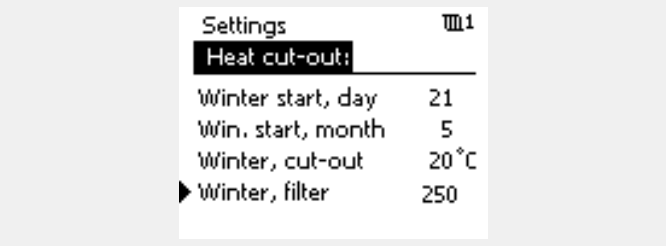
5.11.2 Summer/winter filter constant

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.





5.12 Tank temperature

Please see 'Navigation, ECL application key A390' section 'Parameter list, application A390.11, A390.12 and A390.13'

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

MENU > Settings > Tank temperature

Flow T adapt time (Flow temperature, adaptation time)	**1x068**
Set the adaptation time (in seconds) for the desired temperature in the primary circuit, based on the desired charging temperature. The ECL Comfort controller gradually increases the desired flow temperature in the primary circuit in order to maintain the desired charging temperature.	

See Appendix "Parameter ID overview"

OFF: The desired flow temperature in the primary circuit is not adapted to the desired charging temperature.

Low value: The adaptation is quick.

High value: The adaptation is slow.

The desired heating / charging temperature cannot be higher than the set temperature in 'Max. charge T'.

MENU > Settings > Tank temperature

Max. charge T (maximum heating / charging temperature)	**1x152**
Set the max. heating / charging temperature for the DHW.	

See Appendix "Parameter ID overview"

Value: Set the temperature.

NOTE:
The desired DHW temperature will be reduced if "Max. charge T" is lower than (Desired DHW temp. + Charge difference).

Example:

Desired DHW temp. = 50 °C

Charge difference = 10 K

Max. charge T = 55 °C

Result:
Desired DHW temp. will be reduced to 45 °C.

MENU > Settings > Tank 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 > Tank 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.

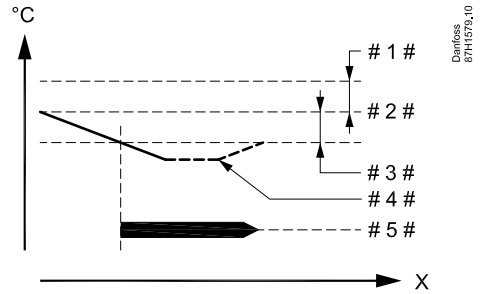
The setting for ‘Temp. max.’ has higher priority than ‘Temp. min.’.

MENU > Settings > Tank temperature

Charge difference	1x193
Set the number of degrees above the desired DHW temperature that will result in the DHW heating (charging) temperature.	

See Appendix “Parameter ID overview”

Value: Number of degrees to be added to the desired DHW temperature to obtain the DHW heating (charging) temperature.



X = Time
# 1 # = Charging difference (ID 1x193)
# 2 # = Desired DHW temperature
# 3 # = Start difference (ID 1x195)
# 4 # = Actual DHW temperature
# 5# = DHW heating / charging activity

The desired DHW temperature is related to the tank temperature sensor.
If two tank temperature sensors are installed, the relation is to the upper tank temperature sensor.

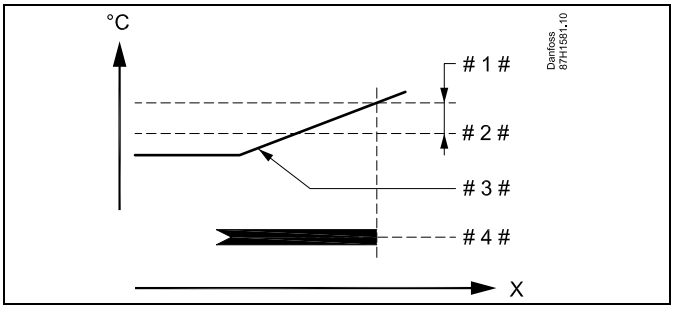
MENU > Settings > Tank temperature

Stop difference	**1x194**
One DHW tank temperature sensor: *Set the number of degrees above or below the desired DHW temperature that will stop the DHW heating / charging.* *Two DHW tank temperature sensors:* *Set the number of degrees below the desired DHW temperature, but measured by the lower tank temperature sensor that will stop the DHW heating / charging.* *NOTE: If condition for stop, related to the lower DHW tank temperature sensor, is present, the stop is done when the upper DHW tank temperature sensor has a temperature 2 K higher than the start difference level.*	

See Appendix "Parameter ID overview"

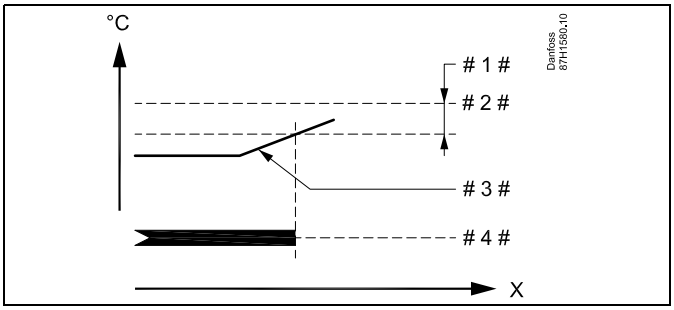
Value: Set the number of degrees.

One DHW tank temperature sensor (example with positive 'Stop difference' value):



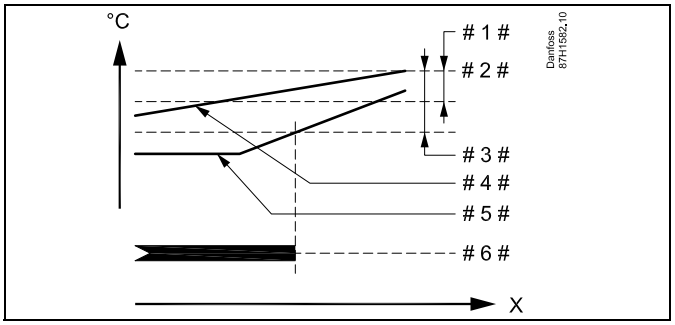
X = Time
# 1 # = Stop difference (ID 1x194)
# 2 # = Desired DHW temperature
# 3 # = Actual DHW temperature
# 4 # = DHW heating / charging activity

One DHW tank temperature sensor (example with negative 'Stop difference' value):



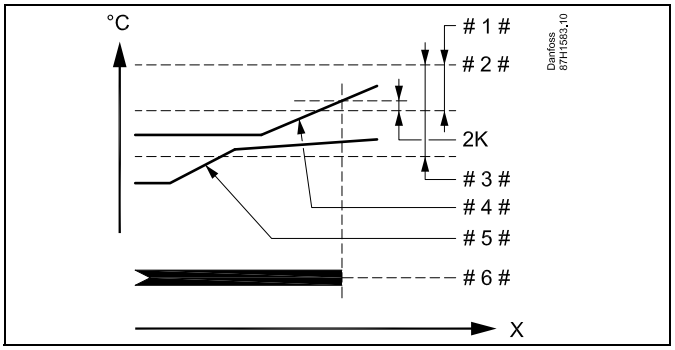
X = Time
# 1 # = Stop difference (ID 1x194)
# 2 # = Desired DHW temperature
# 3 # = Actual DHW temperature
# 4 # = DHW heating / charging activity

Two DHW tank temperature sensors, upper and lower. Upper tank temperature is OK before lower tank temperature:



X = Time
# 1 # = Start difference (ID 1x195)
# 2 # = Desired DHW temperature
# 3 # = Stop difference (ID 1x194)
# 4 # = Upper DHW tank temperature sensor
# 5 # = Lower DHW tank temperature sensor
# 6 # = DHW heating / charging activity

Two DHW tank temperature sensors, upper and lower. Lower tank temperature is OK before upper tank temperature:



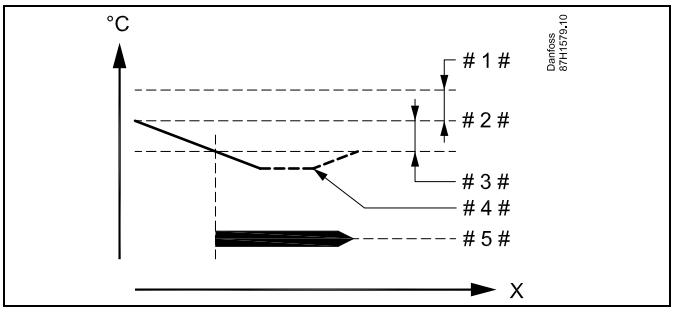
X = Time
# 1 # = Start difference (ID 1x195)
# 2 # = Desired DHW temperature
# 3 # = Stop difference (ID 1x194)
# 4 # = Upper DHW tank temperature sensor
# 5 # = Lower DHW tank temperature sensor
# 6 # = DHW heating / charging activity

MENU > Settings > Tank temperature

Start difference	**1x195**
Set the number of degrees below the desired DHW temperature that will start the DHW heating (charging).	

