ENGINEERING TOMORROW

Operating Guide

ECL Comfort 310, application P318

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1.1 Important safety and product information

1.1.1 Important safety and product information

This Operating Guide is associated with the ECL Application Key P318 (code no. 087H3835).

The ECL Application Key P318 for Domestic Hot Water (DHW) temperature control contains 6 subtypes:

- P318.1, buffer based temperature control
- P318.2, buffer and mixing based temperature control
- P318.5, advanced DHW buffer control. MULTI-HEAT (Additional buffer tank from extra heat source)
- P318.10, advanced temperature control
- P318.11, temperature controlled flow system with layer control and buffer charging
- P318.21, advanced Domestic Hot Water (DHW) temperature control*)

See the Installation Guide for application diagrams and electrical connections.
*) Operating guide for key P318.21 can be found in a separate document.
The application diagrams show mandatory temperature sensors with an underscore; example S3.

The described functions are realized in ECL Comfort 310 which also allows M-bus, Modbus and Ethernet (Internet) communication. The Application Key P318 complies with ECL Comfort 310 controllers as of firmware version 1.11. The firmware (controller software) is visible at start-up of the controller and in 'Common controller settings' in 'System'.

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

The application P318 works with additional Internal I/O modules:

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

A pump can also be considered as a circulator.

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

* PWM = Pulse Width Modulation

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

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

The set-up of input type can be done by means of the Danfoss Software "ECL Tool".
Navigation: Danfoss.com > Products & Solutions > Products > District Heating and Cooling > Documentation > Tools & Software > ECL Tool.
The URL is: *https://www.danfoss.com/en/service-and-support/downloads*

ECL Comfort 310 is available as:

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

The B-type has no display and dial.

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

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

Internal I/O modules:

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

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

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

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

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).

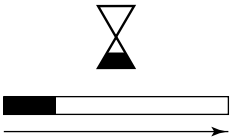
The warning sign is used to emphasize special conditions that should be taken into consideration.

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

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

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

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



Progress bar

During update:

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

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

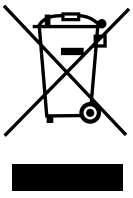
°C (degrees Celsius) is a measured temperature value whereas K (Kelvin) often is used for temperature differences.

The ID no. is unique for the selected parameter.

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

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

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



Disposal Note

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

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

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

2.0 Installation

2.1 Before you start

The ECL application key P318 contains 6 subtypes: **P318.1, P318.2, P318.5, P318.10, P318.11 and P318.21.**

The basic principles for application **P318.1:**

Temperature control of DHW buffer

The desired DHW temperature at S6 (set in circuit 1, favorite display 1) determines the buffer charging procedure. The buffer temperature sensors S6 and S8, the supply temperature sensor S2 and the charging temperature sensor S3 are the most important sensors and must be connected. If one of the mentioned temperature sensors is not connected, the control valve M1 will close; alternatively, the control pump P1 / V1 will stop.
The charging temperature at S3 is based on the desired DHW temperature at S6 and a set charging difference.
The application allows internal or external DHW circulation. When connected for external circulation, the desired S3 temperature is the same as the desired DHW temperature, when charging is not in progress.
Optional: Temperature control of the circulation pipe at S9 ensures the desired temperature by means of ON / OFF control of pump P3 or speed control of pump V3. During the charging process the circulation pump can be switched OFF or run at a minimum speed.

Start buffer charging process:

1. Buffer temperature S6 temperature gets lower than ('Desired DHW temperature' + 'Start difference').

   An example: 60 °C + (-5) = 55 °C
2. X1 is switched ON
3. M1 opens either fully or to a preset position (alternatively, P1 / V1 is switched ON / preset speed) in order to increase the supply temperature S2. Return temperature limitation is respected.
4. P2 / V2 is switched ON when supply temperature S2 gets higher than ('Desired DHW temperature' + 'Pump start diff.').

   An example: 60 °C + 3 K = 63 °C

   V2 starts with minimum speed, for example 20 %.
5. M1 (or P1 / V1) controls the charging temperature at S3.
6. V2 increases the speed as long as the charging temperature S3 is higher than (desired charging temperature - 2 K).

Stop buffer charging process:

1. Buffer temperature S6 temperature gets higher than (2 K + 'Desired DHW temperature' + 'Start difference')

   AND

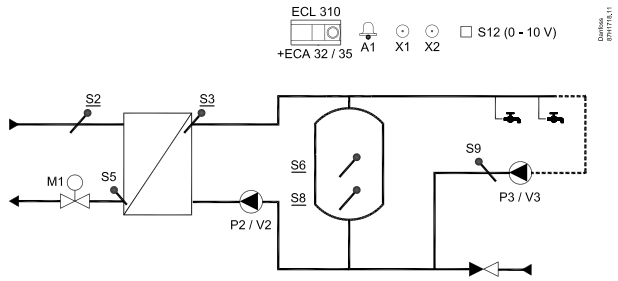
   Lower buffer temperature S8 gets higher than ('Desired DHW temperature' + 'Stop difference).

   An example: S6 temperature higher than (2 + 60 °C + (-5) =

   57 °C) **AND** (60 °C + (-8) = 52 °C)
2. P2 is switched OFF, respecting 'Char. P post-run'. V2 changes to 0 %.

   NOTE: Post-run is not respected if charging temperature S3 is lower than desired charging temperature.
3. X1 is switched OFF.
4. M1 closes (alternatively, P1 / V1 stops) or maintains the desired temperature at S3.

P318.1, ex. a, application with control valve and internal DHW circulation:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
M1	*Motorized control valve (3-point controlled)*
X1	*Heat demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

By means of a week schedule, the DHW circulation can be ON / OFF controlled.
The motorized control valve M1 is opened gradually when the charging temperature is lower than the desired charging temperature and vice versa.
Alternatively, the control pump P1 / V1 is increased in speed when the charging temperature is lower than the desired charging temperature and vice versa.

The return temperature S5 can be limited, for example not to be too high. If so, the desired charging temperature at S3 can be adjusted (typically to a lower value); this results in a gradual closing of the motorized control valve or, alternatively, a lower speed of the control pump.

DHW circulation temperature control:
If DHW circulation return temperature sensor S9 is not connected, the ON-OFF controlled pump will be ON. A speed controlled pump can be limited to a desired speed by means of V.out max. and V.out min settings.

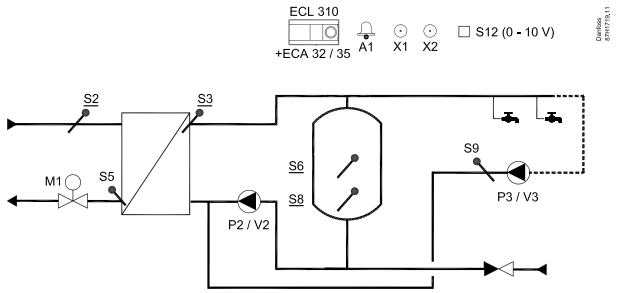
The ON-OFF output X1 is ON at DHW heating demand.

As an option, the desired DHW temperature at S6 can be set externally. A voltage signal (1 - 10 Volt) can be applied to input S12 (ECA 32 / 35). The scale for voltage versus temperature can be set.

An anti-bacteria function for the DHW buffer is available for activation on selected days of the week.
The anti-bacteria function can be set to include the DHW circulation.

The ON-OFF output X2 is ON at active anti-bacteria function.

P318.1, ex. b, application with control valve and external DHW circulation:



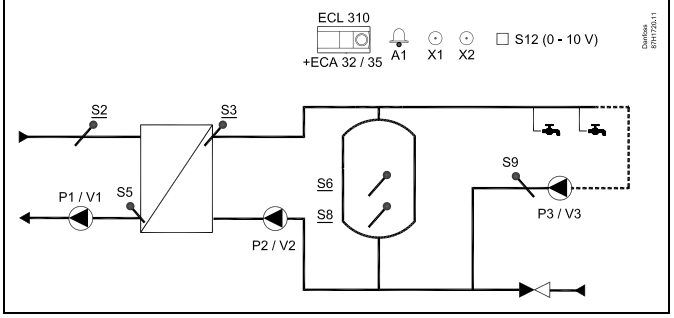
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
M1	*Motorized control valve (3-point controlled)*
X1	*Heat demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

P318.1, ex. c, application with control pump and internal DHW circulation:



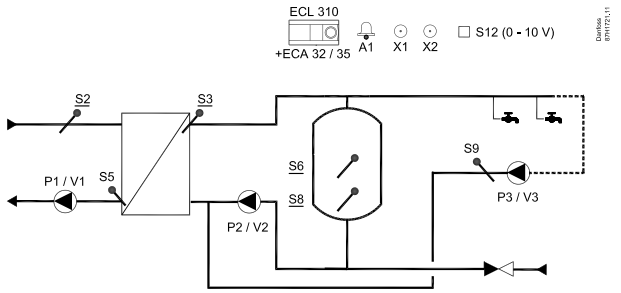
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
P1	*Control pump (ON-OFF controlled)*
V1	*Speed control of control pump (0 – 10 V or PWM)*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
X1	*Heat demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

P318.1, ex. d, application with control pump and external DHW circulation:



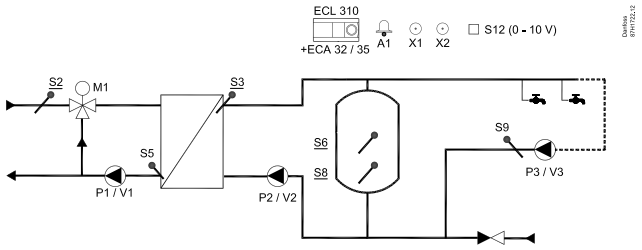
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
P1	*Control pump (ON-OFF controlled)*
V1	*Speed control of control pump (0 – 10 V or PWM)*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
X1	*Heat demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

P318.1, ex. e: Primary side is a combination of a 3-port control valve and a control pump. Internal DHW circulation:



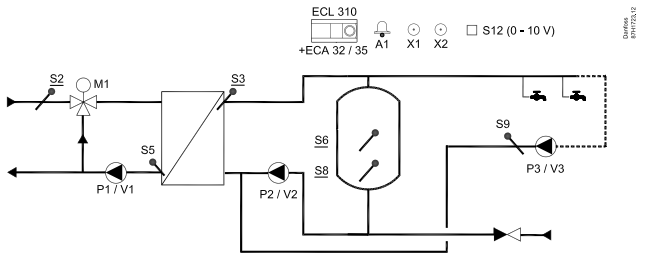
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
M1	*Motorized 3-port control valve (3-point controlled)*
P1	*Control pump (ON-OFF controlled)*
V1	*Speed control of control pump (0 – 10 V or PWM)*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
X1	*Heat demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

P318.1, ex. f: Primary side is a combination of a 3-port control valve and a control pump. External DHW circulation:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
M1	*Motorized 3-port control valve (3-point controlled)*
P1	*Control pump (ON-OFF controlled)*
V1	*Speed control of control pump (0 – 10 V or PWM)*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
X1	*Heat demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

Recommendations / considering settings:

	Int. / Ext. DHW circ. "Cont. T control" (11054) *	**Speed, P1 / V1 "V out max." / "V out min." (11165 / 11167) ****	**Actuator running time "M run" (11186) *****
P318.1, ex. a	OFF		X
P318.1, ex. b	ON		X
P318.1, ex. c	OFF		
P318.1, ex. d	ON		
P318.1, ex. e	OFF	Max. / min. to same value "Adapt time" (11065) *: OFF	X
P318.1, ex. f	ON	Max. / min. to same value "Adapt time" (11065) *: OFF	X

*) Circuit 1 > MENU > Settings > Application >

**) Circuit 1 > MENU > Settings > Control parameters 1 >

***) Circuit 1 > MENU > Settings > Control parameters 1 >

The basic principles for application **P318.2:**

DHW temperature and buffer control

If the measured DHW temperature S4 is lower than the desired DHW temperature (set in circuit 1, favorite display 1), the motorized control valve M2 opens gradually for more water from the buffer tank.
Cold tap water is, via the heat-exchanger, used to control the DHW temperature S4 if the temperature gets higher and will gradually close the control valve M2.

The DHW temperature sensor S4, the charging temperature sensor S3, the supply temperature sensor S2 and the buffer temperature sensors S6 and S8 are the most important sensors and must be connected. If one of the mentioned temperature sensors is not connected, the control valve M1 will close; alternatively, the control pump P1 / V1 will stop.

The buffer charging temperature at S3 is based on the set desired buffer temperature at S6 (set in circuit 2, favorite display 1).

Optional: Temperature control of the circulation pipe at S9 ensures the desired temperature by means of ON / OFF control of pump P3 or speed control of pump V3.

Start buffer charging process:

1. Buffer temperature S6 temperature gets lower than ('Desired charging temperature' + 'Start difference').

   An example: 70 °C + (-5) = 65 °C
2. X1 is switched ON
3. M1 opens (alternatively, P1 / V1 is switched ON / preset speed) in order to increase the supply temperature

   S2. Return temperature limitation is respected.
4. P2 / V2 is switched ON when supply temperature S2 gets higher than ('Desired charging temperature' + 'Pump start diff.').

   An example: 70 °C + 3 K = 73 °C

   V2 starts with minimum speed, for example 20 %.
5. M1 (or P1 / V1) controls the charging temperature at S3.
6. V2 increases the speed as long as the charging temperature S3 is higher than (desired charging temperature - 2 K).

Stop buffer charging process:

1. Buffer temperature S6 temperature gets higher than (2 K + 'Desired charging temperature' + 'Start difference)

   AND

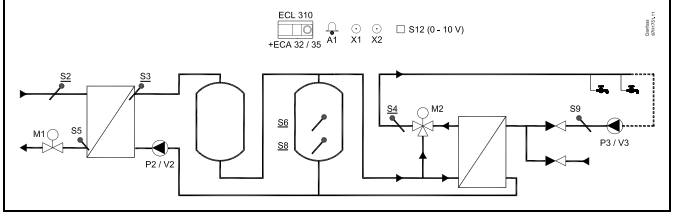
   Lower buffer temperature S8 gets higher than ('Desired DHW temperature' + 'Stop difference).

   An example: S6 temperature higher than (2 + 70 °C + (-5) = 67 °C)

   AND S8 temperature higher than (70 °C + (-8) = 62 °C).
2. P2 is switched OFF, respecting 'DHW P post-run'. V2 changes to 0 %.

   NOTE: Post-run is not respected if charging temperature S3 is lower than desired charging temperature.
3. X1 is switched OFF.
4. M1 closes (alternatively, P1 / V1 stops).

P318.2, ex. a, application with control valve for buffer temperature control:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S4	*(mandatory) DHW temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
M1	*Motorized control valve (3-point controlled)*
M2	*Motorized control valve (3-point controlled)*
X1	*Buffer heating demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

By means of a week schedule, the DHW circulation can be ON / OFF controlled.

The motorized control valve M1 is opened gradually when the charging temperature is lower than the desired charging temperature and vice versa.
Alternatively, the control pump P1 / V1 is increased in speed when the charging temperature is lower than the desired charging temperature and vice versa.
The return temperature S5 can be limited, for example not to be too high. If so, the desired charging temperature at S3 can be adjusted (typically to a lower value); this results in a gradual closing of the motorized control valve or, alternatively, a lower speed of the control pump.

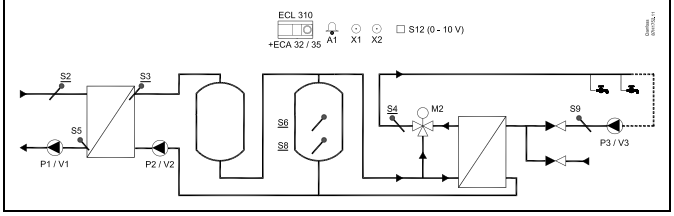
As an option, the desired buffer temperature at S6 can be set externally. A voltage signal (1 - 10 Volt) can be applied to input S12 (ECA 32 / 35). The scale for voltage versus temperature can be set.

The ON-OFF output X1 is ON at buffer heating demand.

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

The anti-bacteria function can be set to include the DHW circulation.
The ON-OFF output X2 is ON when anti-bacteria function is active.

P318.2, ex. b, application with control pump for buffer temperature control:



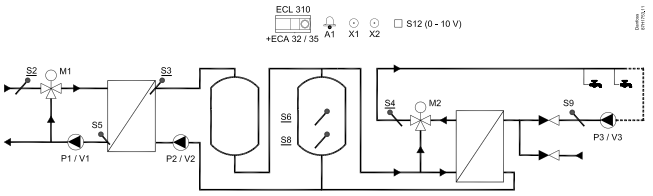
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S4	*(mandatory) DHW temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
P1	*Control pump (ON-OFF controlled)*
V1	*Speed control of control pump (0 – 10 V or PWM)*
M2	*Motorized control valve (3-point controlled)*
X1	*Buffer heating demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

P318.2, ex. c, application with a combination of a 3-port control valve and a control pump for buffer temperature control:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S4	*(mandatory) DHW temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
M1	*Motorized control valve (3-point controlled)*
P1	*Control pump (ON-OFF controlled)*
V1	*Speed control of control pump (0 – 10 V or PWM)*
M2	*Motorized control valve (3-point controlled)*
X1	*Buffer heating demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

Recommendations / considering settings:

	Speed, P1 / V1 "V out max." / "V out min." (11165 / 11167) *	**Actuator running time M2 "M run" (14186) ****	**Actuator running time M1 "M run" (11186) *****
P318.2, ex. a		X	X
P318.2, ex. b		X	
P318.2, ex. c	Max. / min. to same value "Adapt time" (11065) *: OFF	X	X

*) Circuit 2 > MENU > Settings > Control parameters 1 >

**) Circuit 1 > MENU > Settings > Control parameters 2 >

***) Circuit 2 > MENU > Settings > Control parameters 1 >

The basic principles for application **P318.5:**

DHW temperature and buffer control with additional tank from extra heat source

The desired DHW temperature at S6 (set in circuit 1, favorite display 1) determines the buffer charging procedure. The temperature sensors S6 and S8, the supply temperature sensor S2, charging temperature sensor S3 and S7 as external heat source sensor, are the most important sensors and must be connected. If one of the mentioned temperature sensors — S2, S3, S6, S8 — are not connected or faulty, the control valve M1 will close; alternatively, the control pump P1 / V1 will stop.
Charging temperature on S3 sensor is based on desired DHW temperature at S6 and a set charging difference.

The application allows internal or external DHW circulation. When connected for external circulation, the desired S3 temperature is the same as the desired DHW temperature when charging is in progress.

Cold tap water is connected to main buffer and heat-exchanger for external heat source,
S6 is used to control buffer temperature and determine which heat source that will be used based on temperature S7.

Optional: Temperature control of the circulation pipe at S9 ensures the desired temperature by means of ON / OFF control of pump P3 or speed control of pump V3. During the charging process the circulation pump can be switched OFF or run at a minimum speed.

If the measured Supply temperature S2 is lower than the desired DHW temperature (set in circuit 1, favorite display 1), the motorized control valve M1 opens gradually or P1 / V1 increases the speed of the pump for more water in utility side.

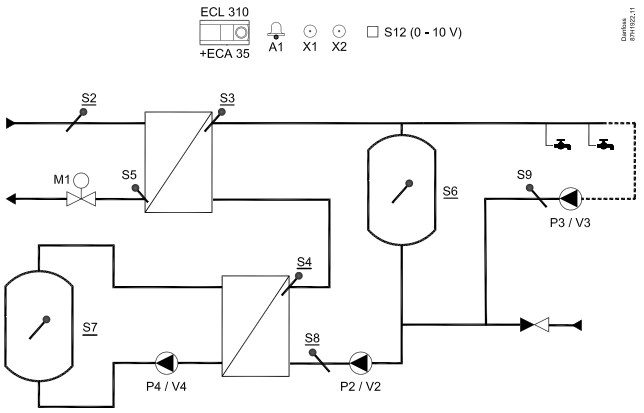
S4 is used to extract the buffer temperature S7. If the temperature at S7 gets higher than the charging reference the calculated charging temperature will start control pump P2 / V2 and motorized valve M2.

P2 / V2 is controlled to reference point of sensor S3 when DHW charging is active. If the temperature at sensor S3 is above reference point lowered for pump start difference and value is increasing (declining), speed of pump P2/V2 is gradually increasing or decreasing according to temperature.

P4 / V4 (combined with M2) is activated or opening according to difference over secondary hex for additional buffer tank temperature extraction to supply temperature at sensor S6. If temperature at S7 is lower than desired charging temperature with pump start difference or this sensor is missing / faulty temperature cannot be extracted from additional buffer tank.

The buffer charging temperature at S3 or additional heat source S4 / S7 is based on the set desired buffer temperature at S6. If S7 sensor is shorted or faulty then only main heat exchanger can be active.

P318.5, ex. a, advanced DHW buffer control. MULTI-HEAT. Additional buffer tank from extra heat source:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor (Suyppy T)*
S3	*(mandatory) Charging temperature sensor (Charge T)*
S4	*(mandatory) DHW temperature sensor (Flow T)*
S5	*Return temperature sensor (prim. Return sensor)*
S6	*(mandatory) Buffer temperature sensor (tank temp.)*
S7	*(mandatory) Alternative buffer T (Buffer top T)*
S8	*(mandatory) Lower buffer temperature sensor (Tank lower T)*
S9	*DHW circulation return temperature sensor (Circ. Return T)*
S12	*0 - 10 V input for desired temperature at S6*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
P4	*Alternative buffer pump (Circulation pump) (ON-OFF controlled)*
V4	*Speed control of circulation pump (0 - 10 V or PWM)*
M1	*Motorized control valve (3-point controlled)*
M2	*Motorized control valve (3-point controlled)*
X1	*Buffer heating demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

Start buffer charging process:

1. Buffer temperature S6 temperature gets lower than ('Desired charging temperature' + 'Start difference').

   An example: 70 °C + (-5) = 65 °C

2. X1 is switched ON

3. Depending on buffer storage tank temperature S7, P2/V2 and P4/V4 (M2) or M1 (or P1 / V1) is activated.

   3a. M1 stays closed when charging starts and S7 is higher than reference charging temperature ('Desired charging temperature' + 3K + 'Pump start diff.')

   3b. M1 opens (alternatively, P1 / V1 is switched ON / preset speed) to increase the supply temperature S2. Return temperature S5 limitation is respected

4. P2 / V2 is switched ON when supply temperature S2 gets higher than ('Desired charging temperature' + 'Pump start diff.').

   An example: 70 °C + 3 K = 73 °C

   V2 starts with minimum speed, for example 20 %.

5. M1 (or P1 / V1) controls the charging temperature at S3.

6. V2 increases the speed if the charging temperature S3 is higher than desired charging temperature - 2 K and vice versa.

7. P4 / V4 is switched on or gradually increased if temperature S7 is higher than S4.

Stop buffer charging process:

1. Buffer temperature S6 temperature gets higher than (2 K + 'Desired charging temperature' + 'Start difference)

   AND

   Lower buffer temperature S8 gets higher than ('Desired DHW temperature' + 'Stop difference).

   An example: S6 temperature higher than (2 + 70 °C + (-5) = 67 °C)

   AND S8 temperature higher than (70 °C + (-8) = 62 °C).

2. P2 is switched OFF, respecting 'DHW P post-run'. V2 changes to 0 %.

   NOTE: Post-run is not respected if charging temperature S3 is lower than desired charging temperature.

3. X1 is switched OFF.

4. P4 / V4 stops (M2 alternatively closes), P2 / V2 stops with overrun OR M1 closes (alternatively, P1 / V1 stops).

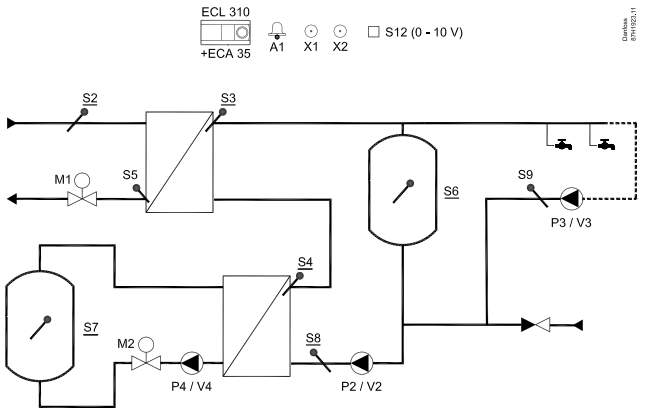
By means of a week schedule, the DHW circulation can be ON /OFF controlled.

The motorized control valve M1 is opened gradually when the charging temperature is lower than the desired charging temperature and vice versa.
Alternatively, the control pump P1 / V1 is increased in speed when the charging temperature is lower than the desired charging temperature and vice versa.
The return temperature S5 can be limited, for example not to be too high. If so, the desired charging temperature at S3 can be adjusted (typically to a lower value); this results in a gradual closing of the motorized control valve or, alternatively, a lower speed of the control pump.

