ENGINEERING TOMORROW

Operating Guide

ECL Comfort 210/296/310, application A217/A317

1.0 Table of Contents

1.1 Important safety and product information

1.1.1 Important safety and product information

This Installation Guide is associated with ECL Application Key A217 (order code no. 087H3807).

The A217 Key contains two sets of applications: one set (A217.1 / A217.2 / A217.3) and another set (A317.1 / A317.2).

The functions can be realized in:
ECL Comfort 210 (A217) for simple solutions or
ECL Comfort 310 (A217 / A317) for advanced solutions, e.g. M-bus, Modbus and Ethernet (Internet) communication.

The applications A217 / A317 comply with ECL Comfort controllers 210 / 310 as of software version 1.11 (visible at start-up of the controller and in 'Common controller settings' in 'System').

Additional documentation for ECL Comfort 210 and 310, modules and accessories is available on *http://heating.danfoss.com/* or *http://store.danfoss.com/*.

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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.

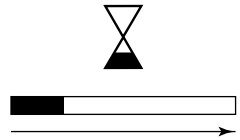
☝

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

☝

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

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

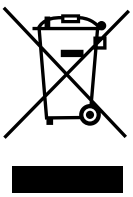
As this Operating Guide covers several system types, special system settings will be marked with a system type. All system types are shown in the chapter: 'Identifying your system type'.

°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 two applications, **A217.1 / A317.1** are almost identical. However, A317.1 has some extra functions which are described separately.

The applications A217.1 / A317.1 are very flexible. These are the basic principles:

Domestic Hot Water (DHW):

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 heating / charging temperature sensor S3 is the most important sensor.

If the measured DHW temperature (S6) gets lower than the desired DHW temperature, the DHW heating / charging pump (P1) is switched ON.

The motorized control valve (M1) is controlled in order to maintain the heating / charging temperature at S3. This temperature is typically 5–10 degrees higher than the desired DHW temperature. A max. value can be set.

DHW tank with 1 temperature sensor (S6):
If the measured DHW temperature (S6) gets higher than the desired DHW temperature, the DHW heating / charging pump (P1) is switched OFF. The post-run time can be set.

DHW tank with 2 temperature sensors (S6 and S8):
If the measured DHW temperature (S6) gets higher than the desired DHW temperature and the lower temperature (at S8) gets higher than the cut-out temperature, the DHW heating / charging pump (P1) is switched OFF. The post-run time can be set.

In charging applications 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 circulation temperature (at S3) is controlled according to the desired DHW temperature.

The return temperature (S5) to the district heating supply should not be too high. If so, the desired charging temperature can be adjusted (typically to a lower value), thus resulting in a gradual closing of the motorized control valve.

In boiler-based heating supply the return temperature should not be too low (same adjustment procedure as above).

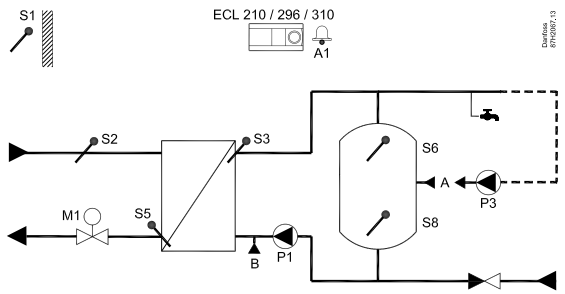
The supply temperature, S2, is used for adjusting the proportional band (Xp) in order to give a stable temperature control.

An anti-bacteria function is available for activation on selected days of the week.

The outdoor temperature sensor 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.

Typical A217.1. / A317.1 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:

S1	*Outdoor temperature sensor*
S2	*Supply temperature sensor*
S3	*Charging temperature sensor*
S5	*Return temperature sensor*
S6	*DHW tank temperature sensor, upper*
S8	*DHW tank temperature sensor, lower*
P1	*DHW charging pump (DHW heating pump)*
P3	*DHW circulation pump*
M1	*Motorized control valve*
A1	*Relay output, alarm*

Application A217.1 (used in ECL Comfort 210) / A317.1 (used in ECL Comfort 310) in general:

A Remote Control Unit, the ECA 30, can be connected in order to control the ECL controller remotely.

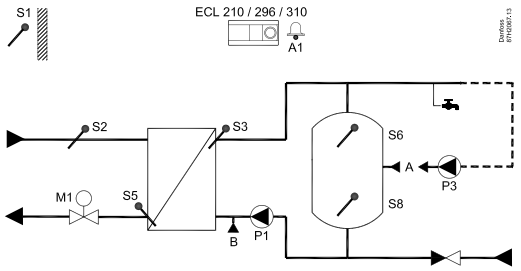
A connected flow or energy meter (in ECL Comfort 210 it is based on pulse signals and in ECL Comfort 310 based on M-bus signal) can limit the flow or energy to a set maximum.

Unused input can, by means of an override switch, be used to override the schedule to a fixed 'Comfort' or 'Saving' mode.

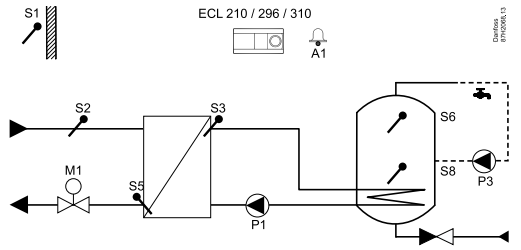
Modbus communication to a SCADA system can be established. In ECL Comfort 310 the M-bus data can furthermore be transferred to the Modbus communication.

Alarm relay (in ECL Comfort 210 it is R4 and in ECL Comfort 310 R6) can be activated if the actual flow temperature at S3 differs from the desired DHW charging temperature.

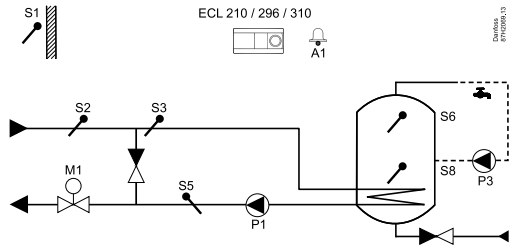
A217.1 / A317.1 example a:



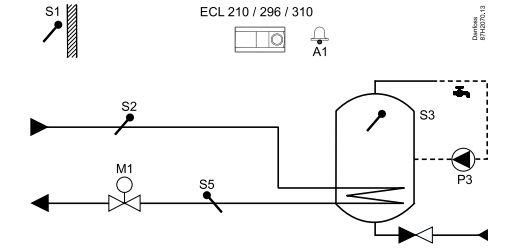
A217.1 / A317.1 example b:



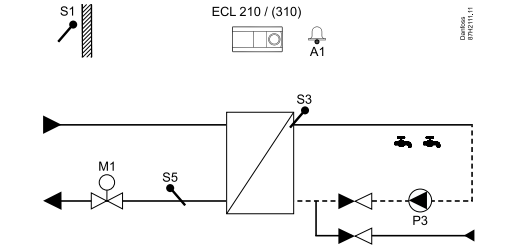
A217.1 / A317.1 example c:



A217.1 / A317.1 example d:



A217.1 / A317.1 example e:



The two applications, **A217.2 / A317.2** are almost identical. However, A317.2 has some extra functions which are described separately.

The applications A217.2 / A317.2 are very flexible. These are the basic principles:

Domestic Hot Water (DHW):

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 and the charging temperature sensor S4 are the most important sensors.

If the measured DHW temperature (S6) gets lower than the desired DHW temperature, the DHW heating pump (P1) is switched ON. 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 charging temperature at S4.

When the DHW heating temperature is reached, the DHW charging pump P2 is switched ON.

If the DHW charging temperature at S4 can not be reached, the ECL controller gradually increases the desired DHW heating temperature at S3 in order to obtain the charging temperature. A max. value can be set.

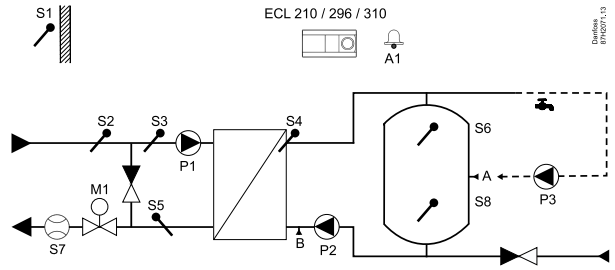
The DHW charging temperature at S4 is typically 5–10 degrees higher than the desired DHW temperature.

DHW tank with 1 temperature sensor (S6):
If the measured DHW temperature (S6) gets higher than the desired DHW temperature, the DHW heating pump (P1) and the DHW charging pump (P2) are switched OFF. The post-run time can be set.

DHW tank with 2 temperature sensors (S6 and S8):
If the measured DHW temperature (S6) gets higher than the desired DHW temperature and the lower temperature (at S8) gets higher than the cut-out temperature, the DHW heating pump (P1) and the DHW charging pump (P2) are switched OFF. The post-run time can be set.

In charging applications 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 circulation temperature (at S4) is controlled according to the desired DHW temperature.

Typical A217.2. / A317.2 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:

S1	*Outdoor temperature sensor*
S2	*Supply temperature sensor*
S3	*DHW heating temperature sensor*
S4	*DHW charging temperature sensor*
S5	*Return temperature sensor*
S6	*DHW tank temperature sensor, upper*
S8	*DHW tank temperature sensor, lower*
P1	*DHW heating pump*
P2	*DHW charging pump*
P3	*DHW circulation pump*
M1	*Motorized control valve*
A1	*Relay output, alarm*

The return temperature (S5) to the district heating supply should not be too high. If so, the desired charging temperature can be adjusted (typically to a lower value), thus resulting in a gradual closing of the motorized control valve.
In boiler-based heating supply the return temperature should not be too low (same adjustment procedure as above).

The supply temperature, S2, is used for adjusting the proportional band (Xp) in order to give a stable temperature control.

An anti-bacteria function is available for activation on selected days of the week.

The outdoor temperature sensor 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.

Application A217.2 (used in ECL Comfort 210) / A317.2 (used in ECL Comfort 310) in general:

A Remote Control Unit, the ECA 30, can be connected in order to control the ECL controller remotely.

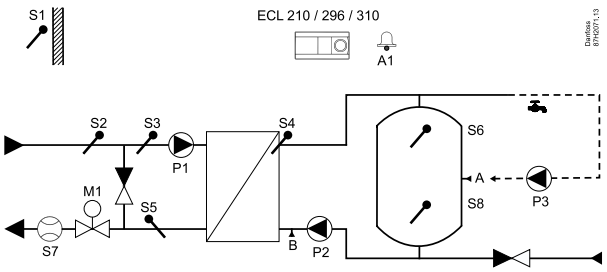
A connected flow or energy meter (in ECL Comfort 210 it is based on pulse signals and in ECL Comfort 310 based on M-bus signal) can limit the flow or energy to a set maximum.

Unused input can, by means of an override switch, be used to override the schedule to a fixed 'Comfort' or 'Saving' mode.

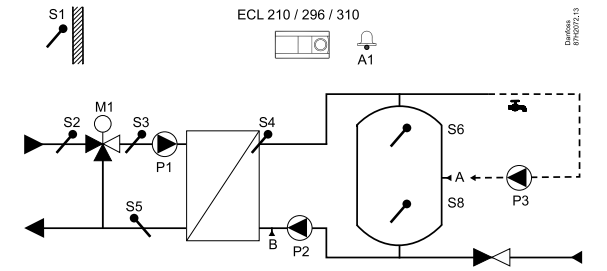
Modbus communication to a SCADA system can be established. In ECL Comfort 310 the M-bus data can furthermore be transferred to the Modbus communication.

Alarm relay (in ECL Comfort 210 it is R4 and in ECL Comfort 310 R6) can be activated if the actual flow temperature at S3 differs from the desired DHW heating temperature.

A217.2 / A317.2 example a:



A217.2 / A317.2 example b:



The application **A217.3** is very flexible. These are the basic principles:

Domestic Hot Water (DHW), example a:

By means of a week schedulee (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 S3). The DHW temperature sensor S3 is the most important sensor.

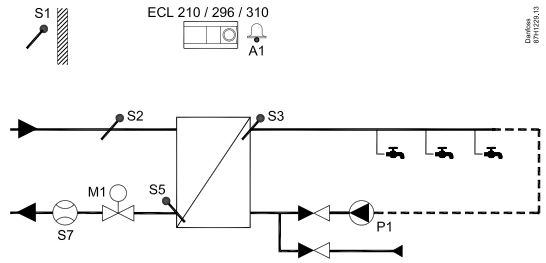
If the measured DHW temperature (S3) is lower than the desired DHW temperature, the motorized control valve (M1) is opened gradually and vice versa.

The return temperature (S5) to the district heating supply should not be too high. If so, the desired flow temperature can be adjusted (typically to a lower value) thus resulting in a gradual closing of the motorized control valve, i.e. the return temperature will decrease.

The circulation pump, P1, is controlled by means of a separate week schedule (up to 3 'Comfort' periods / day).

If a supply temperature sensor S2 is connected, the proportional band Xp is adapted to the actual supply temperature in order to avoid control instability.