See Appendix "Parameter ID overview"

Value: Set the number of degrees.



X	=	Time
# 1 #	=	Charging difference (ID 1x193)
# 2 #	=	Desired DHW temperature
# 3 #	=	Start difference (ID 1x195)
# 4 #	=	Actual DHW temperature
# 5#	=	DHW heating / charging activity

Example:

Desired DHW temp.: 55 °C

Start difference: -3 K

Result:
The DHW heating starts when the temperature measured by the tank temperature sensor (upper) is lower than 52 °C.

Return limit
(Includes the applications A390.11, A390.12, A390.13 only)

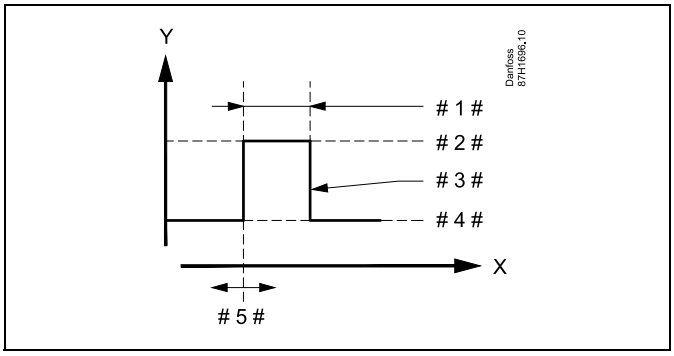
The functions are the same as for the heating circuits. In DHW circuits the limitation value is a set value.

Flow / power limit
(Includes the applications A390.11, A390.12, A390.13 only)
The functions are the same as for the heating circuits. In DHW circuits the limitation value is a set value.

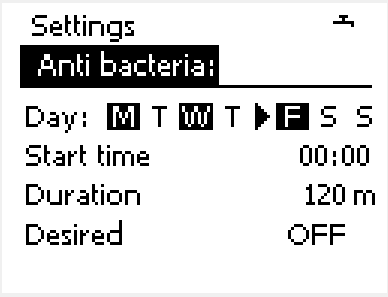
Control parameters
(Includes the applications A390.12, A390.13 only)
The functions are the same as for the heating circuits.

5.13 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.

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.

5.14 Alarm

The section "Alarm" describes specific application related issues.
Application A390 offers different types of alarms:

Type:	Description:
1	Actual flow temperature differs from the desired flow temperature.
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:
Subtype A390.3 (cooling) has no alarm functions.

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:
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 2:
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.:	A390.1	A390.2	A390.3	A390.11	A390.12	A390.13
2	Temp. monitor, circuit 1	1	S3	x	x		x	x	x
3	Temp. monitor, circuit 2	1	S4	x	x		x	x	x
4	Temp. monitor, circuit 3	1	S9	x	x		x	x	x
32	T sensor defect	2	all	x	x		x	x	x

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

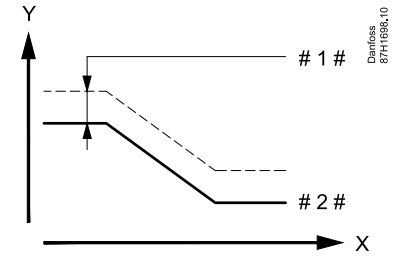
Upper difference	**1x147**
The alarm is activated if the actual flow temperature increases more than the set difference (acceptable temperature difference above the desired flow temperature). See also 'Delay'.	

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

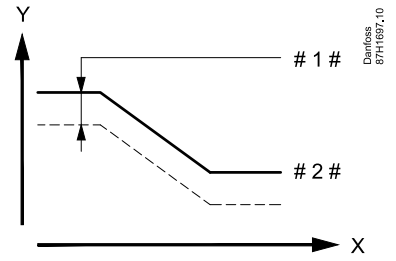
Lower difference	**1x148**
The alarm is activated if the actual flow temperature decreases more than the set difference (acceptable temperature difference below the desired flow temperature). See also 'Delay'.	

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*

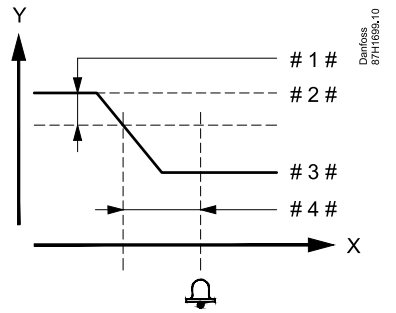
MENU > Settings > Alarm

Delay, example	**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.

5.15 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

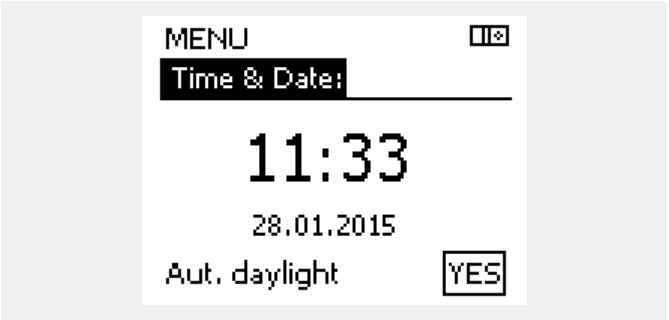
It is only necessary to set the correct date and time in connection with the first use of the ECL Comfort controller or after a power break of more than 72 hours.

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 Holiday

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.

There is a holiday program for each circuit and a holiday program for the common controller.

Each holiday program contains one or more schedules. Each schedule can be set to a start date and an end date. The set period starts on the start date at 00.00 and stops on the end date at 00.00.

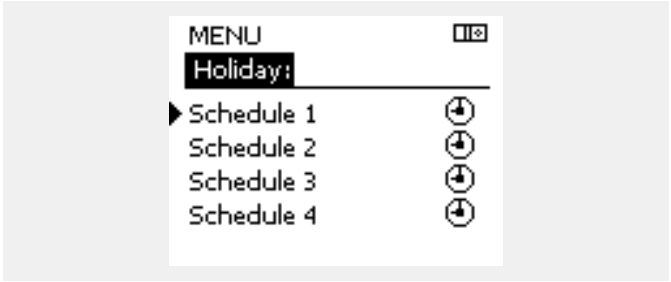
Selectable modes are Comfort, Saving, Frost protection or Comfort 7-23 (before 7 and after 23, the mode is scheduled).

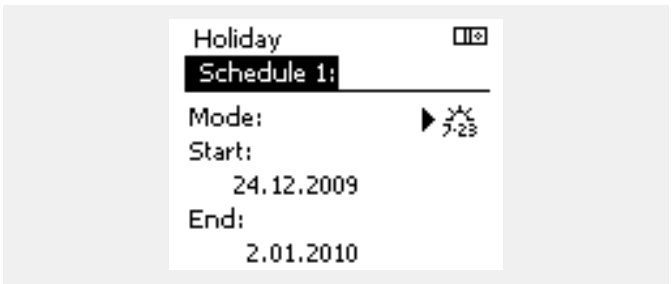
How to set your holiday schedule:

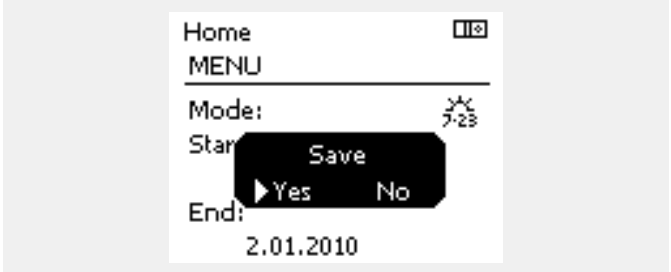
Action:	Purpose:	Examples:
	Choose 'MENU'	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose a circuit or 'Common controller settings'	
	Heating	
	DHW	
	Common controller settings	
	Confirm	
	Go to 'Holiday'	
	Confirm	
	Choose a schedule	
	Confirm	
	Confirm choice of mode selector	
	Choose mode	
	· Comfort	
	· Comfort 7–23	
	· Saving	
	· Frost protection	
	Confirm	
	Enter the start time first and then the end time	
	Confirm	
	Go to 'Menu'	
	Confirm	
	Choose 'Yes' or 'No' in 'Save'. Choose the next schedule, if required	

The holiday program in the 'Common controller settings' is valid for all circuits. The holiday program can also be set individually in the heating or DHW circuits.