DHW circulation temperature control:
If DHW circulation return temperature sensor S9 is not connected, the ON-OFF controlled pump P3 / V3 will be ON and speed controlled V3 will be on V.out max. A speed-controlled pump can be limited to a desired speed by means of V.out max. and V.out min. settings.
The ON-OFF output X1 is ON at DHW heating demand for source in utility or boiler side to charge main buffer tank. If temperature is available from additional tank then X1 is not activated.
As an option, the desired DHW temperature at S6 can be set externally. A voltage signal (1 - 10 Volt) can be applied to input S12 (ECA 35). The scale for voltage versus temperature can be set.

An anti-bacteria function for the DHW buffer is available for activation on selected days of the week.
The anti-bacteria function can be set to include the DHW circulation.
The ON-OFF output X2 is ON at active anti-bacteria function.

P318.5, ex. b, advanced DHW buffer control. MULTI-HEAT. Additional buffer tank from extra heat source:



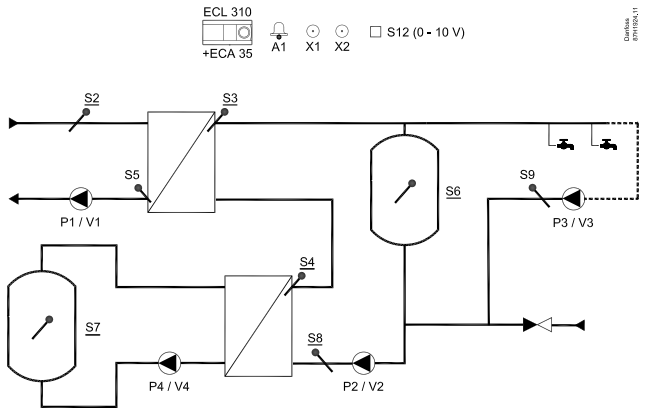
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S4	*(mandatory) DHW temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S7	*(mandatory) Alternative buffer T (Buffer top T)*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
P4	*Circulation pump (ON-OFF controlled)*
V4	*Speed control of circulation pump (0 - 10 V or PWM)*
M1	*Motorized control valve (3-point controlled)*
M2	*Motorized control valve (3-point controlled)*
X1	*Buffer heating demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

P318.5, ex. c, advanced DHW buffer control. MULTI-HEAT. Additional buffer tank from extra heat source:



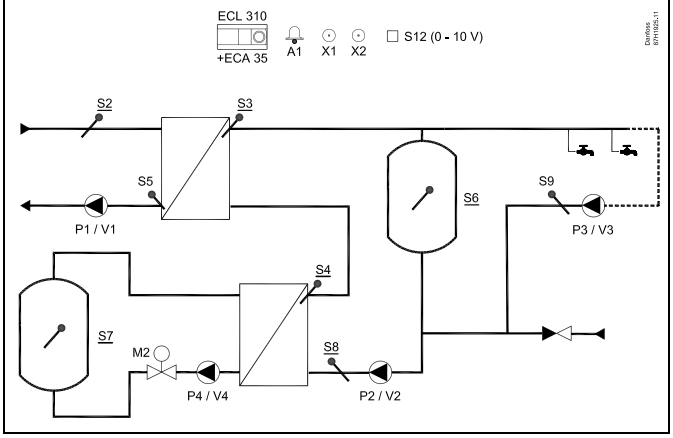
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S4	*(mandatory) DHW temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S7	*(mandatory) Alternative buffer T (Buffer top T)*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
P1	*Control pump (ON-OFF controlled)*
V1	*Speed control of control pump (0 – 10 V or PWM)*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
P4	*Circulation pump (ON-OFF controlled)*
V4	*Speed control of circulation pump (0 - 10 V or PWM)*
M2	*Motorized control valve (3-point controlled)*
X1	*Buffer heating demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

P318.5, ex. d, advanced DHW buffer control. MULTI-HEAT. Additional buffer tank from extra heat source:



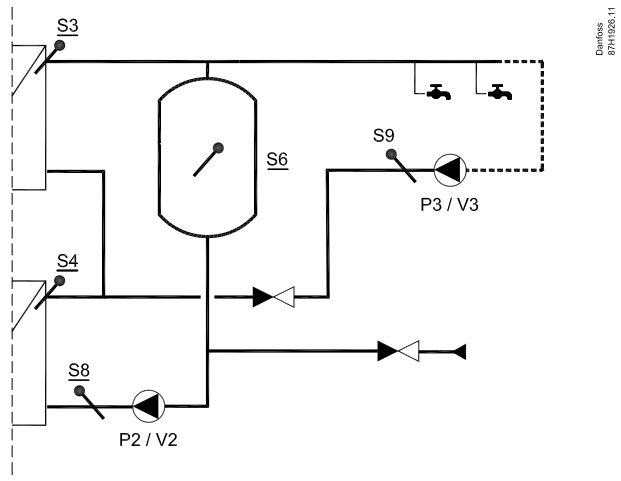
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*(mandatory) Supply temperature sensor*
S3	*(mandatory) Charging temperature sensor*
S4	*(mandatory) DHW temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S7	*(mandatory) Alternative buffer T (Buffer top T)*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S6*
P1	*Control pump (ON-OFF controlled)*
V1	*Speed control of control pump (0 – 10 V or PWM)*
P2	*Charging pump (ON-OFF controlled)*
V2	*Speed control of charging pump (0 - 10 V or PWM)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
P4	*Circulation pump (ON-OFF controlled)*
V4	*Speed control of circulation pump (0 - 10 V or PWM)*
M2	*Motorized control valve (3-point controlled)*
X1	*Buffer heating demand signal*
X2	*Anti-bacteria function is active*
A1	*Alarm*

P318.5, ex. a, b, c, d, advanced DHW buffer control. MULTI-HEAT. Additional buffer tank from extra heat source:



Drawing represents possible different connection of return circulation and connection of cold tap water.

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.

Recommendations / considering settings:

	Actuator running time M1 "M run" (11186) *	**Speed, P1 / V1"V out max." / "V out min." (11165 / 11167) ***	**Speed, P2 / V2 "V out max." / "V out min." (12165 / 12167) ****	**Speed, P4 / V4 "V out max." / "V out min." (14165 / 14167) ***	**Actuator running time M2 "M run" (14186) ***	**Speed, P3/ V3 "V out max." / "V out min." (13165 / 13167) *****
P318.5, ex. a	X		X	X		X
P318.5, ex. b	X		X	X	X	X
P318.5, ex. c		X	X	X		X
P318.5, ex. d		X	X	X	X	X

*) Circuit 1 > MENU > Settings > Control parameters 1 >

**) Circuit 1 > MENU > Settings > Control parameters 2 >

***) Circuit 2 > MENU > Settings > Control parameters 3 >

The basic principles for application **P318.10:**

Temperature control of DHW

The desired DHW temperature at S3 (set in circuit 1, favorite display 1) determines the temperature control.
The DHW flow temperature sensor S3 is the most important sensor and must be connected. If S3 is not connected, the control valve M1 will close; alternatively, the control pump P1 / V1 will stop.

Temperature control of the DHW circulation pipe at S9 ensures the desired temperature by means of speed control of pump P3 / V3.

A week schedule for switching the DHW circulation pump ON and OFF can be set.
If DHW circulation return temperature sensor S9 is not connected, the ON-OFF controlled pump will be ON regardless the schedule status.
A speed-controlled pump can be limited to a desired speed by means of V.out max. and V.out min settings.

The motorized control valve M1 is opened gradually when the DHW flow temperature is lower than the desired DHW temperature and vice versa.
Alternatively, the control pump P1 / V1 is increased in speed when the DHW flow temperature is lower than the desired DHW flow temperature and vice versa.

The return temperature S5 can be limited, for example not to be too high. If so, the desired DHW temperature at S3 can be adjusted (typically to a lower value); this results in a gradual closing of the motorized control valve or, alternatively, a lower speed of the control pump.

The supply temperature S2 is used to compensate the proportional band Xp in order to improve the temperature control at different supply temperatures.

The water flow signal from F1 can be used to override the control valve in order to optimize the DHW temperature control. This pro-active functionality compensates for the delay before the flow temperature sensor S3 measures a change in temperature.

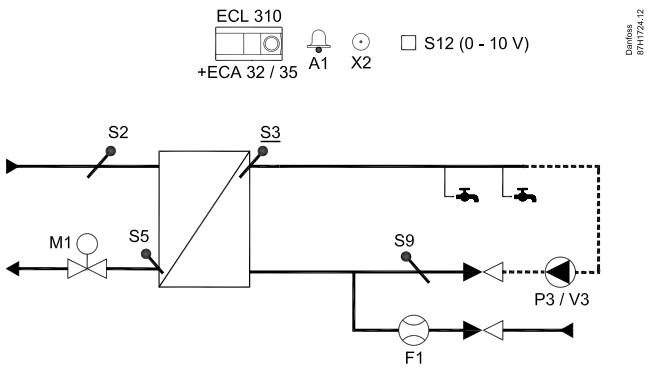
The water flow signal can also be utilized for control of the S3 temperature, even if there is no DHW circulation.

As an option, the desired DHW temperature can be set externally. A voltage signal (1 - 10 Volt) can be applied to input S12 (ECA 32 / 35). The scale for voltage versus temperature can be set.

An anti-bacteria function for the DHW circuit is available for activation on selected days of the week. The anti-bacteria function can be set to include the DHW circulation.

The ON-OFF output X2 is ON when anti-bacteria function is active.

P318.10, ex. a, DHW application with control valve:



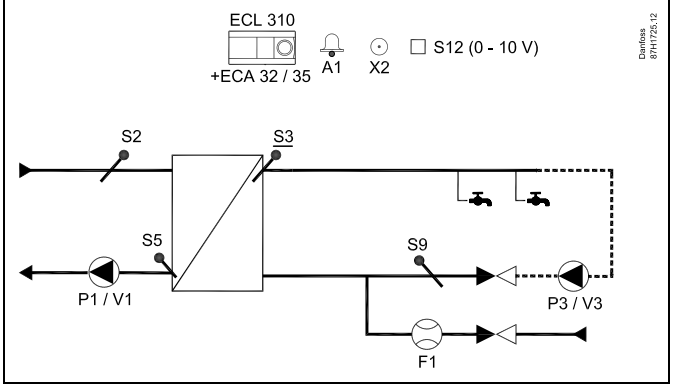
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*Supply temperature sensor*
S3	*(mandatory) DHW flow temperature sensor*
S5	*Return temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S3*
F1	*Cold Water meter (pulse signal)*
P3	*DHW circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
M1	*Motorized control valve (3-point controlled)*
X2	*Anti-bacteria function is active*
A1	*Alarm*

P318.10, ex. b, DHW application with control pump:



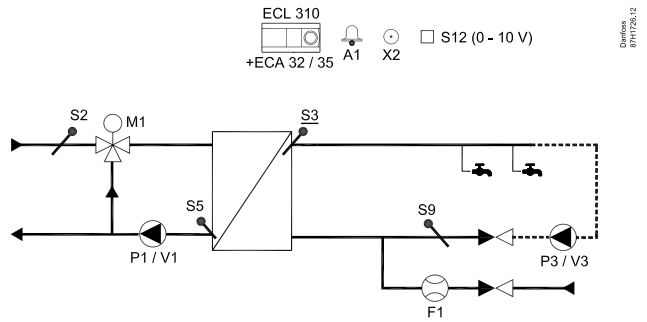
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*Supply temperature sensor*
S3	*(mandatory) DHW flow temperature sensor*
S5	*Return temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S3*
F1	*Cold Water meter (pulse signal)*
P1	*Control pump (ON-OFF controlled)*
V1	*Speed control of control pump (0 - 10 V or PWM)*
P3	*DHW circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
X2	*Anti-bacteria function is active*
A1	*Alarm*

P318.10, ex. c, DHW application with control valve and control pump:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*Supply temperature sensor*
S3	*(mandatory) DHW flow temperature sensor*
S5	*Return temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S3*
F1	*Cold Water meter (pulse signal)*
P1	*Control pump (ON-OFF controlled)*
V1	*Speed control of control pump (0 - 10 V or PWM)*
P3	*DHW circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
M1	*Motorized control valve (3-point controlled)*
X2	*Anti-bacteria function is active*
A1	*Alarm*

Recommendations / considering settings:

	Speed, P1 / V1 "V out max." / "V out min." (11165 / 11167) *	**Actuator running time M1 "M run" (11186) ****
P318.10, ex. a		X
P318.10, ex. b		
P318.10, ex. c	Max. / min. to same value "Adapt time" (11065) *: OFF	X

*) Circuit 1 > MENU > Settings > Control parameters 1 >

**) Circuit 1 > MENU > Settings > Control parameters 1 >

The basic principles for application **P318.11:**

Advanced DHW temperature and buffer control

The desired DHW temperature at S3 (set in circuit 1, favorite display 1) determines the temperature control.
The DHW flow temperature sensor S3, the buffer temperature sensors S6 and S8 are the most important sensors and must be connected. If S3 is not connected, the control pump P1 / V1 will stop; alternatively, the control valve M1 (examples c and d) will close.

Temperature control of the DHW circulation pipe at S9 ensures the desired temperature by means of speed control of pump P3 / V3.
A week schedule for switching the DHW circulation pump ON and OFF can be set.
If DHW circulation return temperature sensor S9 is not connected, the ON-OFF controlled pump will be ON regardless the schedule status.
A speed-controlled pump can be limited to a desired speed by means of V.out max. and V.out min settings.

The control pump P1 / V1 is increased in speed when the DHW flow temperature is lower than the desired DHW flow temperature and vice versa.
Alternatively, the motorized control valve M1 (examples c and d) is opened gradually when the DHW flow temperature is lower than the desired DHW temperature and vice versa.

The buffer is ON / OFF controlled by means of P2 or M2, operating as ON / OFF valve, based on 3-point control.

Start buffer charging process:

1. Buffer temperature S6 temperature gets lower than ('Desired DHW temperature' + 'Start difference').

   An example: 60 °C + 5) = 65 °C
2. X1 is switched ON
3. P2 is switched ON

Stop buffer charging process:

1. Buffer temperature S6 temperature gets higher than (2 K + 'Desired DHW temperature' + 'Start difference)

   AND

   Lower buffer temperature S8 gets higher than ('Desired DHW temperature' + 'Stop difference).

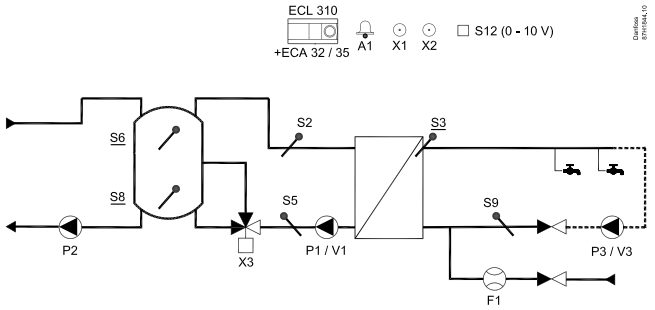
   An example:

   S6 temperature higher than (2 + 60 °C + 5) = 67 °C)

   AND

   S8 temperature higher than (60 °C + (-3) = 57 °C).
2. P2 is switched OFF
3. X1 is switched OFF.

P318.11, ex. a, aapplication with DHW temperature control and ON / OFF control of buffer charging. In addition, control of return layering:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*Supply temperature sensor*
S3	*(mandatory) DHW temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S3*
F1	*Cold Water meter (pulse signal)*
P1	*DHW temperature control pump (ON-OFF controlled)*
V1	*Speed control of DHW temperature control pump (0 - 10 V or PWM)*
P2	*Buffer charging pump (ON-OFF controlled)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
X1	*Buffer heating demand signal*
X2	*Anti-bacteria function is active*
X3	*Change-over valve, layering control*
A1	*Alarm*

Return water from DHW heat-exchanger to buffer can be directed by the change-over valve X3, based on temperature relationship between S5 and S8.
This return layering function directs low temperature water to buffer-bottom or higher temperature water to buffer-mid.
Differential temperatures for layering control can be set.

The supply temperature S2 is used to compensate the proportional band Xp for improving the temperature control at different supply temperatures.

The water flow signal from F1 can be used to override the control valve for optimizing the DHW temperature control. This pro-active functionality compensates for the delay before the flow temperature sensor S3 measures a change in temperature.
The water flow signal can also be utilized for control of the S3 temperature, even if there is no DHW circulation.

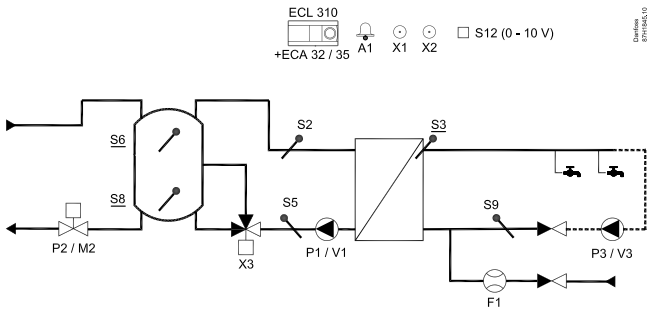
As an option, the desired DHW temperature can be set externally. A voltage signal (1 - 10 Volt) can be applied to input S12 (ECA 32 / 35). The scale for voltage versus temperature can be set.

The ON-OFF output X1 is ON at buffer heating demand.

An anti-bacteria function for the DHW circuit is available for activation on selected days of the week.
The anti-bacteria function can be set to include the DHW circulation.
The ON-OFF output X2 is ON when anti-bacteria function is active.

By means of a week schedule, the DHW circulation can be ON / OFF controlled; this is possible when S9 is connected.

P318.11, ex. b, application with DHW temperature control and ON / OFF control of buffer charging. In addition, control of return layering.



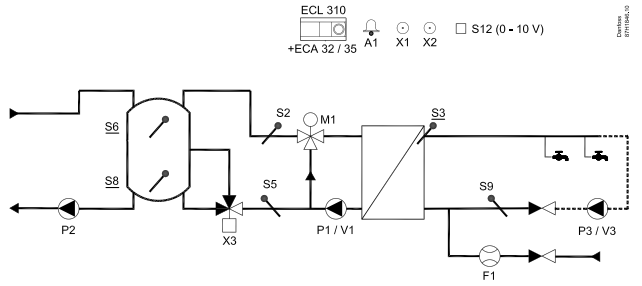
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*Supply temperature sensor*
S3	*(mandatory) DHW temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S3*
F1	*Cold Water meter (pulse signal)*
P1	*DHW temperature control pump (ON-OFF controlled)*
V1	*Speed control of DHW temperature control pump (0 - 10 V or PWM)*
P2 / M2	*Buffer charging valve (ON-OFF controlled)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
X1	*Buffer heating demand signal*
X2	*Anti-bacteria function is active*
X3	*Change-over valve, layering control*
A1	*Alarm*

P318.11, ex. c, application with DHW temperature control and ON / OFF control of buffer charging. In addition, control of return layering.



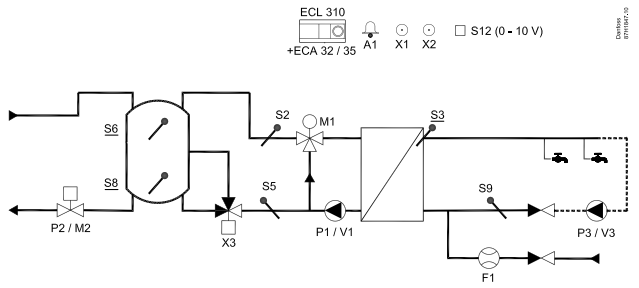
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*Supply temperature sensor*
S3	*(mandatory) DHW temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S3*
F1	*Cold Water meter (pulse signal)*
P1	*DHW temperature control pump (ON-OFF controlled)*
V1	*Speed control of DHW temperature control pump (0 - 10 V or PWM)*
P2	*Buffer charging pump (ON-OFF controlled)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
M1	*Motorized control valve (3-point controlled)*
X1	*Buffer heating demand signal*
X2	*Anti-bacteria function is active*
X3	*Change-over valve, layering control*
A1	*Alarm*

P318.11, ex. d, application with DHW temperature control and ON / OFF control of buffer charging. In addition, control of return layering.



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 310	*ECL Comfort 310 controller*
ECA 32	*Built-in extension module, 0 - 10 V outputs*
ECA 35	*Built-in extension module, 0 - 10 V outputs and PWM outputs*
S2	*Supply temperature sensor*
S3	*(mandatory) DHW temperature sensor*
S5	*Return temperature sensor*
S6	*(mandatory) Buffer temperature sensor*
S8	*(mandatory) Lower buffer temperature sensor*
S9	*DHW circulation return temperature sensor*
S12	*0 - 10 V input for desired temperature at S3*
F1	*Cold Water meter (pulse signal)*
P1	*DHW temperature control pump (ON-OFF controlled)*
V1	*Speed control of DHW temperature control pump (0 - 10 V or PWM)*
P2 / M2	*Buffer charging valve (ON-OFF controlled)*
P3	*Circulation pump (ON-OFF controlled)*
V3	*Speed control of circulation pump (0 - 10 V or PWM)*
M1	*Motorized control valve (3-point controlled)*
X1	*Buffer heating demand signal*
X2	*Anti-bacteria function is active*
X3	*Change-over valve, layering control*
A1	*Alarm*

Recommendations / considering settings:

	Speed, P1 / V1 "V out max." / "V out min." (11165 / 11167) *	**Actuator running time M1 "M run" (11186) ****
P318.11, ex. a		
P318.11, ex. b		
P318.11, ex. c	Max. / min. to same value "Adapt time" (11065) *: OFF	X
P318.11, ex. d	Max. / min. to same value "Adapt time" (11065) *: OFF	X

*) Circuit 1 > MENU > Settings > Control parameters 1 >

**) Circuit 1 > MENU > Settings > Control parameters 1 >

P318, in general

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

Additional ECL Comfort controllers can be connected via the ECL 485 bus in order to utilize common outdoor temperature signal, time and date signals. The ECL Controllers in the ECL 485 bus system can work as master and slaves. The application P318 can work alone or as a slave.

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

The P318 application has event indications for

- Charging temperature
- Tank (buffer) temperature
- DHW flow temperature
- Supply temperature
- Anti-bacteria

Typically, an event is registered if a set temperature condition is not accepted. The events can be prioritized to be indicated as information or an alarm.

The alarm A1 (= relay 6) can be activated if:

- an event occurs
- a temperature sensor or its connection disconnects / short circuits. (See: Common controller settings > System > Raw input overview).

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

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

This behavior can, at low load or a too big pump, cause unstable temperature regulation. To avoid this, the P318 has a function where the applied control signal is converted into a pulsed signal. The pump is shortly stopped and then started again. The result is a pump speed control also below the minimum speed level.
The parameters "PWM period" (ID 11565) and "Adapt time" (ID 11065) are used for this functionality.

*) See the pump manufacturer's data sheet

Input configuration
Inputs which are not part of the application can be configured to be Pt 1000, 0 - 10 Volt, frequency (pulse counter) or Digital input. This feature makes it possible to communicate extra signals, such as temperatures, pressures, ON / OFF conditions, via Modbus and ECL Portal.
The configuration is done by means of the ECL Tool (free software for download) or directly in a dedicated menu in the ECL Portal or the connection for Modbus (BMS / SCADA).

Commissioning
When the P318 application has been uploaded, the ECL Comfort 310 controller starts in Manual mode. This can be used to verify correct connections of input related components, for example temperature and pressure sensors and flow meters.
In addition, controlled components can be verified for correct functionality.

The application key is delivered with factory settings. Depending on system type, it is recommended to change some of the settings individually for optimizing the functionality.
These setting changes, if required, are listed after the explanation of each subtype (See section "Before you start")

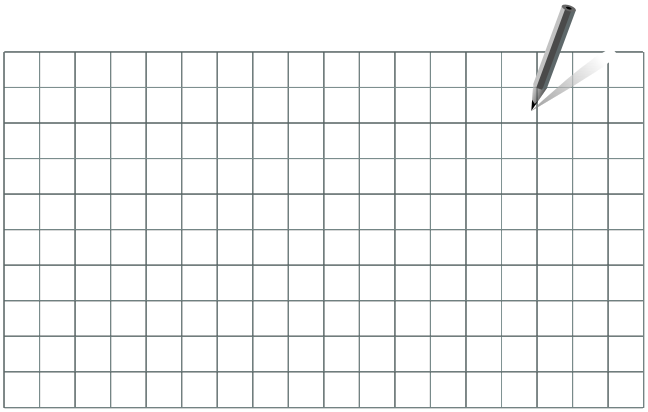
Important:
Set the correct running time "M run" of Motorized Control Valve(s) (Circuit X > MENU > Settings > Control parameters > M run).

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

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.