Typical A217.3 application, example a:



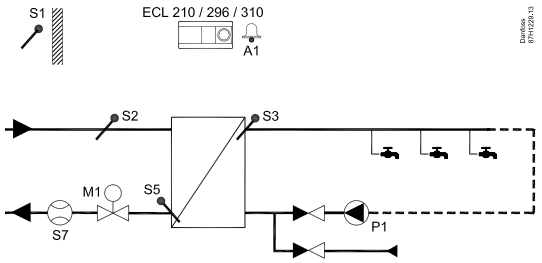
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

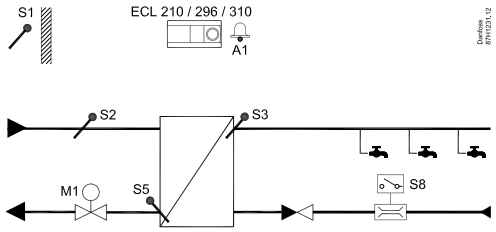
S1	*Outdoor temperature sensor*
S2	*Supply temperature sensor*
S3	*DHW supply temperature sensor*
S5	*Return temperature sensor*
S8	*(Flow switch — examples b, c, d)*
P1	*DHW circulation pump*
M1	*Motorized control valve*
A1	*Relay output, alarm*

A217.3 example a:



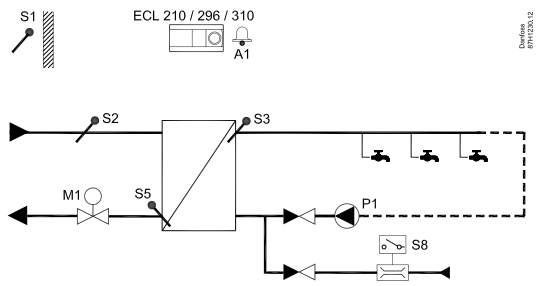
Example b:
A flow switch signal (S8) can be applied in order to heat the DHW on demand (DHW tapping / DHW draw-off). An idle temperature for the supply temperature (at S2) can be maintained to minimize the heat-up time for the DHW.

A217.3 example b:



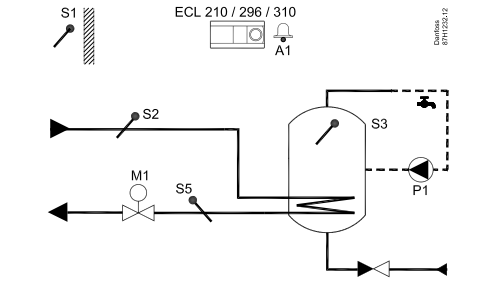
Example c:
A flow switch signal (S8) can be applied in order to heat the DHW on demand (DHW tapping / DHW draw-off). The temperature at S3 is maintained during the comfort times of the circulation pump P1. An idle temperature for the supply temperature (at S2) can be maintained to minimize the heat-up time for the DHW.

A217.3 example c:



Example d:
The DHW tank is directly heated. The setting of the return temperature limitation (at S5) can avoid a too high flow in the heating coil. An idle temperature for the supply temperature (at S2) can be maintained to minimize the heat-up time for the DHW.

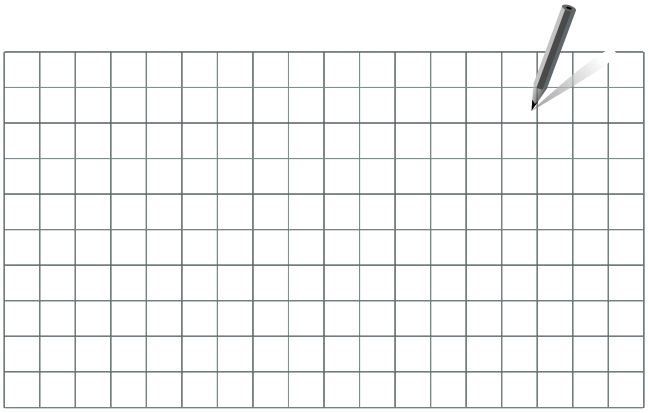
A217.3 example d:



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.

2.3 Mounting

2.3.1 Mounting the ECL Comfort controller

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

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

ECL Comfort 210 / 296 / 310 can be mounted

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

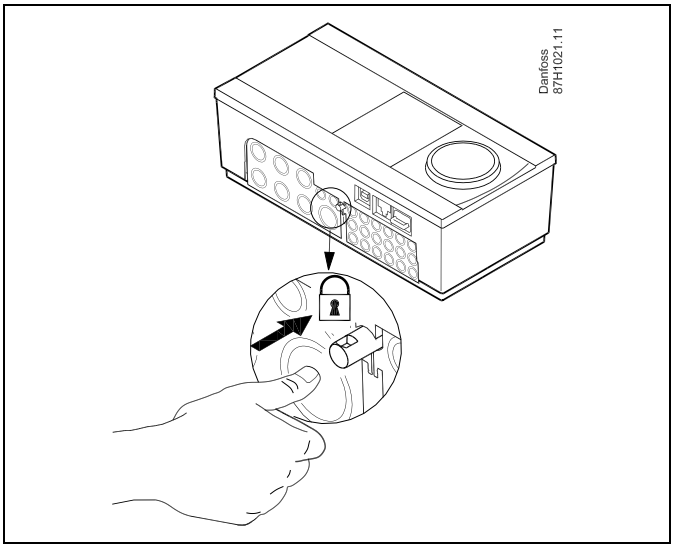
ECL Comfort 296 can be mounted

- in a panel cut-out

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

Screws, PG cable glands and rawlplugs are not supplied.

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



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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.

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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!

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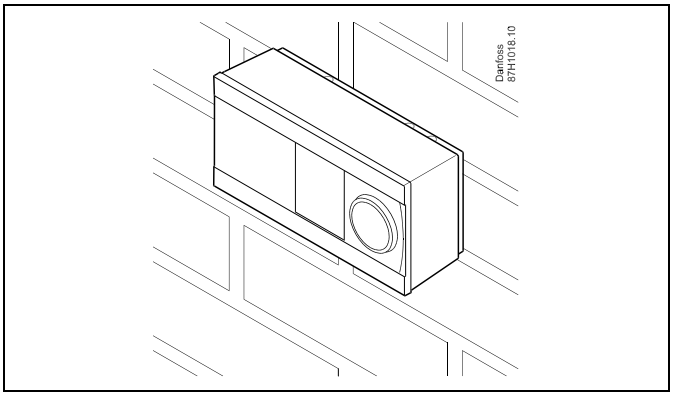
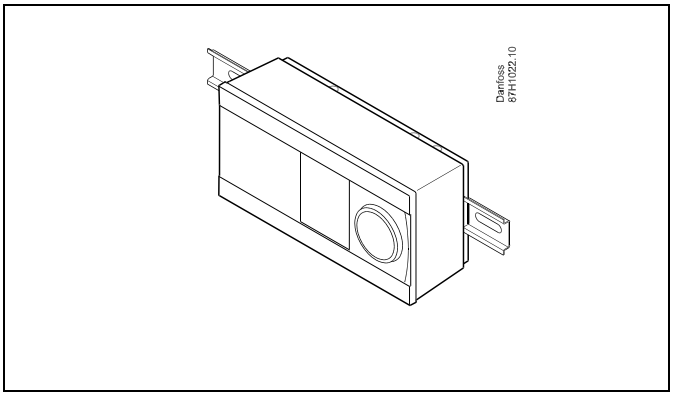
The easy way to lock the controller to its base or unlock it is to use a screw driver as lever.

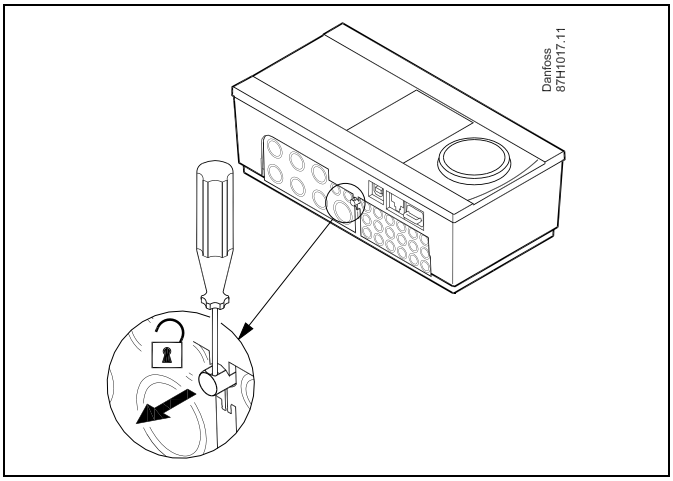
Mounting on a wall
Mount the base part on a wall with a smooth surface. Establish the electrical connections and position the controller in the base part. Secure the controller with the locking pin.



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.

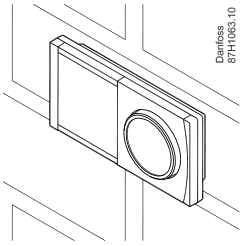
2.3.2 Mounting the Remote Control Units ECA 30 / 31

Select one of the following methods:

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

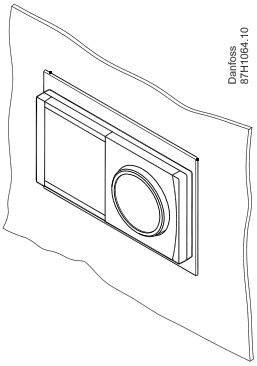
Screws and rawlplugs are not supplied.

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.

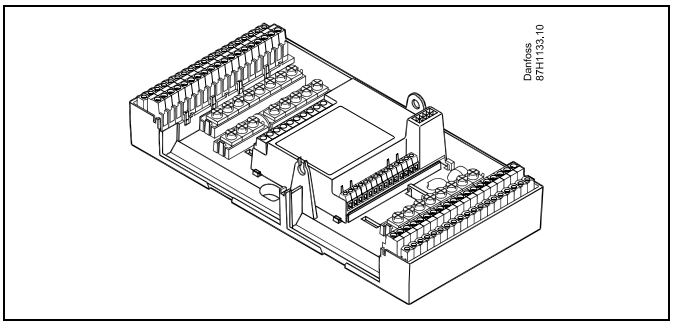
The ECA 31 must not be mounted in a panel if the humidity function is to be used.

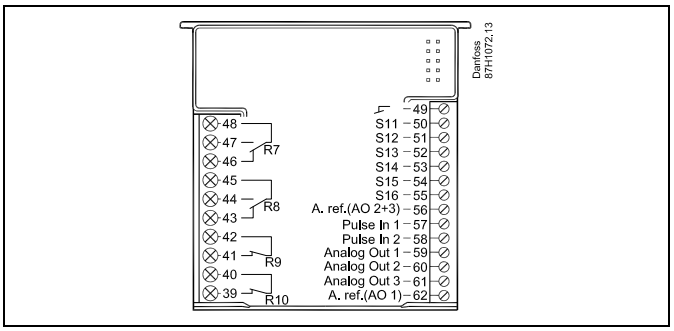


2.3.3 Mounting the internal I/O module ECA 32

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

2.4.1 Placing the temperature sensors

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

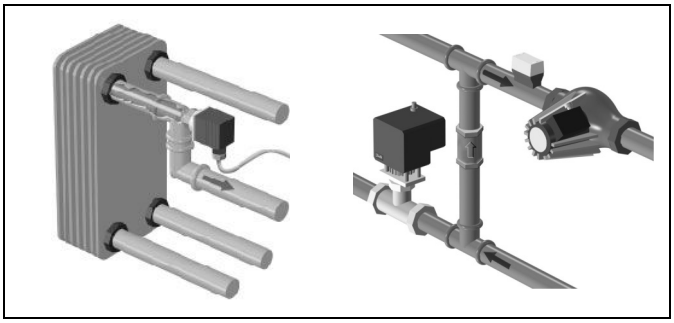
The temperature sensor mentioned below are sensors used for the ECL Comfort 210 / 296 / 310 series which not all will be needed for your application!

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

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

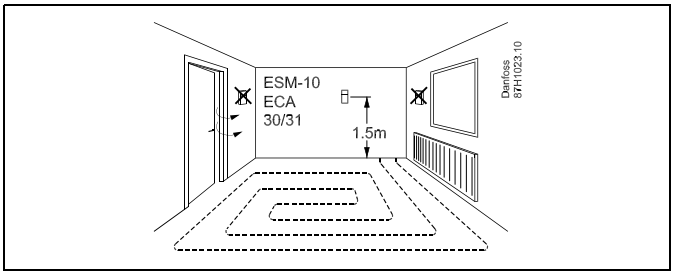
Make sure that the surface of the pipe is clean and even where the sensor is mounted.

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



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

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



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

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

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

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

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

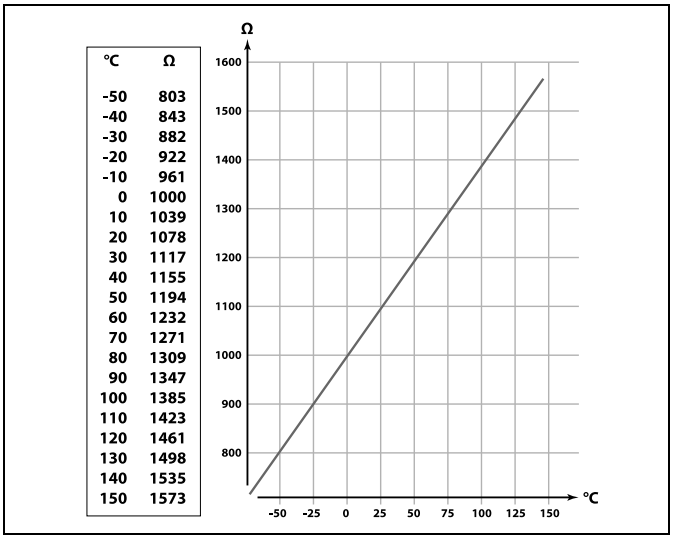
ESM-11, ESMC and ESMB-12: Use heat conducting paste for quick measurement of the temperature.

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

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

Relationship between temperature and ohmic value:

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



2.5 Electrical connections

2.5.1 Electrical connections 230 V a.c.

⚠

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).

