ENGINEERING TOMORROW

Operating Guide

ECL Comfort 210/296/310, application A230

1.0 Table of Contents

1.1 Important safety and product information

1.1.1 Important safety and product information

This Operating Guide is associated with ECL Application Key A230 (order code no. 087H3802).

The ECL Application Key A230 contains 5 subtypes, applicable in ECL Comfort 210, 296 and 310:

- A230.1: Temperature control in heating installations. Optional compensation from wind. Electronic bypass function.
- A230.2: Temperature control in cooling installations. Optional external signal (0 - 10 V) for flow temperature setpoint.
- A230.3: Temperature control in heating installations. Compensation for high relative humidity. Optional compensation from wind.
- A230.4: Temperature control in heating installations. Pressure measurement by S8 or, alternatively, use S8 as external signal (0 - 10 V) for temperature setpoint. Electronic bypass function.
- A230.5: Temperature control in heating installations. Flow temperature-based control of circulation pump. Alarm input. Pressure measurement by S8 or, alternatively, use S8 as external signal (0 - 10 V) for flow temperature setpoint.

The A230 application key also contains a Floor (Screed) Drying Program for the subtypes A230.1, A230.3, A230.4 and A230.5. See separate documentation. (In English and German language only).

Electronic bypass function (A230.1 and A230.4) is used to ensure sufficient supply temperature from the District Heating Utility for heating a self-acting DHW circuit (Domestic Hot Water).

See the Installation Guide (delivered with the application key) for application examples and electrical connections.

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

The described functions are realized in:

- ECL Comfort 210 for basic solutions
- ECL Comfort 296 for basic solutions, inclusive M-bus, Modbus and Ethernet (Internet) communication
- ECL Comfort 310 for advanced solutions, inclusive M-bus, Modbus and Ethernet (Internet) communication. The extension module ECA 32 can be used, via a 0 - 10 Volt output, to control a modulated actuator, for example Danfoss types AME. Furthermore the extension module ECA 32 can be used for extending the numbers of inputs for monitoring via the ECL Portal. Each input can be configured as Pt 1000, 0 - 10 Volt or digital.

The Application Key A230 complies with ECL Comfort 210 / 310 controllers as of firmware version 1.11.
The Application Key A230 complies also with ECL Comfort 296 controllers as of firmware version 1.58.
The firmware (controller software) version 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 for remote monitoring and setting. The built-in room temperature sensor can be utilized.

ECL Portal, Internet based connection, allows ECL 296, 310 and 310B to be monitored and controlled remotely via standard Internet browsers (for example Internet Explorer, Microsoft Edge, Google Chrome and Safari).

Temperatures, measured by heat-meter via M-Bus
The subtypes A230.1, A230.3 and A230.5 can, when used in ECL 296 / 310, utilize the flow and return temperature sensor values of the heat-meter. The value for flow temperature is used instead of S4 (supply temperature); the value for return temperature is used instead of S5 (return temperature).

Together with the ECL Comfort 310, the additional Internal I/O module ECA 32 (order code no. 087H3202) can 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 > Service and support > Downloads > Tools > Heating > ECL Tool.
The URL is:
https://www.danfoss.com/en/service-and-support/downloads/

The Internal I/O module ECA 32 is placed in the base part for ECL Comfort 310.

ECL Comfort 210 is available as:

- ECL Comfort 210, 230 volt a.c. (087H3020)
- ECL Comfort 210B, 230 volt a.c. (087H3030)

ECL Comfort 296 is available as:

- ECL Comfort 296, 230 volt a.c. (087H3000)

ECL Comfort 310 is available as:

- ECL Comfort 310, 230 volt a.c. (087H3040)
- ECL Comfort 310B, 230 volt a.c. (087H3050)
- ECL Comfort 310, 24 volt a.c. (087H3044)

The B-types have no display and dial. The B-types are operated by means of the Remote Control unit ECA 30 / 31:

- ECA 30 (087H3200)
- ECA 31 (087H3201)

Base parts for ECL Comfort:

- for ECL Comfort 210, 230 volt (087H3220)
- for ECL Comfort 296, 230 volt (087H3240)
- for ECL Comfort 310, 230 volt and 24 volt (087H3230)

Additional documentation for ECL Comfort 210, 296 and 310, modules and accessories is available on *http://danfoss.com/* or *http://store.danfoss.com*.

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

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Safety Note

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

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

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

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

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

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

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

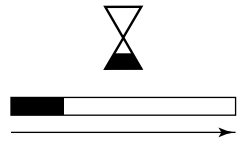
This symbol indicates that this particular piece of information should be read with special attention.

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

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

- 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'.

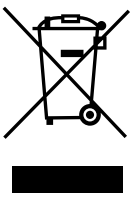
°C (degrees Celsius) is a measured temperature value whereas K (Kelvin) often is used for temperature differences.

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 subtypes in A230 are very flexible. These are the basic principles:

Heating (application A230.1):

Typically, the flow temperature is adjusted according to your requirements. The flow temperature sensor S3 is the most important sensor. The desired flow temperature at S3 is calculated in the ECL controller, based on the outdoor temperature (S1) and the desired room temperature.
The lower the outdoor temperature, the higher the desired flow temperature.

By means of a week schedule, the heating circuit can be in 'Comfort' or 'Saving' mode. The week schedule can have up to 3 'Comfort' periods / day. A value for the desired room temperature can be set in each of the modes.
In Saving mode the heating can be reduced or switched off totally.

The motorized control valve M1 is opened gradually when the flow temperature is lower than the desired flow temperature and vice versa.

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

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

Furthermore, the return temperature limitation can be dependent of the outdoor temperature. Typically, the lower the outdoor temperature, the higher the accepted return temperature.

If the measured room temperature (directly connected temperature sensor ESM-10 (S2) or Remote control unit ECA 30 / 31) does not equal the desired room temperature, the desired flow temperature can be adjusted.

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

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

A connected flow or energy meter based on pulses (S7) can limit the flow or energy to a set maximum value. Furthermore, the limitation can be in relation to the outdoor temperature. Typically, the lower the outdoor temperature, the higher the accepted flow / power. When this subtype is used in an ECL Comfort 296 / 310 the flow / energy signal can alternatively come as an M-bus signal.

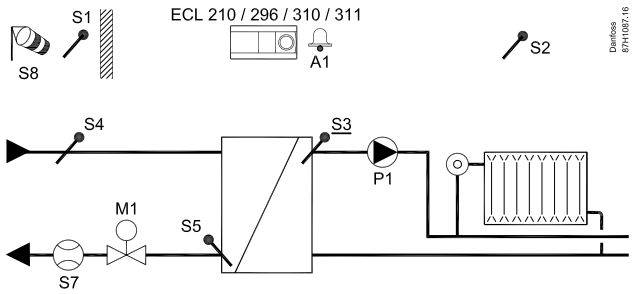
The frost protection mode maintains a selectable flow temperature, for example 10 °C.

To compensate for the influence of wind, a wind speed sensor can be connected. Based on the wind speed sensor signal (0 - 10 V), the controller can be set to increase the desired flow temperature in relation to increased wind speed.

Unused inputs (from S7 and up) can, by means of an override switch or relay contact, be used for overriding the schedule to a fixed 'Comfort', 'Saving', 'Frost protection' or 'Constant temperature' mode.

An alarm can be activated if the actual flow temperature differs from the desired flow temperature.

Typical A230.1 application:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 210 /296/ 310	*Electronic controller ECL Comfort 210, 296 / 310*
S1	*Outdoor temperature sensor*
S2	*(Optional) Room temperature sensor / ECA 30*
S3	*(Mandatory) Flow temperature sensor*
S4	*(Optional) Supply flow temperature sensor (read-out only)*
S5	*(Optional) Return temperature sensor*
S7	*(Optional) Flow / energy meter (pulse signal)*
S8	*(Optional) Wind speed signal (0 - 10 V)*
P1	*Circulation pump*
P2	*(not illustrated) Relay output for Schedule 2*
M1	*Motorized control valve, 3-point controlled* *Alternative 1: Control valve, thermo-actuator controlled (Danfoss type ABV)* *Alternative 2 (ECL 310 with ECA 32): Motorized control valve, 0 - 10 Volt controlled*
A1	*Alarm*

The A230.1 application can utilize a connected flow / energy meter to limit the flow / power.

Cooling (application A230.2):

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

By means of the week schedule, the cooling circuit can be in 'Comfort' or 'Saving' mode (two values for the desired flow temperature).
The week schedule also controls two values ('Comfort' and 'Saving') for the desired room temperature. If the measured room temperature does not equal the desired room temperature, the desired flow temperature can be adjusted.

The motorized control valve M1 is opened gradually when the flow temperature is higher than the desired flow temperature and vice versa.

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

The circulation pump, P1, is ON at cooling demand.

An external signal for the desired flow temperature can be applied as a 0–10 volt signal to the terminals for S8.

A connected flow or energy meter based on pulses (S7) can limit the flow or energy to a set maximum value.
When the A230.2 is used in an ECL Comfort 296 / 310 the flow / energy signal can alternatively come as an M-bus signal.

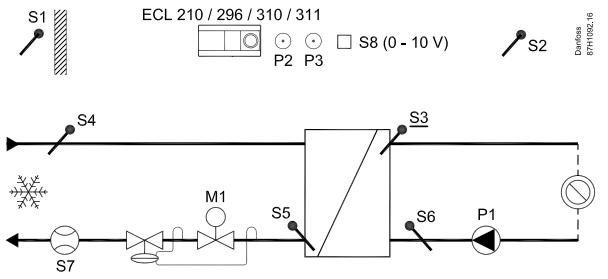
The standby mode maintains a selectable flow temperature, for example 30 °C.

Unused inputs (from S7 and up) can, by means of an override switch or relay contact, be used for overriding the schedule to a fixed 'Comfort' or 'Saving' mode.

The temperatures S4 and S6 are used for monitoring purposes only.

The schedule in "Common controller settings" controls the relays 2 and 3. This can be utilized for shifting between two circulation pumps.
See the installation guide, appl. A230.2, ex. d and related electrical connections.

Typical A230.2 application:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 210 / 296 /310	*Electronic controller ECL Comfort 210 / 296 /310*
S1	*(Optional) Outdoor temperature sensor*
S2	*(Optional) Room temperature sensor / ECA 30*
S3	*(Mandatory) Flow temperature sensor, cooling*
S4	*(Optional) Supply flow temperature sensor (read-out only)*
S5	*(Optional) Return temperature sensor*
S6	*(Optional) Return temperature sensor (read-out only)*
S7	*(Optional) Flow / energy meter (pulse signal), not illustrated*
(S8)	*(Optional) (External voltage (0–10 V) for external setting of desired flow temperature)*
P1	*Circulation pump*
P2 / P3	*Schedule 2*
M1	*Motorized control valve, 3-point controlled Alternative 1: Control valve, thermo-actuator controlled (Danfoss type ABV) Alternative 2 (ECL 310 with ECA 32): Motorized control valve, 0 - 10 Volt controlled*

The A230.2 application can utilize a connected flow / energy meter to limit the flow / power.