Advice for settings:
Factory settings in the subtypes are related to the examples a. Some of the application examples need change of dedicated settings.
See the list after the explanation of each subtype (See section "Before you start")

2.3 Mounting

2.3.1 Mounting the ECL Comfort controller

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

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

ECL Comfort 210 / 296 / 310 can be mounted

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

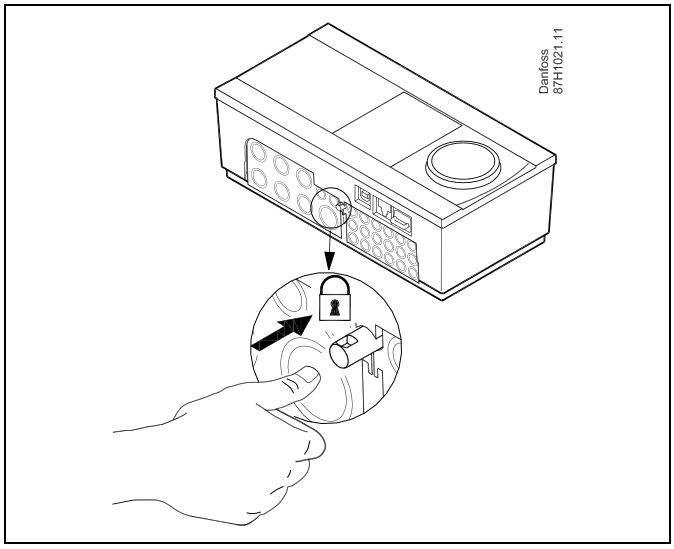
ECL Comfort 296 can be mounted

- in a panel cut-out

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

Screws, PG cable glands and rawlplugs are not supplied.

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



⚠

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

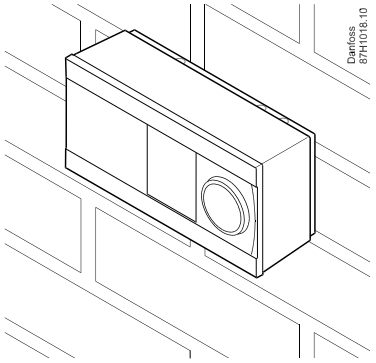
⚠

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

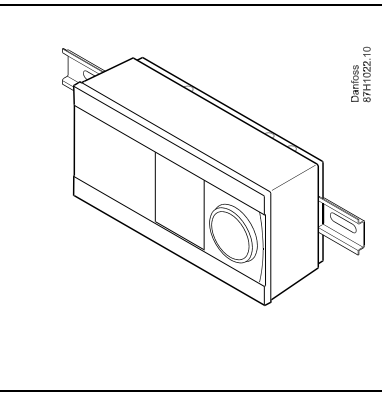
⚠

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

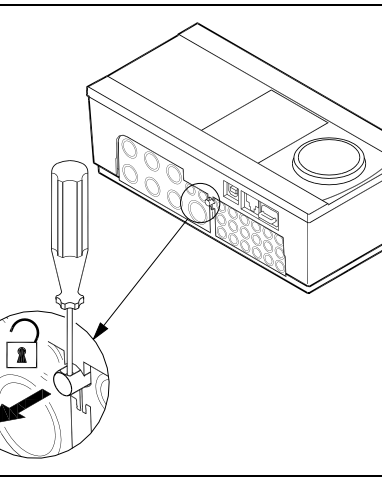
Mounting on a wall
Mount the base part on a wall with a smooth surface. Establish the electrical connections and position the controller in the base part. Secure the controller with the locking pin.



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



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



⚠

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

⚠

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

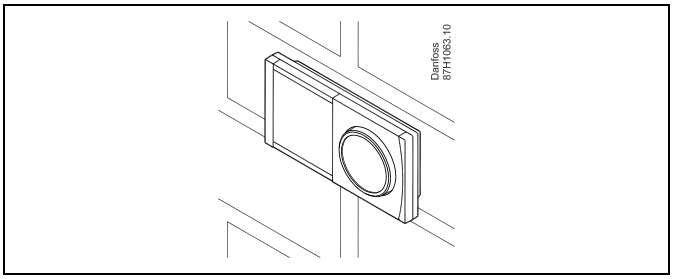
2.3.2 Mounting the Remote Control Units ECA 30 / 31

Select one of the following methods:

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

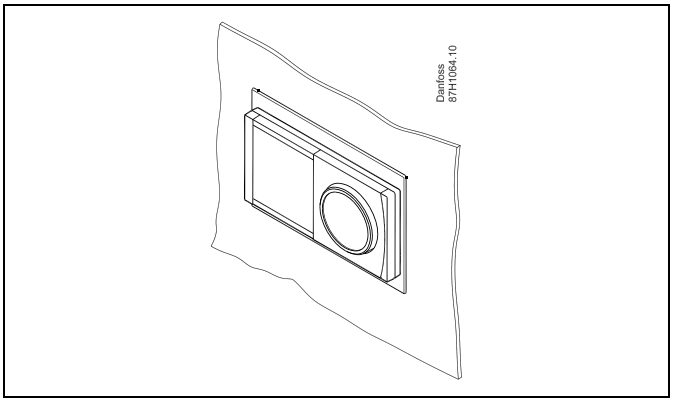
Screws and rawlplugs are not supplied.

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



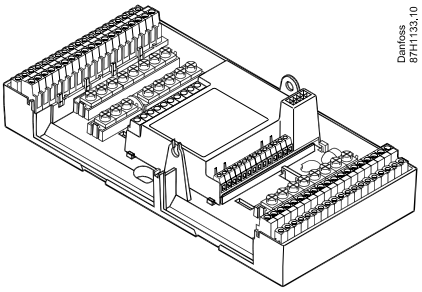
Mounting in a panel
Mount the ECA 30 in a panel using the ECA 30 frame kit (order code no. 087H3236). Establish the electrical connections. Secure the frame with the clamp. Place the ECA 30 in the base part. The ECA 30 can be connected to an external room temperature sensor.

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

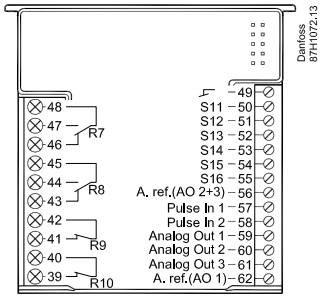


2.3.3 Mounting the internal I/O module ECA 32 or ECA 35

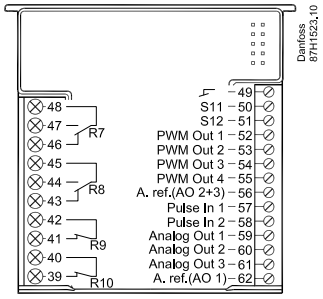
The ECA 32 module (order code no. 087H3202) or ECA 35 module (order code no. 087H3205) can be inserted into the ECL Comfort 310 / 310B base part for additional input and output signals in relevant applications.



ECA 32



ECA 35



2.4 Placing the temperature sensors

2.4.1 Placing the temperature sensors

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

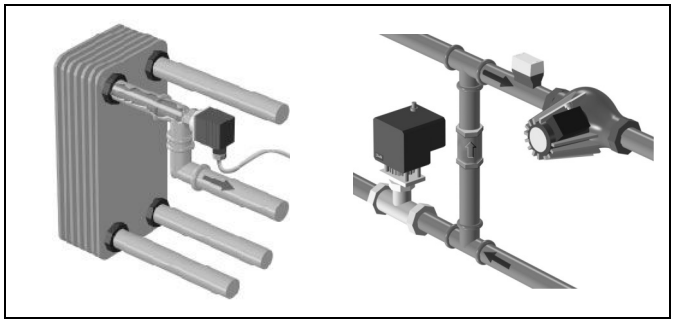
The temperature sensor mentioned below are sensors used for the ECL Comfort 210 / 296 / 310 series which not all will be needed for your application!

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

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

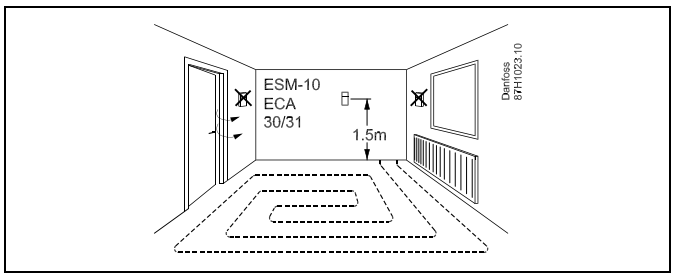
Make sure that the surface of the pipe is clean and even where the sensor is mounted.

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



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

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



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

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

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

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

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

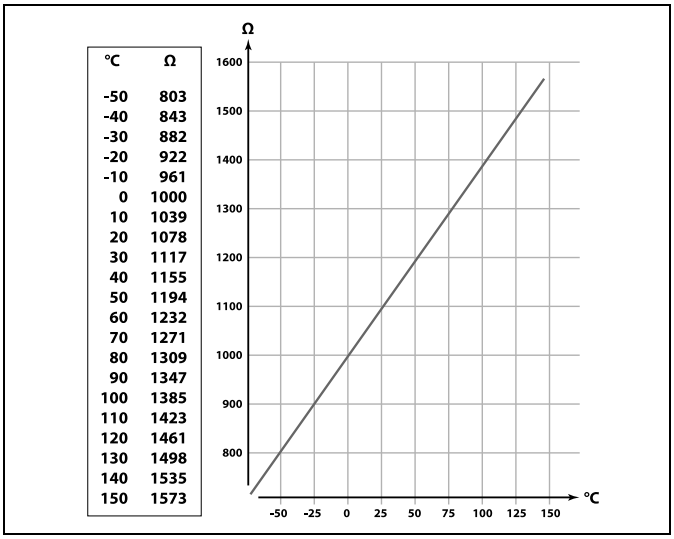
ESM-11, ESMC and ESMB-12: Use heat conducting paste for quick measurement of the temperature.

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

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

Relationship between temperature and ohmic value:

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



2.5 Electrical connections

2.5.1 Electrical connections 230 V a.c.

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

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

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

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

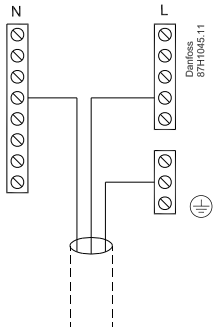
A fuse for the ECL Comfort installation is max. 10 A typically.

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

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

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

ECL 210 / 310



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

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

Maximum load ratings:

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

Electrical connections, ECA 32 / ECA 35

Connections, in general.

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

Maximum load ratings:

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

2.5.2 Electrical connections, Pt 1000 temperature sensors and signals

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

Application diagrams show mandatory temperature sensors with an underscore; example S3.

P318

Sensor	Description	Recommended type
S1	Not used	
S2	Supply temperature sensor	ESM-11 / ESMB / ESMC / ESMU
S3*	**P318.1, P318.2, P318.5:** Charging temperature sensor **P318.10, P318.11:** DHW flow temperature sensor	ESM-11 / ESMB / ESMC / ESMU
S4*	**P318.2, P318.5:** DHW flow temperature sensor	
S5	Return temperature sensor	ESM-11 / ESMB / ESMC / ESMU
S6	**P318.1, P318.2, P318.11:** Upper buffer-tank temperature sensor **P318.10:** Not used	ESMB / ESMU
S7	**P318.5:** Alternative buffer-tank temperature	
S8	**P318.1, P318.2, P318.5, P318.11:** Lower buffer-tank temperature sensor **P318.10:** Not used	ESMB / ESMU
S9	DHW circulation temperature sensor	ESM-11 / ESMB / ESMC / ESMU
S10	Not used	

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

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

Wire cross section for sensor connections: Min. 0.4 mm².
Total cable length: Max. 200 m (all sensors incl. internal ECL 485 communication bus).
Cable lengths of more than 200 m may cause noise sensibility (EMC).

2.5.3 Electrical connections, ECA 30 / 31

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

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

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

The ECA 30 / 31 must be set up accordingly.

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

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

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

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

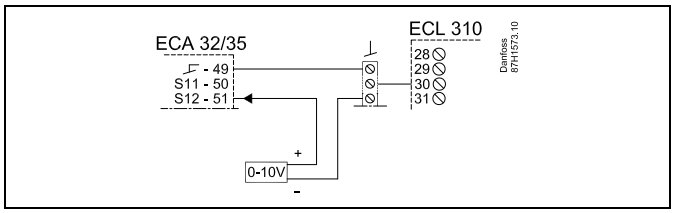
ECA information message:
'Application req. newer ECA':
The software (firmware) of your ECA does not comply with the software (firmware) of your ECL Comfort controller. Please contact your Danfoss sales office.

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

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

ECA 32 / 35
S12

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



2.5.4 Electrical connections, master / slave systems

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

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

Terminal	Description	Type (recomm.)
30	Common terminal	Cable 2 x twisted pair
31	+12 V*, ECL 485 communication bus * 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:

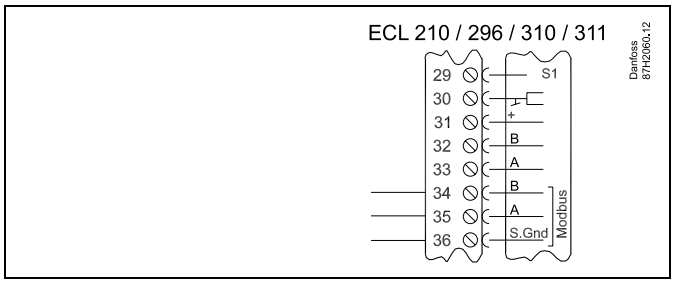
1 x ECL	Outdoor temp. sensor:	15 m
3 x ECL	Flow temp. sensor:	18 m
3 x ECL	Return temp. sensor:	18 m
3 x ECL	Room temp. sensor:	30 m
Total:		81 m

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

2.5.5 Electrical connections, communication

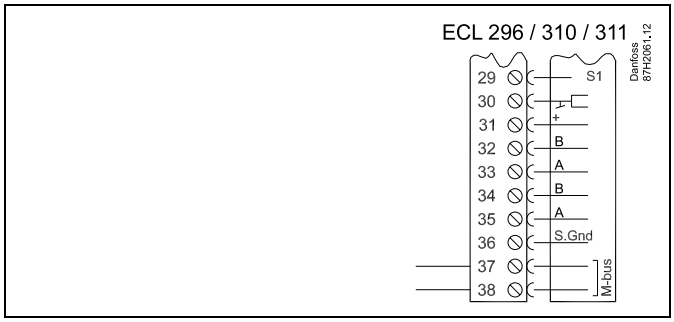
Electrical connections, Modbus

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



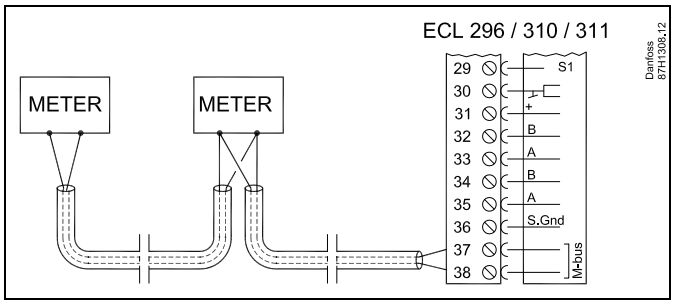
Electrical connections, M-bus

ECL Comfort 210: Not implemented
ECL Comfort 296: On board
ECL Comfort 310: On board



Example, M-bus connections

(ECL Comfort 296 / 310 and 310 B only)



2.6 Inserting the ECL Application Key

2.6.1 Inserting the ECL Application Key

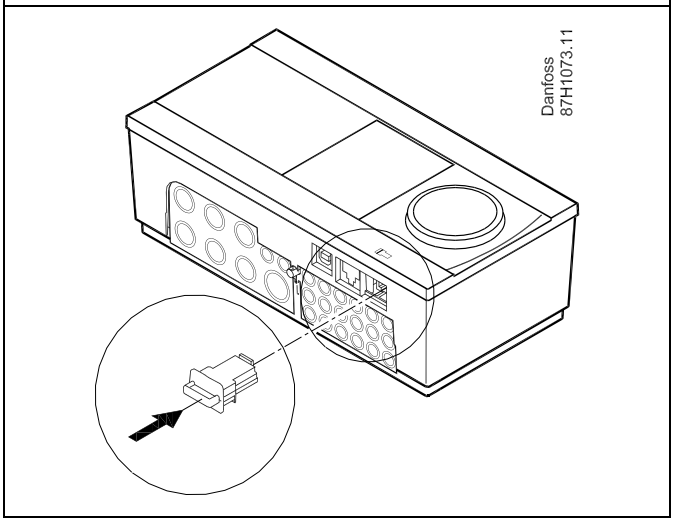
The ECL Application Key contains

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

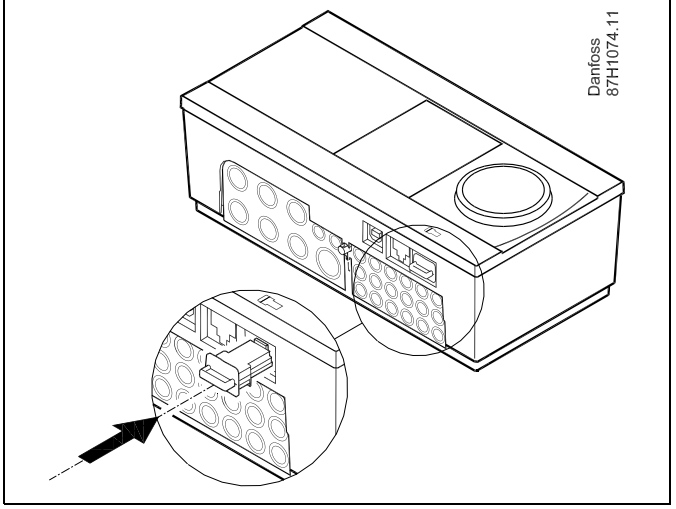
After having powered-up the controller, different situations might be existing:

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

ECL Comfort 210 / 310



ECL Comfort 210 / 310



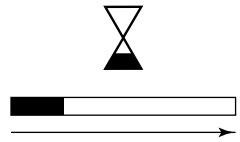
User settings are, among others, desired room temperature, desired DHW temperature, schedules, heat curve, limitation values etc.

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

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

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

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



Progress bar

During update:

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

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

Key inserted / not inserted, description:

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

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

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

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

ECL Comfort 296, controller versions 1.58 and up:

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

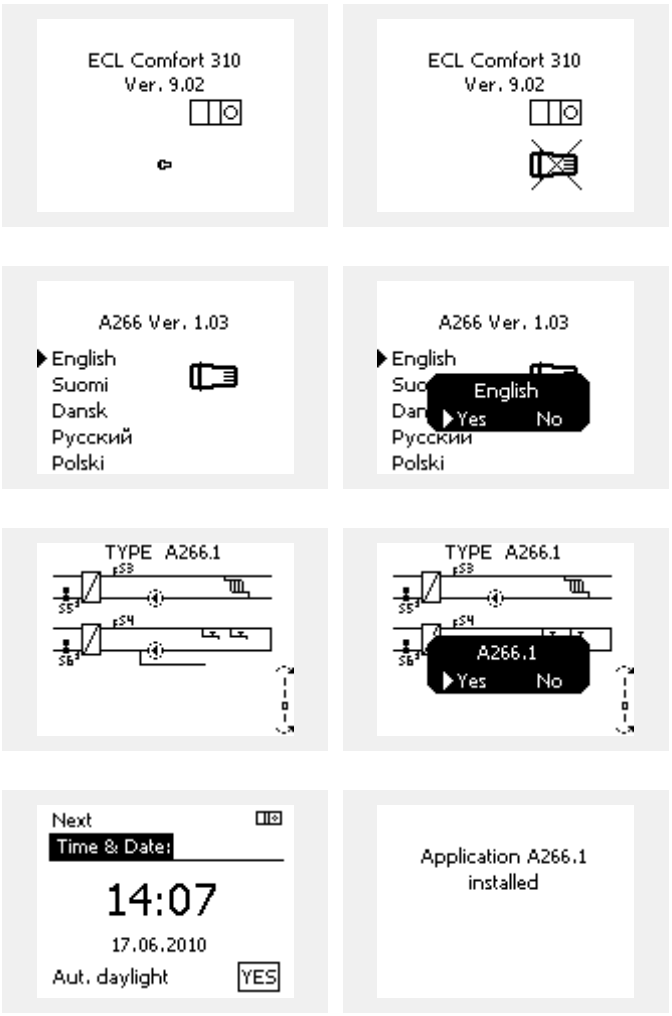
Application Key: Situation 1
The controller is new from the factory, the ECL Application Key is not inserted.

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

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

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

Action:	Purpose:	Examples:
	Select language	
	Confirm	
	Select application (subtype) 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.

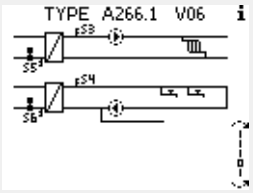
'NO: Only factory settings from the ECL Application Key will be copied to the controller.
'YES*: Special user settings (differing from the factory settings) will be copied to the controller.

* 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.

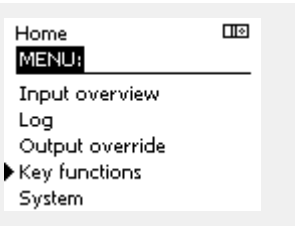


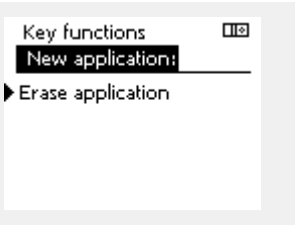
Application Key: Situation 2
The controller already runs an application. The ECL Application Key is inserted, but the application needs to be changed.

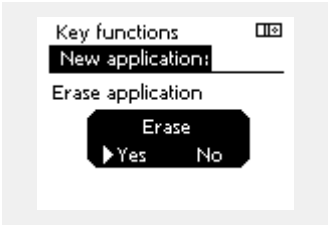
To change to another application on the ECL Application Key, the current application in the controller must be erased (deleted).

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:

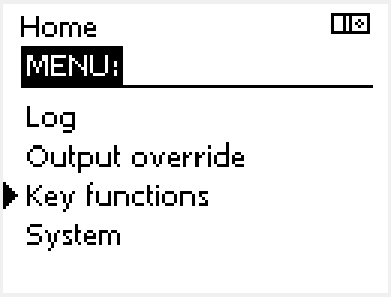
Action:	Purpose:	Examples:
	Choose 'MENU'	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose 'Common controller settings'	
	Confirm	
	Go to 'Key functions'	
	Confirm	
	Choose 'Copy'	
	Confirm	
	Choose 'To'. 'ECL' or 'KEY' will be indicated. Choose 'ECL'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

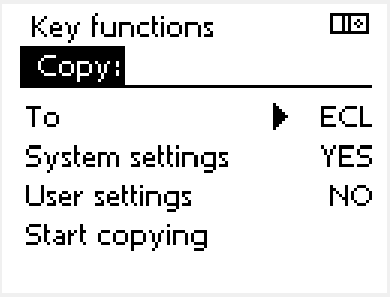
*

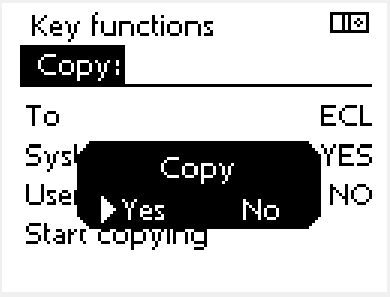
'ECL': Data will be copied from the Application Key to the ECL Controller.
'KEY': Data will be copied from the ECL Controller to the Application Key.