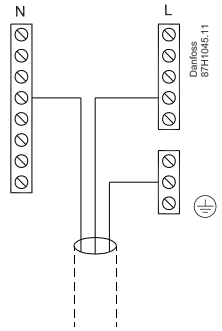
A fuse for the ECL Comfort installation is max. 10 A typically.

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

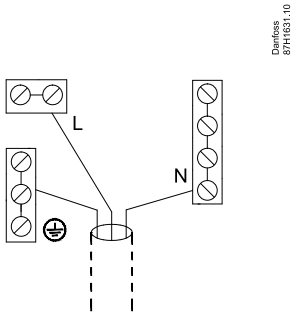
Installation must be avoided if there is a risk for condensation (dew).

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

ECL 210 / 310



ECL 296



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.

2.5.3 Electrical connections, safety thermostats, 230 V a.c. or 24 V a.c.

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

The connection diagrams show various solutions / examples:

Safety thermostat, 1–step closing:
Motorized control valve without safety function

Safety thermostat, 1–step closing:
Motorized control valve with safety function

Safety thermostat, 2–step closing:
Motorized control valve with safety function

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

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

A217/ A317:

Sensor	Description	Recommended type
S1	Outdoor temperature sensor* (optional)	ESMT
S2	Supply temperature sensor (optional)	ESM-11 / ESMB / ESMC / ESMU
S3	DHW heating / charging temperature sensor ** (A217.1 / A317.1) DHW heating temperature sensor ** (A217.2 / A317.2) DHW temperature sensor ** (A217.3)	ESM-11 / ESMB / ESMC / ESMU
S4	DHW charging temperature sensor** (A217.2 / A317.2 only)	ESM-11 / ESMB / ESMC / ESMU
S5	Return temperature sensor (optional)	ESM-11 / ESMB / ESMC / ESMU
S6	DHW tank temperature sensor, upper***	ESMB / ESMU
S7	Flow / heat meter (pulse signal and ECL 210 only)	
S8	DHW tank temperature sensor, lower (A217.1 / A217.2 / A317.1 / A317.2). Flow switch (A217.3)	ESMB / ESMU
	ECL 310 only: Not used	
	ECL 310 only: Not used	

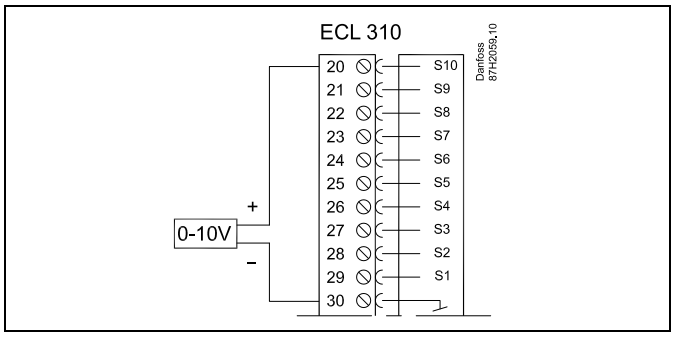
* Used for frost protection purposes. If the outdoor temperature sensor is not connected or the cable is short-circuited, the controller assumes that the outdoor temperature is 0 (zero) °C.

** DHW charging / heating 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).

*** This sensor is used if only one tank temperature sensor is required.

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).

Connection of voltage signal (0–10 V) for external control of desired flow temperature



Connection of flow meter

See the Installation Guide (delivered with the application key).

2.5.5 Electrical connections, ECA 30 / 31

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

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

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

The ECA 30 / 31 must be set up accordingly.

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

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

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

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

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

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).

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

2.5.6 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

2.5.7 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

2.5.8 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

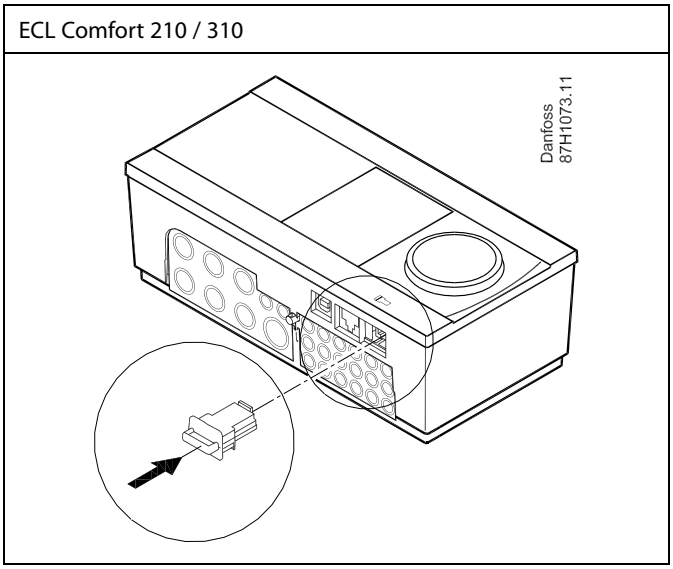
The ECL Application Key contains

- 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.

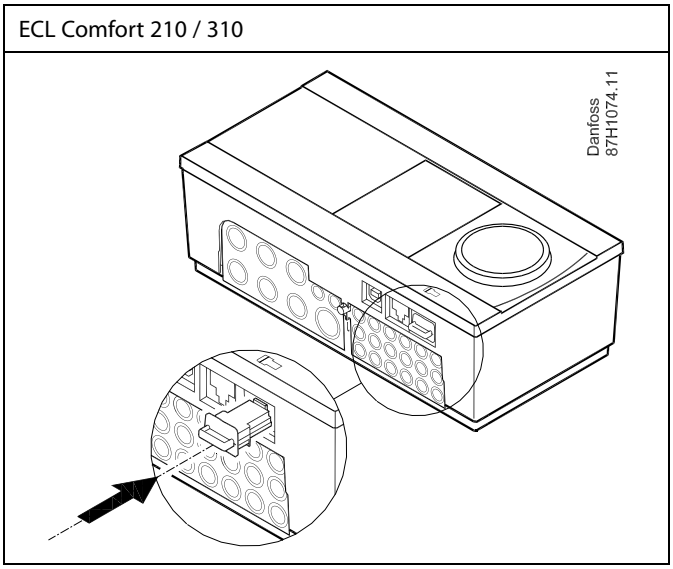
After having powered-up the controller, different situations might be existing:

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.

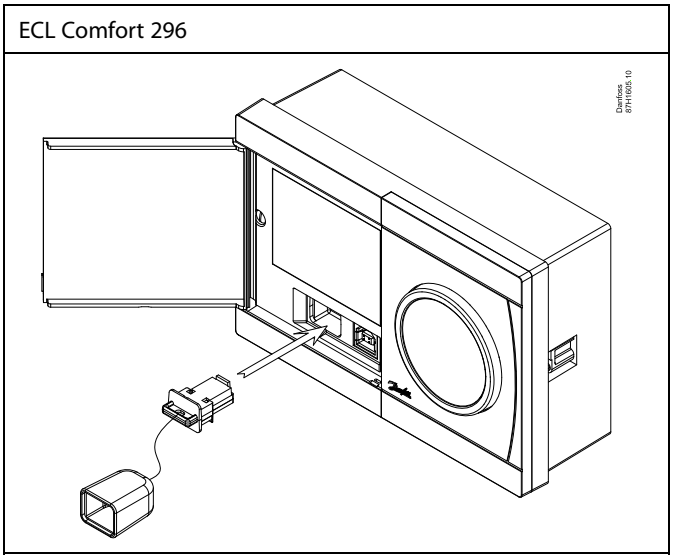
ECL Comfort 210 / 310



ECL Comfort 210 / 310



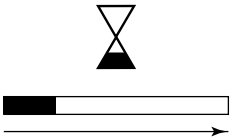
ECL Comfort 296



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:

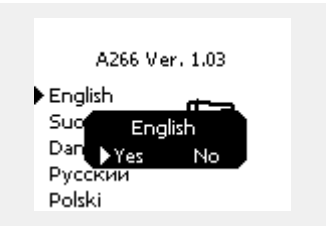
- Take out the application key; for 20 minutes settings can be changed.
- Power up the controller **without** the application key inserted; settings cannot be changed.

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

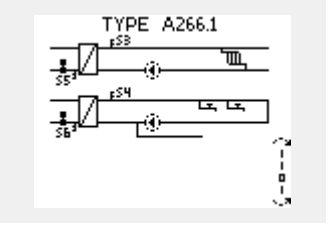
An animation for the ECL Application Key insertion is displayed. Insert the Application Key .

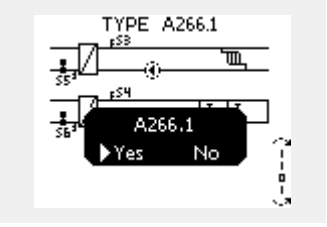
Application Key name and Version is indicated (example: A266 Ver. 1.03).

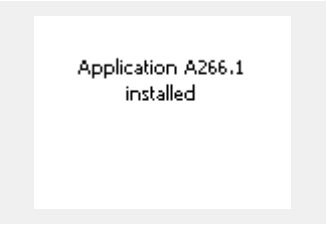
If the ECL Application Key is not suitable for the controller, a "cross" is displayed over the ECL Application Key-symbol.



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





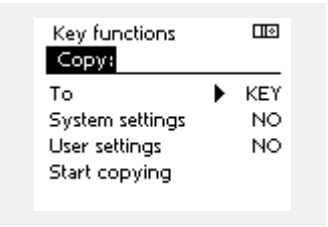


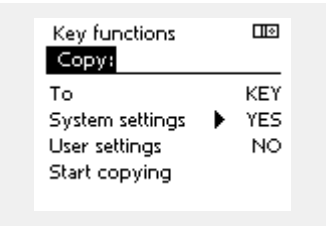
* 'Aut. daylight' is the automatic changeover between summer and winter time.

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.

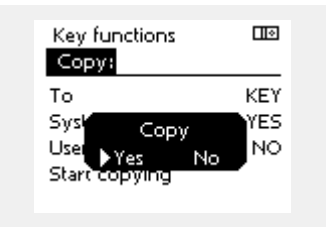
The application is installed, and the controller resets and starts up.

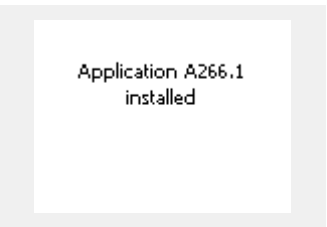




B
The ECL Application key contains changed system settings:
Push the dial repeatedly.

'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.

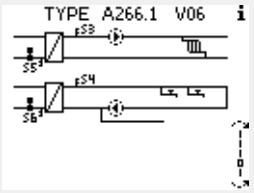
'NO: Only factory settings from the ECL Application Key will be copied to the controller.
'YES*: Special user settings (differing from the factory settings) will be copied to the controller.

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

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

(Example):

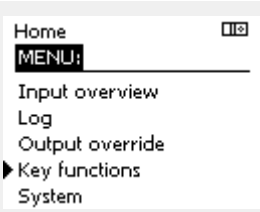
The "**i**" in the upper right corner indicates that - besides the factory settings - the subtype also contains special user / systems settings.

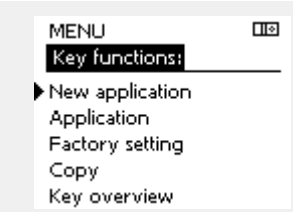


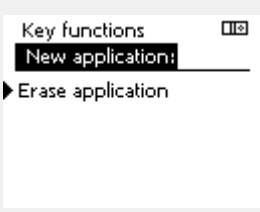
Application Key: Situation 2
The controller already runs an application. The ECL Application Key is inserted, but the application needs to be changed.

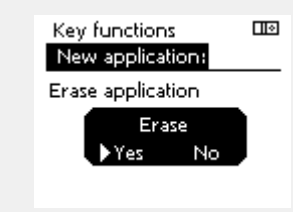
To change to another application on the ECL Application Key, the current application in the controller must be erased (deleted).

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:

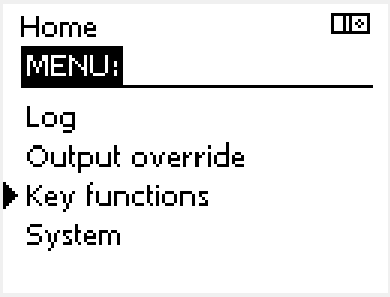
Action:	Purpose:	Examples:
	Choose 'MENU'	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose 'Common controller settings'	
	Confirm	
	Go to 'Key functions'	
	Confirm	
	Choose 'Copy'	
	Confirm	
	Choose 'To'. 'ECL' or 'KEY' will be indicated. Choose 'ECL' 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.	

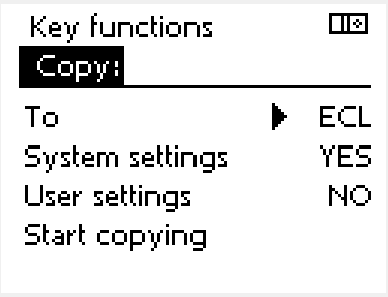
*

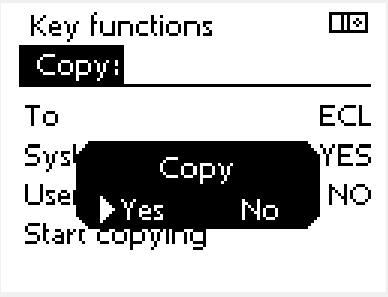
'ECL': Data will be copied from the Application Key to the ECL Controller.
'KEY': Data will be copied from the ECL Controller to the Application Key.