Heating (application A230.3):

This subtype works like A230.1, but the flow - or energy limitation, based on pulse signal is not implemented. If flow - or energy limitation is needed, the M-Bus based signal can be used (ECL Comfort 296 or 310).

In addition, A230.3 can minimize the risk of dew (condensation).

The RH (Relative Humidity) signal can arrange a minimum desired room temperature for protection against dew (condensation). Dew can occur when air with high temperature and humidity comes to colder walls, for example in churches, castles and other thick-wall buildings.

The equation -

T.dew = (0.96 x T.room) + (0.25 x RH) - 22.4

is used for calculation of the dew temperature (T.dew).

T.room is the measured room temperature. RH is the Relative Humidity, based on measured room temperature and humidity.

Room temperature and RH comes either from

- the Remote Control Unit ECA 31

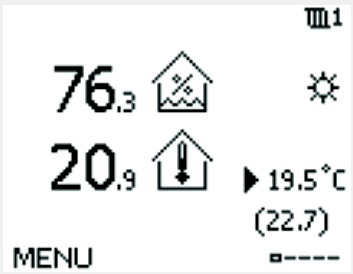
or

- a room temperature sensor and an applied RH signal, 0 - 10 Volt, to S7.

The relationship between applied voltage and related RH value can be set.

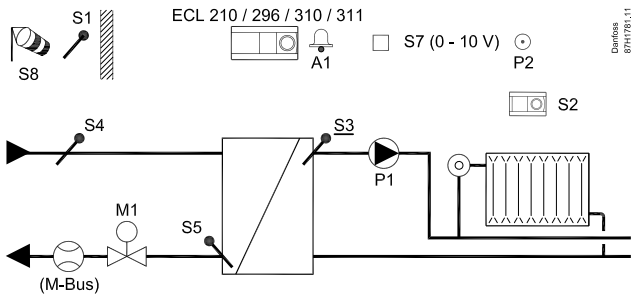
An Offset value for the calculated dew temperature (T.dew) can be added for compensation between wall and room temperatures.

Favorite display 1 can show the following:



RH value: 76.3 %
Room temperature: 20.9 °C
Desired room temperature: 19.5 °C
Minimum desired room temperature, inclusive 6 K offset: 22.7 °C

Typical A230.3 application:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 210 / 296 /310	*Electronic controller ECL Comfort 210 / 296 /310*
S1	*Outdoor temperature sensor*
S2	*(Optional) Room temperature sensor / ECA 31*
S3	*(Mandatory) Flow temperature sensor*
S4	*(Optional) Supply flow temperature sensor (read-out only)*
S5	*(Optional) Return temperature sensor*
S7	*(Optional) RH signal (0 - 10 V)*
S8	*(Optional) Wind speed signal (0 - 10 V)*
P1	*Circulation pump*
P2	*(not illustrated) Relay output for Schedule 2*
M1	*Motorized control valve, 3-point controlled* *Alternative 1: Control valve, thermo-actuator controlled (Danfoss type ABV)* *Alternative 2 (ECL 310 with ECA 32): Motorized control valve, 0 - 10 Volt controlled*
A1	*Alarm*

Heating (A230.4)

This subtype works as subtype A230.1, but the wind influence functionality is not implemented.
In addition, A230.4 can monitor DHW (Domestic Hot Water) temperatures S4 and S6.

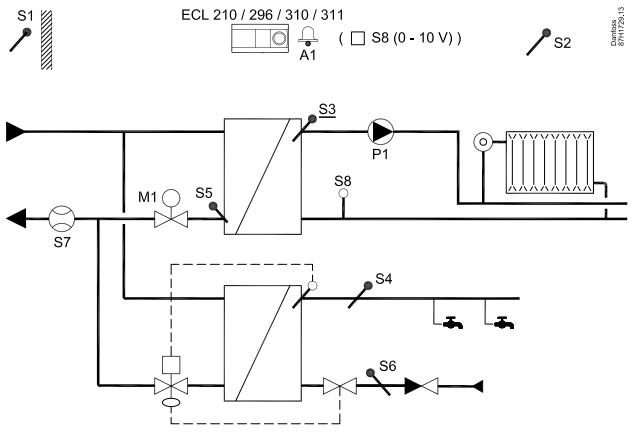
An applied voltage signal (0 - 10 Volt) to S8 can be used for:

- pressure measuring. The voltage is converted in the ECL controller to a pressure, measured in bar

or

- setting the desired flow temperature. The voltage is converted in the ECL controller to a temperature value.

Typical A230.4 application:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 210 / 296 /310	*Electronic controller ECL Comfort 210 / 296 /310*
S1	*Outdoor temperature sensor*
S2	*(Optional) Room temperature sensor / ECA 30*
S3	*(Mandatory) Flow temperature sensor*
S4	*(Optional) DHW flow temperature sensor (read-out only)*
S5	*(Optional) Return temperature sensor*
S6	*(Optional) DHW circulation return temperature sensor (read-out only)*
S7	*(Optional) Flow / energy meter (pulse signal)*
S8	*(Optional) 0 - 10 Volt signal from pressure sensor Alternative: 0 - 10 Volt signal for external setting of desired flow temperature*
P1	*Circulation pump, heating*
M1	*Motorized control valve, 3-point controlled Alternative 1: Control valve, thermo-actuator controlled (Danfoss type ABV) Alternative 2 (ECL 310 with ECA 32): Motorized control valve, 0 - 10 Volt controlled*
A1	*Alarm*

Heating (A230.5)

This subtype works as subtype A230.1, but the wind influence functionality is not implemented. In addition, A230.5 controls the circulation pump P1 at heat demand to be switched OFF if the flow temperature S3 is lower than a set value (f. ex. 28 °C). The circulation pump will be switched ON when the flow temperature S3 gets above another set value (f. ex. 32 °C). This function prevents heated water to go back in the district heating network if the supply temperature is too low.
Furthermore, the control valve position can be displayed, based on a variable resistance applied to input S6. See wiring diagram in the Installation Guide. Input S7 acts as an alarm input.

An applied voltage signal (0 - 10 Volt) to S8 can be used for:

- pressure measuring. The voltage is converted in the ECL controller to a pressure, measured in bar

or

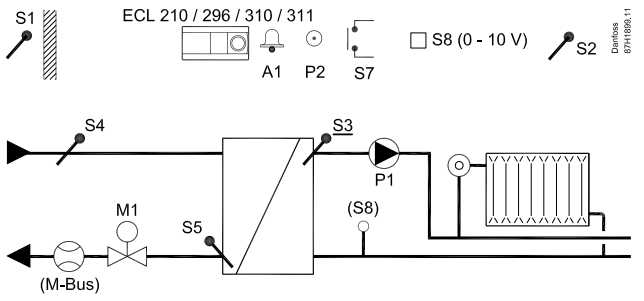
- setting the desired flow temperature. The voltage is converted in the ECL controller to a temperature value.

Special info:
If return temperature sensor S5 is not connected, the return temperature value can come from an M-Bus connected heat-meter. The value will not*) be shown in the display of the ECL, but despite of that, the value can be used for return temperature limitation. Furthermore, the return temperature value from the M-Bus connected heat-meter is shown in ECL Portal / LeanHeat® Monitor.

*) updates of the application subtype to V02 and up will show the return temperature value from the heat-meter.

See the Installation Guide (delivered with the application key) for application example and electrical connections.

Typical A230.5 application:



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

All named components are connected to the ECL Comfort controller.

List of components:

ECL 210 / 296 / 310	*Electronic controller ECL Comfort 210, 296 or 310*
S1	*Outdoor temperature sensor*
S2	*(Optional) Room temperature sensor / ECA 30*
S3	*(Mandatory) Flow temperature sensor*
S4	*(Optional) Supply flow temperature sensor. For monitoring purpose. S4-value can, if supply temperature sensor is not connected, come from an M-Bus connected heat-meter.*
S5	*(Optional) Return temperature sensor. S5-value can, if return temperature sensor is not connected, come from an M-Bus connected heat-meter.*
S6	*(Optional) M1's position*
S7	*(Optional) Alarm input*
S8	*(Optional) 0 - 10 Volt signal from pressure sensor Alternative: 0 - 10 Volt signal for external setting of desired flow temperature.*
P1	*Circulation pump*
P2	*Relay output for Schedule 2*
M1	*Motorized control valve, 3-point controlled. Alternative 1: Control valve, thermo-actuator controlled (Danfoss type ABV). Alternative 2 (ECL 310 with ECA 32): Motorized control valve, 0 - 10 Volt controlled.*
A1	*Alarm*
M-Bus	*Heat-meter connected via M-Bus*

A230, in general:

Up to two Remote Control Units, ECA 30 / 31, can be connected to one ECL controller to control the ECL controller remotely.
Several ECL controllers, internally connected via ECL 485 bus, work in Master / Slave connection. In a Master / Slave system maximum 2 ECA 30 / 31 can be present.

A230, in general:
Exercise of circulation pumps and control valve in periods without heating or cooling demand can be arranged.
Additional ECL Comfort controllers can be connected via the ECL 485 bus to utilize common outdoor temperature signal, time and date signals.
Several ECL controllers, internally connected via ECL 485 bus, work in Master / Slave connection.
An unused input can, by means of an override switch, be used to override the schedule to a fixed mode:
Possibilities for A230.1, A230.3 , A230.4 and A230.5:
'Comfort', 'Saving', 'Frost protection' or 'Constant temperature' mode
Possibilities for A230.2:
'Comfort' or 'Saving' mode

Heat-meters:
Up to 5 heat-meters can be connected to the M-bus terminals (ECL 296 / 310).
Data can be transferred to the SCADA system via Modbus and TCP / IP to the ECL Portal.

Temperatures, measured by heat-meter
The subtypes A230.1, A230.3 and A230.5 can, when used in ECL 296 / 310, utilize the heat-meter's flow and return temperature sensor values. The value for flow temperature is used instead of S4 (supply temperature); the value for return temperature is used instead of S5 (return temperature).
Directly connected temperature sensors S4 and S5 have priority over the temperature values from the heat-meter.
The temperature values for S4 and S5, when coming from the heat-meter, will typically appear 10 sec. after power-up.

Modbus communication (ECL Comfort 296 / 310) to a SCADA system can be established.
The M-bus data (ECL Comfort 296 / 310) can furthermore be transferred to the Modbus communication.

Alarm
A230.1, A230.3, A230.4 and A230.5:
Alarm A1 (= relay 4) can be activated if:

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

A230.2:
Alarm relay 4 is not used, but a temperature sensor or its connections can be monitored.
(See: Common controller settings > System > Raw input overview).

A230.4 and A230.5:
Alarm A1 (= relay 4) can be activated if:

- the actual pressure is not inside an acceptable pressure range

A230.5:
Alarm A1 (= relay 4) can be activated if:

- the alarm input S7 is activated

A230, in general (continued):

Offset adjustment
A measured temperature can be offset adjusted, if needed.
(Navigation: MENU > Common controller > System > Sensor offset)

Input configuration
Inputs (as from S7 and up) 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 in ECL 296 / 310 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).