The end date must be at least be one day later than the start date.







Holiday, specific circuit / Common Controller

When setting one holiday program in specific circuit and another holiday program in Common Controller, a priority will be taken into account:

1. Comfort
2. Comfort 7 - 23
3. Saving
4. Frost protection

Holiday, deleting a set period:

- Choose the Schedule in question
- Change the mode to "Clock"
- Confirm

Example 1:

Circuit 1:
Holiday set to "Saving"

Common Controller:
Holiday set to "Comfort"

Result:
As long as "Comfort" is active in Common Controller, circuit 1 will be in "Comfort".

Example 2:

Circuit 1:
Holiday set to "Comfort"

Common Controller:
Holiday set to "Saving"

Result:
As long as "Comfort" is active in circuit 1, it will be in "Comfort".

Example 3:

Circuit 1:
Holiday set to "Frost protection"

Common Controller:
Holiday set to "Saving"

Result:
As long as "Saving" is active in Common Controller, circuit 1 will be in "Saving".

The ECA 30 / 31 cannot override the holiday schedule of the controller temporarily.

However, it is possible to make use of the following options from the ECA 30 / 31 when the controller is in scheduled mode:

 Day off

 Holiday

 Relaxing (extended comfort period)

 Going out (extended saving period)

Energy-saving trick:
Use 'Going out' (the extended saving period) for airing purposes (e.g. for ventilating the rooms by means of fresh air from open windows).

Connections and setup procedures for ECA 30 / 31:
See section 'Miscellaneous'.

Quick guide "ECA 30 / 31 to override mode":

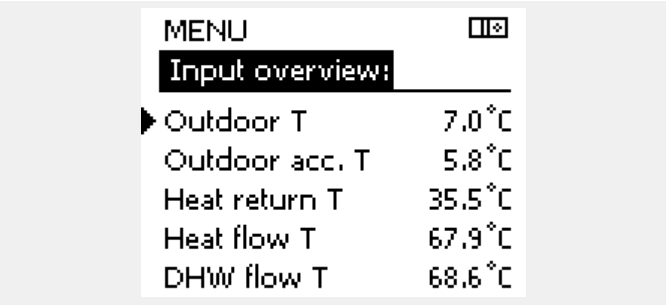
1. Go to ECA MENU
2. Move cursor to "Clock" symbol
3. Select the "Clock" symbol
4. Choose and select one of 4 override functions
5. Below the override symbol: Set hours or date
6. Below hours / date: Set desired room temperature for the override period

6.4 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.

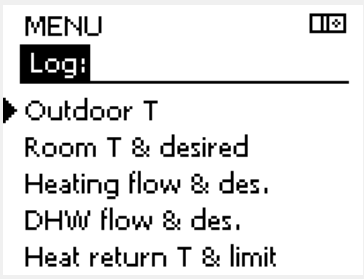
6.5 Log

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.

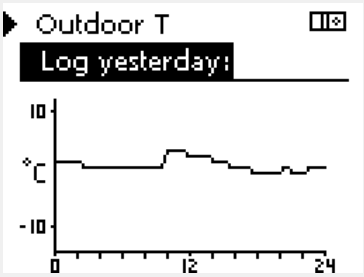
The log function (temperature history) allows you to monitor the logs of today, yesterday, the past 2 days as well as the past 4 days for the connected sensors.

There is a log display for the relevant sensor, showing the measured temperature.

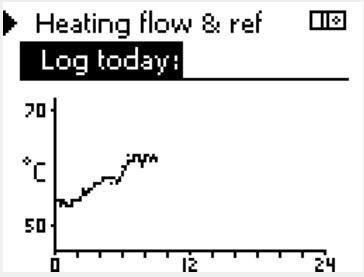
The log function is only available in the 'Common controller settings'.



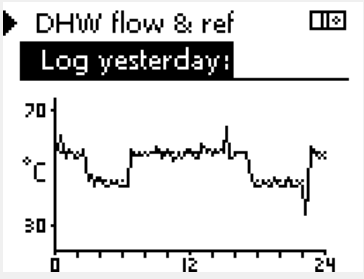
Example 1:
1 day log for yesterday showing the development in outdoor temperature during the past 24 hours.



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.



6.6 Output override

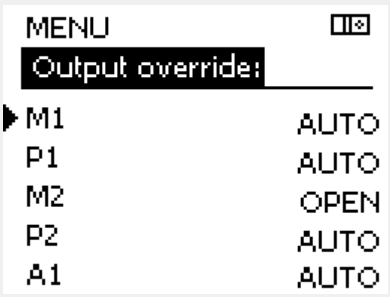
This section describes the function in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application.

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: Motorized control valve: AUTO, STOP, CLOSE, OPEN Pump: AUTO, OFF, ON	
	Confirm status change	

Remember to change the status back again as soon as an override is not required any longer.

Controlled components *Circuit selector*



"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.

When output override of a controlled component is active the symbol '**!**' is shown to the right of the mode indicator in the enduser displays.

A390.2, A390.3, A390.11, A390.12 and A390.13:

The motorized control valves M1, M2 and M3 are controlled by 0 – 10 volt (0–100%) signals. Each of M1, M2 and M3 can be set to AUTO or ON.

AUTO: Normal control (0–100%)

ON: The 0–10 volt signal is set to the %-value, set below the indication 'ON'.

6.7 Key functions

New application	**Erase application:** 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:** System settings are, among others, communication set-up, display brightness etc.
	User settings: User settings are, among others, desired room temperature, desired DHW temperature, schedules, heat curve, limitation values etc.
	Go to factory: Restores the factory settings.
Copy	**To:** Copy direction
	System settings
	User settings
	Start copying
Key overview	Gives an overview over the inserted ECL key. (Example: A266 Ver. 2.30). 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.

6.8 System

6.8.1 ECL version

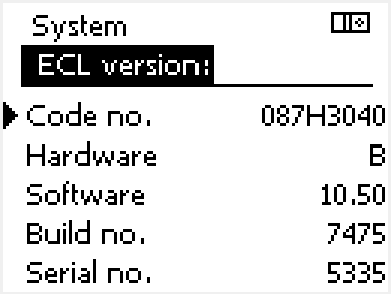
In 'ECL version' you will always be able to find an overview of the data related to your electronic controller.

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



6.8.2 Extension

ECL Comfort 310 / 310B:
'Extension' will offer you information about additional modules, if any. An example could be the ECA 32 module.

6.8.3 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.

6.8.4 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*

6.8.5 M-bus config

ECL Comfort 296 / 310 / 310B have an M-bus communication interface that allows energy meters to be connected as slaves.

M-bus related parameters are set here.

6.8.6 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 **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 **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 **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 **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. *The shown information depends on the settings made in the "M-bus config." menu.*		

6.8.7 Energy Meters

The ECL Comfort 296 / 310 / 310B allow communication with up to 5 energy meters via M-bus. In 'Energy Meters' data can be read the from M-bus connected energy meters

6.8.8 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 " - - - ".

6.8.9 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

6.8.10 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.

6.8.11 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.

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).

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.

Service Pin		**2150**
Circuit	*Setting range*	*Factory setting*
	0 / 1	0
This setting is only used in connection with set-up of Modbus communication. **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.

6.8.12 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.

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

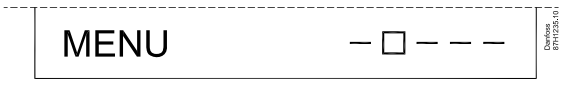
ECA settings: Offset adjustment of the measured room temperature.

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. *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: • Room T offset • RH offset (ECA 31) • Backlight • Contrast • Use as remote • Slave addr. • Connection addr. • Override addr. • Override circuit • Override mode • 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.

Update* of firmware for ECA 30 / 31. The connection address might have changed to 14.

1. Go to ECA MENU
2. Select "ECA factory", choose "ECA default"
3. Select "ECA factory", choose "Update firmware". Update might take up to 12 minutes.

*) ECA 30 / 31 and ECL Comfort controller must be minimum version 1.39. Application key must be inserted in the ECL Comfort controller.

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.