**

'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 A217 / A317

Navigation, application A217.1 / A317.1 (* A217.1 only, ** A317.1 only)

Home		**DHW, circuit 1**	
		ID no.	**Function**
MENU			
Schedule			Selectable
Schedule circ. P			Selectable
Settings	Tank temperature	11193	Charge difference
		11195	Start difference
		11194	Stop difference
		11152	Max. charge T
	Return limit	11030	Limit
		11035	Infl. - max.
		11036	Infl. - min.
		11037	Adapt. time
	Flow / power limit		Actual
		11111	Limit
		11112	Adapt. time
		11113	Filter constant
		11109	Input type
		11115	Units
		11114	Pulse*
	Control par.	11174	Motor pr.
			Xp actual
		11185	Tn
		11186	M run
		11187	Nz
		11189	Min. act. time
	Application	11055	Circ. P priority
		11054	Cont. T control
		11041	DHW P post-run
		11500	Send desired T
		11076	Circ. P frost T
		11093	Frost pr. T
		11141	Ext. input
		11142	Ext. mode
	Anti-bacteria		Selectable
Holiday			Selectable
Alarm	Temp. monitor.	11147	Upper difference
		11148	Lower difference
		11149	Delay
		11150	Lowest temp.
	Digital S9**	11636	Alarm value
		11637	Alarm time-out
	Alarm overview		
Influence overview	Des. DHW T		Return lim.
			Flow / power lim.
			Holiday
			Ext. override
			Anti-bacteria
			SCADA override

Navigation, application A217.1 / A317.1, Common controller settings (* A317.1 only)

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Schedule output*			Selectable
Input overview			Supply T DHW flow T DHW return T Tank upper T Tank lower T S9 status*
Log (sensors)	Supply T DHW flow & des. DHW return T & lim. Tank T up. & des. Tank T up. & low.		Log today Log yesterday Log 2 days Log 4 days
Output override			M1, P1, P3, A1
Key functions	New application		Erase application
	Application		
	Factory setting		System settings User settings Go to factory
	Copy		To System settings User settings Start copying
	Key overview		
System	ECL version		Code no. Hardware Software Build no. Serial no. MAC Production week
	Extension		
	Ethernet		
	M-bus config		Selectable
	Energy Meters		Selectable
	Display	60058 60059	Backlight Contrast
	Communication	38 2048 2150 2151	Modbus addr. ECL 485 addr. Service pin Ext. reset
	Language	2050	Language

Navigation, application A217.2 / A317.2 (* A217.2 only, ** A317.2 only)

Home		**DHW, circuit 1**	
		ID no.	**Function**
MENU			
Schedule			Selectable
Schedule circ. P			Selectable
Settings	Tank temperature		
		11193	Charge difference
		11195	Start difference
		11194	Stop difference
		11152	Max. charge T
		11068	Flow T adapt time
	Return limit	11030	Limit
		11035	Infl. - max.
		11036	Infl. - min.
		11037	Adapt. time
	Flow / power limit		Actual
		11111	Limit
		11112	Adapt. time
		11113	Filter constant
		11109	Input type
		11115	Units
		11114	Pulse*
	Control par.	11174	Motor pr.
			Xp actual
		11185	Tn
		11186	M run
		11187	Nz
		11189	Min. act. time
	Application	11055	Circ. P priority
		11054	Cont. T control
		11041	DHW P post-run
		11042	Char. P post-run
		11500	Send desired T
		11076	Circ. P frost T
		11093	Frost pr. T
		11141	Ext. input
		11142	Ext. mode
	Anti-bacteria		Selectable
Holiday			Selectable
Alarm	Temp. monitor.	11147	Upper difference
		11148	Lower difference
		11149	Delay
		11150	Lowest temp.
	Digital S9**	11136	Alarm value
		11137	Alarm time-out
	Alarm overview		
Influence overview	Des. DHW T		Return lim.
			Flow / power lim.
			Holiday
			Ext. override
			Anti-bacteria
			SCADA override

Navigation, application A217.2 / A317.2, Common controller settings (* A217.2 only, ** A317.2 only)

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Schedule output**			Selectable
Input overview			Supply T DHW flow T Charge T* DHW return T Tank upper T Tank lower T S9 status**
Log (sensors)	Supply T DHW flow & des. Charge T DHW return T & lim. Tank T up. & des. Tank T up. & low.		Log today Log yesterday Log 2 days Log 4 days
Output override			M1, P1, P2, P3, A1
Key functions	New application		Erase application
	Application		
	Factory setting		System settings User settings Go to factory
	Copy		To System settings User settings Start copying
	Key overview		
System	ECL version		Code no. Hardware Software Build no. Serial no. MAC Production week
	Extension		
	Ethernet		
	M-bus config		Selectable
	Energy Meters		Selectable
	Display	60058 60059	Backlight Contrast
	Communication	38 2048 2150 2151	Modbus addr. ECL 485 addr. Service pin Ext. reset
	Language	2050	Language

Navigation, application A217.3

Home		**DHW, circuit 1**	
		ID no.	**Function**
MENU			
Schedule			Selectable
Schedule circ. P			Selectable
Settings	Flow temperature		
		11178	Temp. max.
		11177	Temp. min.
	Return limit	11030	Limit
		11035	Infl. - max.
		11036	Infl. - min.
		11037	Adapt. time
		11085	Priority
	Flow / power limit		Actual
		11111	Limit
		11112	Adapt. time
		11113	Filter constant
		11109	Input type
		11115	Units
		11114	Pulse
	Control par.	11173	Auto tuning
		11174	Motor pr.
			Xp actual
		11185	Tn
		11186	M run
		11187	Nz
		11189	Min. act. time
		11097	Supply T (idle)
		11096	Tn (idle)
		11094	Open time
		11095	Close time
	Application	11500	Send desired T
		11022	P exercise
		11023	M exercise
		11076	Circ. P frost T
		11040	P post-run
		11093	Frost pr. T
		11141	Ext. input
		11142	Ext. mode
	Anti-bacteria		Selectable
Holiday			Selectable
Alarm	Temp. monitor.	11147	Upper difference
		11148	Lower difference
		11149	Delay
		11150	Lowest temp.
		11150	Lowest temp.
	Alarm overview		2: Temp. monitor.
Influence overview	Des. DHW T		Return lim.
			Flow / power lim.
			Holiday
			Ext. override
			Anti-bacteria
			SCADA offset

Navigation, application A217.3, Common controller settings

Home **MENU** **Time & Date**		**Common controller settings** **ID no.**	**Function** Selectable
Input overview			Outdoor T DHW flow T DHW return T Supply T Flow switch
Log (sensors)	Outdoor T DHW flow & des. DHW return T & lim. Supply T		Log today Log yesterday Log 2 days Log 4 days
Output override			M1, P1, A1
Key functions	New application		Erase application
	Application		
	Factory setting		System settings User settings Go to factory
	Copy		To System settings User settings Start copying
	Key overview		
System	ECL version		Code no. Hardware Software Build no. Serial no. MAC Production week
	Extension (ECL 310 only)		
	Ethernet (ECL 310 only)		Selectable
	Portal config (ECL 310 only)		ECL portal Portal status Portal info
	M-bus config (ECL 310 only)		Selectable
	Energy Meters (ECL 310 only)		Selectable
	Raw input overview		Selectable
	Alarm		32: Temp. monitor.
	Display	60058 60059	Backlight Contrast
	Communication	2048 38 39 2150 2151	ECL 485 addr. Modbus addr. Band Service pin Ext. reset
	Language	2050	Language

3.0 Daily use

3.1 How to navigate

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

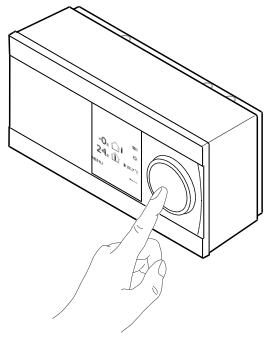
The dial has a built-in accellerator. The faster you turn the dial, the faster it reaches the limits of any wide setting range.

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

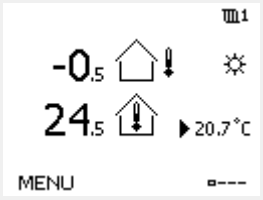
Push the dial to confirm your choices (☝).

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

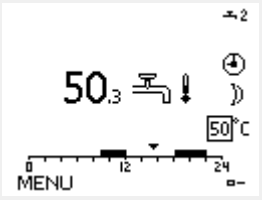
Example shows ECL 210 / 310



Heating circuit (♨):



DHW circuit (🚿);



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

To enter 'Common controller settings':

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

Circuit selector

3.2 Understanding the controller display

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

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

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

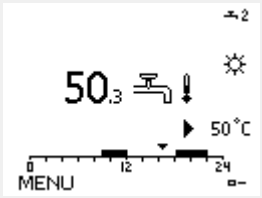
To shift between displays: Turn the dial until you reach the display selector (▫---) at the bottom right side of the display. Push the dial and turn to choose your favorite overview display. Push the dial again.

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

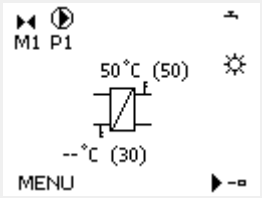
Overview display 2 informs about:
state of the controlled components, actual DHW temperature, (desired DHW temperature), controller mode, return temperature (limitation value), influence on desired DHW temperature.

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

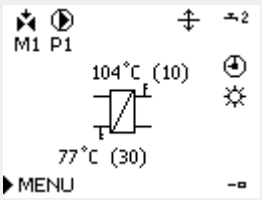
Overview display 1:



Overview display 2:



Example of overview display with Influence indication:



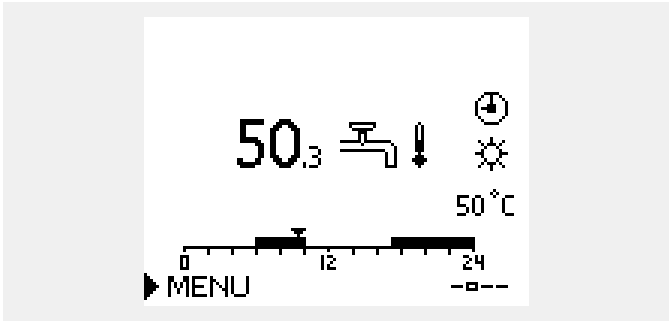
Setting the desired temperature

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

Setting the desired 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.

Overview of setting range and settings for DHW modes:

Mode	Setting range	Factory setting
Comfort	10 ... 150 °C	50 °C
Saving	10 ... 150 °C	10 °C
Frost protection*	5 ... 40 °C	10 °C

* related to desired flow temperature

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.

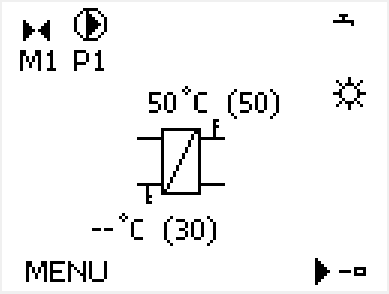
DHW circuit

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

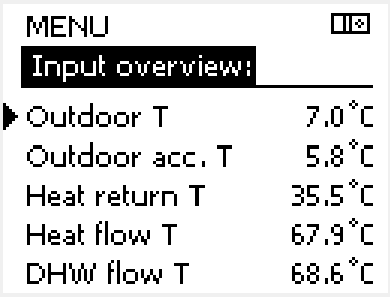
Display example with heat exchanger:



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.

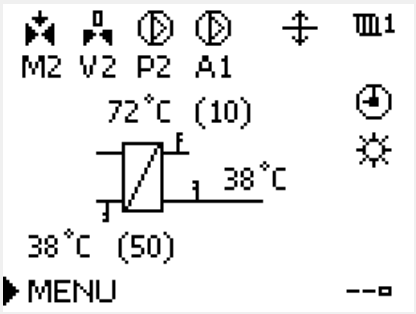
Arrow-up:
The parameter in question increases the desired flow temperature.

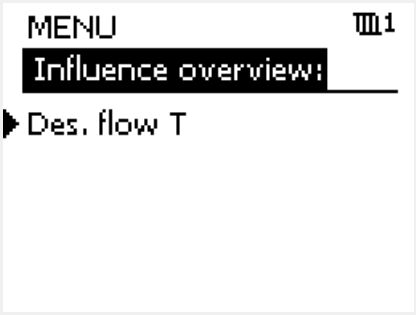
Double-arrow:
The parameter in question creates an override (e.g. Holiday).

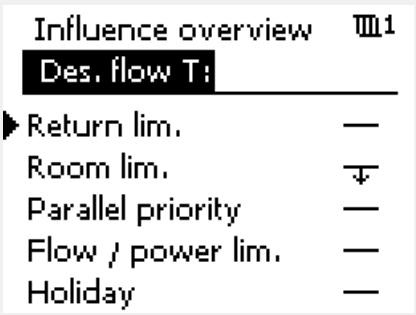
Straight line:
No active influence.

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.

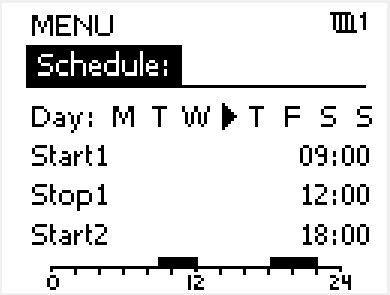
3.7 Schedule

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:

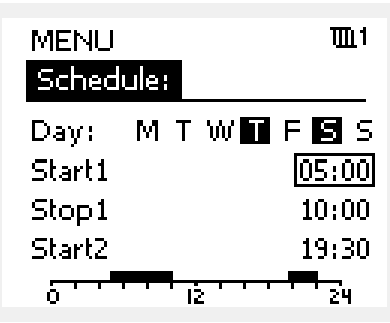
M = Monday
T = Tuesday
W = Wednesday
T = Thursday
F = Friday
S = Saturday
S = Sunday

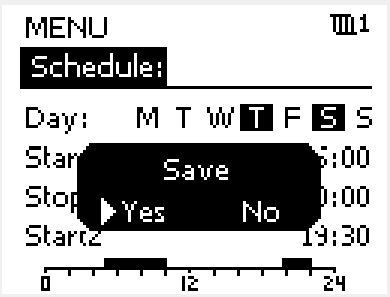


The schedule will day-by-day show you the start and stop times of your comfort periods (heating / DHW circuits).