**

'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 P318

Navigation, P318.1, circuits 1 and 2 (DHW)

Home				**P318.1**	
				Circuit	
MENU		**ID nos.**	**Function**	**1**	**2**
Schedule, Circ. P					●
Settings	Tank temperature	11101	Ext. desired T	●	
		11195	Start difference	●	
		11194	Stop difference	●	
		11371	Pump start diff.	●	
		11152	Max. charge T	●	
	Return limit	11030	Limit	●	
		11035	Infl. - max.	●	
		11036	Infl. - min.	●	
		11037	Adapt. time	●	
	Control par. 1	11184	Xp	●	
		11185	Tn	●	
		11186	M run	●	
		11187	Nz	●	
		11165	V out max.	●	
		11167	V out min.	●	
		11189	Min. act. time	●	
		11171	Reverse out	●	
		11330	Wake up level	●	
		11565	PWM period	●	
		11065	Adapt time	●	
	Control par. 2	12184	Xp	●	
		12185	Tn	●	
		12187	Nz	●	
		12165	V out max.	●	
		12167	V out min.	●	
		12171	Reverse out	●	
		12375	Reduced des. T	●	

Navigation, P318.1, circuits 1 and 2 (DHW), continued

Home				P318.1	
				Circuit	
MENU		**ID nos.**	**Function**	**1**	**2**
Settings	Control par. 3	13370	Max. return T		●
		13055	Circ. P priority		●
		13184	Xp		●
		13185	Tn		●
		13187	Nz		●
		13165	V out max.		●
		13167	V out min.		●
		13171	Reverse out		●
	Application	11054	Cont. T control	●	
		11041	DHW P post-run	●	
		11353	Level	●	
		11500	Send desired T	●	
		11145	Mon. T select	●	
	Anti-bacteria			●	
		12125	Desired T		●
		12124	Duration		●
Event	Charge T	11147	Upper difference	●	
		9022	Event priority 22	●	
		11148	Lower difference	●	
		9021	Event priority 21	●	
		11149	Delay	●	
		11150	Lowest temp.	●	
	Tank temp.	12147	Upper difference	●	
		9042	Event priority 42	●	
		12148	Lower differrence	●	
		9041	Event priority 41	●	
		12149	Delay	●	
		12150	Lowest temp.	●	
	Supply T	11340	Delay	●	
		9020	Event priority 20	●	
	Anti-bacteria	9030	Event priority 30	●	
		9031	Event priority 31	●	
	T sensor defect	9001	Event priority 1	●	
	Event overview			●	
Influence overview					
Tank T	Return lim.			●	
	Ext. override			●	
	Anti-bacteria			●	
	Ext. desired T			●	
Circ. return T	Anti-bacteria				●

Navigation, P318.1, Common controller settings

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Input overview			Charge T
			Supply T
			Prim. return T
			Tank temp.
			Tank lower T
			Circ. return T
			Ext. desired T
Log	Charge T & des.		Log today
	Return T & limit		Log yesterday
	Supply T		Log 2 days
	Tank T up. & des.		Log 4 days
	Tank T up. & low.		
	Circ. return T & lim.		
Output override			M1
			V1
			P1
			V2
			P2
			V3
			P3
			X1
			X2
			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		

Navigation, Common controller settings, continued

Home		Common controller settings	
MENU		**ID no.**	**Function**
System	ECL version	19	Code no.
		34	Hardware
		35	Software
		36	Serial no.
		2099	Production date
	Extension		
	Ethernet (ECL Comfort 310 only)	2152	Inbound accept
		258	Address type
		278	IP1
		279	IP2
		280	IP3
		281	IP3
		282	Gateway IP 1
		283	Gateway IP 2
		284	Gateway IP 3
		285	Gateway IP 4
		286	Net Mask 1
		287	Net Mask 2
		288	Net Mask 3
		289	Net Mask 4
		2240	DNS 1 IP1
		2241	DNS 1 IP2
		2242	DNS 1 IP3
		2243	DNS 1 IP4
		2244	DNS 2 IP1
	Portal config (ECL Comfort 310 only)		ECL portal
			Portal status
			Portal info
	M-bus config (ECL Comfort 310 only)	5999	State
		5998	Command
		5997	Baud
		6000	M-bus address
		6002	Scan time
		6001	Type
	Energy Meters (ECL Comfort 310 only)		Energy Meter 1....5

Navigation, Common controller settings, continued

Home		Common controller settings	
MENU		**ID no.**	**Function**
System	Raw input overview	10201	S1 sensor
		10202	S2 sensor
		10203	S3 sensor
		10204	S4 sensor
		10205	S5 sensor
		10206	S6 sensor
		10207	S7 sensor
		10208	S8 sensor
		10209	S9 sensor
		10210	S10 sensor
		10211	S11 sensor
		10212	S12 sensor
		10213	Room Unit A, Sensor 1
		10216	Room Unit B, Sensor 1
	Sensor offset		S1 - S10 offset
	Alarm	32:	T sensor defect
	Display	60058	Backlight
		60059	Contrast
	Communication	2048	ECL 485 addr.
		38	Modbus addr.
		39	Baud
		2150	Service pin
		2051	Ext. reset
		2153	Portal encryption
	Language	2050	Language

Navigation, P318.2, circuits 1, 2 and 3 (DHW)

Home					**P318.2**		
					Circuit		
MENU		**ID nos.**		**Function**	**1**	**2**	**3**
Schedule, Circ. P							●
Settings	Tank temperature		11101	Ext. desired T		●	
			11195	Start difference		●	
			11194	Stop difference		●	
			11371	Pump start diff.		●	
			11152	Max. charge T		●	
	Return limit		11030	Limit		●	
			11035	Infl. - max.		●	
			11036	Infl. - min.		●	
			11037	Adapt. time		●	
	Control par. 1		11184	Xp		●	
			11185	Tn		●	
			11186	M run		●	
			11187	Nz		●	
			11165	V out max.		●	
			11167	V out min.		●	
			11189	Min. act. time		●	
			11171	Reverse out		●	
			11330	Wake up level		●	
			11565	PWM period		●	
			11065	Adapt time		●	
	Control par. 2	14184	12184	Xp	●	●	
		14185	12185	Tn	●	●	
		14186		M run	●		
		14187	12187	Nz	●	●	
			12165	V out max.		●	
			12167	V out min.		●	
			12171	Reverse out		●	
			12375	Reduced des. T		●	
		14189		Min. act. time	●		

Navigation, P318.2, circuits 1, 2 and 3 (DHW), continued

Home					P318.2		
					Circuit		
MENU		**ID nos.**		**Function**	**1**	**2**	**3**
Settings	Control par. , P circ.		13370	Max. return T			●
			13184	Xp			●
			13185	Tn			●
			13187	Nz			●
			13165	V out max.			●
			13167	V out min.			●
			13171	Reverse out			●
	Application	11041		DHW P post-run		●	
		11353		Level		●	
		11500		Send desired T		●	
	Anti-bacteria				●		
		12125	13125	Desired T			●
		12124	13124	Duration			●
Event	DHW flow T	14148		Lower difference	●		
		9025		Event priority 25	●		
		14149		Delay	●		
		14150		Lowest temp.	●		
	Charge T	11147		Upper difference	●		
		9022		Event priority 22	●		
		11148		Lower difference	●		
		9021		Event priority 21	●		
		11149		Delay	●		
		11150		Lowest temp.	●		
	Tank temp.	12147		Upper difference	●		
		9042		Event priority 42	●		
		12148		Lower differrence	●		
		9041		Event priority 41	●		
		12149		Delay	●		
		12150		Lowest temp.	●		
	Supply T	11340		Delay	●		
		9020		Event priority 20	●		
	Anti-bacteria	9030		Event priority 30	●		
		9031		Event priority 31	●		
	T sensor defect	9001		Event priority 1	●		
	Event overview				●		
Influence overview							
Tank T	Return lim.					●	
	Ext. desired T					●	
Circ. return T	Anti-bacteria						●
DHW flow T	Ext. override				●		
	Anti-bacteria				●		

Navigation, P318.2, Common controller settings

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Input overview			DHW flow T
			Charge T
			Supply T
			Prim. return T
			Tank temp.
			Tank lower T
			Circ. return T
			Ext. desired T
Log	DHS flow & des.		Log today
	Circ. return T & lim.		Log yesterday
	Charge T & des.		Log 2 days
	Return T & limit		Log 4 days
	Supply T		
	Tank T up. & des.		
	Tank T up. & low.		
Output override			M1
			V1
			P1
			V2
			P2
			M2
			V3
			P3
			X1
			X2
			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		

Navigation, Common controller settings, continued

Home		Common controller settings	
MENU		**ID no.**	**Function**
System	ECL version	19	Code no.
		34	Hardware
		35	Software
		36	Serial no.
		2099	Production date
	Extension		
	Ethernet (ECL Comfort 310 only)	2152	Inbound accept
		258	Address type
		278	IP1
		279	IP2
		280	IP3
		281	IP3
		282	Gateway IP 1
		283	Gateway IP 2
		284	Gateway IP 3
		285	Gateway IP 4
		286	Net Mask 1
		287	Net Mask 2
		288	Net Mask 3
		289	Net Mask 4
		2240	DNS 1 IP1
		2241	DNS 1 IP2
		2242	DNS 1 IP3
		2243	DNS 1 IP4
		2244	DNS 2 IP1
	Portal config (ECL Comfort 310 only)		ECL portal
			Portal status
			Portal info
	M-bus config (ECL Comfort 310 only)	5999	State
		5998	Command
		5997	Baud
		6000	M-bus address
		6002	Scan time
		6001	Type
	Energy Meters (ECL Comfort 310 only)		Energy Meter 1....5

Navigation, Common controller settings, continued

Home		Common controller settings	
MENU		**ID no.**	**Function**
System	Raw input overview	10201	S1 sensor
		10202	S2 sensor
		10203	S3 sensor
		10204	S4 sensor
		10205	S5 sensor
		10206	S6 sensor
		10207	S7 sensor
		10208	S8 sensor
		10209	S9 sensor
		10210	S10 sensor
		10211	S11 sensor
		10212	S12 sensor
		10213	Room Unit A, Sensor 1
		10216	Room Unit B, Sensor 1
	Sensor offset		S1 - S10 offset
	Alarm	32:	T sensor defect
	Display	60058	Backlight
		60059	Contrast
	Communication	2048	ECL 485 addr.
		38	Modbus addr.
		39	Baud
		2150	Service pin
		2051	Ext. reset
		2153	Portal encryption
	Language	2050	Language

Navigation, P318.5, circuits 1 and 2 (DHW)

Home				P318.5	
				Circuit	
MENU		**ID nos.**	**Function**	**1**	**2**
Schedule, Circ. P					●
Settings	Tank temperature	11101	Ext. desired T	●	
		11195	Start difference	●	
		11194	Stop difference	●	
		11371	Pump start diff.	●	
		11059	P charge delay	●	
		11152	Max. charge T	●	
	Return limit	11030	Limit	●	
		11035	Infl. - max.	●	
		11036	Infl. - min.	●	
		11037	Adapt. time	●	
	Control par. STEP I	11184	Xp	●	
		11185	Tn	●	
		11186	M run	●	
		11187	Nz	●	
		11165	V out max.	●	
		11167	V out min.	●	
		11189	Min. act. time	●	
		11171	Reverse out	●	
		11330	Wake up level	●	
		11565	PWM period	●	
		11065	Adapt time	●	
	Control par. STEP II	14184	Xp	●	
		14185	Tn	●	
		14186	M run	●	
		14187	Nz	●	
		14165	V out max.	●	
		14167	V out min.	●	
		14189	Min. act. time	●	
		14171	Reverse out	●	
		14565	PWM period	●	
		14065	Adapt time	●	
		14371	Pump start diff.	●	
	Control par. 2	12184	Xp	●	
		12185	Tn	●	
		12187	Nz	●	
		12165	V out max.	●	
		12167	V out min.	●	
		12171	Reverse out	●	
		12375	Reduced des. T	●	
	Application	11054	Cont. T control	●	
		11041	DHW P post-run	●	
		11353	Level	●	
		11500	Send desired T	●	
		11145	Mon. T select	●	
	Anti-bacteria	11122	Day	●	
		11123	Start time	●	
		11124	Duration	●	
		11125	Desired T	●	

Navigation, P318.5, circuits 1 and 2(DHW), continued

Home				P318.5	
				Circuit	
MENU		**ID nos.**	**Function**	**1**	**2**
Settings	Control par. 3	13370	Max. return T		●
		13055	Circ. P priority		●
		13184	Xp		●
		13185	Tn		●
		13187	Nz		●
		13165	V out max.		●
		13167	V out min.		●
		13171	Reverse out		●
	Anti-bacteria	12125	Desired T		●
		12124	Duration		●
Event	Charge T	11147	Upper difference	●	
		9022	Event priority 22	●	
		11148	Lower difference	●	
		9021	Event priority 21	●	
		11149	Delay	●	
		11150	Lowest temp.	●	
	Tank temp.	12147	Upper difference	●	
		9042	Event priority 42	●	
		12148	Lower differrence	●	
		9041	Event priority 41	●	
		12149	Delay	●	
		12150	Lowest temp.	●	
	Supply T	11340	Delay	●	
		9020	Event priority 20	●	
	Flow T	14147	Upper difference	●	
		9026	Event priority 26	●	
		14148	Lower difference	●	
		9025	Event priority 25	●	
		14149	Delay	●	
		14150	Lowest temp.	●	
	Anti-bacteria	9030	Event priority 30	●	
		9031	Event priority 31	●	
	T sensor defect	9001	Event priority 1	●	
	Event overview			●	
Influence overview					
Tank T	Return lim.			●	
	Ext. override			●	
	Ext. desired T			●	
	Anti-bacteria			●	
Circ. return T	Anti-bacteria				●

Navigation, P318.5, Common controller settings

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Input overview			Charge T Supply T Prim. return T Tank temp. Tank lower T Circ. return T Flow T Buffer top T Ext. desired T
Log	Charge T & des. Return T & limit Supply T Tank T up. & des. Tank T up. & low. Circ. return T & lim. Flow T & desired Buffer top T		Log today Log yesterday Log 2 days Log 4 days
Output override			M1 V1 P1 V2 P2 V3 P3 M2 V4 X1 X2 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		

Navigation, Common controller settings, continued

Home		Common controller settings	
MENU		**ID no.**	**Function**
System	ECL version	19	Code no.
		34	Hardware
		35	Software
		36	Serial no.
		2099	Production date
	Extension		
	Ethernet (ECL Comfort 310 only)	2152	Inbound accept
		258	Address type
		278	IP1
		279	IP2
		280	IP3
		281	IP3
		282	Gateway IP 1
		283	Gateway IP 2
		284	Gateway IP 3
		285	Gateway IP 4
		286	Net Mask 1
		287	Net Mask 2
		288	Net Mask 3
		289	Net Mask 4
		2240	DNS 1 IP1
		2241	DNS 1 IP2
		2242	DNS 1 IP3
		2243	DNS 1 IP4
		2244	DNS 2 IP1
	Portal config (ECL Comfort 310 only)		ECL portal
			Portal status
			Portal info
	M-bus config (ECL Comfort 310 only)	5999	State
		5998	Command
		5997	Baud
		6000	M-bus address
		6002	Scan time
		6001	Type
	Energy Meters (ECL Comfort 310 only)		Energy Meter 1....5

Navigation, Common controller settings, continued

Home		Common controller settings	
MENU		**ID no.**	**Function**
System	Raw input overview	10201	S1 sensor
		10202	S2 sensor
		10203	S3 sensor
		10204	S4 sensor
		10205	S5 sensor
		10206	S6 sensor
		10207	S7 sensor
		10208	S8 sensor
		10209	S9 sensor
		10210	S10 sensor
		10211	S11 sensor
		10212	S12 sensor
		10213	Room Unit A, Sensor 1
		10216	Room Unit B, Sensor 1
	Sensor offset		S1 - S10 offset
	Alarm	32:	T sensor defect
	Display	60058	Backlight
		60059	Contrast
	Communication	2048	ECL 485 addr.
		38	Modbus addr.
		39	Baud
		2150	Service pin
		2051	Ext. reset
		2153	Portal encryption
	Language	2050	Language

Navigation, P318.10, circuits 1 and 2 (DHW)

Home				**P318.10**	
				Circuit	
MENU		**ID nos.**	**Function**	**1**	**2**
Schedule, Circ. P					●
Settings	Flow temperature	11101	Ext. desired T	●	
		11177	Temp. min.	●	
		11178	Temp. max.	●	
	Return limit	11030	Limit	●	
		11035	Infl. - max.	●	
		11036	Infl. - min.	●	
		11037	Adapt. time	●	
	Control par. 1		Xp actual	●	
		11185	Tn	●	
		11186	M run	●	
		11187	Nz	●	
		11165	V out max.	●	
		11167	V out min.	●	
		11189	Min. act. time	●	
		11171	Reverse out	●	
		11354	CW influence	●	
		11565	PWM period	●	
		11065	Adapt time	●	
	Flow meter		Actual	●	
		11114	Pulse	●	
		11115	Units	●	
	Control par. 3	13370	Max. return T		●
		13184	Xp		●
		13185	Tn		●
		13187	Nz		●
		13165	V out max.		●
		13167	V out min.		●
		13171	Reverse out		●
		13054	Cont. T control		●
	Application	11500	Send desired T	●	
	Anti-bacteria			●	
		12125	Desired T		●
		12124	Duration		●

Navigation, P318.10, circuits 1 and 2 (DHW), continued

Home				**P318.10**	
				Circuit	
MENU		**ID nos.**	**Function**	**1**	**2**
Event	DHW flow T	11147	Upper difference	●	
		9022	Event priority 22	●	
		11148	Lower difference	●	
		9021	Event priority 21	●	
		11149	Delay	●	
		11150	Lowest temp.	●	
	Supply T	12147	Upper difference	●	
		9020	Event priority 20	●	
		12149	Delay	●	
		12150	Lowest temp.	●	
	Anti-bacteria	9030	Event priority 30	●	
		9031	Event priority 31	●	
	T sensor defect	9001	Event priotiry 1	●	
	Event overview			●	
Influence overview					
Des. DHW T	Return lim.			●	
	Anti-bacteria			●	
	Ext. desired T			●	
Circ. return T	Anti-bacteria				●

Navigation, P318.10, Common controller settings

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Input overview			DHW flow T
			Supply T
			Prim. return T
			Circ. return T
			Ext. desired T
Log	DHW flow & des.		Log today
	DHW return T & lim.		Log yesterday
	Supply T		Log 2 days,
	Circ. return T & lim.		Log 4 days
Output override			M1
			V1
			P1
			V3
			P3
			X2
			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		

Navigation, Common controller settings, continued

Home		Common controller settings	
MENU		**ID no.**	**Function**
System	ECL version	19	Code no.
		34	Hardware
		35	Software
		36	Serial no.
		2099	Production date
	Extension		
	Ethernet (ECL Comfort 310 only)	2152	Inbound accept
		258	Address type
		278	IP1
		279	IP2
		280	IP3
		281	IP3
		282	Gateway IP 1
		283	Gateway IP 2
		284	Gateway IP 3
		285	Gateway IP 4
		286	Net Mask 1
		287	Net Mask 2
		288	Net Mask 3
		289	Net Mask 4
		2240	DNS 1 IP1
		2241	DNS 1 IP2
		2242	DNS 1 IP3
		2243	DNS 1 IP4
		2244	DNS 2 IP1
	Portal config (ECL Comfort 310 only)		ECL portal
			Portal status
			Portal info
	M-bus config (ECL Comfort 310 only)	5999	State
		5998	Command
		5997	Baud
		6000	M-bus address
		6002	Scan time
		6001	Type
	Energy Meters (ECL Comfort 310 only)		Energy Meter 1....5

Navigation, Common controller settings, continued

Home		Common controller settings	
MENU		**ID no.**	**Function**
System	Raw input overview	10201	S1 sensor
		10202	S2 sensor
		10203	S3 sensor
		10204	S4 sensor
		10205	S5 sensor
		10206	S6 sensor
		10207	S7 sensor
		10208	S8 sensor
		10209	S9 sensor
		10210	S10 sensor
		10211	S11 sensor
		10212	S12 sensor
		10213	Room Unit A, Sensor 1
		10216	Room Unit B, Sensor 1
	Sensor offset		S1 - S10 offset
	Alarm	32:	T sensor defect
	Display	60058	Backlight
		60059	Contrast
	Communication	2048	ECL 485 addr.
		38	Modbus addr.
		39	Baud
		2150	Service pin
		2051	Ext. reset
		2153	Portal encryption
	Language	2050	Language

Navigation, P318.11, circuits 1 and 2 (DHW)

Home				P318.11	
				Circuit	
MENU		**ID nos.**	**Function**	**1**	**2**
Schedule, Circ. P					●
Settings	Flow temperature	11101	Ext. desired T	●	
		11177	Temp. min.	●	
		11178	Temp. max.	●	
	Tank temp.	12195	Start difference	●	
		12194	Stop difference	●	
	X3 control	11195	Start difference	●	
		11194	Stop difference	●	
	Control par. 1		Xp actual	●	
		11185	Tn	●	
		11186	M run	●	
		11187	Nz	●	
		11165	V out max.	●	
		11167	V out min.	●	
		11189	Min. act. time	●	
		11171	Reverse out	●	
		11354	CW influence	●	
		11565	PWM period	●	
		11065	Adapt time	●	
	Flow meter		Actual	●	
		11114	Pulse	●	
		11115	Units	●	
	Control par. 3	13370	Max. return T		●
		13184	Xp		●
		13185	Tn		●
		13187	Nz		●
		13165	V out max.		●
		13167	V out min.		●
		13171	Reverse out		●
		13054	Cont. T control		●
	Application	11500	Send desired T	●	
	Anti-bacteria			●	
		12125	Desired T		●
		12124	Duration		●

Navigation, P318.11, circuits 1 and 2 (DHW), continued

Home				P318.11	
				Circuit	
MENU		**ID nos.**	**Function**	**1**	**2**
Event	DHW flow T	11147	Upper difference	●	
		9022	Event priority 22	●	
		11148	Lower difference	●	
		9021	Event priority 21	●	
		11149	Delay	●	
		11150	Lowest temp.	●	
	Tank temp.	13147	Upper difference	●	
		9042	Event priority 42	●	
		13148	Lower difference	●	
		9041	Event priority 41	●	
		13149	Delay	●	
		13150	Lowest temp.	●	
	Supply T	12147	Upper difference	●	
		9020	Event priority 20	●	
		12149	Delay	●	
		12150	Lowest temp.	●	
	Anti-bacteria	9030	Event priority 30	●	
		9031	Event priority 31	●	
	T sensor defect	9001	Event priotiry 1	●	
	Event overview			●	
Influence overview					
Des. DHW T	Anti-bacteria			●	
	Ext. desired T			●	
Circ. return T	Anti-bacteria				●

Navigation, P318.11, Common controller settings

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Input overview			DHW flow T
			Supply T
			DHW return T
			Tank temp.
			Tank lower T
			Circ. return T
			Ext. desired T
Log	DHW flow & des.		Log today
	DHW return		Log yesterday
	Supply T		Log 2 days,
	Tank T up. & des.		Log 4 days
	Tank T up. & low.		
	Circ. return T & lim.		
Output override			M1
			V1
			P1
			P2
			V3
			P3
			X1
			X2
			X3
			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		

Navigation, Common controller settings, continued

Home		Common controller settings	
MENU		**ID no.**	**Function**
System	ECL version	19	Code no.
		34	Hardware
		35	Software
		36	Serial no.
		2099	Production date
	Extension		
	Ethernet (ECL Comfort 310 only)	2152	Inbound accept
		258	Address type
		278	IP1
		279	IP2
		280	IP3
		281	IP3
		282	Gateway IP 1
		283	Gateway IP 2
		284	Gateway IP 3
		285	Gateway IP 4
		286	Net Mask 1
		287	Net Mask 2
		288	Net Mask 3
		289	Net Mask 4
		2240	DNS 1 IP1
		2241	DNS 1 IP2
		2242	DNS 1 IP3
		2243	DNS 1 IP4
		2244	DNS 2 IP1
	Portal config (ECL Comfort 310 only)		ECL portal
			Portal status
			Portal info
	M-bus config (ECL Comfort 310 only)	5999	State
		5998	Command
		5997	Baud
		6000	M-bus address
		6002	Scan time
		6001	Type
	Energy Meters (ECL Comfort 310 only)		Energy Meter 1....5

Navigation, Common controller settings, continued

Home		Common controller settings	
MENU		**ID no.**	**Function**
System	Raw input overview	10201	S1 sensor
		10202	S2 sensor
		10203	S3 sensor
		10204	S4 sensor
		10205	S5 sensor
		10206	S6 sensor
		10207	S7 sensor
		10208	S8 sensor
		10209	S9 sensor
		10210	S10 sensor
		10211	S11 sensor
		10212	S12 sensor
		10213	Room Unit A, Sensor 1
		10216	Room Unit B, Sensor 1
	Sensor offset		S1 - S10 offset
	Alarm	32:	T sensor defect
	Display	60058	Backlight
		60059	Contrast
	Communication	2048	ECL 485 addr.
		38	Modbus addr.
		39	Baud
		2150	Service pin
		2051	Ext. reset
		2153	Portal encryption
	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 (↻).

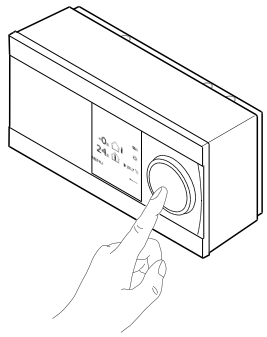
The dial has a built-in accellerator. The faster you turn the dial, the faster it reaches the limits of any wide setting range.

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

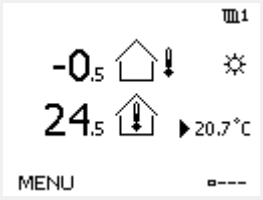
Push the dial to confirm your choices (☝).

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.

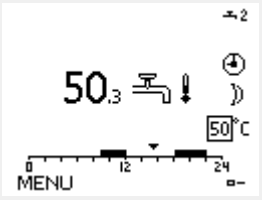
Example shows ECL 210 / 310



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.

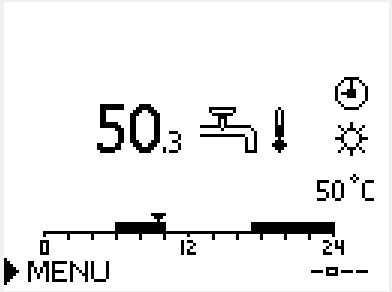
If the dial has not been activated for 20 min., the controller will revert to the overview display you have chosen as favorite.

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.

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.

3.3 A general overview: What do the symbols mean?

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

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

Additional symbols, ECA 30 / 31:

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

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

3.4 Monitoring temperatures and system components

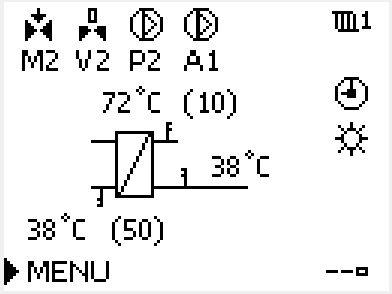
This section describes the function in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application.