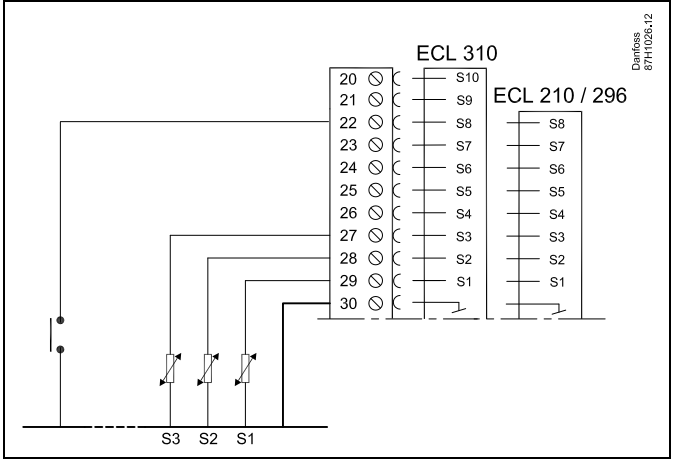
Different override modes can be selected, depending on application key type.

Override modes: Comfort, Saving, Constant temperature and Frost protection.

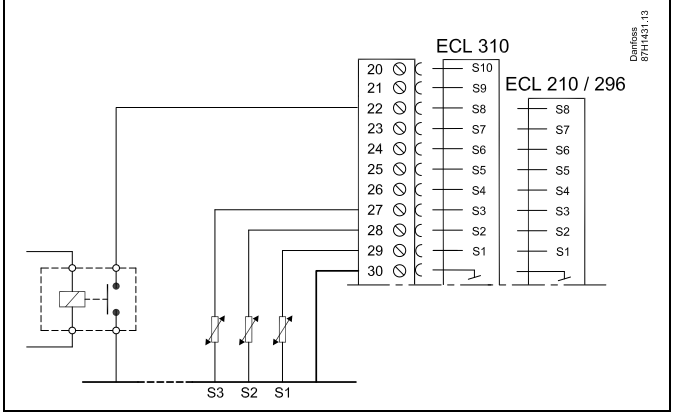
"Comfort" is also called normal heating temperature.
"Saving" can be reduced heating or heating stopped.
"Constant temperature" is a desired flow temperature, set in the menu "Flow temperature".
"Frost protection" stops the heating totally.

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:

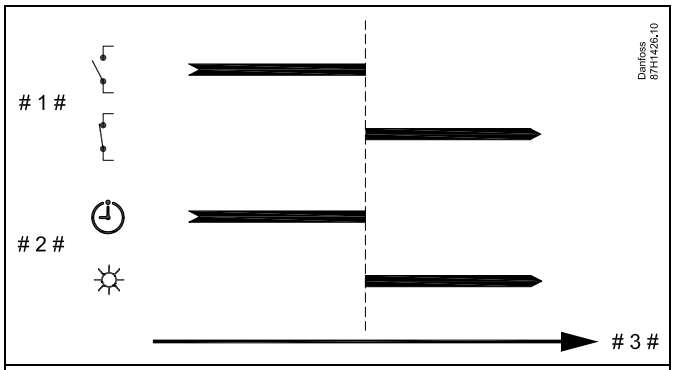
   Select all weekdays

   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

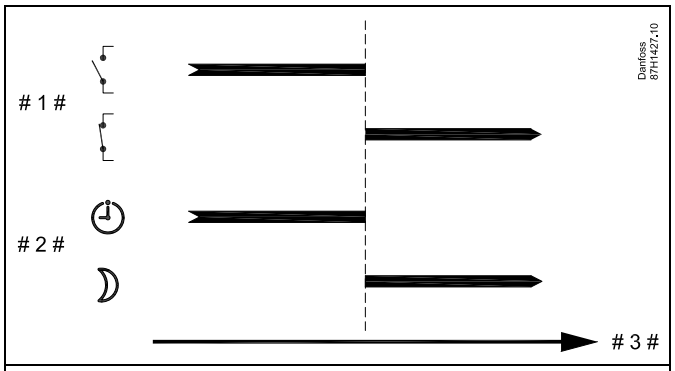
   Set "Start1" to 00.00

   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:

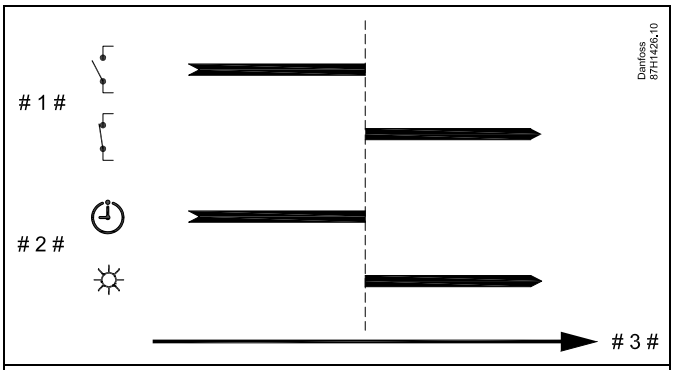
1. Select circuit > MENU > Settings > Application > Ext. input:

   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:

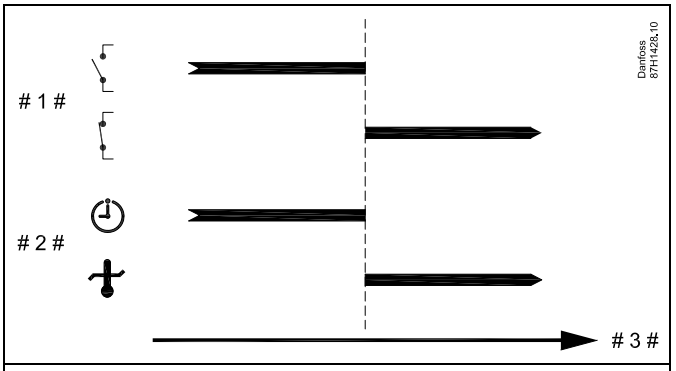
   Select CONST. T
3. Select circuit > MENU > Settings > Flow temperature >

   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

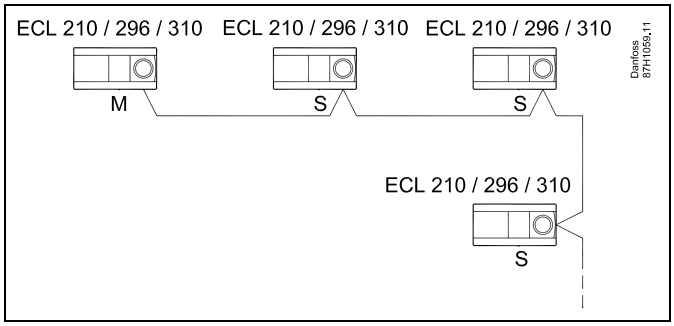
7.3 Several controllers in the same system

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.

MASTER controller:

- In the master circuit (typically circuit 1) go to:

  Settings > Application > Demand offset

Demand offset		**1x017**
Circuit	Setting range	**Choose**
Master	*	**

* heating applications: OFF / 1 . . . 20 K

* cooling applications: - 20 . . . -1 K / OFF

****** (Heating applications): Change OFF to a value, for example 6 K, which will increase the highest demand (desired flow temperature) from the slaves with 6 degrees.

** (Cooling applications): Change OFF to a value, for example -4 K, which will decrease the lowest demand (desired flow temperature) from the slaves with 4 degrees.

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.

Language

At application upload, a language must be selected.*
If another language than English is selected, the selected language **AND** English will be uploaded into the ECL controller.
This makes service easy for English speaking service people, just because the English language menus can be visible by changing the actual set language into English.
(Navigation: MENU > Common controller > System > Language)

If the uploaded language is not suitable, the application must be erased. User and System settings can be saved on the application key before erasing.
After new upload with preferred language, the existing User and System settings can be uploaded.

*)
(ECL Comfort 310, 24 Volt) If language cannot be selected, the power supply is not a.c. (alternating current).

How to set a correct heat curve?

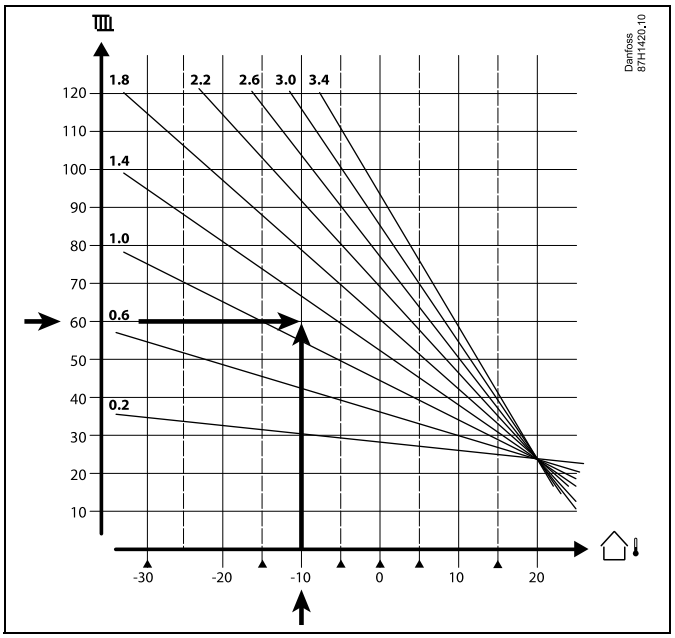
Short answer:
Set the heat curve to the lowest possible value, but still having comfortable room temperature.