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
Actual (actual flow or power)		63	
Xp actual		68	
Day		78	
Start time		78	
Duration		79	
Desired T		79	
P exercise (pump exercise)	1x022	71	
M exercise (valve exercise)	1x023	71	
Limit (return temp. limitation)	1x030	59	
Infl. - max. (return temp. limitation - max. influence)	1x035	59	
Infl. - min. (return temp. limitation - min. influence)	1x036	60	
Adapt. time (adaptation time)	1x037	61	
P post-run	1x040	71	
DHW P post-run (DHW pump, post-run)	1x041	71	
Char. P post-run (DHW charging pump, post-run)	1x042	72	
Cont. T control	1x054	72	
Circ. P priority	1x055	72	
Flow T adapt time (Flow temperature, adaptation time)	1x068	52	
Circ. P frost T	1x076	72	
Priority (priority for return temp. limitation)	1x085	61	
Frost pr. T (frost protection temp.)	1x093	73	
Open time	1x094	66	
Close time	1x095	66	
Tn (idle)	1x096	67	
Supply T (idle)	1x097	67	
Input type	1x109	62	
Limit (limitation value)	1x111	63	
Adapt. time (adaptation time)	1x112	63	
Filter constant	1x113	63	
Pulse	1x114	64	
Units	1x115	64	
Ext. input (external override)	1x141	73	
Ext. mode (external override mode)	1x142	74	
Upper difference	1x147	80	
Lower difference	1x148	80	
Delay, example	1x149	81	
Lowest temp.	1x150	81	
Max. charge T (maximum heating / charging temperature)	1x152	52	
Auto tuning	1x173	67	

Setting	ID	Page	Factory settings in circuit(s) 1
Motor pr. (motor protection)	1x174	68	
Temp. min.	1x177	56	
Temp. max.	1x178	56	
Tn (integration time constant)	1x185	69	
M run (running time of the motorized control valve)	1x186	69	
Nz (neutral zone)	1x187	69	
Min. act. time (min. activation time gear motor)	1x189	70	
Charge difference	1x193	52	
Stop difference	1x194	53	
Start difference	1x195	54	
Send desired T	1x500	76	
Alarm value	1x636	81	
Alarm time-out	1x637	82	

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.

5.2 Tank temperature

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

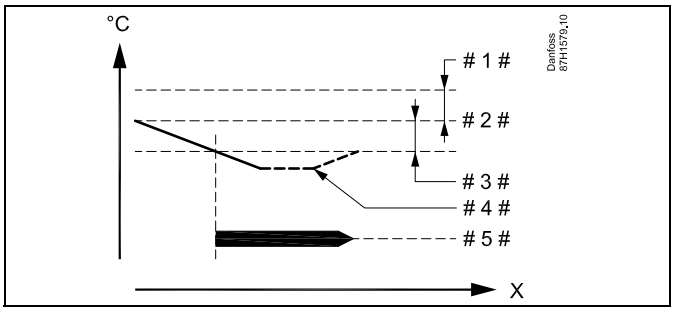
Result:
Desired DHW temp. will be reduced to 45 °C.

MENU > Settings > Tank temperature

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.

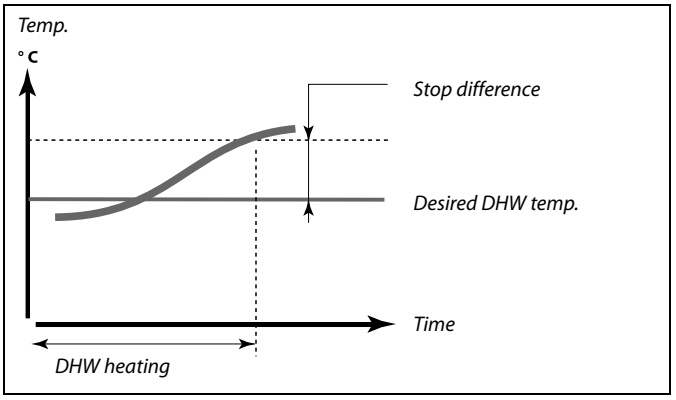
MENU > Settings > Tank temperature

Stop difference	**1x194**
One DHW tank temperature sensor: *Set the number of degrees above the desired DHW temperature that will stop the DHW heating (charging).* *Two DHW tank temperature sensors:* *Set the number of degrees above or below the desired DHW temperature, but measured by the lower tank temperature sensor that will stop the DHW heating (charging).*	

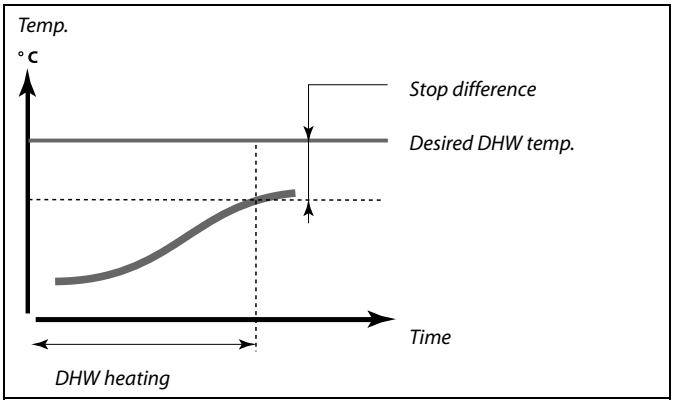
See Appendix "Parameter ID overview"

–50 ... 50: Set the number of degrees.

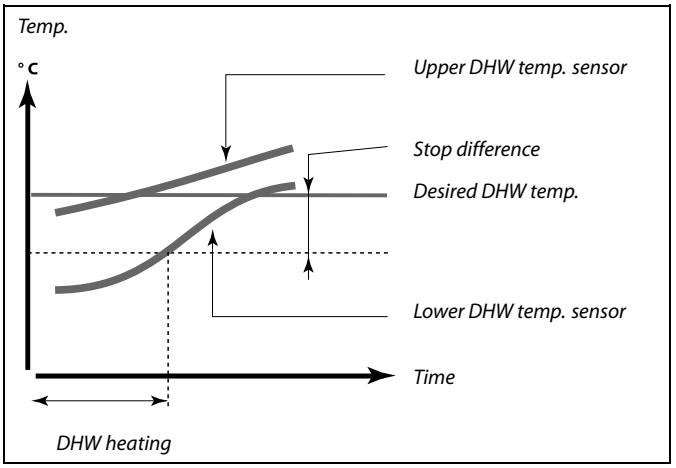
One DHW tank temperature sensor (example with positive 'Stop difference' value):



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



Two DHW tank temperature sensors, upper and lower

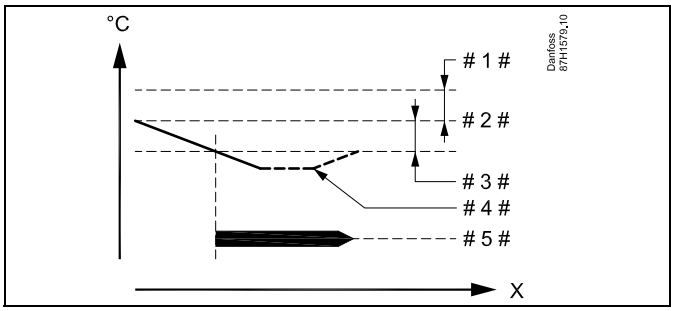


MENU > Settings > Tank temperature

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.

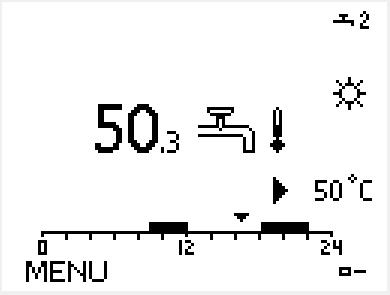
5.3 Flow temperature

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

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”

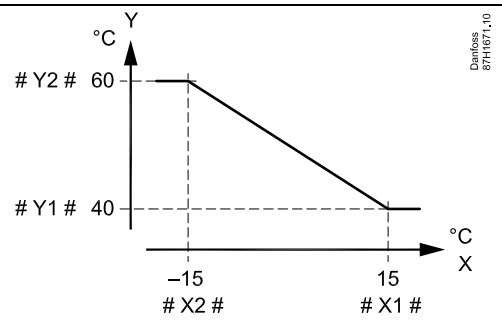
Set the max. flow temperature for the system. The desired temperature will not be higher than this setting. Adjust the factory setting, if required.

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

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

5.4 Return limit

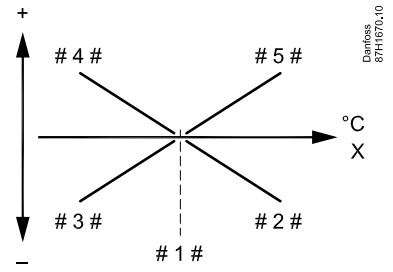
The return temperature limitation is based on the outdoor temperature. Typically in district heating systems a higher return temperature is accepted at a decrease in outdoor temperature. The relationship between the return temperature limits and outdoor temperature is set in two coordinates.
The outdoor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

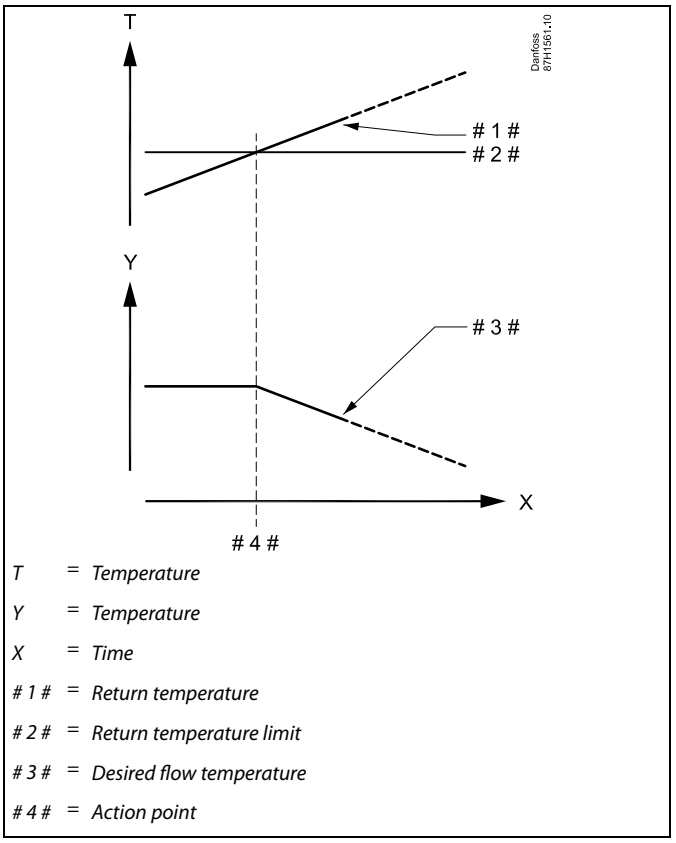
DHW circuit
The return temperature limitation is based on a constant temperature value.
The controller automatically changes the desired flow temperature to obtain an acceptable return temperature when the return temperature falls below or gets higher than the set limit.
This limitation is based on a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

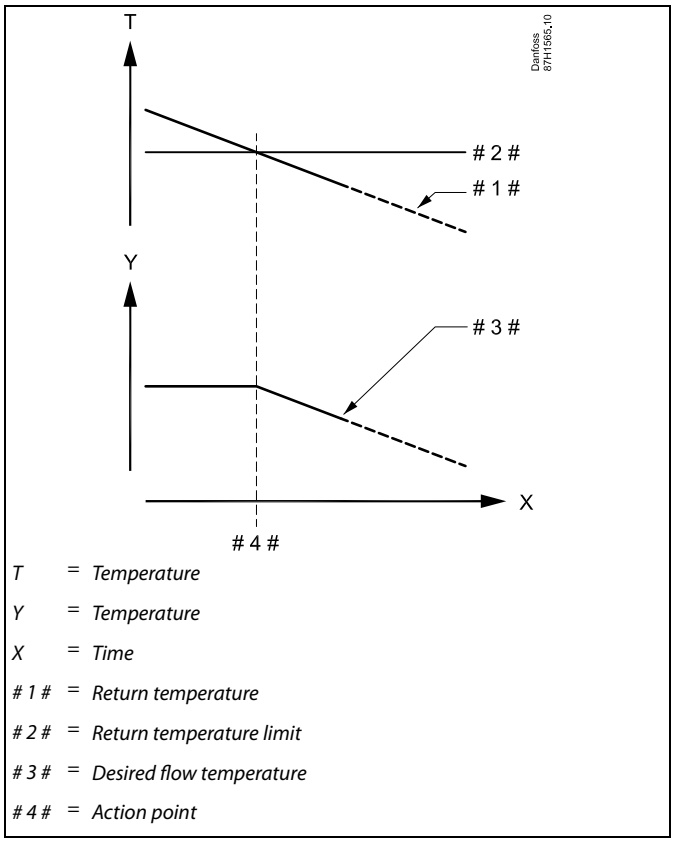
 # 1 # = *Return temperature*

 # 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*

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

MENU > Settings > Return limit

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

See Appendix “Parameter ID overview”

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

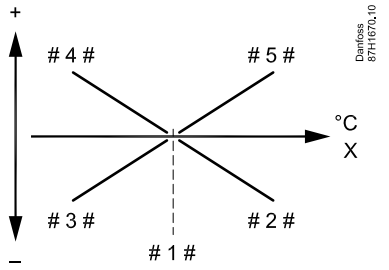
MENU > Settings > Return limit

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.