Application upload
The application upload procedure is the following after having powered up the ECL Comfort controller:

1. Insert the application key
2. Select language
3. Select subtype (the Installation Guide shows subtypes)
4. Set Time and Date

The ECL Comfort controller installs the application, initializes and restarts. Output relays are activated / de-activated (click-sounds from this can be heard). This also means that, for example, circulation pumps can be switched ON and OFF shortly.

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

The application key is delivered with factory settings.
Depending on system type, it might be necessary to change some factory settings individually in order to optimize the functionality.

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

Power-down / power-up
When the power supply to the ECL Comfort controller is disconnected (power-down), the output relays go to de-activated position.
This means that, for example, circulation pumps can be switched ON.
See the electrical connection diagrams in the Installation Guide. All relay contacts are shown in de-activated situation. Some relay contacts are closed, some relay contacts are open.
When the power supply to the ECL Comfort controller is re-established (power-up), the output relays are activated / de-activated (click-sounds from this can be heard). This also means that, for example, circulation pumps can be switched ON and OFF shortly.

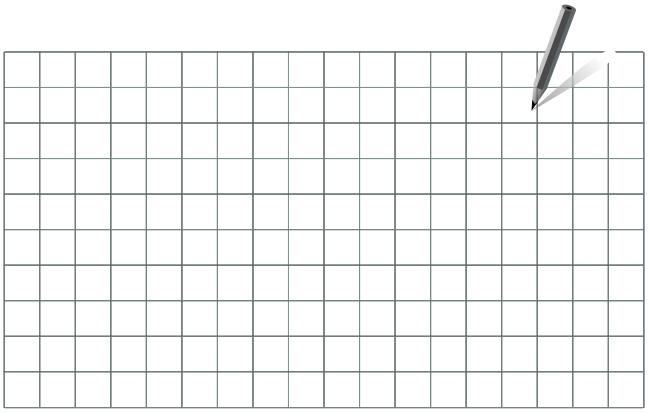
Important:

- Set the correct running time "M run" of the Motorized Control Valve M1. (Circuit 1 > MENU > Settings > Control parameters > M run).

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

2.2 Identifying the system type

Sketch your application



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

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

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

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

2.3 Mounting

2.3.1 Mounting the ECL Comfort controller

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

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

ECL Comfort 210 / 296 / 310 can be mounted

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

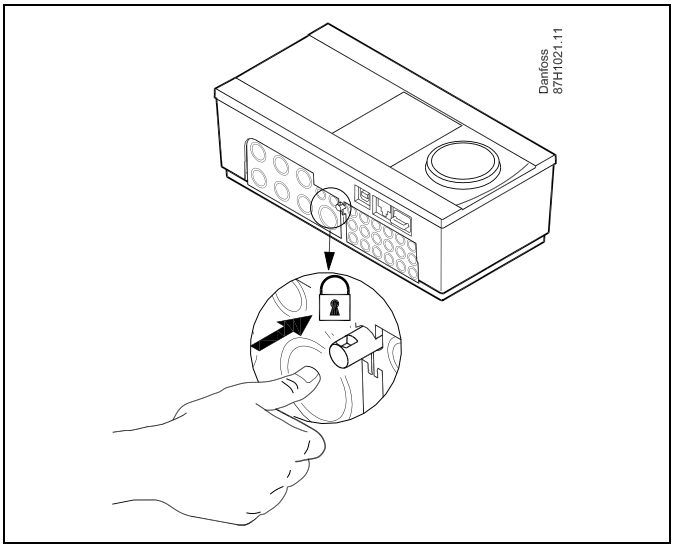
ECL Comfort 296 can be mounted

- in a panel cut-out

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

Screws, PG cable glands and rawlplugs are not supplied.

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



⚠

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

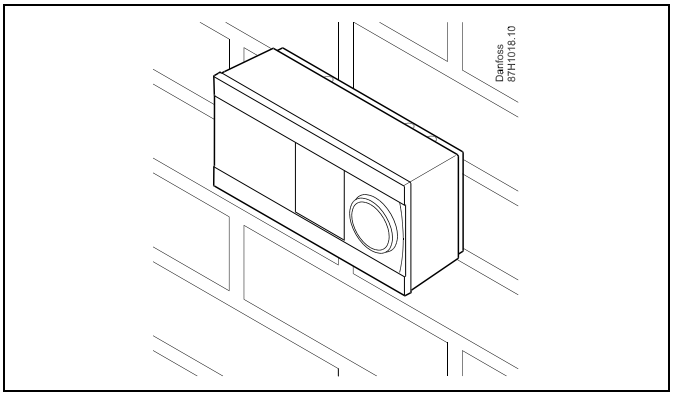
⚠

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

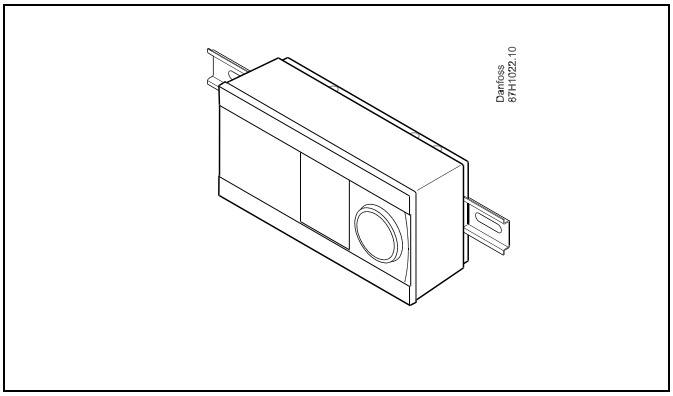
⚠

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

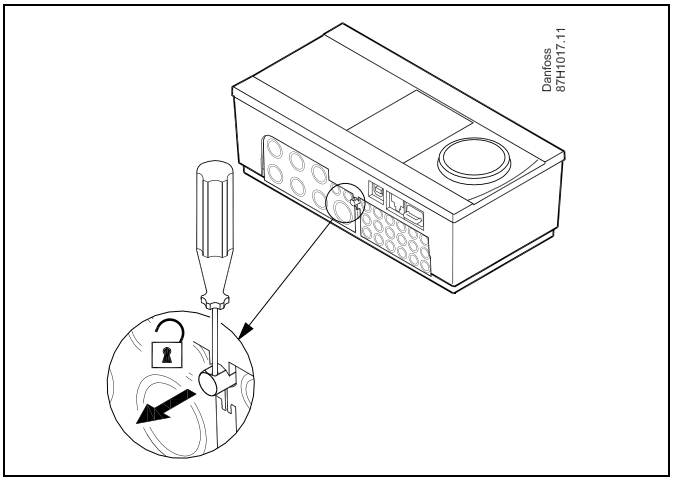
Mounting on a wall
Mount the base part on a wall with a smooth surface. Establish the electrical connections and position the controller in the base part. Secure the controller with the locking pin.



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



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



⚠

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

⚠

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

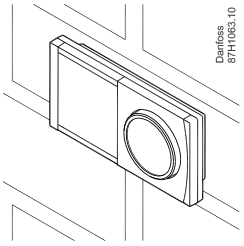
2.3.2 Mounting the Remote Control Units ECA 30 / 31

Select one of the following methods:

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

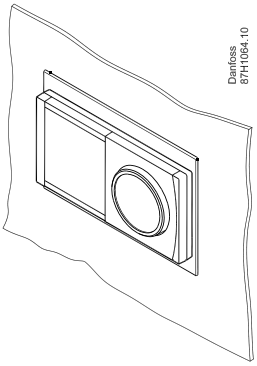
Screws and rawlplugs are not supplied.

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



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

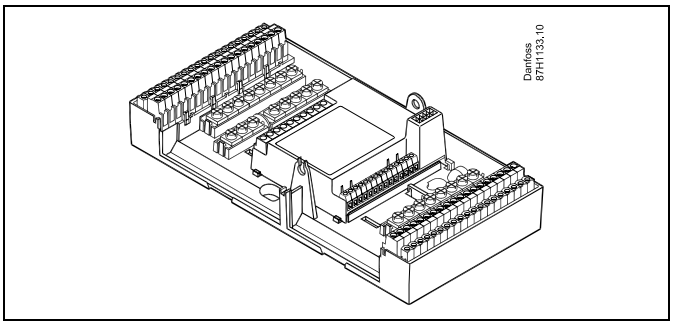
The ECA 31 must not be mounted in a panel if the humidity function is to be used.

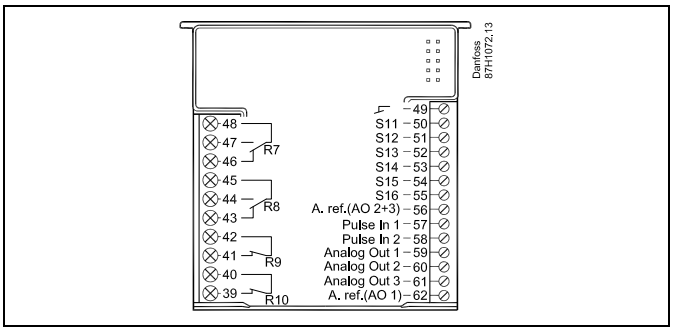


2.3.3 Mounting the internal I/O module ECA 32

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

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





2.4 Placing the temperature sensors

2.4.1 Placing the temperature sensors

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

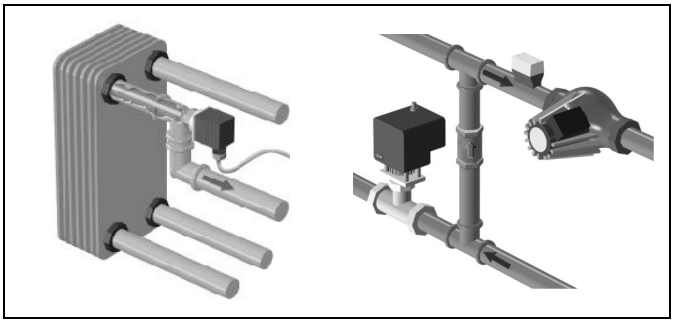
The temperature sensor mentioned below are sensors used for the ECL Comfort 210 / 296 / 310 series which not all will be needed for your application!

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

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

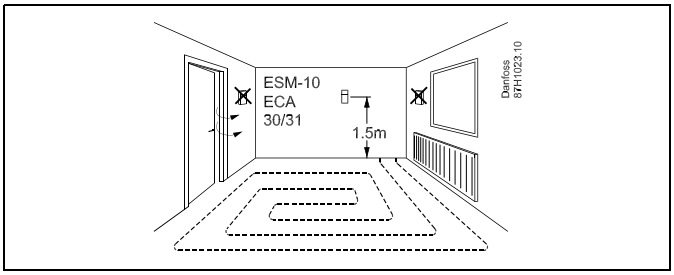
Make sure that the surface of the pipe is clean and even where the sensor is mounted.