The table shows some recommendations:

House with radiators:	Needed flow temp. when the outdoor temp. is -10 °C:	Recommen-ded heat curve value:
Older than 20 years:	65 °C	1.4
Between 10 and 20 years old:	60 °C	1.2
Rather new:	50 °C	0.8
Floor heating systems need, in general, a lower heat curve value		

Technical answer:
In order to save energy, the flow temperature should be as low as possible, but still considering a comfortable room temperature. This means the heat curve slope should have a low value.

See the heat curve slope diagram.



Choose the desired flow temperature (vertical axis) for your heating system at the expected lowest outdoor temperature (horizontal axis) for your area. Pick the heat curve closest to the common point of these two values.

Example: Desired flow temperature: 60 (°C) at outdoor temperature: -10 (°C)
Result: Heat curve slope value = 1.2 (mid-way between 1.4 and 1.0).

In general:

- Smaller radiators in your heating system might require a higher heat curve slope. (Example: Desired flow temperature 70 °C resulting in heat curve = 1.5).
- Floor heating systems require a lower heat curve slope. (Example: Desired flow temperature 35 °C resulting in heat curve = 0.4).
- Corrections of the heat curve slope should be done in small steps when having outdoor temperatures below 0 °C; one step pr. day.
- If required, adjust the heat curve in the six coordinate points.
- Setting of the desired **room** temperature has an influence on the desired flow temperature even if a room temperature sensor / Remote Control Unit is not connected. An example: Increasing the desired **room** temperature results in a higher flow temperature.
- Typically, the desired **room** temperature should be adjusted when having outdoor temperatures above 0 °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 Automatic / manual update of firmware

Info:

- Firmware and application software are on the application key
- ECL Comfort has firmware implemented
- Firmware with Encryption has version 2.00 and up

Situation 1:

ECL Comfort controller, new (= no application installed), from before 10th of July 2018, to be installed:

1. Insert application key.
2. If the firmware on application key is newer than the firmware in the ECL, an update will be done automatically.
3. Hereafter the application can be uploaded.
4. If the firmware in the ECL is newer than the firmware on application key, the application can be uploaded.

Situation 2:

ECL Comfort controller is installed and runs an application.

1. Store all settings on the existing application key *.
2. Erase actual application in the ECL **.
3. Insert an application key with new firmware. The firmware update will be done automatically.
4. When ECL requires language selection, then remove application key.
5. Insert "old" application key.
6. Select language, select application subtype and see an "i" in upper right corner.
7. Set time / date if needed.
8. Choose "Next".
9. In Copy menu, choose YES at System and User settings; then choose "Next".
10. "Old" application is uploaded, ECL restarts and is ready again.

* Navigation: MENU > Common controller settings > Key functions > Copy > "To KEY", System settings = YES, User settings = YES, Start copying: Push dial.
Within 1 sec the settings are stored on the application key.

** Navigation: MENU > Common controller settings > Key functions > New application > Erase application: Push dial.

NOTE: You might come in a situation where the update will not elapse. This is typically when one or two ECA 30 are connected.

Remedy: Disconnect (remove from its base) the ECA 30. If ECL 310B, then only one ECA 30 should be connected.

7.8 Parameter ID overview

A390.x — **x** refers to the subtypes listed in the column.

ID	Parameter Name	A390.x	Setting range	Factory	Unit	Own settings	
11004	Desired T	1, 2, 11, 12, 13	5 ... 150	50	°C		61
11010	ECA addr.	1, 2, 3, 11, 12, 13	OFF ; A ; B	OFF			93
11011	Auto saving	1, 2, 11, 12, 13	OFF, -29 ... 10	-15	°C		82
11012	Boost	1, 2, 11, 12, 13	OFF, 1 ... 99	OFF	%		83
11013	Ramp	1, 2, 11, 12, 13	OFF, 1 ... 99	OFF	Min		84
11014	Optimizer	1, 2, 11, 12, 13	OFF, 10 ... 59	OFF			84
11015	Adapt. time	1, 2, 3, 11, 12, 13	OFF, 1 ... 50	OFF	Sec		64
11017	Demand offset	1, 2, 11, 12	OFF, 1 ... 20	OFF	K		93
	-||-	3	-20 ... -1, OFF	OFF	K		
11018	Des. T comfort	3	-30.0 ... 60.0	7.5	°C		62
11019	Des. T saving	3	-30.0 ... 60.0	25.0	°C		62
11020	Based on	1, 2, 11, 12, 13	OUT ; ROOM	OUT			85
11021	Total stop	1, 2, 11, 12, 13	OFF ; ON	OFF			85
11022	P exercise	1, 2, 3, 11, 12, 13	OFF ; ON	ON			95
11023	M exercise	1, 2, 3, 11, 12, 13	OFF ; ON	OFF			95
11024	Actuator	1, 3, 11, 12, 13	ABV ; GEAR	GEAR			90
11026	Pre-stop	1, 2, 11, 12, 13	OFF ; ON	ON			86
11028	Con. T, ret. T lim.	1, 2, 11, 12, 13	10 ... 110	70	°C		69
11029	DHW, ret. T limit	1, 2, 12	OFF, 10 ... 110	OFF	°C		70
11030	Limit	3	-20 ... 80	20	°C		70
11031	High T out X1	1, 2, 11, 12, 13	-60 ... 20	15	°C		71
11032	Low limit Y1	1, 2, 11, 12, 13	10 ... 150	50	°C		71
11033	Low T out X2	1, 2, 11, 12, 13	-60 ... 20	-15	°C		71
11034	High limit Y2	1, 2, 11, 12, 13	10 ... 150	60	°C		71
11035	Infl. - max.	1, 2, 11, 12, 13	-9.9 ... 9.9	-2.0			71
	-||-	3	-9.9 ... 9.9	0.0			
11036	Infl. - min.	1, 2, 11, 12, 13	-9.9 ... 9.9	0.0			72
	-||-	3	-9.9 ... 9.9	2.0			
11037	Adapt. time	1, 2, 11, 12, 13	OFF, 1 ... 50	25	Sec		73
	-||-	3	OFF, 1 ... 50	OFF	Sec		
11040	P post-run	1, 2, 3, 11, 12, 13	0 ... 99	3	Min		95
11043	Parallel operation	11	OFF, 1 ... 99, ON	OFF	K		86
11050	P demand	1, 2, 3, 11, 12	OFF ; ON	OFF			96
11052	DHW priority	1, 2, 11, 12, 13	OFF ; ON	OFF			97
11060	Limit	3	-20 ... 80	5	°C		74
11061	Adapt. time	3	OFF, 1 ... 50	OFF	Sec		74
11062	Infl. - max.	3	-9.9 ... 9.9	0.0			74
11063	Infl. - min.	3	-9.9 ... 9.9	0.0			75