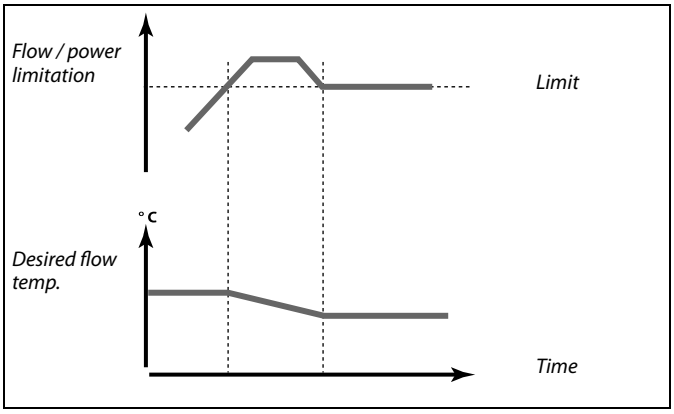
5.5 Flow / power limit

Depending on controller type, the flow / power limit is based on different input types:

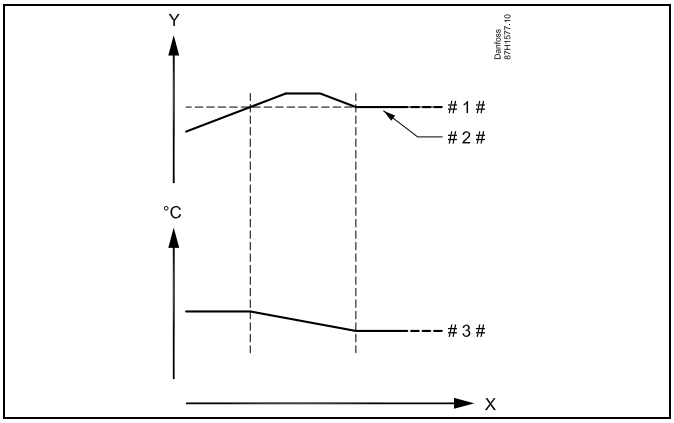
ECL Key application	ECL Comfort 210 controller	ECL Comfort 310 controller
A2xx	Pulse signal	Pulse signal
A3xx	Not possible	M-bus signal

A flow or energy meter can be connected to the ECL controller in order to limit the flow or consumed power. The signal from the flow or energy meter can be based on pulse or M-bus signal.

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



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

IM1 - IM5: Flow / energy meter signal based on pulses.

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

The setting range for IM and EM depends on chosen subtype.

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

Pulse	**1x114**
Set the value of the pulses from the flow / energy meter.	

See Appendix "Parameter ID overview"

OFF: No input.

1 ... 9999: Pulse value.

Example :

One pulse can represent a number of litres (from a flow meter) or a number of kWh (from a energy meter).

MENU > Settings > Flow / power limit

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

See Appendix "Parameter ID overview"

Units to the left: pulse value.
Units to the right: actual and limitation values.

The value from the flow meter is expressed as ml or l.
The value from the energy meter is expressed as Wh, kWh, MWh or GWh.

The values for the actual flow and the flow limitation are expressed as l/h or m^3/h.

The values for the actual power and the power limitation are expressed as kW, MW or GW.

List for setting range of 'Units':
ml, l/h
l, l/h
ml, m^3/h
l, m^3/h
Wh, kW
kWh, kW
kWh, MW
MWh, MW
MWh, GW
GWh, GW

Example 1:

'Units' (11115): l, m^3/h

'Pulse' (11114): 10

Each pulse represents 10 litres and the flow is expressed as cubic meters (m^3) per hour.

Example 2:

'Units' (11115): kWh, kW (= kilo Watt hour, kilo Watt)

'Pulse' (11114): 1

Each pulse represents 1 kilo Watt hour and the power is expressed in kilo Watt.

5.6 Control parameters

Control of valves

The motorized control valves are controlled by means of 3-point control signal.

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

Thermo-hydraulic actuator, 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.

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

MENU > Settings > Control parameters

Open time	**1x094**
The 'Open time' is the forced time (in seconds) that it takes to open the motorized control valve when a DHW draw-off (tapping) is detected (the flow switch is activated). This function compensates for the delay before the flow temperature sensor measures a change in temperature.	

See Appendix “Parameter ID overview”

MENU > Settings > Control parameters

Close time	1x095
The 'Close time' is the forced time (in seconds) that it takes to close the motorized control valve when a DHW draw-off (tapping) is stopped (the flow switch is deactivated). This function compensates for the delay before the flow temperature sensor measures a change in temperature.	

See Appendix "Parameter ID overview"

MENU > Settings > Control parameters

Tn (idle)	1x096
When no DHW draw-off (tapping) is detected (the flow switch is deactivated), the temperature is maintained at a low level (saving temperature). The integration time 'Tn (idle)' can be set to obtain a slow but stable control.	

See Appendix "Parameter ID overview"

MENU > Settings > Control parameters

Supply T (idle)	1x097
The 'supply T (idle)' is the supply temperature when there is no DHW draw-off (tapping). When DHW draw-off is not detected (the flow switch is deactivated), the temperature is maintained at a lower level (saving temperature). Choose which temperature sensor is to maintain the saving temperature.	

See Appendix "Parameter ID overview"

OFF: The saving temperature is maintained at the DHW flow temperature sensor.

ON: The saving temperature is maintained at the supply temperature sensor.

If the supply temperature sensor is not connected, the idle supply temperature will be maintained at the DHW flow temperature sensor.

MENU > Settings > Control parameters

Auto tuning	**1x173**
Automatically determines the control parameters for the DHW control. 'Xp' 'Tn' and 'M run' do not need to be set, when using auto tuning. 'Nz' must be set.	

See Appendix "Parameter ID overview"

OFF: Auto tuning is not activated.

ON: Auto tuning is activated.

The auto tuning function automatically determines the control parameters for DHW control. Thus you do not need to set the 'Xp', 'Tn' and 'M run', as they are automatically set when the auto tuning function is set to ON.

Auto tuning is typically used in connection with the installation of the controller, but it can be activated when needed, e.g. for an extra check of the control parameters.

Before starting the auto tuning, the tapping flow should be adjusted to the relevant value (see table).

If possible, any additional DHW consumption should be avoided during the auto tuning process. Should the tapping load vary too much, the auto tuning and controller will return to the default settings.

Auto tuning is activated by setting the function to ON. When the auto tuning is ended, the function is automatically converted to OFF (default setting). This will be indicated in the display.

The auto tuning process takes up to 25 minutes.

No. of apartments	**Heat transfer (kW)**	**Constant DHW draw-off (l / min)**
1-2	30-49	3 (or 1 tap 25% open)
3-9	50-79	6 (or 1 tap 50% open)
10-49	80-149	12 (or 1 tap 100% open)
50-129	150-249	18 (or 1 tap 100% + 1 tap 50% open)
130-210	250-350	24 (or 2 taps 100% open)

⚠

In order to meet the summer- / winter variations, the ECL clock must be set to the correct date for an successful auto tuning.

The motor protection function ('Motor pr.') has to be deactivated during auto tuning. During auto tuning the circulation pump for tap water must be switched off. This is done automatically if the pump is controlled by the ECL controller.

Auto tuning is only applicable in connection with valves that are approved for auto tuning, i.e. the Danfoss types VB 2 and VM 2 with split characteristic as well as logarithmic valves such as VF and VFS.

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.

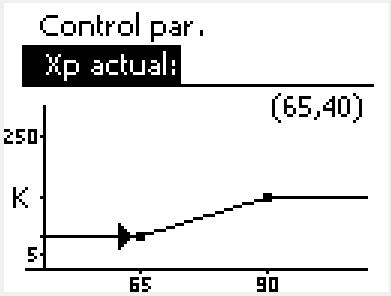
Value: Motor protection is activated after the set activation delay in minutes.

☝

Recommended for duct systems with variable load.

MENU > Settings > Control parameters

Xp actual		
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	
'Xp actual' is the read-out of the actual Xp (proportional band) based on the supply temperature. Xp is determined by settings related to the supply temperature. Typically, the higher the supply temperature, the higher the Xp must be in order to achieve a stable temperature control.		



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

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

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

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

MENU > Settings > Control parameters

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.

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.	

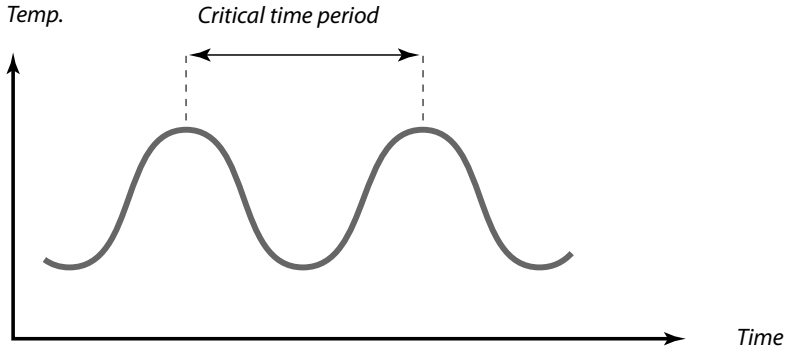
See Appendix "Parameter ID overview"

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.

5.7 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

P exercise (pump exercise)	**1x022**
Exercises the pump to avoid blocking in periods without heat 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 heat 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

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

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

Frost pr. T (frost protection temp.)	**1x093**
Set the desired flow temperature at temperature sensor S3 to protect the system against frost (at heating cut-out, total stop etc.). *When the temperature at S3 gets lower than the setting, the motorized control valve opens gradually.*	

See Appendix “Parameter ID overview”

The frost protection temperature can also be set in your favorite display when the mode selector is in frost protection mode.

Override mode functions:

The following settings describe the function in general for the ECL Comfort 210 / 296 / 310 series. The explained modes are typical and not application related. They might differ from the override modes in your application.

MENU > Settings > Application

Ext. input (external override)	**1x141**
Choose the input for 'Ext. input' (external override). By means of a switch the controller can be overridden to 'Comfort', 'Saving', 'Frost protection' or 'Constant temperature' mode.	

See Appendix "Parameter ID overview"

OFF: No inputs have been selected for external override.

S1 ... S16: Input selected for external override.

If S1... S6 is chosen as override input, the override switch must have gold-plated contacts.
If S7 ... S16 is chosen as override input, the override switch can be a standard contact.

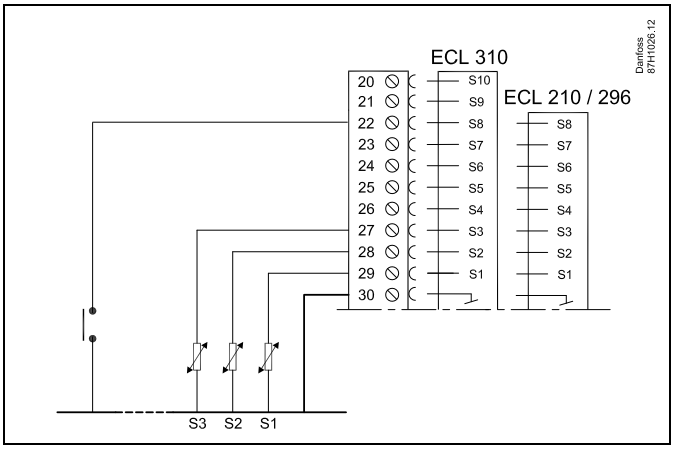
See the drawings for connection examples of override switch and override relay to input S8.

S7...S16 are recommended for override switch.

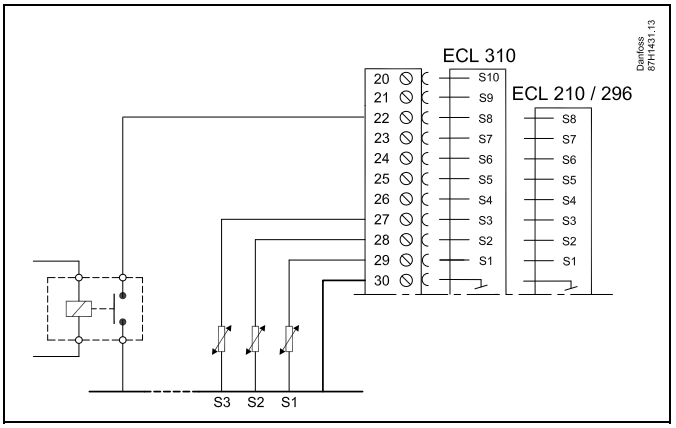
If ECA 32 is mounted, also S11... S16 can be used.

If ECA 35 is mounted, also S11 or S12 can be used.

Example: Connection of an override switch



Example: Connection of an override relay



Choose only an unused input for override. If an already used input is applied for override, the functionality of this input is also neglected.

See also 'Ext. mode'.

MENU > Settings > Application

Ext. mode (external override mode)	**1x142**
The mode override can be activated for Saving, Comfort, Frost pr. or Constant T mode. *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.