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



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

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



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

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

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

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

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

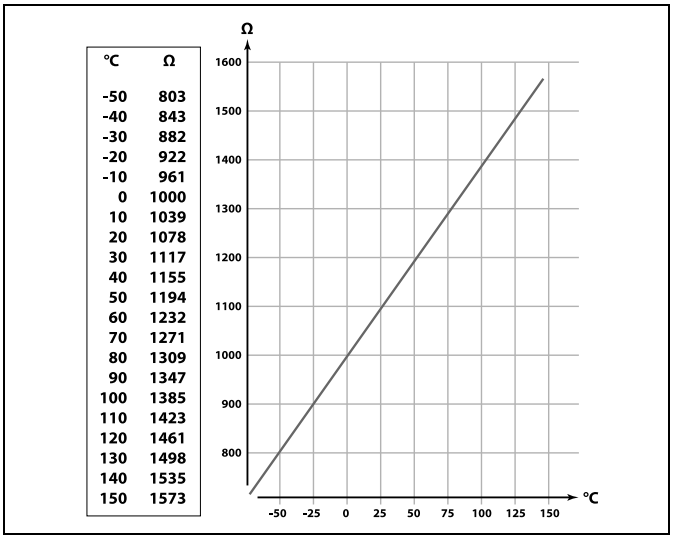
ESM-11, ESMC and ESMB-12: Use heat conducting paste for quick measurement of the temperature.

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

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

Relationship between temperature and ohmic value:

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



2.5 Electrical connections

2.5.1 Electrical connections 230 V a.c.

⚠

Warning

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

If a galvanic separated output is needed, an auxiliary relay is recommended.

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

⚠

Safety Note

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

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

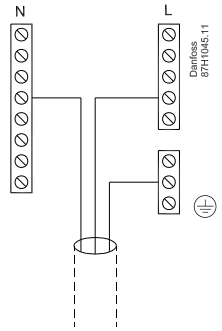
A fuse for the ECL Comfort installation is max. 10 A typically.

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

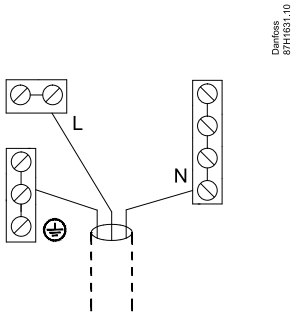
Installation must be avoided if there is a risk for condensation (dew).

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

ECL 210 / 310



ECL 296



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

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

Maximum load ratings:

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

A230.2 (cooling): 2-pump control
Application A230.2, ex. d is an example for scheduled shift between two circulation pumps.
Control of P1 is based on the cooling demand and determines via K1 the ON / OFF control of the pumps P2 and P3. P2 and P3 are related to the output of the schedule in "Common controller settings".
The electric diagram for A230.2, P2 and P3 shows an example for connection.

2.5.2 Electrical connections 24 V a.c.

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

Maximum load ratings:

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

A230.2 (cooling): 2-pump control
Application A230.2, ex. d is an example for scheduled shift between 2 circulation pumps.
Control of P1 is based on the cooling demand and determines via K1 the ON / OFF control of the pumps P2 and P3. P2 and P3 are related to the output of the schedule in "Common controller settings".
The electric diagram for A230.2, P2 and P3 shows an example for connection.

⚠

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

2.5.3 Electrical connections, safety thermostats, in general

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

The connection diagrams show various solutions / examples:

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

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

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

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

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

2.5.4 Electrical connections, Pt 1000 temperature sensors and signals

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

Sensor	Description	Recommended type
S1	Outdoor temperature sensor*	ESMT
S2	Room temperature sensor ** Alternative: ECA 30 / 31	ESM-10
S3	Flow temperature sensor***	ESM-11 / ESMB / ESMC / ESMU
S4	A230.1, A230.2, A230.3, A230.5: Supply temperature sensor, for monitoring A230.4: DHW temperature sensor, for monitoring	ESM-11 / ESMB / ESMC / ESMU
S5	Return temperature sensor	ESM-11 / ESMB / ESMC / ESMU
S6	A230.2: Return temperature sensor, for monitoring A230.4: DHW circulation return temperature sensor, for monitoring A230.5: M1 position	ESM-11 / ESMB / ESMC / ESMU
S7	A230.1, A230.2, A230.4: Flow / energy meter (pulse signal) A230.3: Relative Humidity signal (0 - 10 V) A230.5: Alarm	
S8	A230.2: Desired cooling temperature, 0 - 10 V A230.4 / A230.5: Pressure transmitter, 0 - 10 V. Alternatively, desired heating temperature, 0 - 10 V	

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

** Only for room temperature sensor connection. The room temperature signal can also be available from a Remote Control Unit (ECA 30 / 31). See the Installation Guide (delivered with the application key) for specific connections.

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

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

Connection of flow / energy meter with pulse signal

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

The output of the flow / energy meter can be equipped with an external pull-up resistor if an internal pull-up resistor is not present.

Pulse based signal for flow / power, applied to input S7
For monitoring:
Frequency range is 0.01 - 200 Hz

For limitation:
Minimum frequency is recommended to be 1 Hz in order to have a stable control. Furthermore, the pulses must appear regularly.

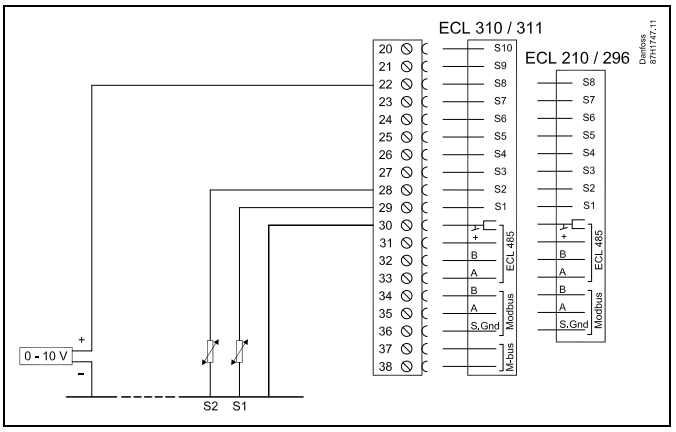
A230.1, A230.3
Connection of wind speed sensor
See the Installation Guide (delivered with the application key).

A230.4, A230.5
Connection of pressure sensor
See the Installation Guide (delivered with the application key).

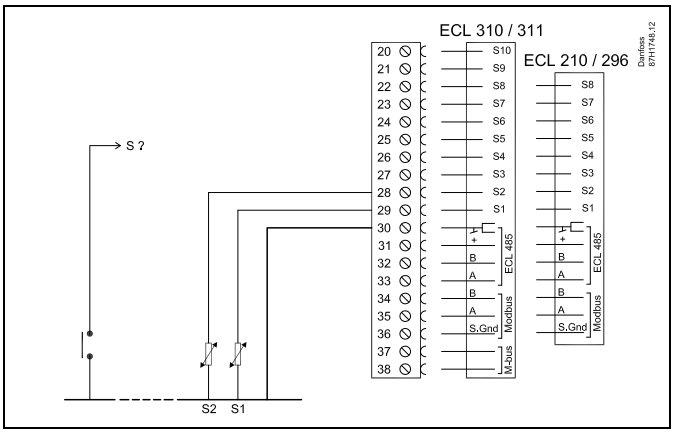
Set-up of relation between applied voltage (0 - 10 V) from pressure sensor and expressed pressure (in Bar) in ECL: See section **Frequently asked questions**.

A230.2, A230.4, A230.5

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



Connection of switch for external override



S ?:
ECL 210 / 296: S7 - S8
ECL 310: S7 - S10
ECL 310 + ECA 32: S7 - S16

Using an input for override requires a volt free contact / switch.

If S1... S6 is chosen as override input, the override switch must have gold-plated contacts.

If S7 ... S16 is chosen as override input, the override switch can be a standard contact.

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).

2.5.5 Electrical connections, ECA 30 / 31

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

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

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

The ECA 30 / 31 must be set up accordingly.

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

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

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

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

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

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

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

2.5.6 Electrical connections, master / slave systems

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

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

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

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

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

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

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

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

2.5.7 Electrical connections, communication

Electrical connections, Modbus

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

2.5.8 Electrical connections, communication

Electrical connections, M-bus

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

2.6 Inserting the ECL Application Key

2.6.1 Inserting the ECL Application Key

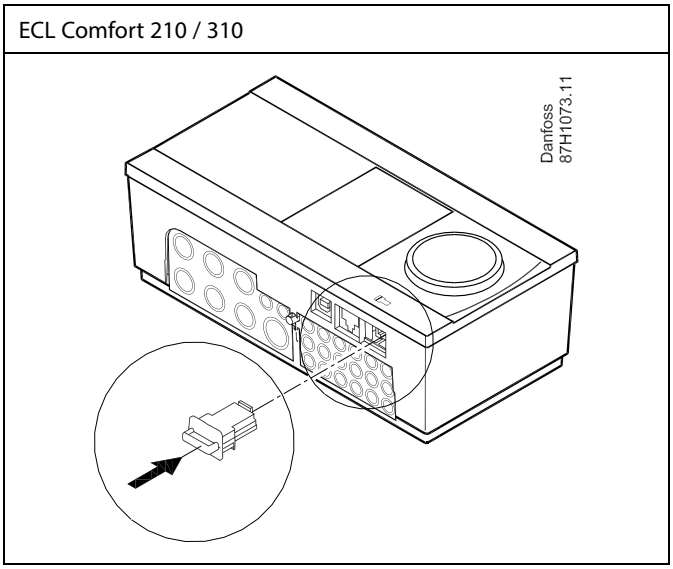
The ECL Application Key contains

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

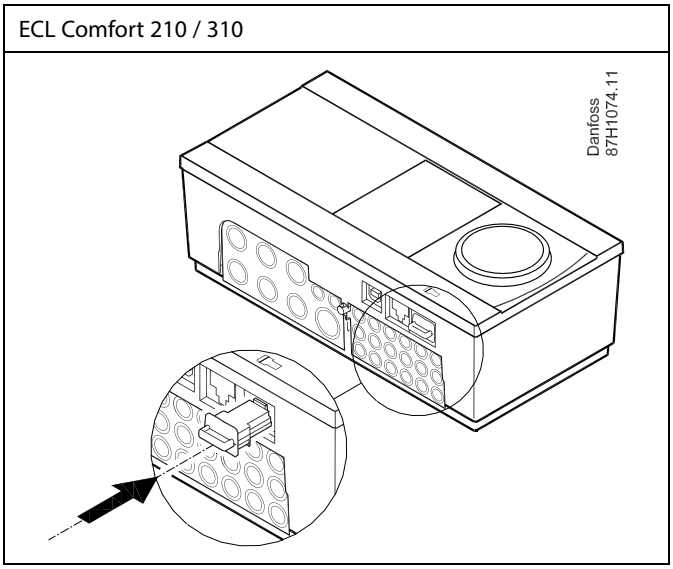
After having powered-up the controller, different situations might be existing:

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

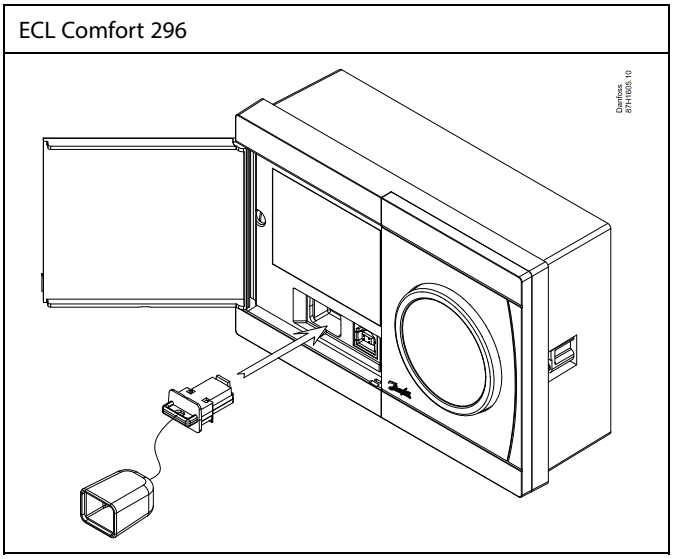
ECL Comfort 210 / 310



ECL Comfort 210 / 310



ECL Comfort 296



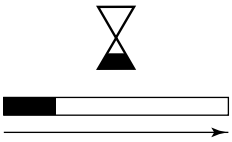
User settings are, among others, desired room temperature, desired DHW temperature, schedules, heat curve, limitation values etc.