ID	Parameter Name	A390.x	Setting range	Factory	Unit	Own settings	
11064	Limit	3	-20 ... 80	25	°C		76
11065	Adapt. time	3	OFF, 1 ... 50	OFF	Sec		76
11066	Infl. - max.	3	-9.9 ... 9.9	0.0			76
11067	Infl. - min.	3	-9.9 ... 9.9	0.0			76
11070	P cool T	3	5 ... 60	25	°C		99
11077	P frost T	1, 2, 11, 12, 13	OFF, -10 ... 20	2	°C		99
11078	P heat T	1, 2, 11, 12, 13	5 ... 40	20	°C		99
11085	Priority	1, 2, 11, 12, 13	OFF ; ON	OFF			73
11092	Standby T	3	5 ... 40	30	°C		100
11093	Frost pr. T	1, 2, 11, 12, 13	5 ... 40	10	°C		100
11109	Input type	1, 2, 11, 12, 13	EM1 ; EM2 ; EM3 ; EM4 ; EM5 ; OFF	OFF			79
	-||-	3	OFF ; IM1 ; IM2 ; IM3 ; IM4 ; EM1 ; EM2 ; EM3 ; EM4 ; EM5	OFF			
11111	Limit	3	0.0 ... 999.9	999.9			79
11112	Adapt. time	1, 2, 3, 11, 12, 13	OFF, 1 ... 50	OFF	Sec		80
11113	Filter constant	1, 2, 3, 11, 12, 13	1 ... 50	10			80
11114	Pulse	3	OFF, 1 ... 9999	OFF			
11115	Units	1, 2, 3, 11, 12, 13	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			80
11116	High limit Y2	1, 2, 11, 12, 13	0.0 ... 999.9	999.9			80
11117	Low limit Y1	1, 2, 11, 12, 13	0.0 ... 999.9	999.9			81
11118	Low T out X2	1, 2, 11, 12, 13	-60 ... 20	-15	°C		81
11119	High T out X1	1, 2, 11, 12, 13	-60 ... 20	15	°C		81
11141	Ext. input	1, 2, 3, 11, 12, 13	OFF ; S1 ; S2 ; S3 ; S4 ; S5 ; S6 ; S7 ; S8 ; S9 ; S10 ; S11 ; S12 ; S13 ; S14 ; S15 ; S16	OFF			100
11142	Ext. mode	1, 2, 11, 12, 13	COMFORT ; SAVING ; FROST PR. ; CONST. T	COMFORT			101
	-||-	3	COMFORT ; SAVING	COMFORT			
11147	Upper difference	1, 2, 11, 12, 13	OFF, 1 ... 30	OFF	K		116
11148	Lower difference	1, 2, 11, 12, 13	OFF, 1 ... 30	OFF	K		116
11149	Delay	1, 2, 11, 12, 13	1 ... 99	10	Min		117
11150	Lowest temp.	1, 2, 11, 12, 13	10 ... 50	30	°C		117
11174	Motor pr.	1, 2, 3, 11, 12, 13	OFF, 10 ... 59	OFF	Min		90
11177	Temp. min.	1, 2, 11, 12, 13	10 ... 150	10	°C		
	-||-	3	-30 ... 50	0	°C		
11178	Temp. max.	1, 2, 11, 12, 13	10 ... 150	90	°C		
	-||-	3	-30 ... 70	30	°C		
11179	Summer, cut-out	1, 2, 11, 12, 13	OFF, 1 ... 50	20	°C		

ID	Parameter Name	A390.x	Setting range	Factory	Unit	Own settings	
11182	Infl. - max.	1, 2, 11, 12, 13	-9.9 ... 0.0	-4.0			65
	-||-	3	-9.9 ... 0.0	0.0			
11183	Infl. - min.	1, 2, 11, 12, 13	0.0 ... 9.9	0.0			65
	-||-	3	0.0 ... 9.9	4.0			
11184	Xp	1, 11, 12, 13	5 ... 250	120	K		91
	-||-	2, 3	5 ... 250	80	K		
11185	Tn	1, 11, 12, 13	1 ... 999	50	Sec		91
	-||-	2, 3	1 ... 999	30	Sec		
11186	M run	1, 11, 12, 13	5 ... 250	60	Sec		91
	-||-	3	5 ... 250	35	Sec		
11187	Nz	1, 2, 11, 12, 13	1 ... 9	3	K		91
	-||-	3	1 ... 9	2	K		
11189	Min. act. time	1, 3, 11, 12, 13	2 ... 50	10			92
11392	Sum. start, month	1, 2, 11, 12, 13	1 ... 12	5			106
11393	Sum. start, day	1, 2, 11, 12, 13	1 ... 31	20			106
11395	Summer, filter	1, 2, 11, 12, 13	OFF, 1 ... 300	250			106
11396	Win. start, month	1, 2, 11, 12, 13	1 ... 12	5			106
11397	Winter start, day	1, 2, 11, 12, 13	1 ... 31	20			106
11398	Winter, cut-out	1, 2, 11, 12, 13	OFF, 1 ... 50	20	°C		106
11399	Winter, filter	1, 2, 11, 12, 13	OFF, 1 ... 300	250			106
11500	Send desired T	1, 2, 3, 11, 12, 13	OFF ; ON	ON			103
12004	Desired T	1, 2, 11, 12, 13	5 ... 150	50	°C		61
12010	ECA addr.	1, 2, 3, 11, 12	OFF ; A ; B	OFF			93
	-||-	13	OFF ; A ; B	A			
12011	Auto saving	1, 2, 11, 12, 13	OFF, -29 ... 10	-15	°C		82
12012	Boost	1, 2, 11, 12, 13	OFF, 1 ... 99	OFF	%		83
12013	Ramp	1, 2, 11, 12, 13	OFF, 1 ... 99	OFF	Min		84
12014	Optimizer	1, 2, 11, 12, 13	OFF, 10 ... 59	OFF			84
12015	Adapt. time	1, 2, 3, 11, 12, 13	OFF, 1 ... 50	OFF	Sec		64
12018	Des. T comfort	3	-30.0 ... 60.0	7.5	°C		62
12019	Des. T saving	3	-30.0 ... 60.0	25.0	°C		62
12020	Based on	1, 2, 11, 12, 13	OUT ; ROOM	OUT			85
12021	Total stop	1, 2, 11, 12, 13	OFF ; ON	OFF			85
12022	P exercise	1, 2, 3, 11, 12, 13	OFF ; ON	ON			95
12023	M exercise	1, 2, 3, 11, 12, 13	OFF ; ON	OFF			95
12024	Actuator	1, 3, 11, 12, 13	ABV ; GEAR	GEAR			90
12026	Pre-stop	1, 2, 11, 12, 13	OFF ; ON	ON			86
12028	Con. T, ret. T lim.	1, 2, 11, 12, 13	10 ... 110	70	°C		69
12030	Limit	3	-20 ... 80	20	°C		70
12031	High T out X1	1, 2, 11, 12, 13	-60 ... 20	15	°C		71
12032	Low limit Y1	1, 2, 11, 12, 13	10 ... 150	50	°C		71

ID	Parameter Name	A390.x	Setting range	Factory	Unit	Own settings	
12033	Low T out X2	1, 2, 11, 12, 13	-60 ... 20	-15	°C		71
12034	High limit Y2	1, 2, 11, 12, 13	10 ... 150	60	°C		71
12035	Infl. - max.	1, 2, 11, 12, 13	-9.9 ... 9.9	-2.0			71
	-||-	3	-9.9 ... 9.9	0.0			
12036	Infl. - min.	1, 2, 11, 12, 13	-9.9 ... 9.9	0.0			72
	-||-	3	-9.9 ... 9.9	2.0			
12037	Adapt. time	1, 2, 11, 12, 13	OFF, 1 ... 50	25	Sec		73
	-||-	3	OFF, 1 ... 50	OFF	Sec		
12040	P post-run	1, 2, 3, 11, 12, 13	0 ... 99	3	Min		95
12052	DHW priority	1, 2, 11, 12, 13	OFF ; ON	OFF			97
12060	Limit	3	-20 ... 80	5	°C		74
12061	Adapt. time	3	OFF, 1 ... 50	OFF	Sec		74
12062	Infl. - max.	3	-9.9 ... 9.9	0.0			74
12063	Infl. - min.	3	-9.9 ... 9.9	0.0			75
12064	Limit	3	-20 ... 80	25	°C		76
12065	Adapt. time	3	OFF, 1 ... 50	OFF	Sec		76
12066	Infl. - max.	3	-9.9 ... 9.9	0.0			76
12067	Infl. - min.	3	-9.9 ... 9.9	0.0			76
12070	P cool T	3	5 ... 60	25	°C		99
12077	P frost T	1, 2, 11, 12, 13	OFF, -10 ... 20	2	°C		99
12078	P heat T	1, 2, 11, 12, 13	5 ... 40	20	°C		99
12085	Priority	1, 2, 11, 12, 13	OFF ; ON	OFF			73
12092	Standby T	3	5 ... 40	30	°C		100
12093	Frost pr. T	1, 2, 11, 12, 13	5 ... 40	10	°C		100
12109	Input type	1, 2, 11, 12, 13	EM1 ; EM2 ; EM3 ; EM4 ; EM5 ; OFF	OFF			79
	-||-	3	OFF ; IM1 ; IM2 ; IM3 ; IM4 ; EM1 ; EM2 ; EM3 ; EM4 ; EM5	OFF			
12111	Limit	3	0.0 ... 999.9	999.9			79
12112	Adapt. time	1, 2, 3, 11, 12, 13	OFF, 1 ... 50	OFF	Sec		80
12113	Filter constant	1, 2, 3, 11, 12, 13	1 ... 50	10			80
12114	Pulse	3	OFF, 1 ... 9999	OFF			
12115	Units	1, 2, 3, 11, 12, 13	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			80
12116	High limit Y2	1, 2, 11, 12, 13	0.0 ... 999.9	999.9			80
12117	Low limit Y1	1, 2, 11, 12, 13	0.0 ... 999.9	999.9			81
12118	Low T out X2	1, 2, 11, 12, 13	-60 ... 20	-15	°C		81
12119	High T out X1	1, 2, 11, 12, 13	-60 ... 20	15	°C		81