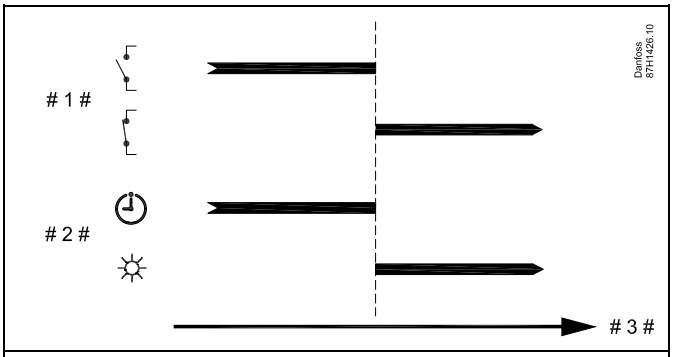
CONSTANT T: The circuit in question controls a constant temperature *)

*) 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.

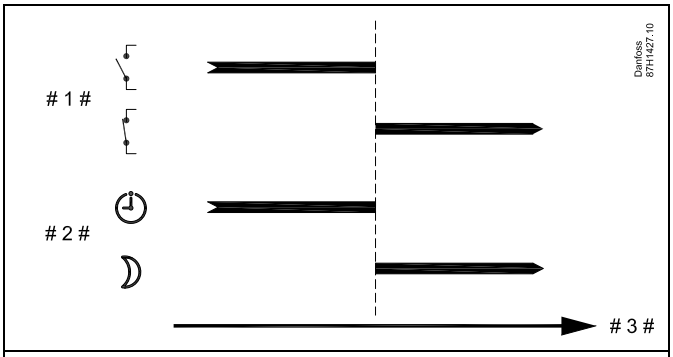
See also ‘Ext. input’.

Example: Override to Comfort mode



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

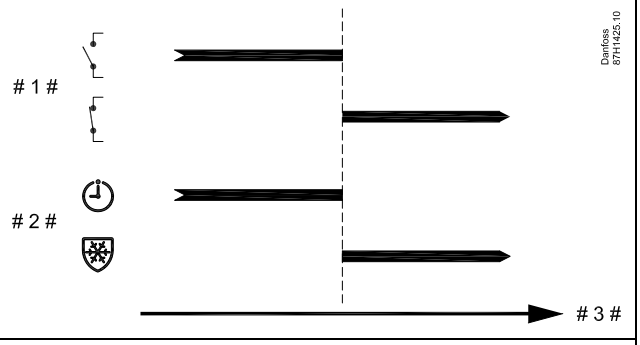
Example: Override to Saving mode



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

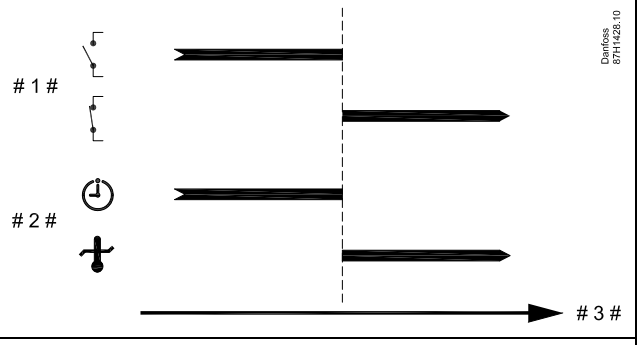
The result of override to 'Saving' mode depends on the setting in 'Total stop'.
Total stop = OFF: Heating reduced
Total stop = ON: Heating stopped

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.

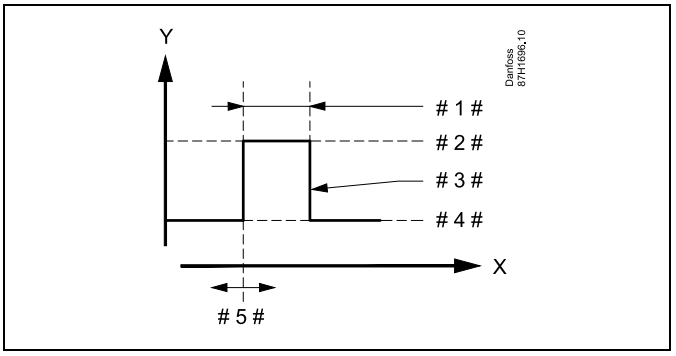
ON: Information about the desired flow temperature is sent to the master controller.

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.

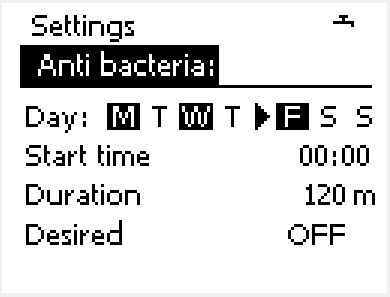
When the controller acts as a slave, its address must be 1, 2, 3 ... 9 in order to send the desired temperature to the master (see the section ‘Miscellaneous’, ‘Several controllers in the same system’).

5.8 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.

5.9 Alarm

Many applications in the ECL Comfort 210 and 310 series have an alarm function. The alarm function typically activates relay 4 (ECL Comfort 210) or relay 6 (ECL Comfort 310).

The alarm relay can activate a lamp, a horn, an input to an alarm transmitting device etc.

The relay in question is activated as long as the alarm condition is present.

Typical alarms:

- Actual flow temperature differs from the desired flow temperature.

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

5.9.1 Temp. monitor.

MENU > Settings > Alarm

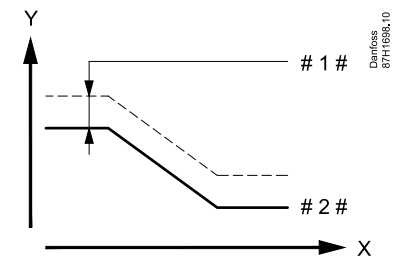
Upper difference	**1x147**
The alarm is activated if the actual flow temperature increases more than the set difference (acceptable temperature difference above the desired flow temperature). See also 'Delay'.	

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

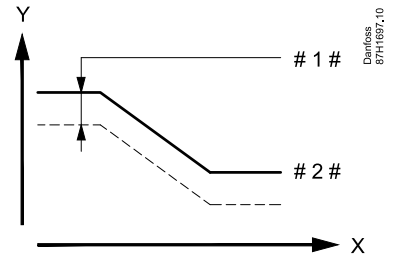
Lower difference	**1x148**
The alarm is activated if the actual flow temperature decreases more than the set difference (acceptable temperature difference below the desired flow temperature). See also 'Delay'.	

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*

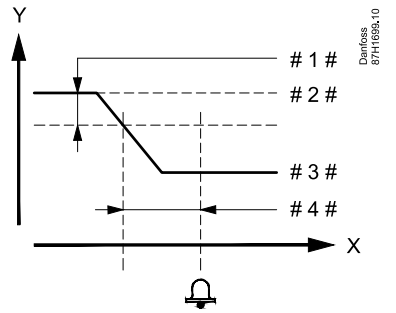
MENU > Settings > Alarm

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.

MENU > Settings > Alarm

Alarm value	1x636
A fire thermostat can be connected to the S8 input. When the temperature, measured by the fire thermostat, gets above the set value, the S8 input will be activated. *The fire alarm can be activated when the contacts in the fire thermostat open or close.*	

See Appendix “Parameter ID overview”

0: The fire alarm is activated when the contacts in the fire thermostat close.

1: The fire alarm is activated when the contacts in the fire thermostat open.

An active fire alarm is indicated by a 🔔 in the display.

S8 input status:
MENU > Common controller > System > Raw input overview > S8:
0 = Input activated. 1 = input not activated

See also 'Alarm time-out', parameter 1x637.

MENU > Settings > Alarm

Alarm time-out	1x637
The alarm is activated when the alarm reason has been present for a longer time (in seconds) than the set value.	

See Appendix “Parameter ID overview”

Value: Set the alarm time-out

5.10 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

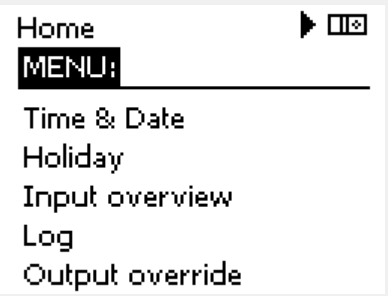
6.1 Introduction to 'Common controller settings'

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.

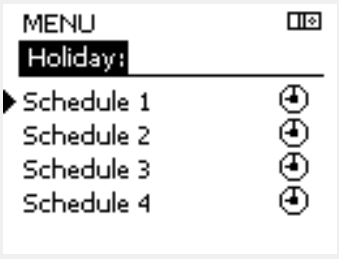
Selectable modes are Comfort, Saving, Frost protection or Comfort 7-23 (before 7 and after 23, the mode is scheduled).

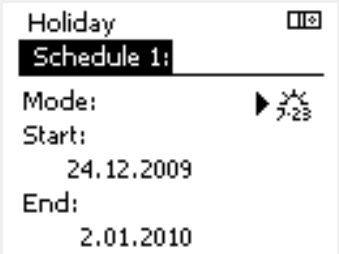
How to set your holiday schedule:

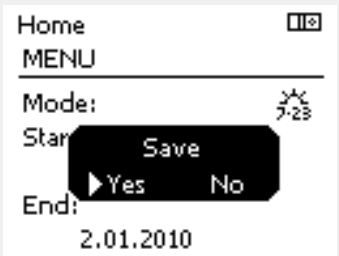
Action:	Purpose:	Examples:
	Choose 'MENU'	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose a circuit or 'Common controller settings'	
	Heating	
	DHW	
	Common controller settings	
	Confirm	
	Go to 'Holiday'	
	Confirm	
	Choose a schedule	
	Confirm	
	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":

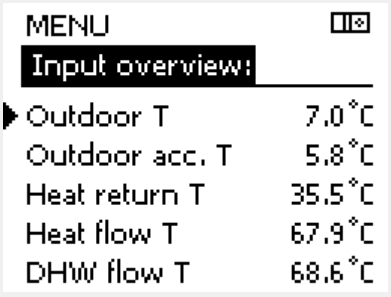
1. Go to ECA MENU
2. Move cursor to "Clock" symbol
3. Select the "Clock" symbol
4. Choose and select one of 4 override functions
5. Below the override symbol: Set hours or date
6. Below hours / date: Set desired room temperature for the override period

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.

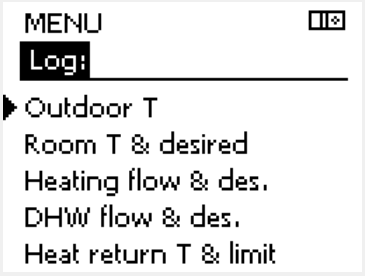
6.5 Log

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.

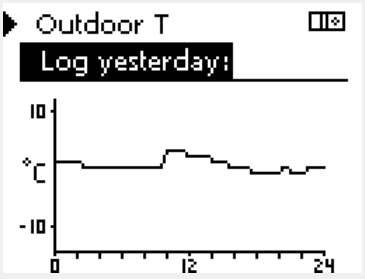
The log function (temperature history) allows you to monitor the logs of today, yesterday, the past 2 days as well as the past 4 days for the connected sensors.

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

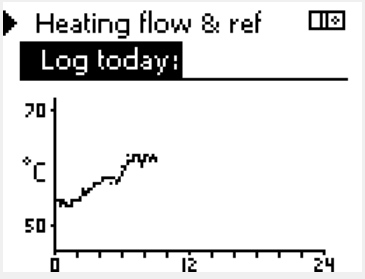
The log function is only available in the 'Common controller settings'.



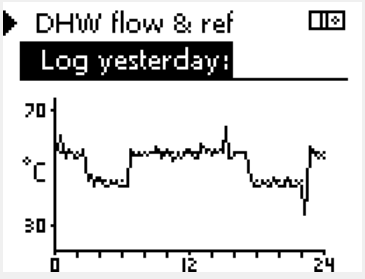
Example 1:
1 day log for yesterday showing the development in outdoor temperature during the past 24 hours.



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.



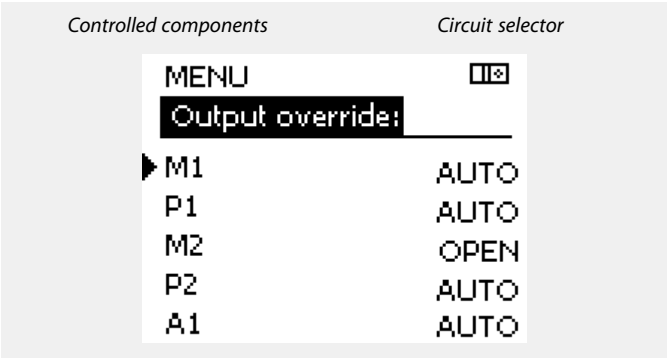
6.6 Output override

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.



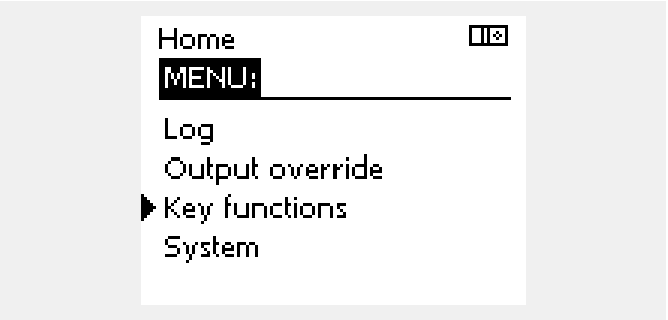
"Manual control" has higher priority than "Output override".

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.

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

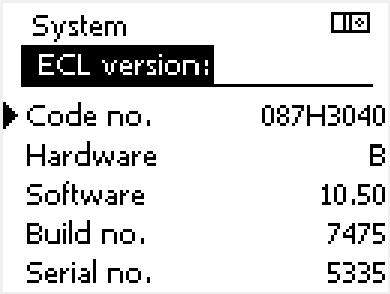
In 'ECL version' you will always be able to find an overview of the data related to your electronic controller.