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

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

- 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.

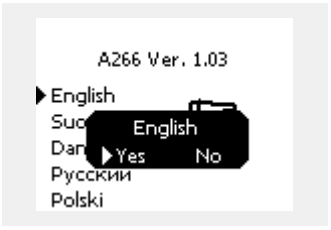
Application Key: Situation 1
The controller is new from the factory, the ECL Application Key is not inserted.

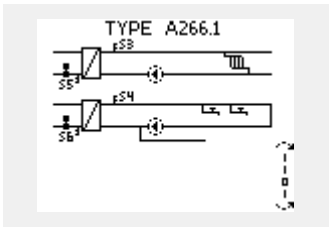
An animation for the ECL Application Key insertion is displayed. Insert the Application Key .

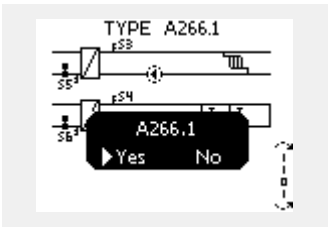
Application Key name and Version is indicated (example: A266 Ver. 1.03).

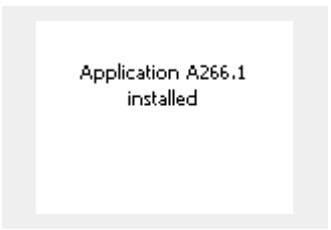
If the ECL Application Key is not suitable for the controller, a "cross" is displayed over the ECL Application Key-symbol.

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







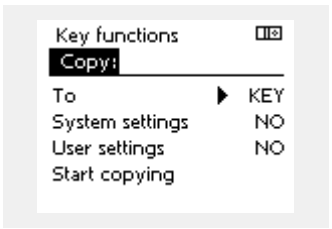


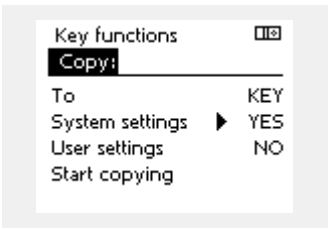
* 'Aut. daylight' is the automatic changeover between summer and winter time.

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.

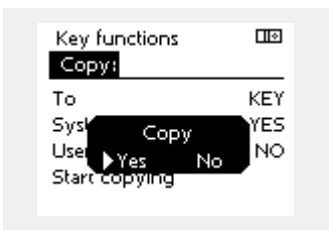
The application is installed, and the controller resets and starts up.

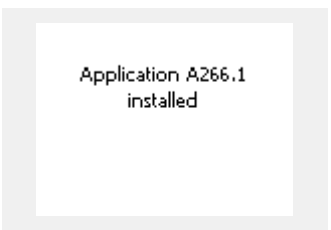




B
The ECL Application key contains changed system settings:
Push the dial repeatedly.

'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.

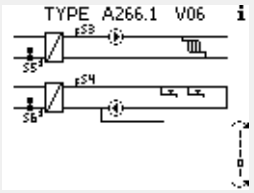
'NO: Only factory settings from the ECL Application Key will be copied to the controller.
'YES*: Special user settings (differing from the factory settings) will be copied to the controller.

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

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

(Example):

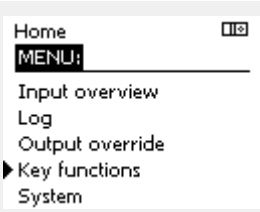
The "**i**" in the upper right corner indicates that - besides the factory settings - the subtype also contains special user / systems settings.

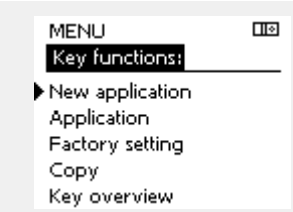


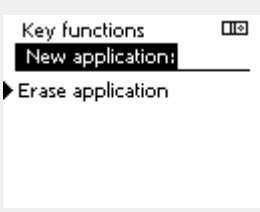
Application Key: Situation 2
The controller already runs an application. The ECL Application Key is inserted, but the application needs to be changed.

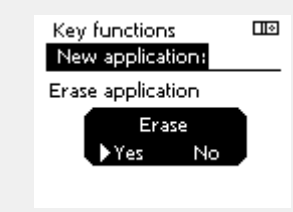
To change to another application on the ECL Application Key, the current application in the controller must be erased (deleted).

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:

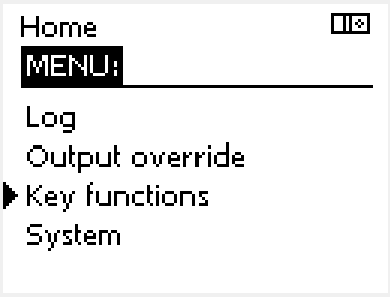
Action:	Purpose:	Examples:
	Choose 'MENU'	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose 'Common controller settings'	
	Confirm	
	Go to 'Key functions'	
	Confirm	
	Choose 'Copy'	
	Confirm	
	Choose 'To'. 'ECL' or 'KEY' will be indicated. Choose 'ECL'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

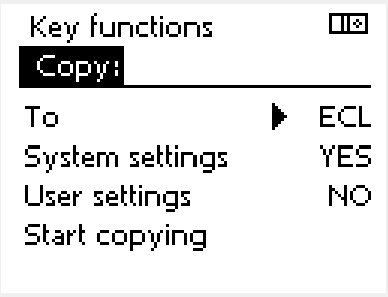
*

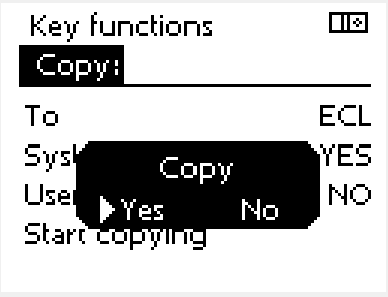
'ECL': Data will be copied from the Application Key to the ECL Controller.
'KEY': Data will be copied from the ECL Controller to the Application Key.

**

'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 A230

Navigation, A230, application A230.1

Home		Application A230.1	
		ID no.	Function
MENU			
Schedule			Selectable
Settings	Flow temperature		Heat curve
		11178	Temp. max.
		11177	Temp. min.
		11004	Desired T
	Room limit	11015	Adapt. time
		11182	Infl. - max.
		11183	Infl. - min.
	Return limit	11031	High T out X1
		11032	Low limit Y1
		11033	Low T out X2
		11034	High limit Y2
		11035	Infl. - max.
		11036	Infl. - min.
		11037	Adapt. time
		11085	Priority
		11029	DHW, ret. T limit
		11028	Con. T, re. T lim.
	Flow / power limit		Actual
			Limit
		11119	High T out X1
		11117	Low limit Y1
		11118	Low T out X2
		11116	High limit Y2
		11112	Adapt. time
		11113	Filter constant
		11109	Input type
		11115	Units
		11114	Pulse
	Wind influence		Wind actual
		11099	Limit
		11057	Infl. - max.
		11081	Filter constant

Navigation, A230, application A230.1, continued

Home		Application A230.1	
MENU		**ID no.**	**Function**
Settings	Optimization	11011	Auto saving
		11012	Boost
		11013	Ramp
		11014	Optimizer
		11026	Pre-stop
		11020	Based on
		11021	Total stop
		11179	Summer, cut-out
	Control par.	11174	Motor pr.
		11184	Xp
		11185	Tn
		11186	M run
		11187	Nz
		11189	Min. act. time
		11024	Actuator
	Application	11010	ECA addr.
		11017	Demand offset
		11050	P demand
		11500	Send desired T
		11022	P exercise
		11023	M exercise
		11052	DHW priority
		11077	P frost T
		11078	P heat T
		11040	P post-run
		11093	Frost pr. T
		11141	Ext. input
		11142	Ext. mode
	Heat cut-out	11393	Sum. start, day
		11392	Sum. start, month
		11179	Summer, cut-out
		11395	Summer, filter
		11397	Winter start, day
		11396	Winter start, month
		11398	Winter, cut-out
		11399	Winter, filter

Navigation, A230, application A230.1, continued

Home		**Application A230.1**	
MENU		**ID no.**	**Function**
Holiday			Selectable
Alarm	Temp. monitoring	11147	Upper difference
		11148	Lower difference
		11149	Delay
		11150	Lowest temp.
	Alarm overview		Selectable
Influence overview	Des. flow T		Return lim.
			Room lim.
			Wind influence
			Flow / power lim.
			Holiday
			Ext. override
			ECA override
			Boost
			Ramp
			Slave, demand
			Heating cut-out
			DHW priority
			SCADA offset
			Floor dry., active

Navigation, A230, Application A230.1, Common controller settings

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Schedule			Selectable
Holiday			Selectable
Input overview			Outdoor T
			Outdoor acc. T
			Room T
			Heat flow T
			Heat return T
			Supply T
			Wind actual
Log (sensors)	Outdoor T		Log today
	Heating flow & des.		Log yesterday
	Room T & desired		Log 2 days
	Heat return T & limit		Log 4 days
	Supply T		
	Wind speed		
Output override			M1
			P1
			V1
			P2
			A1
Floor drying	Functional heating		Desired flow T
			X1
			X2
			X3
			X4
	Curing heating		Desired flow T
			X5
			X6
			X7
			X8
			Ramp X5–X6
			Ramp X7–X8
			Max. pwr. failure
			After power fail.
			Prog. execution
			Appl. continue