Heating circuit

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

Display example:

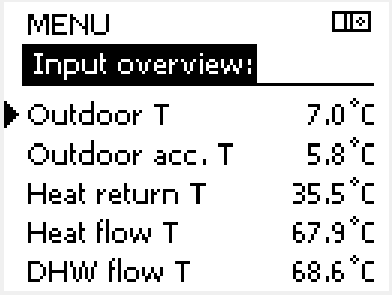
49 °C	Flow temperature
(31)	Desired flow temperature
24 °C	Return temperature
(50)	Return temperature limitation



Input overview

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

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



3.5 Influence overview

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

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

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

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

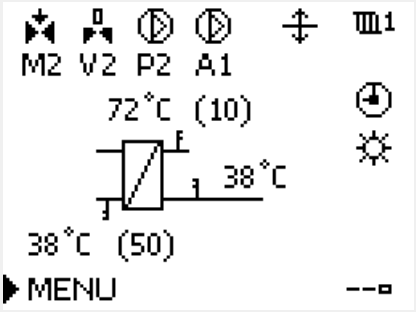
Arrow-up:
The parameter in question increases the desired flow temperature.

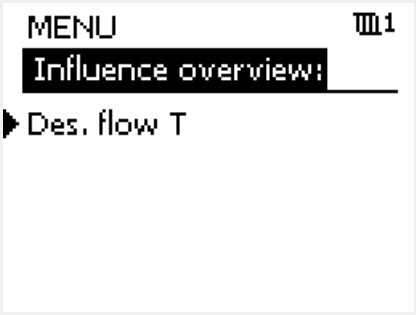
Double-arrow:
The parameter in question creates an override (e.g. Holiday).

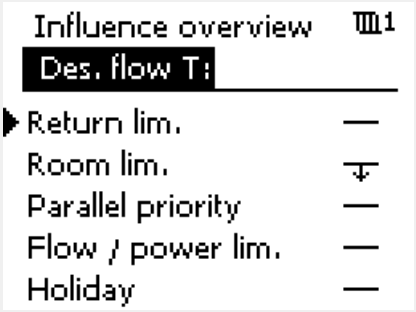
Straight line:
No active influence.

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

Example of overview display with Influence indication:







3.6 Manual control

It is possible to manually control the installed components.

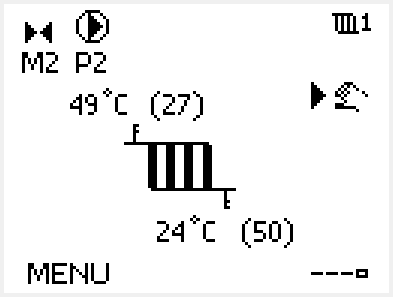
Manual control can only be selected in favorite displays in which the symbols for the controlled components (valve, pump etc.) are visible.

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

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

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

Controlled components *Circuit selector*



During manual operation:

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

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

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

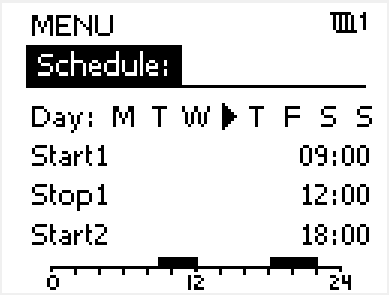
3.7 Schedule

3.7.1 Set your schedule

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

The schedule consists of a 7-day week:

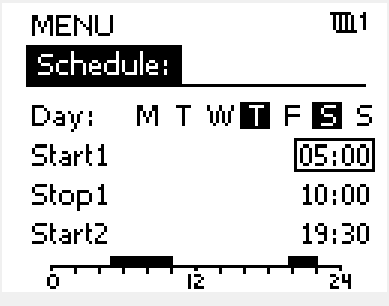
M = Monday
T = Tuesday
W = Wednesday
T = Thursday
F = Friday
S = Saturday
S = Sunday

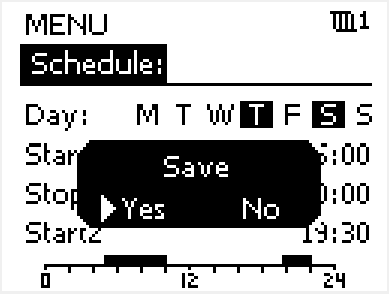


The schedule will day-by-day show you the start and stop times of your comfort periods (heating / DHW circuits).

Changing your schedule:

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





* Several days can be marked

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

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

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

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

4.0 Settings overview

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

Setting	ID	Page	Factory settings in circuit(s)		
			1	2	3
Ext. desired T — (ECL Comfort 310)		95			
Ext. desired T — (ECL Comfort 310)		100			
Actual		115			
Desired T		119			
Level	11353	117			
Cont. T control (Continued temperature control)	13054	109			
Limit (return temp. limitation)	1x030	104			
Infl. - max. (return temp. limitation - max. influence)	1x035	104			
Infl. - min. (return temp. limitation - min. influence)	1x036	105			
Adapt. time (adaptation time)	1x037	105			
DHW P post-run (DHW pump, post-run)	1x041	117			
Cont. T control (Continued temperature control)	1x054	117			
Circ. P priority	1x055	109			
P charge delay (Charging pump, delayed start)	1x059	95			
Adapt. time (adaptation time)	1x065	109			
Pulse	1x114	115			
Units	1x115	115			
Duration	1x124	119			
Mon. T select (Monitoring temperature, selection)	1x145	117			
Upper difference	1x147	122			
Upper difference	1x147	124			
Upper difference	1x147	126			
Lower difference	1x148	122			
Lower difference	1x148	124			
Lower difference	1x148	126			
Delay	1x149	123			
Delay	1x149	125			
Delay	1x149	127			
Lowest temp.	1x150	123			
Lowest temp.	1x150	125			
Lowest temp.	1x150	127			
Max. charge T (maximum heating / charging temperature)	1x152	96			
V out max.	1x165	110			
V out min.	1x167	110			
Reverse out	1x171	110			
Temp. min.	1x177	101			
Temp. max.	1x178	101			
Xp (proportional band)	1x184	111			
Tn (integration time constant)	1x185	111			

Setting	ID	Page	Factory settings in circuit(s)		
			1	2	3
M run (running time of the motorized control valve)	1x186	111			
Nz (neutral zone)	1x187	112			
Min. act. time (min. activation time gear motor)	1x189	112			
Stop difference	1x194	96			
Stop difference	1x194	99			
Start difference	1x195	97			
Start difference	1x195	99			
Wake up level	1x330	112			
Delay	1x340	128			
CW influence (Cold Water influence)	1x354	112			
Max. return T	1x370	113			
Pump start diff.	1x371	98			
Reduced des. T (Reduced desired temperature)	1x375	113			
Send desired T	1x500	118			
PWM period	1x565	113			
Event priority 1	9001	130			
Event priority 20	9020	128			
Event priority 21	9021	122			
Event priority 21	9021	124			
Event priority 22	9022	122			
Event priority 22	9022	124			
Event priority 30	9030	129			
Event priority 31	9031	129			
Event priority 41	9041	127			
Event priority 42	9042	126			

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

External signal for desired flow temperature

A voltage (0 - 10 V) can be applied to the input terminal S12 in order to determine the desired flow temperature.

The measured voltage on input S12 must be converted to a temperature value by the controller. When the voltage gets higher, the desired flow temperature increases.

The following settings set up the scaling.

MENU > Settings > Tank temperature

Ext. desired T — (ECL Comfort 310)		
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	
The actual desired flow temperature is indicated by the unit °C.		

Read-out:

- - : External voltage signal is not connected..

°C : External voltage signal converted to desired flow temperature.

Push the dial to see the graph and enter the value sets for the input voltage (1 and 10 volt) and displayed desired flow temperature.

Desired flow temperature: 10 ... 120 °C

Fixed voltage settings: 1 V and 10 V

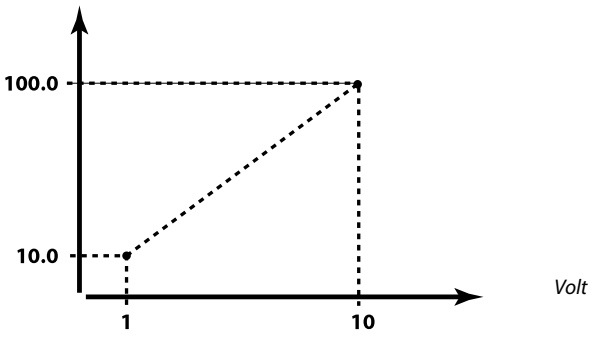
Factory settings: (1,10) and (10,100)

This means that the 'Desired flow temperature' is 10 °C at 1.0 V and 100 °C at 10 V.

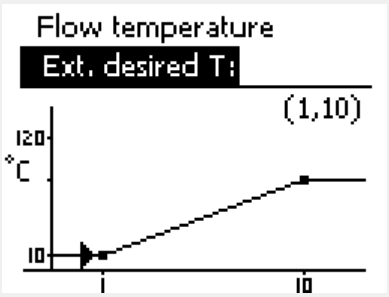
Typically, the higher the voltage, the higher the displayed desired flow temperature.

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

Example: Relationship between input voltage and displayed desired DHW temperature



This example shows that 1 volt corresponds to 10.0 °C and 10 volt correspond to 100 °C.



The external voltage signal must be higher than 1.0 V in order to activate the override.

MENU > Settings > Tank temperature

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

See Appendix “Parameter ID overview”

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

0: DHW heating / charging pump is switched ON.

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

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

MENU > Settings > 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.

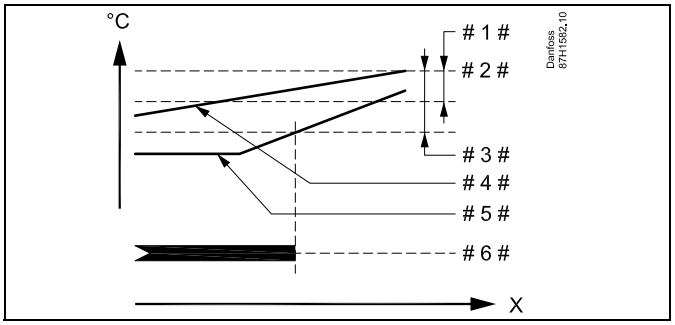
MENU > Settings > Tank temperature

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

See Appendix “Parameter ID overview”

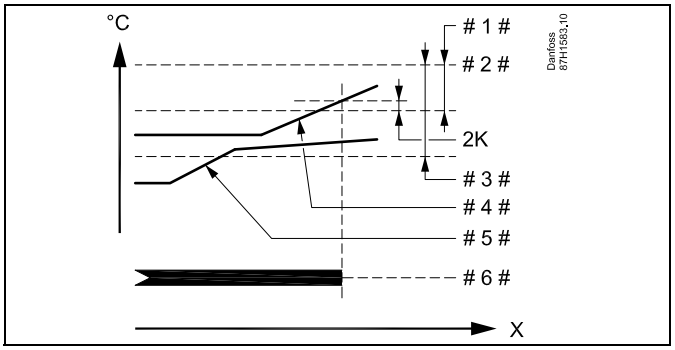
Value: Set the number of degrees.

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



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

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



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

MENU > Settings > Tank temperature

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

See Appendix “Parameter ID overview”

Value: Set the number of degrees.

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.

MENU > Settings > Tank temperature

Pump start diff.	**1x371**
Charging pump P2 is switched ON when supply temperature S2 gets higher than ('Desired buffer temperature' + 'Pump start diff.'). *Example: 60 °C + 3 K = 63 °C*	

See Appendix “Parameter ID overview”

5.3 X3 control

MENU > Settings > X3 control

Stop difference	**1x194**
When return temperature S5 gets lower than buffer temperature S8, the water is directed to buffer-bottom. *The set difference for S5 determines the X3 change-over to buffer-bottom (X3 = OFF).* ***Formula:*** *S5 + diff < S8 => X3 goes OFF*	

See Appendix “Parameter ID overview”

Value: Set the difference for X3 direction "Buffer-bottom"

Example 1

"Stop difference":	5 K
S8 =	45 °C
When (S5 + "Stop difference") gets lower than 45 °C, X3 changes to buffer-bottom. Result: When S5 gets lower than 40 °C, X3 changes to buffer-bottom.	

Example 2

"Stop difference":	-2 K
S8 =	45 °C
When (S5 + "Stop difference") gets lower than 45 °C, X3 changes to buffer-bottom. Result: When S5 gets lower than 47 °C, X3 changes to buffer-bottom.	

MENU > Settings > X3 control

Start difference	**1x195**
When return temperature S5 gets higher than buffer temperature S8, the water is directed to buffer-mid. *The set difference for S5 determines the X3 change-over to buffer-mid (X3 = ON).* ***Formula:*** *S5 + diff > S8 => X3 goes ON*	

See Appendix “Parameter ID overview”

Value: Set the difference for X3 direction "Buffer-mid"

Example 1

"Start difference":	-2 K
S8 =	45 °C
When (S5 + "Start difference") gets higher than 45 °C, X3 changes to buffer-mid. Result: When S5 gets higher than 47 °C, X3 changes to buffer-mid.	

Example 2

"Start difference":	-5 K
S8 =	45 °C
When (S5 + "Stop difference") gets lower than 45 °C, X3 changes to buffer-mid. Result: When S5 gets higher than 50 °C, X3 changes to buffer-mid.	

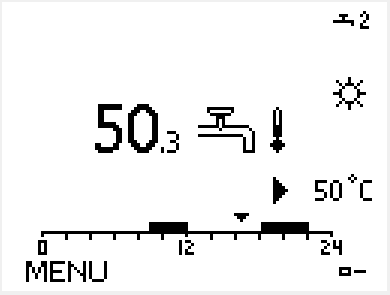
5.4 Flow temperature

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.

External signal for desired flow temperature

A voltage (0 - 10 V) can be applied to the input terminal S12 in order to determine the desired flow temperature.

The measured voltage on input S12 must be converted to a temperature value by the controller. When the voltage gets higher, the desired flow temperature increases.

The following settings set up the scaling.

MENU > Settings > Flow temperature

Ext. desired T — (ECL Comfort 310)		
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	
The actual desired flow temperature is indicated by the unit °C.		

Read-out:

- - : External voltage signal is not connected..

°C : External voltage signal converted to desired flow temperature.

Push the dial to see the graph and enter the value sets for the input voltage (1 and 10 volt) and displayed desired flow temperature.

Desired flow temperature: 10 ... 120 °C

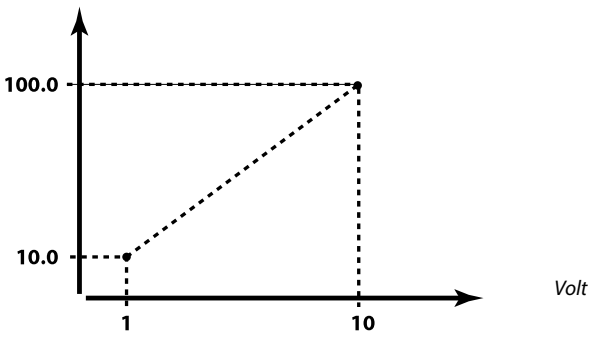
Fixed voltage settings: 1 V and 10 V

Factory settings: (1,10) and (10,100)

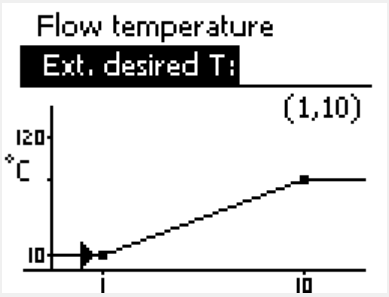
This means that the 'Desired flow temperature' is 10 °C at 1.0 V and 100 °C at 10 V.

Typically, the higher the voltage, the higher the displayed desired flow temperature.

Example: Relationship between input voltage and displayed desired DHW temperature



This example shows that 1 volt corresponds to 10.0 °C and 10 volt correspond to 100 °C.



The external voltage signal must be higher than 1.0 V in order to activate the override.

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"

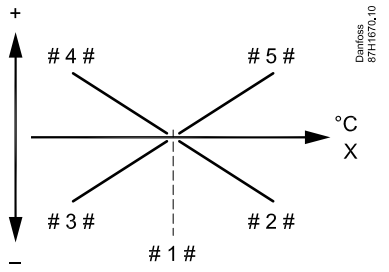
Set the max. flow temperature for the system. The desired temperature will not be higher than this setting. Adjust the factory setting, if required.

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

The setting for 'Temp. max.' has higher priority than 'Temp. min.'.

5.5 Return limit

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

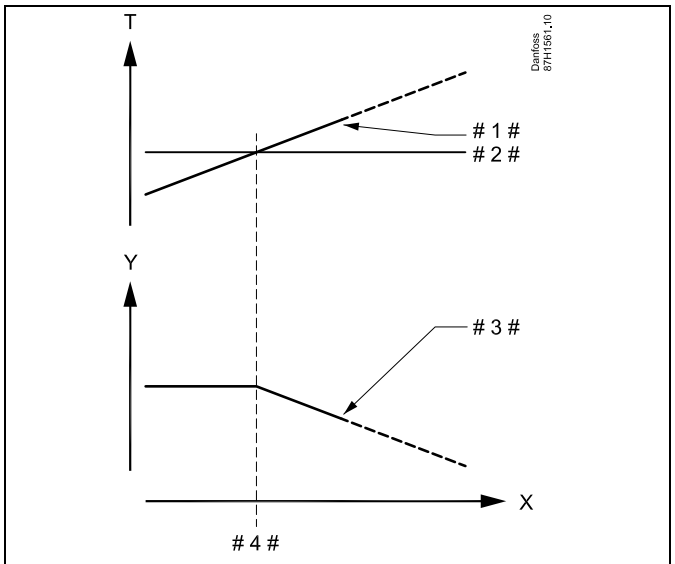


X = *Return temperature*
 # 1 # = *Limitation temperature*
 # 2 # = *Negative influence (1x035) when return temp. gets higher than limit. temp.*
 # 3 # = *Negative influence (1x036) when return temp. gets lower than limit. temp.*
 # 4 # = *Positive influence (1x036) when return temp. gets lower than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

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

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

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



T = *Temperature*

Y = *Temperature*

X = *Time*

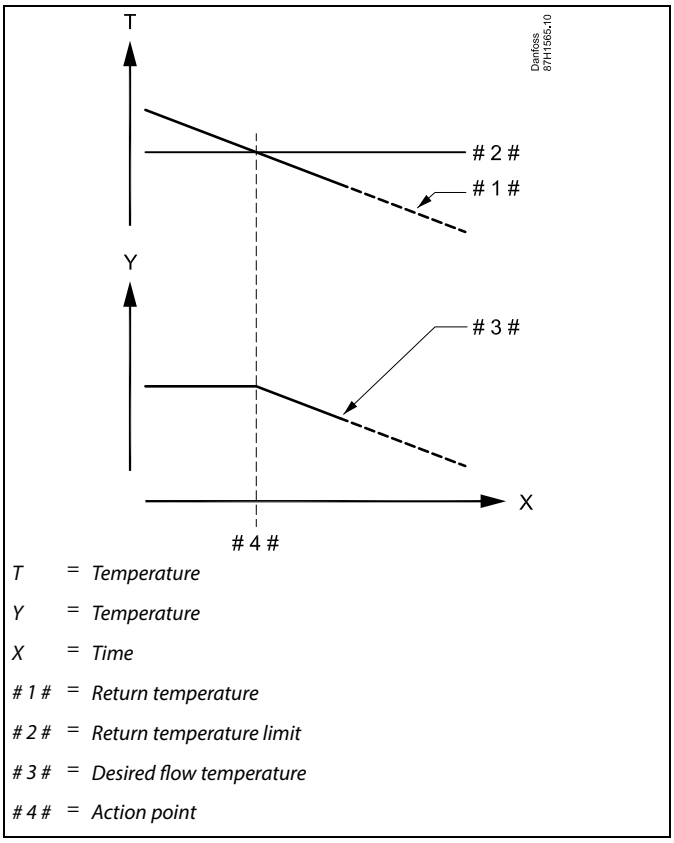
 # 1 # = *Return temperature*

 # 2 # = *Return temperature limit*

 # 3 # = *Desired flow temperature*

 # 4 # = *Action point*

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



T = Temperature
Y = Temperature
X = Time
 # 1 # = Return temperature
 # 2 # = Return temperature limit
 # 3 # = Desired flow temperature
 # 4 # = Action point

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.

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.

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.

Speed control of pumps, in general

0 – 10 Volt (0 – 100 %) as control signal
Typically, the pump speed will be 100 % at 10 Volt. When lowering the control voltage, the pump speed falls. Depending on pump type, the lowest pump speed can be 20 – 30 %. If the control signal gets lower than 2 – 3 Volt, the pump remains on "lowest pump speed". The pump will be switched OFF if the applied voltage gets lower than 1 Volt. The pump will be switched ON again when the control signal gets higher than 3 Volt.

PWM % as control signal
Typically, the pump speed will be 100 % at PWM value = 100 %. When lowering the PWM value, the pump speed falls. Depending on pump type, the lowest pump speed can be 10 - 15 %. If the control signal gets lower than 10 – 15 %, the pump remains on "lowest pump speed". The pump will be switched OFF if the applied PWM value gets lower than 10 %. The pump will be switched ON again when the control signal gets higher than 15 %.

Dimensioning:
When dimensioning the installation, the pump characteristics must be considered in order to achieve an acceptable temperature control.

Speed control of control pump (primary control pump)

The control pump P1 / V1 can be speed controlled by means of a 0 -10 volt signal or a PWM (Pulse Width Modulation) signal. The speed control signal, as 0 - 10 V, comes from the "Analog Out 1" (terminals 59 and 62) on the ECA 32 or 35 module.

The speed control signal, as PWM, comes from the output "PWM Out 1" (terminals 52 and 49) on the ECA 35 module.

The desired temperature at S3 is basis for the speed control procedure.

The control voltage / PWM is expressed as a % value and displayed at the V1 symbol.

When the S3 temperature gets lower than the desired temperature, the control voltage / PWM is gradually increased in order to increase the speed of the control pump more than the moment before. By this, the S3 temperature aligns with the desired temperature.

The control voltage / PWM remain on a stable value as long as the S3 temperature corresponds to the desired temperature.

The control voltage / PWM can be limited to a maximum and a minimum % value.

Furthermore, the control signal can be reversed; this means the higher the % value, the lower the speed.

Speed control of charging pump

The charging pump P2 / V2 can be speed controlled by means of a 0 - 10 volt signal or a PWM (Pulse Width Modulation) signal. The speed control signal, as 0 - 10 V, comes from the "Analog Out 2" (terminals 60 and 56) on the ECA 32 or 35 module.

The speed control signal, as PWM, comes from the output "PWM Out 2" (terminals 53 and 49) on the ECA 35 module.

When the charging temperature at S3 is less than 2 K below the desired charging temperature, the speed will be decreased gradually.

The control voltage / PWM is expressed as a % value and displayed at the V2 symbol.

When the difference between charging temperature and desired charging temperature becomes more than 2 K, the speed will be decreased gradually.

The control voltage / PWM can be limited to a maximum and a minimum % value.

Furthermore, the control signal can be reversed; this means the higher the % value, the lower the speed.

Speed control of circulation pump

The circulation pump P3 / V3 can be speed controlled by means of a 0 - 10 volt signal or a PWM (Pulse Width Modulation) signal. The speed control signal, as 0 - 10 V, comes from the "Analog Out 3" (terminals 61 and 56) on the ECA 32 or 35 module.

The speed control signal, as PWM, comes from the output "PWM Out 3" (terminals 54 and 49) on the ECA 35 module.
A maximum return temperature (ID 13370) at S9 is set for the speed control procedure.
The control voltage / PWM is expressed as a % value and displayed at the V3 symbol.

When the return temperature gets lower than the set maximum return temperature, the control voltage / PWM is gradually increased in order to increase the speed of the circulation pump more than the moment before. By this, the return temperature aligns with the set maximum return temperature.

The control voltage / PWM remains on a stable value as long as the return temperature corresponds to the set maximum return temperature.
The control voltage / PWM can be limited to a maximum and a minimum % value.

Furthermore, the control signal can be reversed; this means the higher the % value, the lower the speed.

The control parameters are used for different issues, for example temperature and pump speed control.

Parameters Xp (proportional band) with ID 1x184 are also used for pump speed control.

Parameters Tn (integration time constant) with ID 1x185 are also used for pump speed control.

Parameters Nz (neutral zone) with ID 1x187 are also used for pump speed control.

Parameters V out max. and V out min. (ID 1x165 and 1x167) are setting the limits for the control voltage as well as for the PWM control.

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

MENU > Settings > Control parameters

Cont. T control (Continued temperature control)	**13054**
Temperature control at S9 is done via P3 / V3. The temperature control is active when Schedule for circulation pump is in Comfort mode. When water flow is detected at F1, the temperature control at S9 can either be continued or the pump goes to max. speed.	

See Appendix “Parameter ID overview”

NO: No temperature control; pump speed goes to max.

YES: Temperature control via pump speed

MENU > Settings > Control parameters

Circ. P priority	**1x055**
Select the control form for the DHW circulation pump during buffer charging.	

See Appendix “Parameter ID overview”

AUTO: P3 is operated according to Schedule and Max. return temperature at S9

IDLE: P3 is operated at the set V. min.

STOP: P3 is stopped

MENU > Settings > Control parameters

Adapt. time (adaptation time)	1x065
When the pump is controlled at low speed (in pulsed mode) the regulation can be dampened. A too low dampening can result in unstable temperature regulation. In setting "OFF", the pulsed signal is cancelled. Pump speed remains at minimum.	