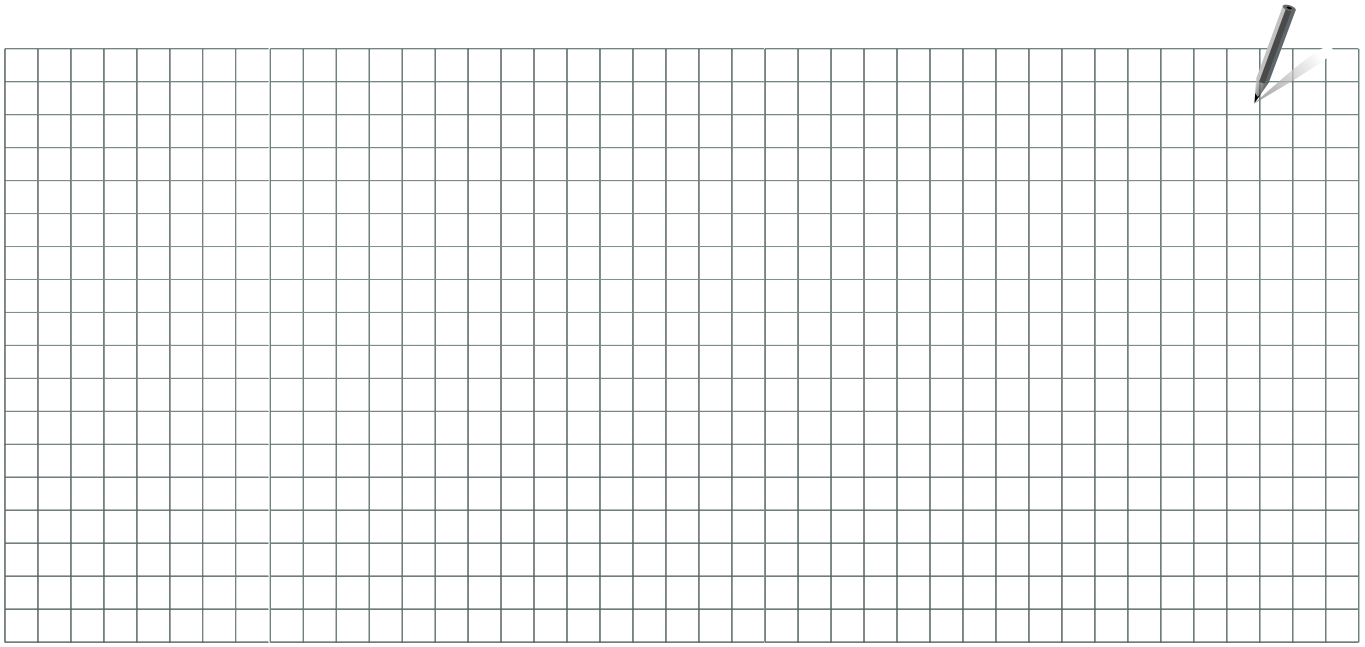
ID	Parameter Name	A390.x	Setting range	Factory	Unit	Own settings	
12141	Ext. input	1, 2, 3, 11, 12, 13	OFF ; S1 ; S2 ; S3 ; S4 ; S5 ; S6 ; S7 ; S8 ; S9 ; S10 ; S11 ; S12 ; S13 ; S14 ; S15 ; S16	OFF			100
12142	Ext. mode	1, 2, 11, 12, 13	COMFORT ; SAVING ; FROST PR. ; CONST. T	COMFORT			101
	-||-	3	COMFORT ; SAVING	COMFORT			
12147	Upper difference	1, 2, 11, 12, 13	OFF, 1 ... 30	OFF	K		116
12148	Lower difference	1, 2, 11, 12, 13	OFF, 1 ... 30	OFF	K		116
12149	Delay	1, 2, 11, 12, 13	1 ... 99	10	Min		117
12150	Lowest temp.	1, 2, 11, 12, 13	10 ... 50	30	°C		117
12174	Motor pr.	1, 2, 3, 11, 12, 13	OFF, 10 ... 59	OFF	Min		90
12177	Temp. min.	1, 2, 11, 12, 13	10 ... 150	10	°C		
	-||-	3	-30 ... 50	0	°C		
12178	Temp. max.	1, 2, 11, 12, 13	10 ... 150	90	°C		
	-||-	3	-30 ... 70	30	°C		
12179	Summer, cut-out	1, 2, 11, 12, 13	OFF, 1 ... 50	20	°C		
12182	Infl. - max.	1, 2, 11, 12, 13	-9.9 ... 0.0	-4.0			65
	-||-	3	-9.9 ... 0.0	0.0			
12183	Infl. - min.	1, 2, 11, 12, 13	0.0 ... 9.9	0.0			65
	-||-	3	0.0 ... 9.9	4.0			
12184	Xp	1, 11, 12, 13	5 ... 250	120	K		91
	-||-	2, 3	5 ... 250	80	K		
12185	Tn	1, 11, 12, 13	1 ... 999	50	Sec		91
	-||-	2, 3	1 ... 999	30	Sec		
12186	M run	1, 11, 12, 13	5 ... 250	60	Sec		91
	-||-	3	5 ... 250	35	Sec		
12187	Nz	1, 2, 11, 12, 13	1 ... 9	3	K		91
	-||-	3	1 ... 9	2	K		
12189	Min. act. time	1, 3, 11, 12, 13	2 ... 50	10			92
12395	Summer, filter	1, 2, 11, 12, 13	OFF, 1 ... 300	250			106
12398	Winter, cut-out	1, 2, 11, 12, 13	OFF, 1 ... 50	20	°C		106
12399	Winter, filter	1, 2, 11, 12, 13	OFF, 1 ... 300	250			106
12500	Send desired T	1, 2, 3, 11, 12, 13	OFF ; ON	ON			103
13004	Desired T	1, 2, 11	5 ... 150	50	°C		61
13010	ECA addr.	1, 2, 3, 11	OFF ; A ; B	OFF			93
13011	Auto saving	1, 2, 11	OFF, -29 ... 10	-15	°C		82
13012	Boost	1, 2, 11	OFF, 1 ... 99	OFF	%		83
13013	Ramp	1, 2, 11	OFF, 1 ... 99	OFF	Min		84
13014	Optimizer	1, 2, 11	OFF, 10 ... 59	OFF			84
13015	Adapt. time	1, 2, 3, 11	OFF, 1 ... 50	OFF	Sec		64
13017	Demand offset	13	OFF, 1 ... 20	5	K		93
13018	Des. T comfort	3	-30.0 ... 60.0	7.5	°C		62

ID	Parameter Name	A390.x	Setting range	Factory	Unit	Own settings	
13019	Des. T saving	3	-30.0 ... 60.0	25.0	°C		62
13020	Based on	1, 2, 11	OUT ; ROOM	OUT			85
13021	Total stop	1, 2, 11	OFF ; ON	OFF			85
13022	P exercise	1, 2, 3, 11	OFF ; ON	ON			95
13023	M exercise	1, 2, 3, 11	OFF ; ON	OFF			95
13024	Actuator	1, 3, 11	ABV ; GEAR	GEAR			90
13026	Pre-stop	1, 2, 11	OFF ; ON	ON			86
13028	Con. T, ret. T lim.	1, 2, 11	10 ... 110	70	°C		69
13030	Limit	3	-20 ... 80	20	°C		70
	-||-	12, 13	10 ... 110	60	°C		
13031	High T out X1	1, 2, 11	-60 ... 20	15	°C		71
13032	Low limit Y1	1, 2, 11	10 ... 150	50	°C		71
13033	Low T out X2	1, 2, 11	-60 ... 20	-15	°C		71
13034	High limit Y2	1, 2, 11	10 ... 150	60	°C		71
13035	Infl. - max.	1, 2, 11, 12, 13	-9.9 ... 9.9	-2.0			71
	-||-	3	-9.9 ... 9.9	0.0			
13036	Infl. - min.	1, 2, 11, 12, 13	-9.9 ... 9.9	0.0			72
	-||-	3	-9.9 ... 9.9	2.0			
13037	Adapt. time	1, 2, 11, 12, 13	OFF, 1 ... 50	25	Sec		73
	-||-	3	OFF, 1 ... 50	OFF	Sec		
13040	P post-run	1, 2, 3, 11	0 ... 99	3	Min		95
13041	DHW P post-run	12, 13	0 ... 30	0	Min		95
13042	Char. P post-run	12	0 ... 30	1	Min		96
	-||-	13	0 ... 30	0	Min		
13044	Max. DHW time	13	OFF, 1 ... 100	OFF	Min		96
13045	DHW deact. time	13	1 ... 250	60	Min		96
13050	P demand	13	5 ... 40	20	°C		96
13052	DHW priority	1, 2, 11	OFF ; ON	OFF			97
13054	Cont. T control	12, 13	OFF ; ON	OFF			98
13055	Circ. P priority	12, 13	OFF ; ON	OFF			98
13059	P charge delay	12	OFF, 0 ... 30	9	Min		98
	-||-	13	OFF, 0 ... 30	0	Min		
13060	Limit	3	-20 ... 80	5	°C		74
13061	Adapt. time	3	OFF, 1 ... 50	OFF	Sec		74
13062	Infl. - max.	3	-9.9 ... 9.9	0.0			74
13063	Infl. - min.	3	-9.9 ... 9.9	0.0			75
13064	Limit	3	-20 ... 80	25	°C		76
13065	Adapt. time	3	OFF, 1 ... 50	OFF	Sec		76
13066	Infl. - max.	3	-9.9 ... 9.9	0.0			76
13067	Infl. - min.	3	-9.9 ... 9.9	0.0			76
13068	Flow T adapt time	12	OFF, 1 ... 50	20	Sec		108