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

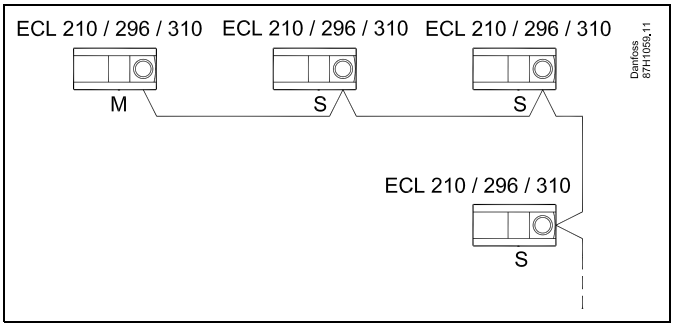
7.1 Several controllers in the same system

When ECL Comfort controllers are interconnected by means of the ECL 485 communication bus (cable type: 2 x twisted pair), the master controller will broadcast the following signals to the slave controllers:

- Outdoor temperature (measured by S1)
- Time and date
- DHW tank heating / charging activity

Furthermore, the master controller can receive information about:

- the desired flow temperature (demand) from slave controllers
- and (as from ECL controller version 1.48) DHW tank heating / charging activity in slave controllers



Situation 1:
SLAVE controllers: How to make use of the outdoor temperature signal sent from the MASTER controller

The slave controllers only receive information about outdoor temperature and date / time.

SLAVE controllers:
Change the factory set address from 15 to address 0.

- In ☐⊙, go to System > Communication > ECL 485 addr.

ECL 485 addr. (master / slave address)		**2048**
Circuit	Setting range	**Choose**
☐⊙	0 ... 15	**0**

ECL 485 bus cable
Maximum recommended length of the ECL 485 bus is calculated like this:

Subtract "Total length of all input cables of all ECL controllers in the master - slave system" from 200 m.

Simple example for total length of all input cables, 3 x ECL:

1 x ECL	Outdoor temp. sensor:	15 m
3 x ECL	Flow temp. sensor:	18 m
3 x ECL	Return temp. sensor:	18 m
3 x ECL	Room temp. sensor:	30 m
Total:		81 m

Maximum recommended length of the ECL 485 bus:
200 - 81 m = 119 m

In a system with MASTER / SLAVE controllers, only one MASTER controller with address 15 is allowed.

If by mistake more MASTER controllers are present in an ECL 485 communication bus system, decide which controller is to be MASTER. Change the address in the remaining controllers. However, the system will operate but not be stable with more than one MASTER controller.

In the MASTER controller, the address in 'ECL 485 addr. (master / slave address)', ID no. 2048, must always be 15.
Navigation:

- In ☐⊙, go to System > Communication > ECL 485 addr.

SLAVE controllers must be set to another address than 15:
Navigation:

- In ☐⊙, go to System > Communication > ECL 485 addr.

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

Situation 2:
SLAVE controller: How to react on a DHW tank heating / charging activity sent from the MASTER controller

The slave receives information about a DHW tank heating / charging activity in the master controller and can be set to close the selected heating circuit.

ECL controller versions 1.48 (as from August 2013):
The master receives information about DHW tank heating / charging activity in the master controller itself and also slaves in the system.
This status is broadcasted to all ECL controllers in the system and each heating circuit can be set to close the heating.

SLAVE controller:
Set the desired function:

- In circuit 1 / circuit 2, go to 'Settings' > 'Application' >'DHW priority':

DHW priority (closed valve / normal operation)		**11052 / 12052**
Circuit	Setting range	**Choose**
1 / 2	OFF / ON	**OFF / ON**

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

ON: The valve in the heating circuit is closed during active DHW heating / charging in the master / slave system.

Situation 3:
SLAVE controller: How to make use of the outdoor temperature signal and send information about the desired flow temperature back to the MASTER controller

The slave controller receives information about outdoor temperature and date / time. The master controller receives information about the desired flow temperature from slave controllers with an address from 1 ... 9:

SLAVE controller:

- In ⊡⊙, go to System > Communication > ECL 485 addr.
- Change the factory set address from 15 to an address (1 ... 9). Each slave must be configured with its own address.

ECL 485 addr. (master / slave address)		**2048**
Circuit	Setting range	**Choose**
⊡⊙	0 ... 15	**1 ... 9**

Furthermore, each slave can send information about the desired flow temperature (demand) in each circuit back to the master controller.

SLAVE controller:

- In the circuit in question, go to Settings > Application > Send desired T
- Choose ON or OFF.

Send desired T		**11500 / 12500**
Circuit	Setting range	**Choose**
1 / 2	OFF / ON	**ON or OFF**

OFF: Information about the desired flow temperature is not sent to the master controller.

ON: Information about the desired flow temperature is sent to the master controller.

In the MASTER controller, the address in 'ECL 485 addr. (master / slave address)', ID no. 2048, must always be 15.

7.2 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).

7.3 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.

7.4 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]	-

7.5 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.

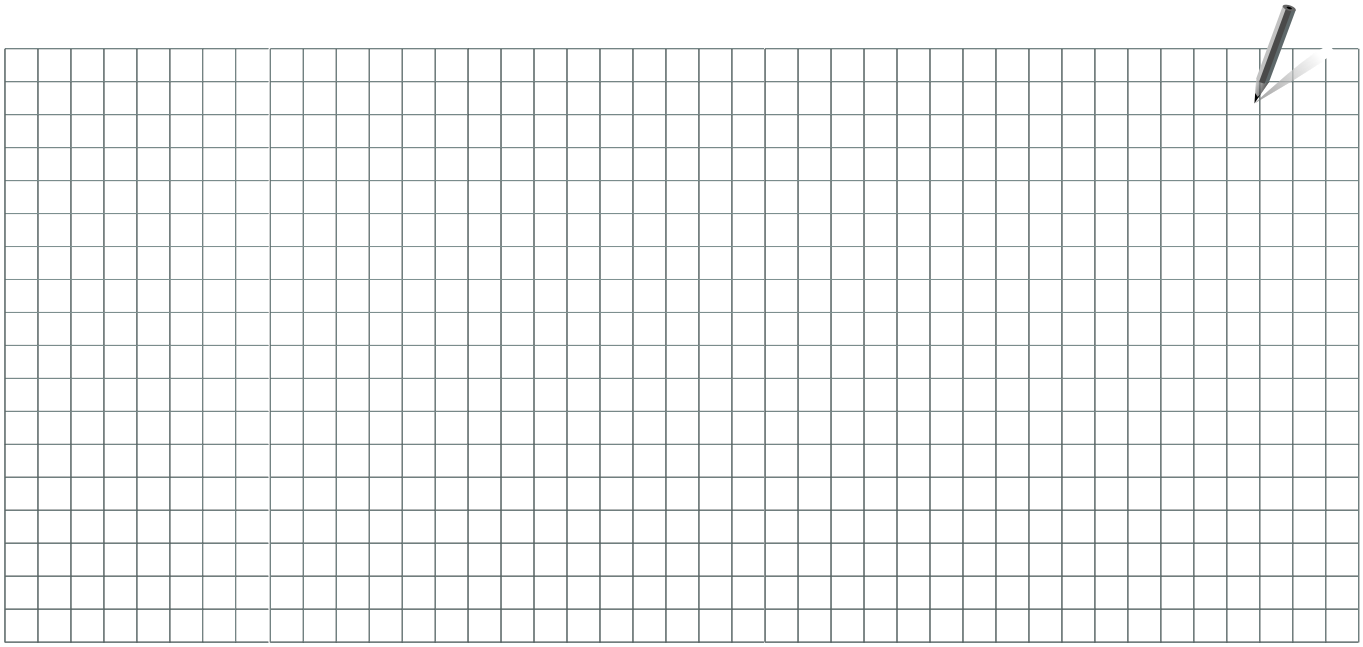
Remedy: Disconnect (remove from its base) the ECA 30. If ECL 310B, then only one ECA 30 should be connected.

7.6 Parameter ID overview

A217.x or A317.x— **x** refers to the subtypes listed in the column.

ID	Parameter Name	A217.x	A317.x	Setting range	Factory	Unit	Own settings	
11022	P exercise	1, 2	1, 2	OFF ; ON	ON			71
	-||-	3		OFF ; ON	OFF			
11023	M exercise	1, 2, 3	1, 2	OFF ; ON	OFF			71
11030	Limit	1, 2	1, 2	10 ... 110	40	°C		59
	-||-	3		10 ... 120	30	°C		
11035	Infl. - max.	1, 2	1, 2	-9.9 ... 9.9	-2.0			59
	-||-	3		-9.9 ... 9.9	0.0			
11036	Infl. - min.	1, 2, 3	1, 2	-9.9 ... 9.9	0.0			60
11037	Adapt. time	1, 2, 3	1, 2	OFF, 1 ... 50	25	Sec		61
11040	P post-run	3		0 ... 99	3	Min		71
11041	DHW P post-run	1, 2	1, 2	0 ... 30	0	Min		71
11042	Char. P post-run	2	2	0 ... 30	1	Min		72
11054	Cont. T control	1, 2	1, 2	OFF ; ON	OFF			72
11055	Circ. P priority	1, 2	1, 2	OFF ; ON	OFF			72
11068	Flow T adapt time	2	2	OFF, 1 ... 50	20	Sec		52
11076	Circ. P frost T	1, 2, 3	1, 2	OFF, -10 ... 20	2	°C		72
11085	Priority	3		OFF ; ON	OFF			61
11093	Frost pr. T	1, 2, 3	1, 2	5 ... 40	10	°C		73
11094	Open time	3		OFF, 0.1 ... 25.0	OFF	Sec		66
11095	Close time	3		OFF, 0.1 ... 25.0	OFF	Sec		66
11096	Tn (idle)	3		1 ... 999	120	Sec		67
11097	Supply T (idle)	3		OFF ; ON	OFF			67
11109	Input type	1, 2		OFF ; IM1	OFF			62
	-||-	3		OFF ; IM1 ; IM2 ; IM3 ; IM4 ; EM1 ; EM2 ; EM3 ; EM4 ; EM5	OFF			
	-||-		1, 2	EM1 ; EM2 ; EM3 ; EM4 ; EM5 ; OFF	OFF			
11111	Limit	1, 2, 3	1, 2	0.0 ... 999.9	999.9			63
11112	Adapt. time	1, 2, 3	1, 2	OFF, 1 ... 50	OFF	Sec		63
11113	Filter constant	1, 2, 3	1, 2	1 ... 50	10			63
11114	Pulse	1, 2, 3		OFF, 1 ... 9999	OFF			64
11115	Units	1, 2, 3	1, 2	ml, l/h ; l, l/h ; ml, m3/h ; l, m3/h ; Wh, kW ; kWh, kW ; kWh, MW ; MWh, MW ; MWh, GW ; GWh, GW	ml, l/h			64
11122	Day:	1, 2, 3	1, 2	0 ... 127	0			
11123	Start time	1, 2, 3	1, 2	0 ... 47	0			
11124	Duration	1, 2, 3	1, 2	10 ... 600	120	Min		

ID	Parameter Name	A217.x	A317.x	Setting range	Factory	Unit	Own settings	
11125	Desired T	1, 2, 3	1, 2	OFF, 10 ... 110	OFF	°C		
11141	Ext. input	1, 2, 3		OFF ; S1 ; S2 ; S3 ; S4 ; S5 ; S6 ; S7 ; S8	OFF			73
	-||-		1, 2	OFF ; S1 ; S2 ; S3 ; S4 ; S5 ; S6 ; S7 ; S8 ; S9 ; S10	OFF			
11142	Ext. mode	1, 2, 3	1, 2	COMFORT ; SAVING	COM-FORT			74
11147	Upper difference	1, 2, 3	1, 2	OFF, 1 ... 30	OFF	K		80
11148	Lower difference	1, 2, 3	1, 2	OFF, 1 ... 30	OFF	K		80
11149	Delay	1, 2, 3	1, 2	1 ... 99	10	Min		81
11150	Lowest temp.	1, 2, 3	1, 2	10 ... 50	30	°C		81
11152	Max. charge T	1, 2	1, 2	10 ... 110	80	°C		52
11173	Auto tuning	3		OFF ; ON	OFF			67
11174	Motor pr.	1, 2, 3	1, 2	OFF, 10 ... 59	OFF	Min		68
11177	Temp. min.	3		10 ... 150	10	°C		56
11178	Temp. max.	3		10 ... 150	90	°C		56
11184	Xp	1, 2, 3	1, 2	5 ... 250	40	K		
11185	Tn	1, 2	1, 2	1 ... 999	30	Sec		69
	-||-	3		1 ... 999	20	Sec		
11186	M run	1, 2	1, 2	5 ... 250	30	Sec		69
	-||-	3		5 ... 250	20	Sec		
11187	Nz	1, 2, 3	1, 2	1 ... 9	3	K		69
11189	Min. act. time	1, 2, 3	1, 2	2 ... 50	3			70
11193	Charge difference	1, 2	1, 2	1 ... 50	15	K		52
11194	Stop difference	1, 2	1, 2	-50 ... 50	3	K		53
11195	Start difference	1, 2	1, 2	-50 ... -1	-3	K		54
11500	Send desired T	1, 2, 3	1, 2	OFF ; ON	ON			76
11623	Digital		1, 2	0 ... 1	0			
11636	Alarm value		1, 2	0 ... 1	0			81
11637	Alarm time-out		1, 2	0 ... 240	30	Sec		82



Installer:

By:

Date:

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