See Appendix “Parameter ID overview”

Low value: Low dampening

High value: High dampening

OFF: Pulsed signal is cancelled

MENU > Settings > Control parameters

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

See Appendix “Parameter ID overview”

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

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

MENU > Settings > Control parameters

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

See Appendix “Parameter ID overview”

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

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

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

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

MENU > Settings > Control parameters

Reverse out	1x171
Valid only when the internal I / O module ECA 35 is used: The analog output (0-10 volt) can be a rising or a falling voltage for rising temperature demand. Also the PWM signal can be reversed.	

See Appendix "Parameter ID overview"

OFF: The analog output voltage will rise at a rising temperature demand.
The PWM signal will rise in % at a rising temperature demand.

ON: The analog output voltage will fall at a rising temperature demand.
The PWM signal will fall in % at a rising temperature demand.

MENU > Settings > Control parameters

Xp (proportional band)	1x184

See Appendix "Parameter ID overview"

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

Special for the parameters 11184 / 12184 / 13184:
Set the proportional band for the speed control. A higher value will result in a stable, but slow control of the speed.

MENU > Settings > Control parameters

Tn (integration time constant)	1x185

See Appendix "Parameter ID overview"

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

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

Special for 11184 / 12184 / 13184:
Set the integration time for the speed control. Set a higher value (in seconds) to obtain a slow, but stable reaction to deviations.
A low integration time constant will make the controller react fast, but with less stability.

MENU > Settings > Control parameters

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

See Appendix "Parameter ID overview"

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

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

Seated valves

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

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

Rotating valves

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

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

MENU > Settings > Control parameters

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

See Appendix "Parameter ID overview"

Set the acceptable flow temperature deviation.

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

Special for 11187 / 12187 / 13187:
Set the acceptable temperature deviation.
When the actual temperature is within the neutral zone, the controller does not change the pump speed.

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

MENU > Settings > Control parameters

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

See Appendix "Parameter ID overview"

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

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

MENU > Settings > Control parameters

Wake up level	1x330
If the control valve has been closed after a charging, it will be opened to the set value at next charging. Then await an acceptable S2 temperature before switching ON the charging pump. The opening position is the value (percentage) of the M.run (Motor running time). *If the control pump has been stopped after a charging, it will start with a speed level as the set value at next charging. Then await an acceptable S2 temperature before switching ON the charging pump.*	

See Appendix "Parameter ID overview"

MENU > Settings > Control parameters

CW influence (Cold Water influence)	1x354
The cold water flow (measured by Cold Water meter F1) can influence the DHW temperature control by overriding the control of the motorized control valve. By this, the temperature control is pro-active and compensates for the delay before the flow temperature sensor S3 measures a change in temperature. *The value expresses how many % of 100 liters / hour will do an influence on the motorized control valve.*	

See Appendix "Parameter ID overview"

Low value: Minor influence

High value: Major influence

MENU > Settings > Control parameters

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

See Appendix "Parameter ID overview"

Value: Desired max. return temperature.

MENU > Settings > Control parameters

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

See Appendix "Parameter ID overview"

Example:

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

MENU > Settings > Control parameters

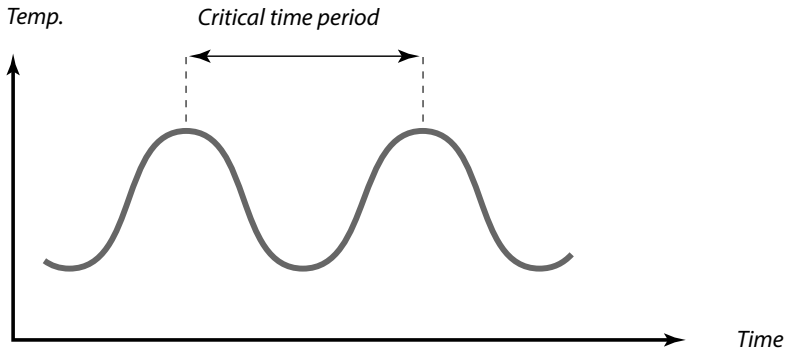
PWM period	1x565
When the pump is controlled at low speed (in pulsed mode) the set value reflects the reaction time of the pump, the water flow and the temperature sensor. A too low value can result in unstable temperature regulation.	

See Appendix "Parameter ID overview"

Value: Reaction time

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

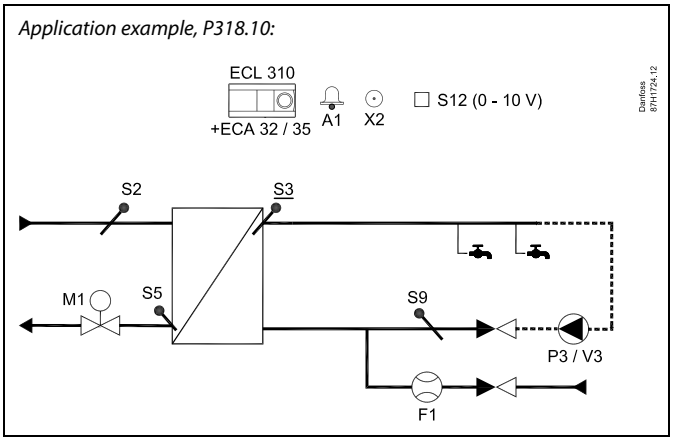
'Xp' = 2.2 x proportional band value in the critical time period

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 Flow meter

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

Application example, P318.10:



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

MENU > Settings > Flow meter

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

MENU > Settings > Flow meter

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

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

MENU > Settings > Flow meter

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

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

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

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

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

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

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

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

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

5.8 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

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. Post-run is cancelled if the charging temperature S3 gets lower than the desired temperature at S6.	

See Appendix “Parameter ID overview”

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

MENU > Settings > Application

Cont. T control (Continued temperature control)	**1x054**
P318.1 *The desired DHW temperature at S6 can be maintained at S3 after the buffer charging procedure has elapsed.*	

See Appendix “Parameter ID overview”

OFF: The desired temperature at S6 is not maintained at S3. The control valve closes / control pump stops.

ON: The desired temperature at S6 is maintained at S3.

MENU > Settings > Application

Mon. T select (Monitoring temperature, selection)	**1x145**
The DHW temperature, shown in Favorite display 1, can be a selected temperature sensor.	

See Appendix “Parameter ID overview”

Select the desired temperature sensor.

MENU > Settings > Application

Level	**11353**
Change in water flow more than set value will make further activation of the control valve.	

See Appendix “Parameter ID overview”

MENU > Settings > Application

Send desired T	**1x500**
When the controller acts as a slave controller in a master / slave system, information about the desired flow temperature can be sent to the master controller via the ECL 485 bus. *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’).

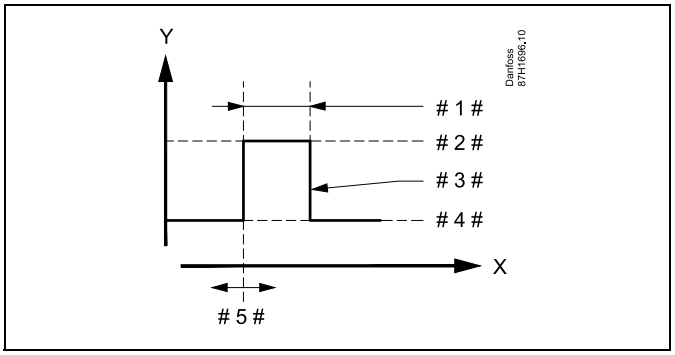
5.9 Anti-bacteria

On selected days during the week the DHW temperature S3 can be increased in order to neutralize bacteria in the DHW system. Start time and duration can be set. The desired DHW temperature 'Desired T' (for example 80 °C) will be present for the selected day(s) and time.

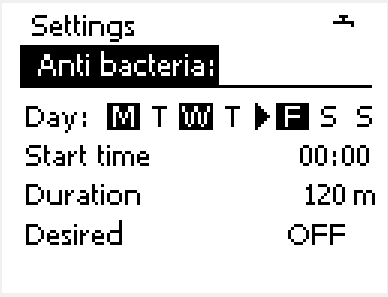
External control:
When activating a selectable input (S1 – S16) the anti-bacteria process will start. The anti-bacteria process is in progress as long as the input is activated.

The circulation temperature S9 can be increased in order to neutralize bacteria in the circulation pipe. This takes place at same periods as the anti-bacteria function at S3. The temperature demand at S3 is not influenced by the temperature demand at S9.

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.

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

MENU > Settings > Anti-bacteria

Duration	**1x124**
Set the duration (minutes) for the anti-bacteria function.	

MENU > Settings > Anti-bacteria

Desired T	**1x125**
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.

6.0 Event

6.1 Introduction to Event

The section "Event" explains how events are registered and listed. The Event overview lists the Event number, the priority and date / time.

Furthermore, 3 levels of actions are possible: Log, Notification and Alarm.

If a temperature exceeds a set range it can be registered as an event.

Events are related to:

- Charge T (Charging temperature)
- Tank temp. (Tank temperature)
- DHW flow T (DHW flow temperature)
- Supply T (Supply temperature)
- Anti-bacteria

The explanation is made common for the mentioned events.

6.2 Charge T

MENU > Event > Charge T

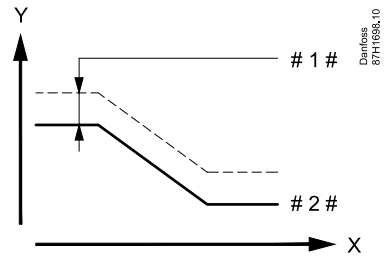
Upper difference	1x147
The event is registered if the temperature in question increases more than the set difference (acceptable temperature difference above the desired temperature). See also 'Delay'.	

See Appendix "Parameter ID overview"

OFF: The event function is not active.

Value: The event function is active if the actual temperature gets above the acceptable difference.

Upper difference



X = *Time*
Y = *Temperature*
 # 1 # = *Upper difference*
 # 2 # = *Desired temperature*

MENU > Event > Charge T

Event priority 22	9022
The event number and priority possibilities. The event can be activated if the controlled temperature S3 has been too high for more than the set "Delay" time.	

See Appendix "Parameter ID overview"

0: Log of event not active

1: Log of event in list

2: Log of event in list and notice (letter symbol in display)

3: Log of event in list and alarm (bell symbol in display and activation of alarm output)

MENU > Event > Charge T

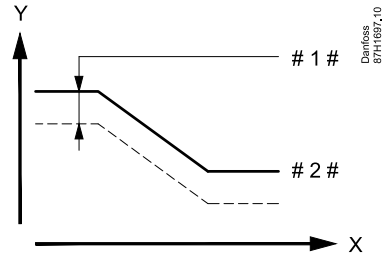
Lower difference	1x148
The event is registered if the temperature in question decreases more than the set difference (acceptable temperature difference below the desired temperature). See also 'Delay'.	

See Appendix "Parameter ID overview"

OFF: The event function is not active.

Value: The event function is active if the actual temperature gets below the acceptable difference.

Lower difference



X = *Time*
Y = *Temperature*
 # 1 # = *Lower difference*
 # 2 # = *Desired temperature*

MENU > Event > Charge T

Event priority 21	9021
The event number and priority possibilities. *The event can be activated if the controlled temperature S3 has been too low for more than the set "Delay" time.*	

See Appendix “Parameter ID overview”

0: Log of event not active

1: Log of event in list

2: Log of event in list and notice (letter symbol in display)

3: Log of event in list and alarm (bell symbol in display and activation of alarm output)

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

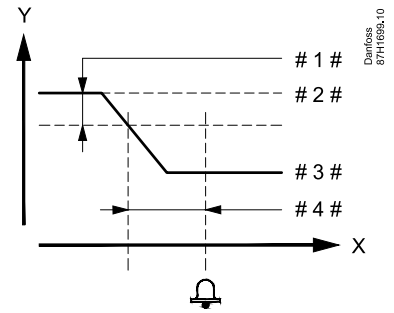
MENU > Event > Charge T

Delay	1x149
If an event from either 'Upper difference' or 'Lower difference' is present for a longer time than the set delay (in minutes), the event is registered.	

See Appendix “Parameter ID overview”

Value: The event will be present if the alarm condition remains after the set delay.

Delay, example



X = *Time*
Y = *Temperature*
 # 1 # = *Lower difference*
 # 2 # = *Desired temperature*
 # 3 # = *Actual temperature*
 # 4 # = *Delay (ID 1x149)*

MENU > Event > Charge T

Lowest temp.	1x150
The event will not be registered if the desired temperature is lower than the set value.	

See Appendix “Parameter ID overview”

If the cause of the event disappears, the event indication and, possibly, the alarm output will also disappear.

6.3 DHW flow T

MENU > Event > DHW flow T

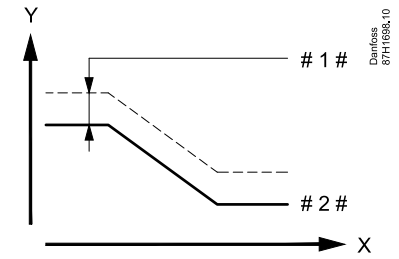
Upper difference	1x147
The event is registered if the temperature in question increases more than the set difference (acceptable temperature difference above the desired temperature). See also 'Delay'.	

See Appendix "Parameter ID overview"

OFF: The event function is not active.

Value: The event function is active if the actual temperature gets above the acceptable difference.

Upper difference



X = *Time*
Y = *Temperature*
 # 1 # = *Upper difference*
 # 2 # = *Desired temperature*

MENU > Event > DHW flow T

Event priority 22	9022
The event number and priority possibilities. *The event can be activated if the controlled temperature S3 has been too high for more than the set "Delay" time.*	

See Appendix "Parameter ID overview"

0: Log of event not active

1: Log of event in list

2: Log of event in list and notice (letter symbol in display)

3: Log of event in list and alarm (bell symbol in display and activation of alarm output)

MENU > Event > DHW flow T

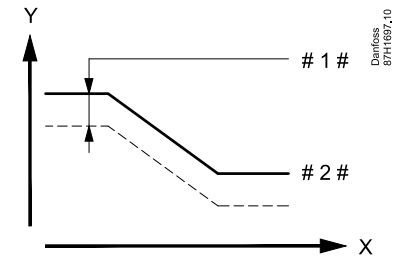
Lower difference	1x148
The event is registered if the temperature in question decreases more than the set difference (acceptable temperature difference below the desired temperature). See also 'Delay'.	

See Appendix "Parameter ID overview"

OFF: The event function is not active.

Value: The event function is active if the actual temperature gets below the acceptable difference.

Lower difference



X = *Time*
Y = *Temperature*
 # 1 # = *Lower difference*
 # 2 # = *Desired temperature*

MENU > Event > DHW flow T

Event priority 21	**9021**
The event number and priority possibilities. The event can be activated if the controlled temperature S3 has been too low for more than the set "Delay" time.	

See Appendix “Parameter ID overview”

0: Log of event not active

1: Log of event in list

2: Log of event in list and notice (letter symbol in display)

3: Log of event in list and alarm (bell symbol in display and activation of alarm output)

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

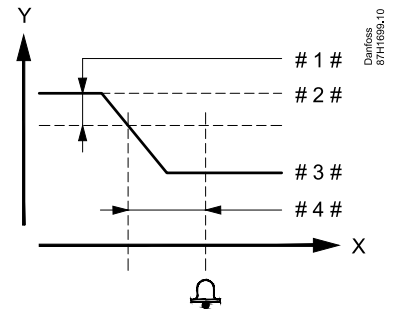
MENU > Event > DHW flow T

Delay	**1x149**
If an event from either 'Upper difference' or 'Lower difference' is present for a longer time than the set delay (in minutes), the event is registered.	

See Appendix “Parameter ID overview”

Value: The event will be present if the alarm condition remains after the set delay.

Delay, example



X = *Time*
Y = *Temperature*
 # 1 # = *Lower difference*
 # 2 # = *Desired temperature*
 # 3 # = *Actual temperature*
 # 4 # = *Delay (ID 1x149)*

MENU > Event > DHW flow T

Lowest temp.	**1x150**
The event will not be registered if the desired temperature is lower than the set value.	

See Appendix “Parameter ID overview”

If the cause of the event disappears, the event indication and, possibly, the alarm output will also disappear.

6.4 Tank temperature

MENU > Event > Tank temperature

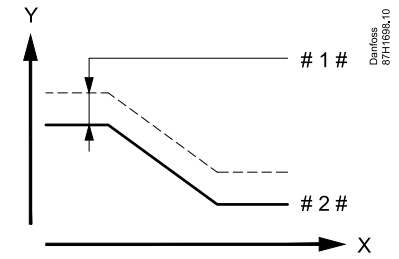
Upper difference	**1x147**
The event is registered if the temperature in question increases more than the set difference (acceptable temperature difference above the desired temperature). See also 'Delay'.	

See Appendix "Parameter ID overview"

OFF: The event function is not active.

Value: The event function is active if the actual temperature gets above the acceptable difference.

Upper difference



X = *Time*
Y = *Temperature*
 # 1 # = *Upper difference*
 # 2 # = *Desired temperature*

MENU > Event > Tank temperature

Event priority 42	**9042**
The event number and priority possibilities. *The event can be activated if the tank temperature S6 has been too high for more than the set "Delay" time.*	

See Appendix "Parameter ID overview"

0: Log of event not active

1: Log of event in list

2: Log of event in list and notice (letter symbol in display)

3: Log of event in list and alarm (bell symbol in display and activation of alarm output)

MENU > Event > Tank temperature

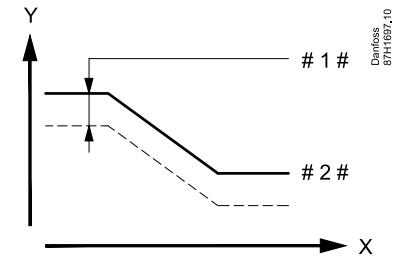
Lower difference	**1x148**
The event is registered if the temperature in question decreases more than the set difference (acceptable temperature difference below the desired temperature). See also 'Delay'.	

See Appendix "Parameter ID overview"

OFF: The event function is not active.

Value: The event function is active if the actual temperature gets below the acceptable difference.

Lower difference



X = *Time*
Y = *Temperature*
 # 1 # = *Lower difference*
 # 2 # = *Desired temperature*

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

MENU > Event > Tank temperature

Event priority 41	**9041**
The event number and priority possibilities. *The event can be activated if the tank temperature S6 has been too low for more than the set "Delay" time.*	

See Appendix “Parameter ID overview”

0: Log of event not active

1: Log of event in list

2: Log of event in list and notice (letter symbol in display)

3: Log of event in list and alarm (bell symbol in display and activation of alarm output)

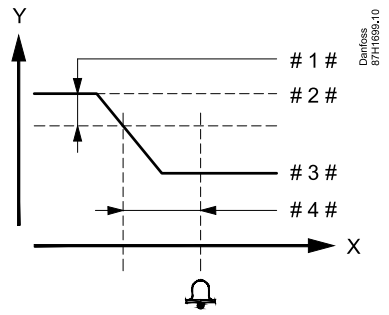
MENU > Event > Tank temperature

Delay	**1x149**
If an event from either 'Upper difference' or 'Lower difference' is present for a longer time than the set delay (in minutes), the event is registered.	

See Appendix “Parameter ID overview”

Value: The event will be present if the alarm condition remains after the set delay.

Delay, example



X = *Time*
Y = *Temperature*
 # 1 # = *Lower difference*
 # 2 # = *Desired temperature*
 # 3 # = *Actual temperature*
 # 4 # = *Delay (ID 1x149)*

MENU > Event > Tank temperature

Lowest temp.	**1x150**
The event will not be registered if the desired temperature is lower than the set value.	

See Appendix “Parameter ID overview”

If the cause of the event disappears, the event indication and, possibly, the alarm output will also disappear.

6.5 Supply T

MENU > Event > Supply T

Event priority 20	**9020**
The event number and priority possibilities. ***P318.1:*** *The event can be activated if the supply temperature S2 has been lower than the desired charging temperature at S3 for more than the set "Delay" time.* ***P318.10:*** *The event can be activated if the supply temperature S2 has been lower than the desired DHW flow temperature at S3 for more than the set "Delay" time.*	

See Appendix “Parameter ID overview”

0 Log of event not active

1 Log of event in list

2 Log of event in list and notice (letter symbol in display)

3 Log of event in list and alarm (bell symbol in display and activation of alarm output)

MENU > Event > Supply T

Delay	**1x340**
If the supply temperature S2 is not acceptable for more than the set "Delay" (in minutes), the event is registered.* * ***P318.1:*** *S2 lower than ('Desired buffer temperature' + 'Pump start diff.'). Example: 60 °C + 3 K = 63 °C.* ***P318.10:*** *S2 lower than the desired DHW flow temperature at S3.*	

See Appendix “Parameter ID overview”

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

6.6 Anti-bacteria

MENU > Event > Anti-bacteria

Event priority 30	**9030**
The event number and priority possibilities. *The event can be activated when the anti-bacteria process has elapsed successfully.*	

See Appendix "Parameter ID overview"

0: Log of event not active

1: Log of event in list

2: Log of event in list and notice (letter symbol in display)

3: Log of event in list and alarm (bell symbol in display and activation of alarm output)

MENU > Event > Anti-bacteria

Event priority 31	**9031**
The event number and priority possibilities. *The event can be activated when the anti-bacteria process has not elapsed successfully.*	

See Appendix "Parameter ID overview"

0: Log of event not active

1: Log of event in list

2: Log of event in list and notice (letter symbol in display)

3: Log of event in list and alarm (bell symbol in display and activation of alarm output)

6.7 T sensor defect

MENU > Event > T sensor defect

Event priority 1	**9001**
The event number and priority possibilities. *The event can be activated if a monitored* temperature sensor should be disconnected, short-circuited or the sensor itself be defective.*	

See Appendix “Parameter ID overview”

0: Log of event not active

1: Log of event in list

2: Log of event in list and notice (letter symbol in display)

3: Log of event in list and alarm (bell symbol in display and activation of alarm output)

*** Monitoring the temperature sensors:**
In the "Raw input overview" (MENU > Common controller settings > System > Raw input overview) the sensor(s) in question is / are marked (dial-click) by means of the cursor. A symbol for a magnifying glass appears.
The temperature sensor(s) is / are now being monitored.

Should the connection to the temperature sensor be disconnected, short-circuited or the sensor itself is defective, the event function is activated.

Resetting the event:
Go to "Raw input overview" (MENU > Common controller settings > System > Raw input overview). See the sensor marked with a bell-symbol (alarm).
Mark the line by means of the cursor and click the dial. The symbols for alarm and magnifying glass disappears.
When the dial is pressed again, the monitoring function is reactivated.
When the event priority is set to "2", the bell-symbol is not shown.

6.8 Event overview

The event overview menu can contain the latest 20 events. By means of the software "ECL Tool" the latest 100 events can be read out.

Example for Event overview:

Cursor position	Event type	Event number	Date / time
▶	!	20	2016-6-28 10:04
▶	🔔	10	2016-6-24 16:12
▶	✉	30	2016-6-12 19:47
▶	🔔	10	2016-6-11 11:37

An event is acknowledged by moving the cursor to the line in question. Then push the dial.
By acknowledgement the event type symbol disappears, but the event remains with event number, date and time.

Event number list:

Event number	Decription
1	Temperature sensor
20	Supply temperature S2 too low
21	Charging or DHW flow temperature S3 too low
22	Charging or DHW flow temperature S3 too high
25	DHW flow temperature S4 too low
30	Anti-bacteria process successful
31	Anti-bacteria process not successful
41	Tank temperature S6 too low
42	Tank temperature S6 too high

7.0 Common controller settings

7.1 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

7.2 Time & Date

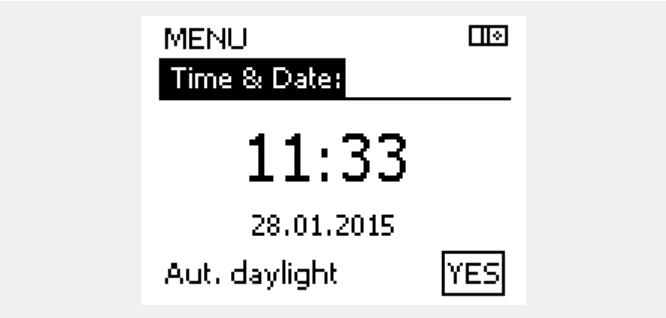
It is only necessary to set the correct date and time in connection with the first use of the ECL Comfort controller or after a power break of more than 72 hours.

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:

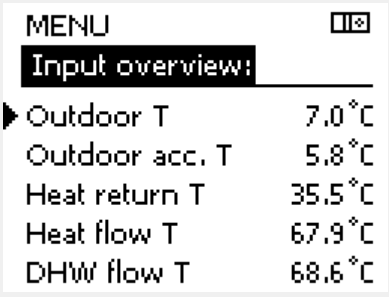
Action:	Purpose:	Examples:
	Choose 'MENU'	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose 'Common controller settings'	
	Confirm	
	Go to 'Time & Date'	
	Confirm	
	Place the cursor at the position to be changed	
	Confirm	
	Enter the desired value	
	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	

7.3 Input overview

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

The input overview is located in the common controller settings.

This overview will always show you the actual temperatures in the system (read-only).