ID	Parameter Name	A390.x	Setting range	Factory	Unit	Own settings	
13070	P cool T	3	5 ... 60	25	°C		99
13076	Circ. P frost T	12, 13	OFF, -10 ... 20	OFF	°C		99
13077	P frost T	1, 2, 11	OFF, -10 ... 20	2	°C		99
13078	P heat T	1, 2, 11	5 ... 40	20	°C		99
13085	Priority	1, 2, 11	OFF ; ON	OFF			73
13092	Standby T	3	0 ... 40	30	°C		100
13093	Frost pr. T	1, 2, 11, 12, 13	5 ... 40	10	°C		100
13109	Input type	1, 2, 11, 12, 13	EM1 ; EM2 ; EM3 ; EM4 ; EM5 ; OFF	OFF			79
	-||-	3	OFF ; IM1 ; IM2 ; IM3 ; IM4 ; EM1 ; EM2 ; EM3 ; EM4 ; EM5	OFF			
13111	Limit	3, 12, 13	0.0 ... 999.9	999.9			79
13112	Adapt. time	1, 2, 3, 11, 12, 13	OFF, 1 ... 50	OFF	Sec		80
13113	Filter constant	1, 2, 3, 11, 12, 13	1 ... 50	10			80
13114	Pulse	3	OFF, 1 ... 9999	OFF			
13115	Units	1, 2, 3, 11, 12, 13	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			80
13116	High limit Y2	1, 2, 11	0.0 ... 999.9	999.9			80
13117	Low limit Y1	1, 2, 11	0.0 ... 999.9	999.9			81
13118	Low T out X2	1, 2, 11	-60 ... 20	-15	°C		81
13119	High T out X1	1, 2, 11	-60 ... 20	15	°C		81
13122	Day:	12, 13	0 ... 127	0			
13123	Start time	12, 13	0 ... 47	0			
13124	Duration	12, 13	10 ... 600	120	Min		
13125	Desired T	12, 13	OFF, 10 ... 110	OFF	°C		
13141	Ext. input	1, 2, 3, 11, 12, 13	OFF ; S1 ; S2 ; S3 ; S4 ; S5 ; S6 ; S7 ; S8 ; S9 ; S10 ; S11 ; S12 ; S13 ; S14 ; S15 ; S16	OFF			100
13142	Ext. mode	1, 2, 11	COMFORT ; SAVING ; FROST PR. ; CONST. T	COMFORT			101
	-||-	3	COMFORT ; SAVING	COMFORT			
	-||-	12, 13	COMFORT ; SAVING ; FROST PR.	COMFORT			
13147	Upper difference	1, 2, 11, 12, 13	OFF, 1 ... 30	OFF	K		116
13148	Lower difference	1, 2, 11, 12, 13	OFF, 1 ... 30	OFF	K		116
13149	Delay	1, 2, 11, 12, 13	1 ... 99	10	Min		117
13150	Lowest temp.	1, 2, 11, 12, 13	10 ... 50	30	°C		117
13152	Max. charge T	12	10 ... 110	80	°C		108
13174	Motor pr.	1, 2, 3, 11, 12, 13	OFF, 10 ... 59	OFF	Min		90
13177	Temp. min.	1, 2, 11, 13	10 ... 150	10	°C		
	-||-	3	-30 ... 50	0	°C		

ID	Parameter Name	A390.x	Setting range	Factory	Unit	Own settings	
13178	Temp. max.	1, 2, 11, 13	10 ... 150	90	°C		
	-||-	3	-30 ... 70	30	°C		
13179	Summer, cut-out	1, 2, 11	OFF, 1 ... 50	20	°C		
13182	Infl. - max.	1, 2, 11	-9.9 ... 0.0	-4.0			65
	-||-	3	-9.9 ... 0.0	0.0			
13183	Infl. - min.	1, 2, 11	0.0 ... 9.9	0.0			65
	-||-	3	0.0 ... 9.9	4.0			
13184	Xp	1, 11, 12, 13	5 ... 250	120	K		91
	-||-	2, 3	5 ... 250	80	K		
13185	Tn	1, 11, 12, 13	1 ... 999	50	Sec		91
	-||-	2, 3	1 ... 999	30	Sec		
13186	M run	1, 11, 12, 13	5 ... 250	60	Sec		91
	-||-	3	5 ... 250	35	Sec		
13187	Nz	1, 2, 11, 12, 13	1 ... 9	3	K		91
	-||-	3	1 ... 9	2	K		
13189	Min. act. time	1, 3, 11	2 ... 50	10			92
	-||-	12, 13	2 ... 50	3			
13193	Charge difference	12, 13	1 ... 50	15	K		109
13194	Stop difference	12, 13	-50 ... 50	3	K		109
13195	Start difference	12, 13	-50 ... -1	-3	K		111
13395	Summer, filter	1, 2, 11	OFF, 1 ... 300	250			106
13398	Winter, cut-out	1, 2, 11	OFF, 1 ... 50	20	°C		106
13399	Winter, filter	1, 2, 11	OFF, 1 ... 300	250			106
13500	Send desired T	1, 2, 3, 11, 12	OFF ; ON	ON			103
	-||-	13	OFF ; ON	OFF			
14030	Limit	11	OFF, 11 ... 110	60	°C		70
14041	DHW P post-run	11	0 ... 30	0	Min		95
14042	Char. P post-run	11	0 ... 30	1	Min		96
14044	Max. DHW time	11	OFF, 1 ... 100	OFF	Min		96
14045	DHW deact. time	11	1 ... 250	60	Min		96
14051	Ch.-o. valve / P	11	OFF ; ON	ON			97
14053	Tank, sec. / prim.	11	OFF ; ON	OFF			97
14055	Circ. P priority	11	OFF ; ON	OFF			98
14059	P charge delay	11	OFF, 0 ... 30	0	Min		98
14076	Circ. P frost T	11	OFF, -10 ... 20	OFF	°C		99
14093	Frost pr. T	11	5 ... 40	10	°C		100
14111	Limit	11	0.0 ... 999.9	999.9			79
14122	Day:	11	0 ... 127	0			
14123	Start time	11	0 ... 47	0			
14124	Duration	11	10 ... 600	120	Min		
14125	Desired T	11	OFF, 10 ... 110	OFF	°C		

ID	Parameter Name	A390.x	Setting range	Factory	Unit	Own settings	
14141	Ext. input	11	OFF ; S1 ; S2 ; S3 ; S4 ; S5 ; S6 ; S7 ; S8 ; S9 ; S10 ; S11 ; S12 ; S13 ; S14 ; S15 ; S16	OFF			100
14142	Ext. mode	11	COMFORT ; SAVING ; FROST PR.	COMFORT			101
14152	Max. charge T	11	10 ... 110	80	°C		108
14193	Charge difference	11	1 ... 50	15	K		109
14194	Stop difference	11	-50 ... 50	3	K		109
14195	Start difference	11	-50 ... -1	-3	K		111
14500	Send desired T	11	OFF ; ON	ON			103



Installer:

By:

Date:

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