Navigation, A230, application A230.1, Common controller settings, continued

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Key functions	New application		Erase application
	Application		
	Factory setting		System settings
			User settings
			Go to factory
	Copy		To
			System settings
			User settings
			Start copying
	Key overview		
System	ECL version		Code no.
			Hardware
			Software
			Build no.
			Serial no.
			Production date
	Extension		
	Ethernet (ECL Comfort 296 / 310 only)		Address type
	Portal config (ECL Comfort 296 / 310 only)		ECL portal
			Portal status
			Portal info
	M-bus config (ECL Comfort 296 / 310 only)	5998	Command
		5997	Baud
		6000	M-bus address
		6002	Scan time
		6001	Type
	Energy Meters (ECL Comfort 296 / 310 only)		Energy Meter 1....5
	Raw input overview		S1 - S8 (ECL Comfort 210 / 296) S1 - S10 (ECL Comfort 310) S1 - S18 (ECL Comfort 310 with ECA 32)
	Sensor offset		S1 ... S8 offset (ECL Comfort 210 / 296) S1 ... S10 offset (ECL Comfort 310)

Navigation, A230, application A230.1, Common controller settings, continued

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
	Alarm	32:	T sensor defect
	Display	60058	Backlight
		60059	Contrast
	Communication	2048	ECL 485 addr.
		38	Modbus addr.
		39	Baud
		2150	Service pin
		2151	Ext. reset
	Language	2050	Language

Navigation, A230, application A230.2

Home		Application A230.2	
		ID no.	Function
MENU			
Schedule			Selectable
Settings	Flow temperature		Ext. desired T
		11084	Ext. signal
		11018	Des. T comfort
		11019	Des. T saving
		11178	Temp. max.
		11177	Temp. min.
	Room limit	11015	Adapt. time
		11182	Infl. - max.
		11183	Infl. - min.
	Return limit	11030	Limit
		11037	Adapt. time
		11035	Infl. - max.
		11036	Infl. - min.
	Compensation 1	11060	Limit
		11061	Adapt. time
		11062	Infl. - max.
		11063	Infl. - min.
	Compensation 2	11064	Limit
		11065	Adapt. time
		11066	Infl. - max.
		11067	Infl. - min.
	Flow / power limit		Actual
		11111	Limit
		11112	Adapt. time
		11113	Filter constant
		11109	Input type
		11115	Units
		11114	Pulse

Navigation, A230, application A230.2, continued

Home		**Application A230.2**	
MENU		**ID no.**	**Function**
Settings	Control par.	11174	Motor pr.
		11184	Xp
		11185	Tn
		11186	M run
		11187	Nz
		11189	Min. act. time
		11024	Actuator
	Application	11010	ECA addr.
		11017	Demand offset
		11050	P demand
		11500	Send desired T
		11022	P exercise
		11023	M exercise
		11070	P cool T
		11092	Standby T
		11040	P post-run
		11141	Ext. input
		11142	Ext. mode
Holiday			Selectable
Influence overview	Des. flow T		Return lim.
			Room lim.
			Compensation 1
			Compensation 2
			Flow / power lim.
			Holiday
			Ext. override
			ECA override
			Slave, demand
			SCADA offset

Navigation, A230, Application A230.2, Common controller settings

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Schedule			Selectable
Input overview			Outdoor T
			Room T
			Cool flow T
			Supply T
			Cool return T
			Return T sec.
			Ext. desired T
Log (sensors)	Outdoor T		Log today
	Cool T & desired		Log yesterday
	Room T & desired		Log 2 days
	Cool return & lim.		Log 4 days
	Return T sec.		
	Supply T		
Output override			M1
			P1
			V1
			P2
			P3
			A1
Key functions	New application		Erase application
	Application		
	Factory setting		System settings
			User settings
			Go to factory
	Copy		To
			System settings
			User settings
			Start copying
	Key overview		

Navigation, A230, application A230.2, Common controller settings, continued

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
System	ECL version		Code no.
			Hardware
			Software
			Build no.
			Serial no.
			Production date
	Extension		
	Ethernet (ECL Comfort 296 / 310 only)		Address type
	Portal config (ECL Comfort 296 / 310 only)		ECL portal
			Portal status
			Portal info
	M-bus config (ECL Comfort 296 / 310 only)	5998	Command
		5997	Baud
		6000	M-bus address
		6002	Scan time
		6001	Type
	Energy Meters (ECL Comfort 296 / 310 only)		Energy Meter 1....5
	Raw input overview		S1 - S8 (ECL Comfort 210 / 296) S1 - S10 (ECL Comfort 310) S1 - S18 (ECL Comfort 310 with ECA 32)
	Sensor offset		S1 ... S8 offset (ECL Comfort 210 / 296) S1 ... S10 offset (ECL Comfort 310)
	Alarm	32:	T sensor defect
	Display	60058	Backlight
		60059	Contrast
	Communication	2048	ECL 485 addr.
		38	Modbus addr.
		39	Baud
		2150	Service pin
		2151	Ext. reset
	Language	2050	Language

Navigation, A230, application A230.3

Home		Application A230.3	
		ID no.	Function
MENU			
Schedule			Selectable
Settings	Flow temperature		Heat curve
		11178	Temp. max.
		11177	Temp. min.
		11004	Desired T
	Room limit		Humidity
		11164	Dew p. T offset
		11015	Adapt. time
		11182	Infl. - max.
		11183	Infl. - min.
	Return limit	11031	High T out X1
		11032	Low limit Y1
		11033	Low T out X2
		11034	High limit Y2
		11035	Infl. - max.
		11036	Infl. - min.
		11037	Adapt. time
		11085	Priority
		11029	DHW, ret. T limit
		11028	Con. T, re. T lim.
	Flow / power limit		Actual
			Limit
		11119	High T out X1
		11117	Low limit Y1
		11118	Low T out X2
		11116	High limit Y2
		11112	Adapt. time
		11113	Filter constant
		11109	Input type
		11115	Units
	Wind influence		Wind actual
		11099	Limit
		11057	Infl. - max.
		11081	Filter constant

Navigation, A230, application A230.3, continued

Home		Application A230.3	
MENU		**ID no.**	**Function**
Settings	Optimization	11011	Auto saving
		11012	Boost
		11013	Ramp
		11014	Optimizer
		11026	Pre-stop
		11020	Based on
		11021	Total stop
		11179	Summer, cut-out
	Control par.	11174	Motor pr.
		11184	Xp
		11185	Tn
		11186	M run
		11187	Nz
		11189	Min. act. time
		11024	Actuator
	Application	11010	ECA addr.
		11017	Demand offset
		11050	P demand
		11500	Send desired T
		11022	P exercise
		11023	M exercise
		11052	DHW priority
		11077	P frost T
		11078	P heat T
		11040	P post-run
		11093	Frost pr. T
		11141	Ext. input
		11142	Ext. mode
	Heat cut-out	11393	Sum. start, day
		11392	Sum. start, month
		11179	Summer, cut-out
		11395	Summer, filter
		11397	Winter start, day
		11396	Winter start, month
		11398	Winter, cut-out
		11399	Winter, filter

Navigation, A230, application A230.3, continued

Home		**Application A230.3**	
MENU		**ID no.**	**Function**
Holiday			Selectable
Alarm	Temp. monitoring	11147	Upper difference
		11148	Lower difference
		11149	Delay
		11150	Lowest temp.
	Alarm overview		Selectable
Influence overview	Des. flow T		Return lim.
			Room lim.
			Wind influence
			Flow / power lim.
			Holiday
			Ext. override
			ECA override
			Boost
			Ramp
			Slave, demand
			Heating cut-out
			DHW priority
			SCADA offset
			Floor dry., active

Navigation, A230, Application A230.3, Common controller settings

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Schedule			Selectable
Holiday			Selectable
Input overview			Outdoor T
			Outdoor acc. T
			Room T
			Heat flow T
			Heat return T
			Supply T
			Wind actual
			Humidity
Log (sensors)	Outdoor T		Log today
	Heating flow & des.		Log yesterday
	Room T & desired		Log 2 days
	Heat return T & limit		Log 4 days
	Supply T		
	Wind speed		
	Humidity		
Output override			M1
			P1
			V1
			P2
			A1
Floor drying	Functional heating		Desired flow T
			X1
			X2
			X3
			X4
	Curing heating		Desired flow T
			X5
			X6
			X7
			X8
			Ramp X5–X6
			Ramp X7–X8
			Max. pwr. failure
			After power fail.
			Prog. execution
			Appl. continue

Navigation, A230, application A230.3, Common controller settings, continued

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Key functions	New application		Erase application
	Application		
	Factory setting		System settings
			User settings
			Go to factory
	Copy		To
			System settings
			User settings
			Start copying
	Key overview		
System	ECL version		Code no.
			Hardware
			Software
			Build no.
			Serial no.
			Production date
	Extension		
	Ethernet (ECL Comfort 296 / 310 only)		Address type
	Portal config (ECL Comfort 296 / 310 only)		ECL portal
			Portal status
			Portal info
	M-bus config (ECL Comfort 296 / 310 only)	5998	Command
		5997	Baud
		6000	M-bus address
		6002	Scan time
		6001	Type
	Energy Meters (ECL Comfort 296 / 310 only)		Energy Meter 1....5
	Raw input overview		S1 - S8 (ECL Comfort 210 / 296) S1 - S10 (ECL Comfort 310) S1 - S18 (ECL Comfort 310 with ECA 32)
	Sensor offset		S1 ... S8 offset (ECL Comfort 210 / 296) S1 ... S10 offset (ECL Comfort 310)

Navigation, A230, application A230.3, Common controller settings, continued

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
	Alarm	32:	T sensor defect
	Display	60058	Backlight
		60059	Contrast
	Communication	2048	ECL 485 addr.
		38	Modbus addr.
		39	Baud
		2150	Service pin
		2151	Ext. reset
	Language	2050	Language

Navigation, A230, application A230.4

Home		Application A230.4	
		ID no.	Function
MENU			
Schedule			Selectable
Settings	Flow temperature		Heat curve
		11178	Temp. max.
		11177	Temp. min.
			Ext. desired T
		11004	Desired T
	Room limit	11015	Adapt. time
		11182	Infl. - max.
		11183	Infl. - min.
	Return limit	11031	High T out X1
		11032	Low limit Y1
		11033	Low T out X2
		11034	High limit Y2
		11035	Infl. - max.
		11036	Infl. - min.
		11037	Adapt. time
		11085	Priority
		11029	DHW, ret. T limit
		11028	Con. T, re. T lim.
	Flow / power limit		Actual
			Limit
		11119	High T out X1
		11117	Low limit Y1
		11118	Low T out X2
		11116	High limit Y2
		11112	Adapt. time
		11113	Filter constant
		11109	Input type
		11115	Units
		11114	Pulse

Navigation, A230, application A230.4, continued

Home		Application A230.4	
MENU		**ID no.**	**Function**
Settings	Optimization	11011	Auto saving
		11012	Boost
		11013	Ramp
		11014	Optimizer
		11026	Pre-stop
		11020	Based on
		11021	Total stop
		11179	Summer, cut-out
	Control par.	11174	Motor pr.
		11184	Xp
		11185	Tn
		11186	M run
		11187	Nz
		11189	Min. act. time
		11024	Actuator
	Application	11010	ECA addr.
		11017	Demand offset
		11050	P demand
		11500	Send desired T
		11022	P exercise
		11023	M exercise
		11052	DHW priority
		11077	P frost T
		11078	P heat T
		11040	P post-run
		11093	Frost pr. T
		11141	Ext. input
		11142	Ext. mode
		11327	Input type
	Heat cut-out	11393	Sum. start, day
		11392	Sum. start, month
		11179	Summer, cut-out
		11395	Summer, filter
		11397	Winter start, day
		11396	Winter start, month
		11398	Winter, cut-out
		11399	Winter, filter