"Outdoor acc. T" means "Accummulated outdoor temperature" and is a calculated value in the ECL Comfort controller.

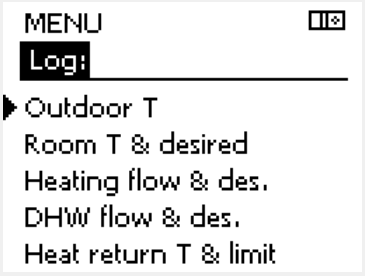
7.4 Log

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

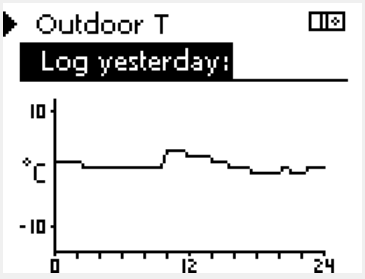
The log function (temperature history) allows you to monitor the logs of today, yesterday, the past 2 days as well as the past 4 days for the connected sensors.

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

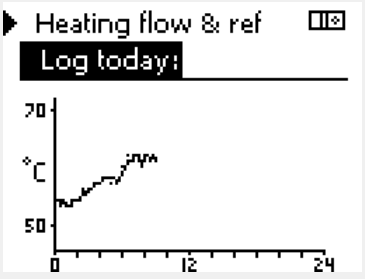
The log function is only available in the 'Common controller settings'.



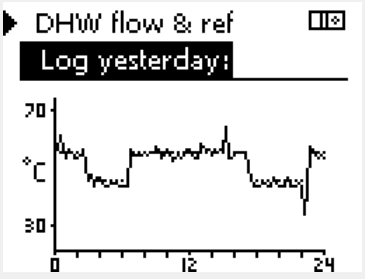
Example 1:
1 day log for yesterday showing the development in outdoor temperature during the past 24 hours.



Example 2:
Today's log for the actual heating flow temperature as well as the desired temperature.



Example 3:
Yesterday's log for the DHW flow temperature as well as the desired temperature.



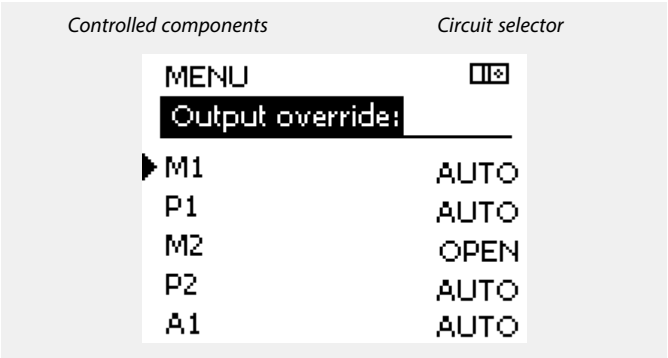
7.5 Output override

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

The output override is used to disable one or more of the controlled components. This could among others be useful in a service situation.

Action:	Purpose:	Examples:
	Choose 'MENU' in any of the overview displays	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose common controller settings	
	Confirm	
	Choose 'Output override'	
	Confirm	
	Choose a controlled component	M1, P1 etc.
	Confirm	
	Adjust the status of the controlled component: 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".

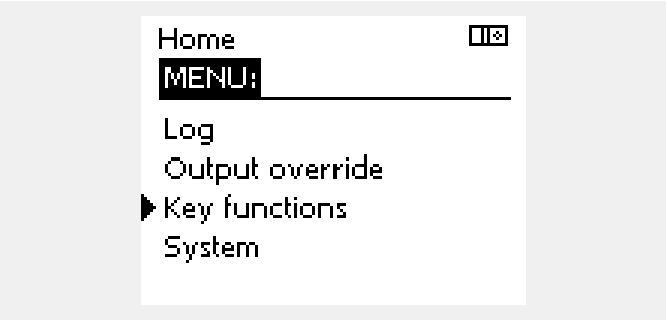
When the selected controlled component (output) is not 'AUTO', the ECL Comfort controller does not control the component in question (pump or motorized control valve e.g.). Frost protection is not active.

The speed controlled pumps V1, V2 and V3 are controlled by 0 - 10 Volt (0 - 100%) or PWM signals. Each of them can be set to AUTO or ON.
AUTO: Normal control (0 - 100%)
ON: The 0 - 10 Volt or PWM signal is set to the %-value, set below the indication 'ON'.

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

7.6 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.

7.7 System

7.7.1 ECL version

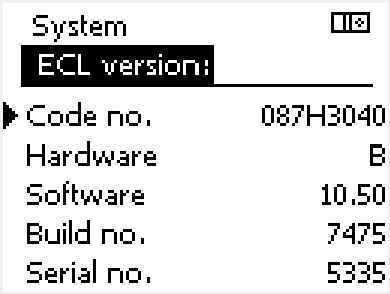
In 'ECL version' you will always be able to find an overview of the data related to your electronic controller.

Please have this information available if you need to contact your Danfoss sales organization concerning the controller.

Information about your ECL Application Key can be found in 'Key functions' and ' Key overview'.

Code no.:	The Danfoss sales and order no. for the controller
Hardware:	Hardware version of the controller
Software:	Software (firmware) version of the controller
Serial no.:	Unique number for the individual controller
Production week:	Week no. and year (WW.YYYY)

Example, ECL version



7.7.2 Extension

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

7.7.3 Ethernet

ECL Comfort 296 / 310 / 310B have a Modbus/TCP communication interface that allows the ECL controller to be connected to an Ethernet network. This allows remote access to the ECL 296 / 310 / 310B controller based on standard communication infrastructures.

In 'Ethernet' it is possible to set up the required IP addresses.

7.7.4 Portal config

ECL Comfort 296 / 310 / 310B have a Modbus/TCP communication interface that allows the ECL controller to be monitored and controlled via the ECL Portal.

ECL Portal related parameters are set here.

Documentation for ECL Portal: See *https://ecl.portal.danfoss.com*

7.7.5 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.

7.7.6 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.*		

7.7.7 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 " - - - ".

7.7.8 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

7.7.9 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.

7.7.10 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).

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.

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.

7.7.11 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.

8.0 Miscellaneous

8.1 ECA 30 / 31 setup procedures

ECA 30 (code no. 087H3200) is a remote control unit with built-in room temperature sensor.

ECA 31 (code no. 087H3201) is a remote control unit with built-in room temperature sensor and humidity sensor (relative humidity).

An external room temperature sensor can be connected to both types to substitute the built-in sensor.
An external room temperature sensor will be recognized at ECA 30 / 31 power-up.

Connections: See the section 'Electrical connections'.

Max. two ECA 30 / 31 can be connected to one ECL controller or a system (master-slave) consisting of several ECL controllers connected on the same ECL 485 bus. In the master-slave system only one of the ECL controllers is master. The ECA 30 / 31 can, among others, be set to:

- monitor and set the ECL controller remotely
- measure the room temperature and (ECA 31) humidity
- extend comfort / saving period temporarily

After application upload in the ECL Comfort controller, the remote control unit ECA 30 / 31 will after approx. one minute ask to 'Copy application'.
Confirm this in order to upload the application to the ECA 30 / 31.

Menu structure

The menu structure of ECA 30 / 31 is an "ECA MENU" and the ECL menu, copied from the ECL Comfort controller.

The ECA MENU contains:

- ECA settings
- ECA system
- ECA factory

ECA settings: Offset adjustment of the measured room temperature.

Offset adjustment of relative humidity (ECA 31 only).

ECA system: Display, communication, override settings and version info.

ECA factory: Erase of all applications in the ECA 30 / 31, restore to factory settings, reset of ECL address and firmware update.

Part of the ECA 30 / 31 display in ECL mode:

Part of the ECA 30 / 31 display in ECA mode:

If only the "ECA MENU" is shown, it can indicate that the ECA 30 / 31 is not having correct communication address.
See ECA MENU > ECA system > ECA communication: ECL address.
In most cases the ECL address setting must be "15".

Regarding ECA settings:
When ECA 30 / 31 is not used as remote unit, the offset adjustments menu(s) are not present.

The ECL menus are as described for the ECL controller.

Most of the settings done directly in the ECL controller can be done via the ECA 30 / 31 too.

All settings can be seen even if the application key is not inserted in the ECL controller.
For changing settings, the application key must be inserted.

The Key overview (MENU > 'Common controller settings' > 'Key functions') does not show the applications of the key.

The ECA 30 / 31 will display this information (an X on the ECA 30 / 31 symbol) if the application in the ECL controller does not comply with the ECA 30 / 31:

In the example 1.10 is current version and 1.42 is desired version.

Display part of ECA 30 / 31:

This display indicates that an application has not been uploaded or the communication to the ECL controller (master) is not working properly. An X on the ECL controller symbol indicates wrong setup of communication addresses.

Display part of ECA 30 / 31:

Newer versions of ECA 30 / 31 indicate the address number of the connected ECL Comfort controller.
Address number can be changed in the ECA MENU.
A stand-alone ECL Controller has the address 15.

When ECA 30 / 31 is in ECA MENU mode, the date and measured room temperature is displayed.

ECA MENU > ECA settings > ECA sensor

Room T Offset	
Setting range	*Factory setting*
–10.0 ... 10.0 K	0.0 K
The measured room temperature can be corrected with a number of Kelvin. The corrected value is used by the heating circuit in the ECL controller.	

Example:

Room T offset:	0.0 K
Displayed room temperature:	21.9 °C
Room T offset:	1.5 K
Displayed room temperature:	23.4 °C

Minus value: The indicated room temperature is lower.

0.0 K: No correction of the measured room temperature.

Plus value: The indicated room temperature is higher.

ECA MENU > ECA settings > ECA sensor

RH offset (ECA 31 only)	
Setting range	*Factory setting*
–10.0 ... 10.0 %	0.0 %
The measured relative humidity can be corrected with a number of %-values. The corrected value is used by the application in the ECL controller.	

Example:

RH offset:	0.0 %
Displayed relative humidity:	43.4 %
RH offset:	3.5 %
Displayed relative humidity:	46.9 %

Minus value: The indicated relative humidity is lower.

0.0 %: No correction of the measured relative humidity.

Plus value: The indicated relative humidity is higher.

ECA MENU > ECA system > ECA display

Backlight (display brightness)	
Setting range	*Factory setting*
0 ... 10	5
Adjust the brightness of the display.	

0: Weak backlight.

10: Strong backlight.

ECA MENU > ECA system > ECA display

Contrast (display contrast)	
Setting range	*Factory setting*
0 ... 10	3
Adjust the contrast of the display.	

0: Low contrast.

10: High contrast.

ECA MENU > ECA system > ECA display

Use as remote	
Setting range	*Factory setting*
OFF / ON	*)
ECA 30 / 31 can act as a simple or normal remote control for the ECL controller.	

OFF: Simple remote control, no room temperature signal.

ON: Remote control, room temperature signal is available.

***):** Differently, depending on chosen application.

When set to OFF: The ECA menu shows date and time.

When set to ON: The ECA menu shows date and room temperature (and for ECA 31 relative humidity).

ECA MENU > ECA system > ECA communication

Slave addr. (Slave address)	
Setting range	*Factory setting*
A / B	A
The setting of 'Slave addr.' is related to the setting 'ECA address' in the ECL controller. *In the ECL controller it is selected from which ECA 30 / 31 unit the room temperature signal is received.*	

A: The ECA 30 / 31 has the address A.

B: The ECA 30 / 31 has the address B.

For installation of an application in an ECL Comfort 210 / 296 / 310 controller the 'Slave addr.' must be A.

If two ECA 30 / 31 are connected in the same ECL 485 bus system, the 'Slave addr.' must be "A" in the one ECA 30 / 31 unit and "B" in the other.

ECA MENU > ECA system > ECA communication

Connection addr. (Connection address)	
Setting range	*Factory setting*
1 … 9 / 15	15
Setting of the address to which ECL controller the communication must run.	

1 .. 9: Slave controllers.

15: Master controller.

An ECA 30 / 31 can in an ECL 485 bus system (master – slave) be set to communicate, one by one, with all addressed ECL controllers.

Example:

Connection addr. = 15:	The ECA 30 / 31 communicates with the ECL master controller.
Connection addr. = 2:	The ECA 30 / 31 communicates with the ECL controller with address 2.

There must be a master controller present in order to broadcast time and date information.

An ECL Comfort controller 210 / 310, type B (without display and dial) cannot be assigned to the address 0 (zero).

ECA MENU > ECA system > ECA override

Override addr. (Override address)	
Setting range	*Factory setting*
OFF / 1 … 9 / 15	OFF
The feature 'Override' (to extended comfort or saving period or holiday) must be addressed to the ECL controller in question.	

OFF: Override not possible.

1 .. 9: Address of slave controller for override.

15: Address of master controller for override.

Override functions:	Extended saving mode:	
	Extended comfort mode:	
	Holiday away from home:	
	Holiday at home:	

Override by means of settings in ECA 30 / 31 are cancelled if the ECL Comfort controller goes into holiday mode or is changed to another mode than scheduled mode.

The circuit in question for override in the ECL controller must be in scheduled mode.
See also the parameter 'Override circuit'.

ECA MENU > ECA system > ECA override

Override circuit	
Setting range	*Factory setting*
OFF / 1 … 4	OFF
The feature 'Override' (to extended comfort or saving period or holiday) must be addressed to the heating circuit in question.	

OFF: No heating circuit is selected for override.

1 … 4: The heating circuit number in question.

The circuit in question for override in the ECL controller must be in scheduled mode.
See also the parameter 'Override addr.'.

Example 1:

(One ECL controller and one ECA 30 / 31)		
Override of heating circuit 2:	Set 'Connection addr.' to 15	Set 'Override circuit' to 2

Example 2:

(Several ECL controllers and one ECA 30 / 31)		
Override of heating circuit 1 in ECL controller with the address 6:	Set 'Connection addr.' to 6	Set 'Override circuit' to 1

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

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

ECA MENU > ECA system > ECA version

ECA version (read-out only), examples	
Code no.	087H3200
Hardware	A
Software	1.42
Build no.	5927
Serial no.	13579
Production week	23.2012

The ECA version information is useful in service situations.

ECA 30 / 31:

15	Connection address (master: 15, slaves: 1 - 9)

ECA MENU > ECA factory > ECA clear apps.

Erase all apps. (Erase all applications)
Erase all applications which are in the ECA 30 / 31. *After erasing, the application can be uploaded again.*

NO: The erase procedure is not done.

YES: The erase procedure is done (await 5 sec.).

After the erase procedure, a pop-up in the display indicates "Copy application". Choose "Yes".
Hereafter the application is uploaded from the ECL controller. An upload bar is shown.

ECA MENU > ECA factory > ECA default

Restore factory
The ECA 30 / 31 is set back to factory settings.
Affected settings by the restore procedure: • Room T offset • RH offset (ECA 31) • Backlight • Contrast • Use as remote • Slave addr. • Connection addr. • Override addr. • Override circuit • Override mode • Override mode end time

NO: The restore procedure is not done.

YES: The restore procedure is done.

ECA MENU > ECA factory > Reset ECL addr.

Reset ECL addr. (Reset ECL address)
If none of the connected ECL Comfort controllers has the address 15, the ECA 30 / 31 can set all connected ECL controllers on the ECL 485 bus back to address 15.

NO: The reset procedure is not done.

YES: The reset procedure is done (await 10 sec.).

The ECL 485 bus related address of the ECL controller is found:
MENU > 'Common controller settings' > 'System' > 'Communication' > 'ECL 485 addr.'

The "Reset ECL addr." cannot be activated if one or more of the connected ECL Comfort controllers has the address 15.

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

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

ECA MENU > ECA factory > Update firmware

Update firmware
The ECA 30 / 31 can be updated with new firmware (software). *The firmware comes with the ECL application key, when the key version is at least 2.xx.* *If no new firmware is available, a symbol of the application key is displayed with an X.*

NO: The updating procedure is not done.

YES: The updating procedure is done.

The ECA 30 / 31 automatically verifies if a new firmware is present on the application key in the ECL Comfort controller.
The ECA 30 / 31 is automatically updated at new application upload in the ECL Comfort controller.
The ECA 30 / 31 is not automatically updated when connected to an ECL Comfort controller with uploaded application. A manual update is always possible.

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

8.2 Override function

The ECL 210 / 296 / 310 controllers can receive a signal in order to override the existing schedule. The override signal can be a switch or a relay contact.

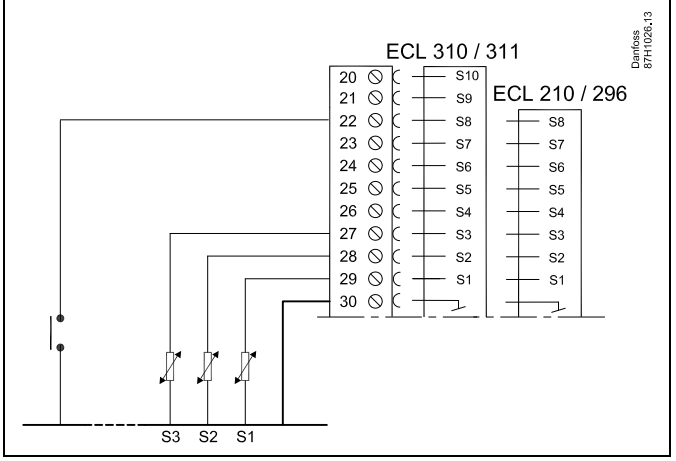
Different override modes can be selected, depending on application key type.

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

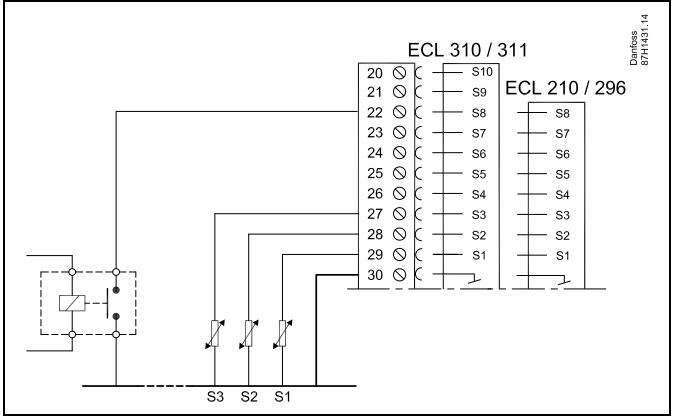
"Comfort" is also called normal heating temperature.
"Saving" can be reduced heating or heating stopped.
"Constant temperature" is a desired flow temperature, set in the menu "Flow temperature".
"Frost protection" stops the heating totally.

Override by means of override switch or relay contact is possible when the ECL 210 / 296 / 310 is in scheduled mode (clock).

Example, override switch connected to S8:



Example, override relay connected to S8:



Example 1

ECL in Saving mode, but in Comfort mode at override.

Choose an unused input, for example S8. Connect the override switch or override relay contact.

Settings in ECL:

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

   Select the input S8 (the wiring example)
2. Select circuit > MENU > Settings > Application > Ext. mode:

   Select COMFORT
3. Select circuit > MENU > Schedule:

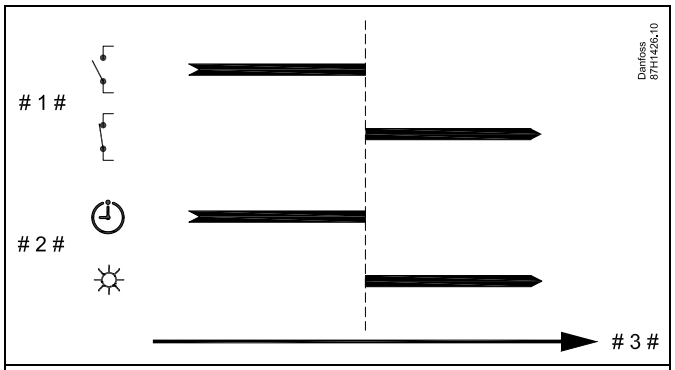
   Select all weekdays

   Set "Start1" to 24.00 (this disables Comfort mode)

   Exit menu and confirm by "Save"
4. Remember to set the circuit in question in scheduled mode ("clock").

Result: When the override switch (or the relay contact) is ON, the ECL 210 / 296 / 310 will operate in Comfort mode.

When the override switch (or the relay contact) is OFF, the ECL 210 / 296 / 310 will operate in Saving mode.



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

Example 2

ECL in Comfort mode, but in Saving mode at override.

Choose an unused input, for example S8. Connect the override switch or override relay contact.

Settings in ECL:

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

   Select the input S8 (the wiring example)
2. Select circuit > MENU > Settings > Application > Ext. mode:

   Select SAVING
3. Select circuit > MENU > Schedule:

   Select all weekdays

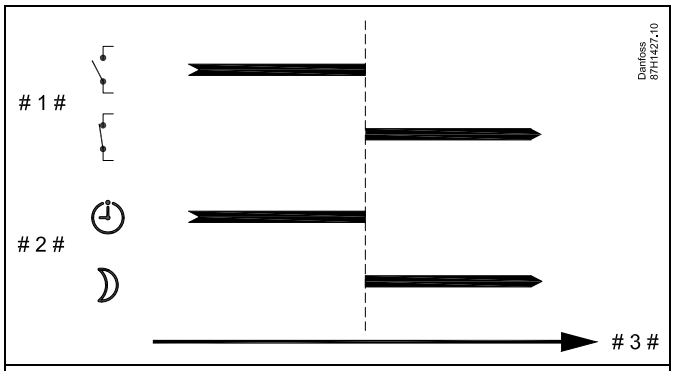
   Set "Start1" to 00.00

   Set "Stop1" to 24.00

   Exit menu and confirm by "Save"
4. Remember to set the circuit in question in scheduled mode ("clock").

Result: When the override switch (or the relay contact) is ON, the ECL 210 / 296 / 310 will operate in Saving mode.

When the override switch (or the relay contact) is OFF, the ECL 210 / 296 / 310 will operate in Comfort mode.



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

Example 3

The week schedule for the building is set with comfort periods Monday - Friday: 07.00 - 17.30. Sometimes, a team meeting takes place in the evening or in the week-end.

An override switch is installed and heating must be ON (Comfort mode) as long as the switch is ON.

Choose an unused input, for example S8. Connect the override switch.

Settings in ECL:

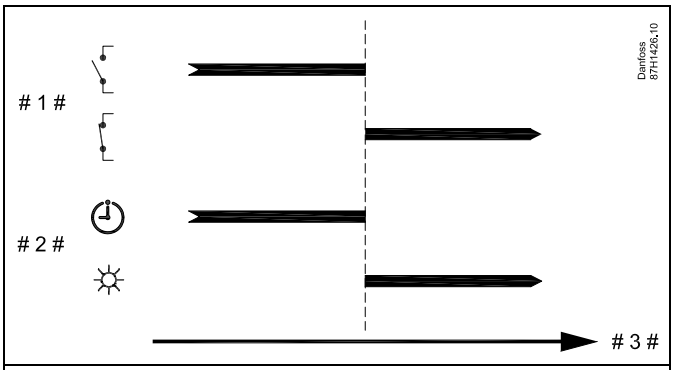
1. Select circuit > MENU > Settings > Application > Ext. input:

   Select the input S8 (the wiring example)
2. Select circuit > MENU > Settings > Application > Ext. mode:

   Select COMFORT
3. Remember to set the circuit in question in scheduled mode ("clock").

Result: When the override switch (or a relay contact) is ON, the ECL 210 / 296 / 310 will operate in Comfort mode.

When the override switch is OFF, the ECL 210 / 296 / 310 will operate according to the schedule.



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

Example 4

The week schedule for the building is set with comfort periods all weekdays: 06.00 - 20.00. Sometimes, the desired flow temperature must be constant on 65 °C.

An override relay is installed and the flow temperature must be 65 °C as long as the override relay is activated.

Choose an unused input, for example S8. Connect the contacts of the override relay.

Settings in ECL:

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

   Select the input S8 (the wiring example)
2. Select circuit > MENU > Settings > Application > Ext. mode:

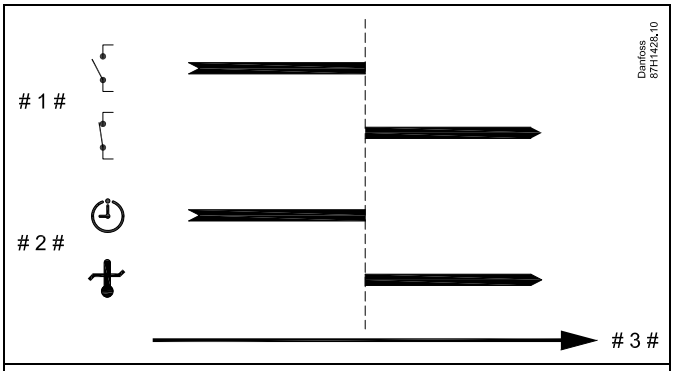
   Select CONST. T
3. Select circuit > MENU > Settings > Flow temperature >

   Desired T (ID 1x004):

   Set to 65 °C
4. Remember to set the circuit in question in scheduled mode ("clock").

Result: When the override relay is activated, the ECL 210 / 296 / 310 will operate in Const. temp. mode and control a flow temperature of 65 °C.

When the override relay is not activated, the ECL 210 / 296 / 310 will operate according to the schedule.



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

8.3 Several controllers in the same system

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

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

Furthermore, the master controller can receive information about:

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

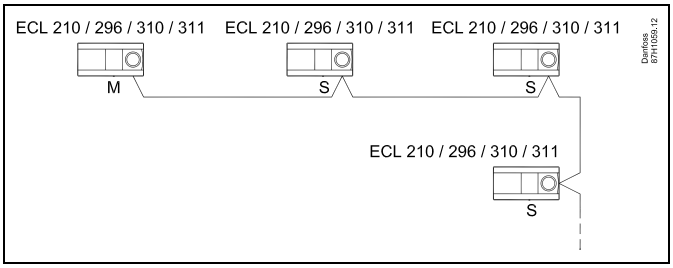
Situation 1:
SLAVE controllers: How to make use of the outdoor temperature signal sent from the MASTER controller

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SLAVE controller:
Set the desired function:

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

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

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

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

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

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

SLAVE controller:

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

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

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

SLAVE controller:

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

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

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

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

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

8.4 Frequently asked questions

The definitions apply to the ECL Comfort 210 / 296 / 310 series. Consequently, you might come across expressions that are not mentioned in your guide.

Circulation pump (heating) does not stop as expected
It is in operation at frost protection (outdoor temperature lower than "P frost T" value) and at heat demand (desired flow temperature higher than "P heat T" value)

The time shown in the display is one hour off?
See 'Time and Date'.

The time shown in the display is not correct?
The internal clock may have been reset, if there has been a power break for more than 72 hours.
Go to the 'Common controller settings' and 'Time & Date' to set the correct time.

The ECL Application Key is lost?
Switch the power off and on again to see the ECL controller type, version code (e.g. 1.52), code no. and application (e.g. A266.1) or go to 'Common controller settings' >'Key functions' > 'Application'. The system type (e.g. TYPE A266.1) and the system diagram is displayed.
Order a replacement from your Danfoss representative (e.g. ECL Application Key A266).
Insert the new ECL Application Key and copy your personal settings from the controller to the new ECL Application Key, if required.

The room temperature is too low?
Make sure that the radiator thermostat does not limit the room temperature.
If you still cannot obtain the desired room temperature by adjusting the radiator thermostats, the flow temperature is too low. Increase the desired room temperature (display with desired room temperature). If this does not help, adjust the 'Heat curve' ('Flow temp.').

The room temperature is too high during saving periods?
Make sure that the min. flow temperature limitation ('Temp. min.') is not too high.

The temperature is unstable?
Check that the flow temperature sensor is correctly connected and in the right place. Adjust the control parameters ('Control par.').
If the controller has a room temperature signal, see 'Room limit'.

The controller does not operate and the control valve is closed?
Check that the flow temperature sensor is measuring the correct value, see 'Daily use' or 'Input overview'.
Check the influence from other measured temperatures.

How to make an extra comfort period in the schedule?
You can set an additional comfort period by adding new 'Start' and 'Stop' times in 'Schedule'.

How to remove a comfort period in the schedule?
You can remove a comfort period by setting start and stop times to the same value.

How to restore your personal settings?
Please read the chapter concerning 'Inserting the ECL Application Key'.

How to restore the factory settings?
Please read the chapter concerning 'Inserting the ECL Application Key'.

Why can't the settings be changed?
The ECL Application Key has been removed.

Why can't an application be selected when inserting the ECL application key into the controller?
The actual application in the ECL Comfort controller must be deleted before a new application (subtype) can be selected.

How to react on alarms?
An alarm indicates that the system is not operating satisfactorily. Please contact your installer.

What does P and PI control mean?
P control: Proportional control.
By using a P control, the controller will change the flow temperature proportional to the difference between a desired and an actual temperature, e.g. a room temperature.
A P control will always have an offset which not will disappear over time.

PI control: Proportional and Integrating control.
A PI control does the same as a P control, but the offset will disappear over time.
A long 'Tn' will give a slow but stable control, and a short 'Tn' will result in a fast control but with a higher risk of unstability.

What does the "i" in the upper right corner of the display mean?
When uploading an application (subtype) from the application key into the ECL Comfort controller, the "**i**" in the upper right corner indicates that - besides the factory settings - the subtype also contains special user / systems settings.

Why can't the ECL 485 Bus (used in ECL 210 / 296 / 310) and the ECL Bus (used in ECL 100 / 110 / 200 / 300) communicate?
These two communication busses (Danfoss proprietary) are different in connection form, telegram form and speed.

Why can't I select a language when uploading an application?
Reason can be that the ECL 310 is powered with 24 Volt d.c.

Language

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

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

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

How to set a correct heat curve?

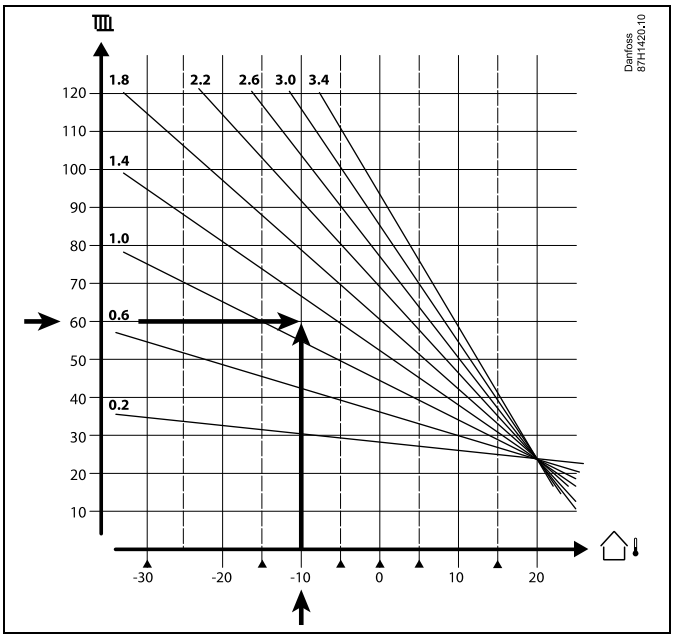
Short answer:
Set the heat curve to the lowest possible value, but still having comfortable room temperature.

The table shows some recommendations:

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

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

See the heat curve slope diagram.



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

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

In general:

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

8.5 Definitions

The definitions apply to the ECL Comfort 210 / 296 / 310 series. Consequently, you might come across expressions that are not mentioned in your guide.

Accumulated temperature value
A filtered (dampened) value, typically for room and outdoor temperatures. Is calculated in the ECL controller and is used to express the heat stored in the walls of the house. The accumulated value does not change so rapidly as the actual temperature.

Air duct temperature
Temperature measured in the air duct where the temperature is to be controlled.

Alarm function
Based on the alarm settings, the controller can activate an output.

Anti-bacteria function
For a defined period, the DHW temperature is increased in order to neutralize dangerous bacteria, e.g. Legionella.

Balance temperature
This setpoint is the basis for the flow / air duct temperature. The balance temperature can be adjusted by the room temperature, the compensation temperature and the return temperature. The balance temperature is only active if a room temperature sensor is connected.

BMS
Building Management System. A supervisory system for remote control and monitoring.

Comfort operation
Normal temperature in the system controlled by the schedule. During heating the flow temperature in the system is higher to maintain the desired room temperature. During cooling the flow temperature in the system is lower to maintain the desired room temperature.

Comfort temperature
Temperature maintained in the circuits during comfort periods. Normally during daytime.

Compensation temperature
A measured temperature influencing the flow temperature reference / balance temperature.

Desired flow temperature
Temperature calculated by the controller on basis of the outdoor temperature and influences from the room and / or return temperatures. This temperature is used as a reference for the control.

Desired room temperature
Temperature which is set as the desired room temperature. The temperature can only be controlled by the ECL Comfort controller if a room temperature sensor is installed.
If a sensor is not installed, the set desired room temperature however still influences the flow temperature.
In both cases the room temperature in each room is typically controlled by radiator thermostats / valves.

Desired temperature
Temperature based on a setting or a controller calculation.

Dew point temperature
Temperature at which the humidity in the air condensates.

DHW circuit
The circuit for heating the domestic hot water (DHW).

Duct temperature
Temperature measured in the air duct where the temperature is to be controlled.

ECL 485 Bus
This communication bus is Danfoss proprietary and used for internal communication between ECL 210, ECL 210B, ECL 296, ECL 310, ECL 310B, ECA 30 and ECA 31.
Communication with "ECL Bus", used in ECL 100, ECL 110, ECL 200, ECL 300 and ECL 301, is not possible.

ECL Portal
A supervisory system for remote control and monitoring, locally and via Internet.

EMS
Energy Management System. A supervisory system for remote control and monitoring.

Factory settings
Settings stored on the ECL Application Key to simplify the set up of your controller the first time.

Firmware
is used by the ECL Comfort controller and ECA 30 / 31 to manage display, dial and program execution.

Flow temperature
Temperature measured in the water flow where the temperature is to be controlled.

Flow temperature reference
Temperature calculated by the controller on basis of the outdoor temperature and influences from the room and / or return temperatures. This temperature is used as a reference for the control.

Heat curve
A curve showing the relationship between actual outdoor temperature and desired flow temperature.

Heating circuit
The circuit for heating the room / building.

Holiday schedule
Selected days can be programmed to be in comfort, saving or frost protection mode. Besides this, a day schedule with comfort period from 07.00 to 23.00 can be selected.

Humidistat
A device, which reacts on the air's humidity. A switch can go ON if the measured humidity gets above a set point.

Humidity, relative
This value (stated in %) refers to the indoor moisture content compared to the max. moisture content. The relative humidity is measured by the ECA 31 and is used for the calculation of the dew point temperature.

Inlet temperature
Temperature measured in the inlet air flow where the temperature is to be controlled.

Limitation temperature
Temperature that influences the desired flow / balance temperature.

Log function
The temperature history is displayed.

Master / slave
Two or more controllers are interconnected on the same bus, the master sends out e.g. time, date and outdoor temperature. The slave receives data from master and sends e.g. desired flow temperature value.

Modulating control (0 - 10 V control)
Positioning (by means of a 0 - 10 V control signal) of the actuator for the motorized control valve in order to control the flow.

Optimization
The controller optimizes the start time of the scheduled temperature periods. Based on the outdoor temperature, the controller automatically calculates when to start in order to reach the comfort temperature at the set time. The lower the outdoor temperature, the earlier the start time.

Outdoor temperature trend
The arrow indicates the tendency, i.e. whether the temperature rises or falls.

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

Pt 1000 sensor
All sensors used with the ECL Comfort controller are based on the Pt 1000 type (IEC 751B). The resistance is 1000 ohm at 0 °C and it changes with 3.9 ohm / degree.

Pump control
One circulation pump is working and the other is the spare circulation pump. After a set time, the roles are exchanged.

Refill water function
If the measured pressure in the heating system is too low (e.g. due to a leakage), water can be supplemented.

Return temperature
The temperature measured in the return influences the desired flow temperature.

Room temperature
Temperature measured by the room temperature sensor or the Remote Control Unit. The room temperature can only be controlled directly if a sensor is installed. The room temperature influences the desired flow temperature.

Room temperature sensor
Temperature sensor placed in the room (reference room, typically the living room) where the temperature is to be controlled.

Saving temperature
Temperature maintained in the heating / DHW circuit during saving temperature periods. Typically, the Saving temperature is lower than the Comfort temperature in order to save energy.

SCADA
Supervisory Control And Data Acquisition. A supervisory system for remote control and monitoring.

Schedule
Schedule for periods with comfort and saving temperatures. The schedule can be made individually for each week day and may consist of up to 3 comfort periods per day.

Software
is used in the ECL Comfort controller to do the application related processes.

Weather compensation
Flow temperature control based on the outdoor temperature. The control is related to a user-defined heat curve.

2-point control
ON / OFF control, e.g. circulation pump, ON / OFF valve, change-over valve or damper control.

3-point control
Actuator positioning by means of Opening, Closing or No-action signals for the motorized control valve in order to control the flow. No-action means that the actuator remains in its current position.

8.6 M-Bus communication, in general

The ECL Comfort 296 / 310 / 310 B has a communication port for M-Bus. The ECL Comfort controller acts as an M-Bus master and the connected energy / flow meters act as slaves. The M-Bus master requests data from the meters.
Up to 5 connected energy / flow meters can directly be read by the ECL Comfort and energy / flow related limitation can be activated. The 5 mentioned meters, also power meters, can be read by the ECL Portal or Leanheat Monitor.

Energy / flow meters are produced by several manufactures. The ECL Comfort 296 / 310 / 310 B must be configured to read data from meter. The data, sent from the meter to the ECL Comfort 296 / 310 / 310 B, are available via Modbus register.

Many meters have the same data set-up, so that, for example, measured flow temperature, return temperature, flow and energy are understood clearly by the ECL Comfort controller. It is sometimes seen that some meters are special; in a way that the ECL Comfort controllers cannot read / understand them.

8.7 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]	-

8.8 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.

8.9 Parameter ID overview

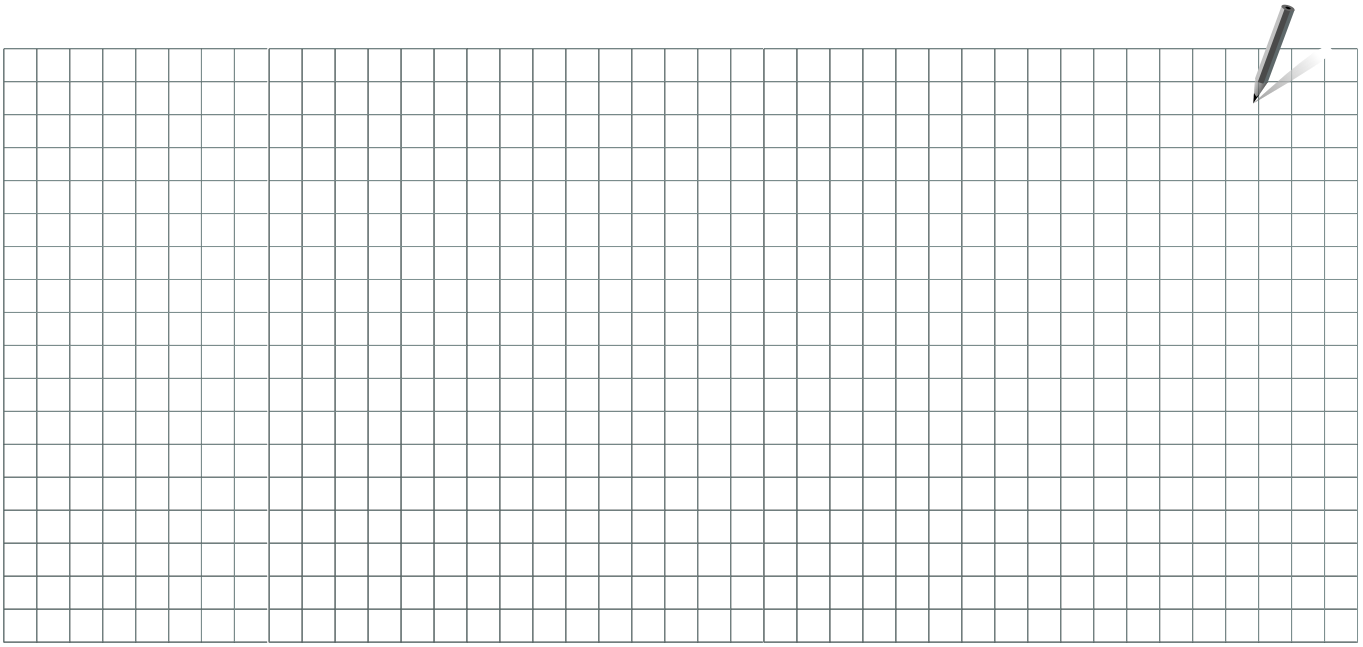
P318.x — **x** refers to the subtypes listed in the column.

ID	Parameter Name	P318.x	Setting range	Factory	Unit	Own settings	
9001	Event priority 1	1, 2, 5, 10, 11	0 ... 3	3			
9020	Event priority 20	1, 2, 5, 10, 11	0 ... 3	0			
9021	Event priority 21	1, 2, 5, 10, 11	0 ... 3	0			
9022	Event priority 22	1, 2, 5, 10, 11	0 ... 3	0			
9025	Event priority 25	2, 5	0 ... 3	0			
9026	Event priority 26	5	0 ... 3	0			
9030	Event priority 30	1, 2, 5, 10, 11	0 ... 3	1			
9031	Event priority 31	1, 2, 5, 10, 11	0 ... 3	0			
9041	Event priority 41	1, 2, 5, 11	0 ... 3	0			
9042	Event priority 42	1, 2, 5, 11	0 ... 3	0			
11030	Limit	1, 2, 5, 10	10 ... 110	40	°C		104
11035	Infl. - max.	1, 2, 5, 10	-9.9 ... 9.9	-2.0			104
11036	Infl. - min.	1, 2, 5, 10	-9.9 ... 9.9	0.0			105
11037	Adapt. time	1, 2, 5, 10	OFF, 1 ... 50	25	Sec		105
11041	DHW P post-run	1, 2, 5	0 ... 180	1	Min		117
11045	DHW deact. time	21	OFF, 1 ... 250	OFF	Sec		
11054	Cont. T control	1, 5	OFF ; ON	OFF			117
11059	P charge delay	5	0 ... 99	0	Min		95
11065	Adapt. time	1, 2, 5, 10, 11	OFF, 1 ... 100	10	Sec		109
11080	Delay	21	2 ... 200	45	Min		
11097	Supply T (idle)	21	OFF, 10 ... 100	OFF	°C		
11114	Pulse	10, 11	1 ... 9999	81			115
	-||-	21	1 ... 9999	119			
11115	Units	10, 11	ml, l/h ; l, l/h ; ml, m3/h ; l, m3/h	l, m3/h			115
	-||-	21	ml, l/h ; l, l/h ; ml, m3/h ; l, m3/h	l, l/h			
11122	Day:	1, 2, 5, 10, 11	0 ... 127	0			
11123	Start time	1, 2, 5, 10, 11	0 ... 47	0			
11124	Duration	1, 5, 10, 11	10 ... 600	120	Min		119
	-||-	2	5 ... 250	20	Min		
11125	Desired T	1, 2, 5, 10, 11	OFF, 10 ... 110	OFF	°C		
11145	Mon. T select	1, 5	S3 ; S4 ; S5 ; S6 ; S7	S3			117
11147	Upper difference	1, 2, 5, 10, 11	OFF, 1 ... 30	OFF	K		
11148	Lower difference	1, 2, 5, 10, 11	OFF, 1 ... 30	OFF	K		
11149	Delay	1, 2, 5, 10, 11	1 ... 99	10	Min		
11150	Lowest temp.	1, 2, 5, 10, 11	10 ... 50	30	°C		
11152	Max. charge T	1, 2, 5	10 ... 110	80	°C		96

ID	Parameter Name	P318.x	Setting range	Factory	Unit	Own settings	
11165	V out max.	1, 2, 5, 10, 11, 21	0 ... 100	100	%		110
11167	V out min.	1, 2, 5, 10, 11	0 ... 100	20	%		110
11171	Reverse out	1, 2, 5, 10, 11, 21	NO ; YES	NO			110
11177	Temp. min.	10, 11	10 ... 120	10	°C		101
11178	Temp. max.	10, 11	10 ... 120	90	°C		101
11184	Xp	1, 2, 5, 10, 11	5 ... 250	80	K		111
	-||-	21	5 ... 250	45	K		
11185	Tn	1, 2, 5, 10, 11	1 ... 999	20	Sec		111
	-||-	21	OFF, 1 ... 999	10	Sec		
11186	M run	1, 2, 5, 10, 11	5 ... 250	100	Sec		111
11187	Nz	1, 2, 5	1 ... 9	2	K		112
	-||-	10, 11, 21	0 ... 9	1	K		
11189	Min. act. time	1, 2, 5, 10, 11	2 ... 50	2			112
11194	Stop difference	1, 2, 5	-50 ... -1	-3	K		
	-||-	11	-30 ... 30	0	K		
11195	Start difference	1, 2, 5	-50 ... 30	-5	K		
	-||-	11	-30 ... 30	-2	K		
11197	Td	21	0.0 ... 25.0	0.0	Sec		
11330	Wake up level	1, 2, 5	0 ... 100, ON	ON	%		112
	-||-	21	0 ... 100	0	%		
11340	Delay	1, 2, 5	OFF, 1 ... 50	5	Min		128
11353	Level	1, 2, 5	20 ... 110	50	°C		
	-||-	21	0 ... 250	20	l/h		
11354	CW influence	10, 11	OFF, 0.1 ... 100.0	OFF	%		112
	-||-	21	OFF, 0.1 ... 100.0	7.0	%		
11364	Control, delay	21	OFF ; ON	ON			
11371	Pump start diff.	1, 2, 5	0 ... 40	4	K		98
11500	Send desired T	1, 2, 5, 10, 11, 21	OFF ; ON	ON			118
11565	PWM period	1, 2, 5, 10, 11	0.2 ... 10.0	7.0	Sec		113
11580	DHW max. T	21	OFF, 10 ... 110	40	°C		
11581	DHW max. diff.	21	-20 ... -1	-4	K		
11609	Low Y	1, 2, 5, 10, 11	10 ... 120	10	°C		
11610	High Y	1, 2, 5, 10, 11	10 ... 120	100	°C		
12124	Duration	1, 5, 10, 11	5 ... 250	12	Min		119
12125	Desired T	1, 5, 10, 11	OFF, 10 ... 110	OFF	°C		
12147	Upper difference	1, 2, 5, 10, 11	OFF, 1 ... 30	OFF	K		
12148	Lower difference	1, 2, 5	OFF, 1 ... 30	OFF	K		
12149	Delay	1, 2, 5, 10, 11	1 ... 99	10	Min		
12150	Lowest temp.	1, 2, 5, 10, 11	10 ... 50	30	°C		

ID	Parameter Name	P318.x	Setting range	Factory	Unit	Own settings	
12165	V out max.	1, 2, 5	0 ... 100	100	%		110
12167	V out min.	1, 2, 5	0 ... 100	20	%		110
12171	Reverse out	1, 2, 5	NO ; YES	YES			110
12184	Xp	1, 2, 5	5 ... 250	80	K		111
12185	Tn	1, 2, 5	1 ... 999	30	Sec		111
12187	Nz	1, 2, 5	1 ... 9	1	K		112
12194	Stop difference	11	-50 ... -1	-3	K		
12195	Start difference	11	-50 ... 30	5	K		
12375	Reduced des. T	1, 2, 5	-10 ... 0	-2	K		113
13054	Cont. T control	10, 11	NO ; YES	YES			117
13055	Circ. P priority	1, 5	AUTO ; IDLE ; STOP	AUTO			109
13124	Duration	2	5 ... 250	12	Min		119
13125	Desired T	2	OFF, 10 ... 110	OFF	°C		
13141	Ext. input	1, 5, 10, 11	OFF ; S1 ; S2 ; S3 ; S4 ; S5 ; S6 ; S7 ; S8 ; S9 ; S10 ; S11 ; S12 ; S13 ; S14 ; S15 ; S16	OFF			
13147	Upper difference	11	OFF, 1 ... 30	OFF	K		
13148	Lower difference	11	OFF, 1 ... 30	OFF	K		
13149	Delay	11	1 ... 99	10	Min		
13150	Lowest temp.	11	10 ... 50	30	°C		
13165	V out max.	1, 2, 5, 10, 11	0 ... 100	100	%		110
13167	V out min.	1, 2, 5, 10, 11	0 ... 100	20	%		110
13171	Reverse out	1, 2, 5, 10, 11	NO ; YES	YES			110
13184	Xp	1, 2, 5, 10, 11	5 ... 250	80	K		111
13185	Tn	1, 2, 5, 10, 11	1 ... 999	30	Sec		111
13187	Nz	1, 2, 5, 10, 11	1 ... 9	1	K		112
13370	Max. return T	1, 2, 5, 10, 11	5 ... 90	55	°C		113
14065	Adapt. time	5	OFF, 1 ... 100	OFF	Sec		109
14141	Ext. input	2	OFF ; S1 ; S2 ; S3 ; S4 ; S5 ; S6 ; S7 ; S8 ; S9 ; S10 ; S11 ; S12 ; S13 ; S14 ; S15 ; S16	OFF			
14147	Upper difference	5	OFF, 1 ... 30	OFF	K		
14148	Lower difference	2, 5	OFF, 1 ... 30	OFF	K		
14149	Delay	2, 5	1 ... 99	20	Min		
14150	Lowest temp.	2, 5	10 ... 50	30	°C		
14165	V out max.	5	0 ... 100	100	%		110
14167	V out min.	5	0 ... 100	20	%		110
14171	Reverse out	5	NO ; YES	NO			110
14184	Xp	2, 5	5 ... 250	80	K		111
14185	Tn	2, 5	1 ... 999	20	Sec		111

ID	Parameter Name	P318.x	Setting range	Factory	Unit	Own settings	
14186	M run	2, 5	5 ... 250	100	Sec		111
14187	Nz	2, 5	1 ... 9	2	K		112
14189	Min. act. time	2, 5	2 ... 50	2			112
14371	Pump start diff.	5	0 ... 40	6	K		98
14565	PWM period	5	0.2 ... 10.0	7.0	Sec		113



Installer: By: Date:

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