Navigation, A230, application A230.4, continued

		Application A230.4	
Home			
MENU		**ID no.**	**Function**
Holiday			Selectable
Alarm	Pressure		Pressure
		11614	Alarm high
		11615	Alarm low
		11617	Alarm time-out
	Temp. monitoring	11147	Upper difference
		11148	Lower difference
		11149	Delay
		11150	Lowest temp.
	Alarm overview		Selectable
Influence overview	Des. flow T		Return lim.
			Room lim.
			Flow / power lim.
			Holiday
			Ext. override
			ECA override
			Boost
			Ramp
			Slave, demand
			Heating cut-out
			DHW priority
			SCADA offset
			Floor dry., active

Navigation, A230, Application A230.4, Common controller settings

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Schedule			Selectable
Holiday			Selectable
Input overview			Outdoor T
			Outdoor acc. T
			Room T
			Heat flow T
			Heat return T
			Pressure
			Ext. desired T
Log (sensors)	Outdoor T		Log today
	Heating flow & des.		Log yesterday
	Room T & desired		Log 2 days
	Heat return T & limit		Log 4 days
	Pressure		
Output override			M1
			P1
			V1
			P2
			A1
Floor drying	Functional heating		Desired flow T
			X1
			X2
			X3
			X4
	Curing heating		Desired flow T
			X5
			X6
			X7
			X8
			Ramp X5–X6
			Ramp X7–X8
			Max. pwr. failure
			After power fail.
			Prog. execution
			Appl. continue

Navigation, A230, application A230.4, Common controller settings, continued

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Key functions	New application		Erase application
	Application		
	Factory setting		System settings
			User settings
			Go to factory
	Copy		To
			System settings
			User settings
			Start copying
	Key overview		
System	ECL version		Code no.
			Hardware
			Software
			Build no.
			Serial no.
			Production date
	Extension		
	Ethernet (ECL Comfort 296 / 310 only)		Address type
	Portal config (ECL Comfort 296 / 310 only)		ECL portal
			Portal status
			Portal info
	M-bus config (ECL Comfort 296 / 310 only)	5998	Command
		5997	Baud
		6000	M-bus address
		6002	Scan time
		6001	Type
	Energy Meters (ECL Comfort 296 / 310 only)		Energy Meter 1....5
	Raw input overview		S1 - S8 (ECL Comfort 210 / 296) S1 - S10 (ECL Comfort 310) S1 - S18 (ECL Comfort 310 with ECA 32)
	Sensor offset		S1 ... S8 offset (ECL Comfort 210 / 296) S1 ... S10 offset (ECL Comfort 310)

Navigation, A230, application A230.4, Common controller settings, continued

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
	Alarm	32:	T sensor defect
	Display	60058	Backlight
		60059	Contrast
	Communication	2048	ECL 485 addr.
		38	Modbus addr.
		39	Baud
		2150	Service pin
		2151	Ext. reset
	Language	2050	Language

Navigation, A230, application A230.5

Home		Application A230.5	
		ID no.	Function
MENU			
Schedule			Selectable
Settings	Flow temperature		Des. flow T
			Heat curve
		11178	Temp. max.
		11177	Temp. min.
			Ext. desired T
		11004	Desired T
	Room limit	11015	Adapt. time
		11182	Infl. - max.
		11183	Infl. - min.
	Return limit	11031	High T out X1
		11032	Low limit Y1
		11033	Low T out X2
		11034	High limit Y2
		11035	Infl. - max.
		11036	Infl. - min.
		11037	Adapt. time
		11085	Priority
		11029	DHW, ret. T limit
		11028	Con. T, re. T lim.
	Flow / power limit		Actual
			Limit
		11119	High T out X1
		11117	Low limit Y1
		11118	Low T out X2
		11116	High limit Y2
		11112	Adapt. time
		11113	Filter constant
		11109	Input type
		11115	Units

Navigation, A230, application A230.5, continued

Home		Application A230.5	
MENU		**ID no.**	**Function**
Settings	Optimization	11011	Auto saving
		11012	Boost
		11013	Ramp
		11014	Optimizer
		11026	Pre-stop
		11020	Based on
		11021	Total stop
		11179	Summer, cut-out
	Control par.	11174	Motor pr.
		11184	Xp
		11185	Tn
		11186	M run
		11187	Nz
		11189	Min. act. time
		11024	Actuator
	Application	11010	ECA addr.
		11017	Demand offset
		11500	Send desired T
		11022	P exercise
		11023	M exercise
		11052	DHW priority
		11077	P frost T
		11342	Start heat
		11344	Stop heat
		11040	P post-run
		11093	Frost pr. T
		11141	Ext. input
		11142	Ext. mode
		11327	Input type
	Heat cut-out	11393	Sum. start, day
		11392	Sum. start, month
		11179	Summer, cut-out
		11395	Summer, filter
		11397	Winter start, day
		11396	Winter start, month
		11398	Winter, cut-out
		11399	Winter, filter

Navigation, A230, application A230.5, continued

Home		**Application A230.5**	
MENU		**ID no.**	**Function**
Holiday			Selectable
Alarm	Temp. monitoring	11147	Upper difference
		11148	Lower difference
		11149	Delay
		11150	Lowest temp.
	Alarm overview		Selectable
Influence overview	Des. flow T		Return lim.
			Room lim.
			Wind influence
			Flow / power lim.
			Holiday
			Ext. override
			ECA override
			Boost
			Ramp
			Slave, demand
			Heating cut-out
			DHW priority
			SCADA offset
			Ext. desired T

Navigation, A230, Application A230.5, Common controller settings

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Schedule			Selectable
Holiday			Selectable
Input overview			Outdoor T
			Outdoor acc. T
			Room T
			Heat flow T
			Heat return T
			Supply T
			Pressure
			Ext. desired T
			Position
Log (sensors)	Outdoor T		Log today
	Heating flow & des.		Log yesterday
	Room T & desired		Log 2 days
	Heat return T & limit		Log 4 days
	Supply T		
	Pressure		
Output override			M1
			P1
			V1
			P2
			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, A230, application A230.5, Common controller settings, continued

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
System	ECL version		Code no.
			Hardware
			Software
			Build no.
			Serial no.
			Production date
	Extension		
	Ethernet (ECL Comfort 296 / 310 only)		Address type
	Portal config (ECL Comfort 296 / 310 only)		ECL portal
			Portal status
			Portal info
	M-bus config (ECL Comfort 296 / 310 only)	5998	Command
		5997	Baud
		6000	M-bus address
		6002	Scan time
		6001	Type
	Energy Meters (ECL Comfort 296 / 310 only)		Energy Meter 1....5
	Raw input overview		S1 - S8 (ECL Comfort 210 / 296) S1 - S10 (ECL Comfort 310) S1 - S18 (ECL Comfort 310 with ECA 32)
	Sensor offset		S1 ... S8 offset (ECL Comfort 210 / 296) S1 ... S10 offset (ECL Comfort 310)
	Alarm	32:	T sensor defect
	Display	60058	Backlight
		60059	Contrast
	Communication	2048	ECL 485 addr.
		38	Modbus addr.
		39	Baud
		2150	Service pin
		2151	Ext. reset
		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 (↻).

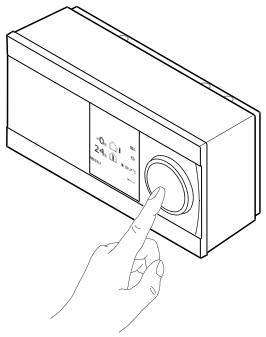
The dial has a built-in accellerator. The faster you turn the dial, the faster it reaches the limits of any wide setting range.

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

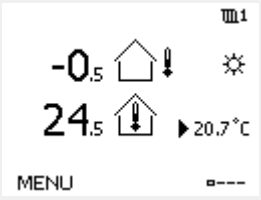
Push the dial to confirm your choices (☝).

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.

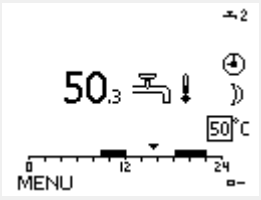
Example shows ECL 210 / 310



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.

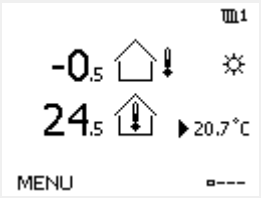
If the dial has not been activated for 20 min., the controller will revert to the overview display you have chosen as favorite.

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.

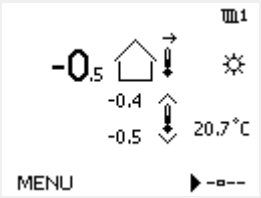
Heating circuit
Overview display 1 informs about:
actual outdoor temperature, controller mode,
actual room temperature, desired room temperature.

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

Overview display 1:



Overview display 2:



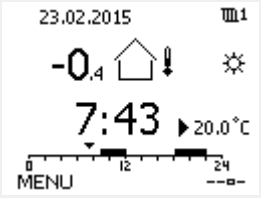
Overview display 3 informs about:
date, actual outdoor temperature, controller mode, time, desired room temperature as well as shows the comfort schedule of the current day.

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

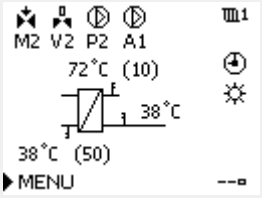
The value above the V2 symbol indicates 0–100% of the analogue signal (0–10 V).

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

Overview display 3:

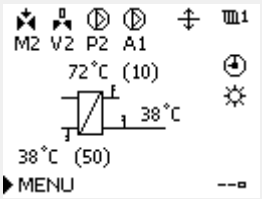


Overview display 4:

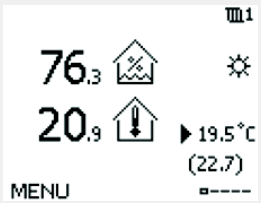


Dependent on the chosen display, the overview displays for the heating circuit inform you about:
- actual outdoor temperature (-0.5)
- controller mode (☼)
- actual room temperature (24.5)
- desired room temperature (20.7 °C)
- trend in outdoor temperature (↗ → ↘)
- min. and max. outdoor temperatures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

Example of overview display with Influence indication:



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



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

If the temperature value is displayed as

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

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

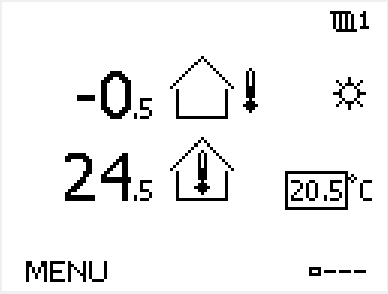
Setting the desired temperature

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

Setting the desired room temperature

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

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



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

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

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

Setting the desired room temperature, ECA 30 / ECA 31

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

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

3.3 A general overview: What do the symbols mean?

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

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

Additional symbols, ECA 30 / 31:

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

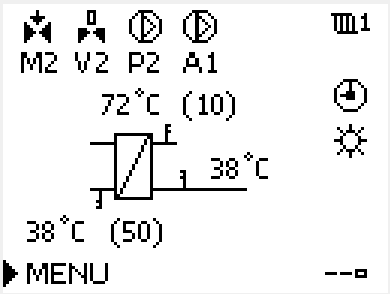
In ECA 30 / 31 only the symbols that are relevant to the application in the controller are displayed.

3.4 Monitoring temperatures and system components

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:

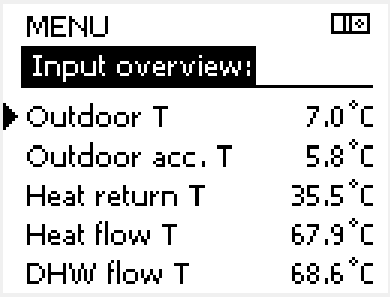


49 °C	Flow temperature
(31)	Desired flow temperature
24 °C	Return temperature
(50)	Return temperature limitation

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.

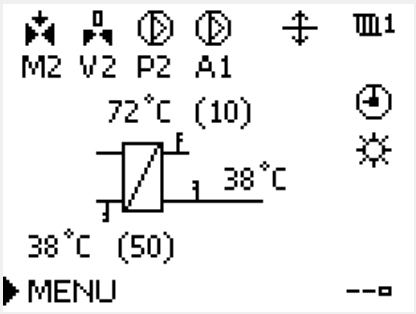
Arrow-up:
The parameter in question increases the desired flow temperature.

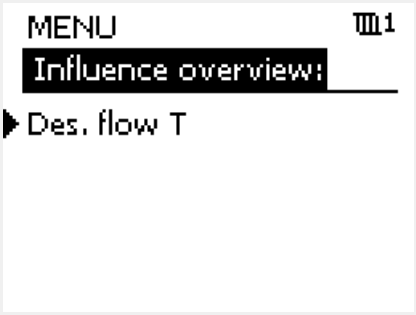
Double-arrow:
The parameter in question creates an override (e.g. Holiday).

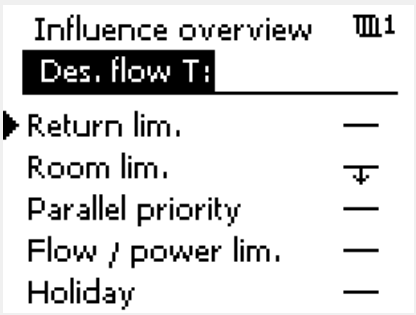
Straight line:
No active influence.

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

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

It is possible to manually control the installed components.

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

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

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

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

Controlled components *Circuit selector*

During manual operation:

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

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

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

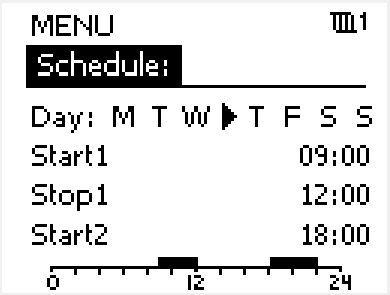
3.7 Schedule

3.7.1 Set your schedule

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

The schedule consists of a 7-day week:

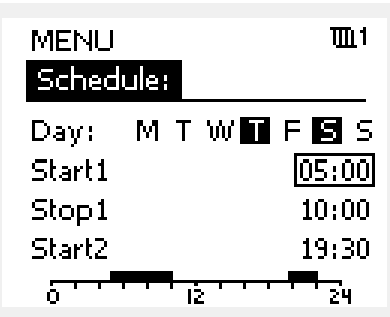
M = Monday
T = Tuesday
W = Wednesday
T = Thursday
F = Friday
S = Saturday
S = Sunday

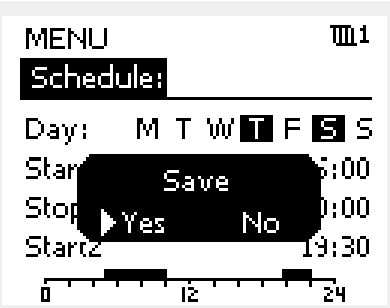


The schedule will day-by-day show you the start and stop times of your comfort periods (heating / DHW circuits).

Changing your schedule:

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





* Several days can be marked

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

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

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

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

4.0 Settings overview

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

Setting	ID	Page	Factory settings in circuit(s)	
			1	2
Heat curve		81		
Ext. desired T		82		
Humidity (Relative humidity)		86		
Actual (actual flow or power)		96		
Wind actual		100		
Await time (read-out only)		109		
Extended heat cut-out setting		128		
Extended winter cut-out setting		128		
Desired T (Desired flow temperature)	1x004	83		
ECA addr. (ECA address, choice of Remote Control Unit)	1x010	118		
Auto saving (saving temp. dependent on outdoor temp.)	1x011	102		
Boost	1x012	103		
Ramp (reference ramping)	1x013	104		
Optimizer (optimizing time constant)	1x014	104		
Adapt. time (adaption time)	1x015	87		
Demand offset	1x017	118		
Des. T Comfort	1x018	84		
Des. T Saving	1x019	84		
Based on (optimization based on room / outdoor temp.)	1x020	105		
Total stop	1x021	105		
P exercise (pump exercise)	1x022	119		
M exercise (valve exercise)	1x023	120		
Actuator	1x024	110		
Pre-stop (optimized stop time)	1x026	106		
Con.T, re. T lim. (Constant temperature mode, return temperature limitation)	1x028	91		
DHW, ret. T limit	1x029	91		
Limit (return temp. limitation)	1x030	92		
High T out X1 (return temp. limitation, high limit, X-axis)	1x031	92		
Low limit Y1 (return temp. limitation, low limit, Y-axis)	1x032	92		
Low T out X2 (return temp. limitation, low limit, X-axis)	1x033	92		
High limit Y2 (return temp. limitation, high limit, Y-axis)	1x034	93		
Infl. - max. (return temp. limitation - max. influence)	1x035	93		
Infl. - min. (return temp. limitation - min. influence)	1x036	93		
Adapt. time (adaptation time)	1x037	93		
P post-run	1x040	120		
P demand	1x050	120		
DHW priority (closed valve / normal operation)	1x052	121		
Infl. — max.	1x057	100		

Setting	ID	Page	Factory settings in circuit(s) 1	2
Limit (compensation temp., 1. point)	1x060	114		
Adapt. time (adaptation time)	1x061	114		
Infl. - max. (compensation temp., 1. point)	1x062	114		
Infl. - min. (compensation temp., 1. point)	1x063	115		
Limit (compensation temp., 2. point)	1x064	116		
Adapt. time (adaptation time)	1x065	116		
Infl. - max. (compensation temp., 2. point)	1x066	116		
Infl. - min. (compensation temp., 2. point)	1x067	116		
P cool T (cooling demand)	1x070	121		
P frost T (circulation pump, frost protection temp.)	1x077	121		
P heat T (heat demand)	1x078	122		
Filter constant	1x081	100		
Ext. signal	1x084	84		
Priority (priority for return temp. limitation)	1x085	94		
Standby T	1x092	122		
Frost pr. T (frost protection temp.)	1x093	122		
Supply T (idle)	1x097	110		
Limit	1x099	101		
Input type	1x109	96		
Limit (limitation value)	1x111	97		
Adapt. time (adaptation time)	1x112	97		
Filter constant	1x113	97		
Pulse	1x114	97		
Units	1x115	97		
High limit Y2 (flow / power limitation, high limit, Y-axis)	1x116	98		
Low limit Y1 (flow / power limitation, low limit, Y-axis)	1x117	98		
Low T out X2 (flow / power limitation, low limit, X-axis)	1x118	99		
High T out X1 (flow / power limitation, high limit, X-axis)	1x119	99		
Ext. input (external override)	1x141	122		
Ext. mode (external override mode)	1x142	123		
Mon. T select (Monitoring temperature, selection of monitoring temperature sensor)	1x145	110		
Upper difference	1x147	133		
Lower difference	1x148	133		
Delay	1x149	134		
Lowest temp.	1x150	134		
Dew p. T offset (Dew point temperature, offset)	1x164	84		
Dew p. T offset (Dew point temperature offset)	1x164	87		
Motor pr. (motor protection)	1x174	110		
Temp. min.	1x177	85		
Temp. max.	1x178	85		
Summer, cut-out (limit for heating cut-out)	1x179	106		

Setting	ID	Page	Factory settings in circuit(s)	
			1	2
Infl. - max. (room temp. limitation, max.)	1x182	87		
Infl. - min. (room temp. limitation, min.)	1x183	88		
Xp (proportional band)	1x184	111		
Tn (integration time constant)	1x185	111		
M run (running time of the motorized control valve)	1x186	111		
Nz (neutral zone)	1x187	111		
Min. act. time (min. activation time gear motor)	1x189	112		
Input type	1x327	125		
Wake up level	1x330	112		
Start heat	1x342	125		
Stop heat	1x344	126		
Control, delay	1x364	112		
Send desired T	1x500	126		
Alarm high	1x614	132		
Alarm low	1x615	132		
Alarm value	1x616	134		
Alarm time-out	1x617	133		
Alarm time-out	1x617	135		

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 Flow temperature

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

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

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

MENU > Settings > Flow temperature

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

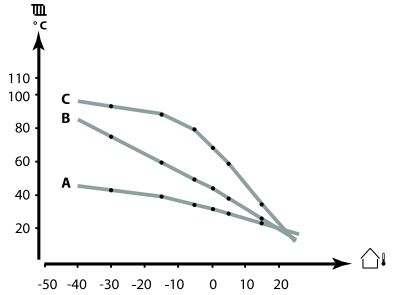
The heat curve can be changed in two ways:

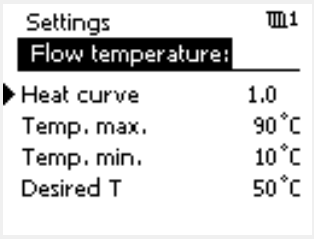
1. The value of the slope is changed (see heat curve examples on next page)
2. The coordinates of the heat curve are changed

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

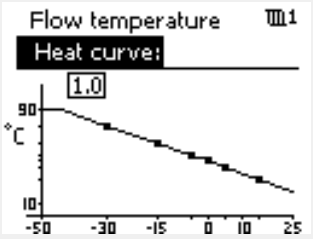
Change the coordinates:
Push the dial to enter / change the coordinates of the heat curve (example: -30,75).
The heat curve represents the desired flow temperatures at different outdoor temperatures and at a desired room temperature of 20 °C.
If the desired room temperature is changed, the desired flow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

Desired flow temperature

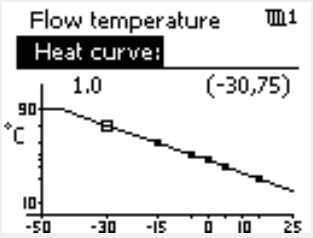




Slope changes



Coordinate changes



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

Example:

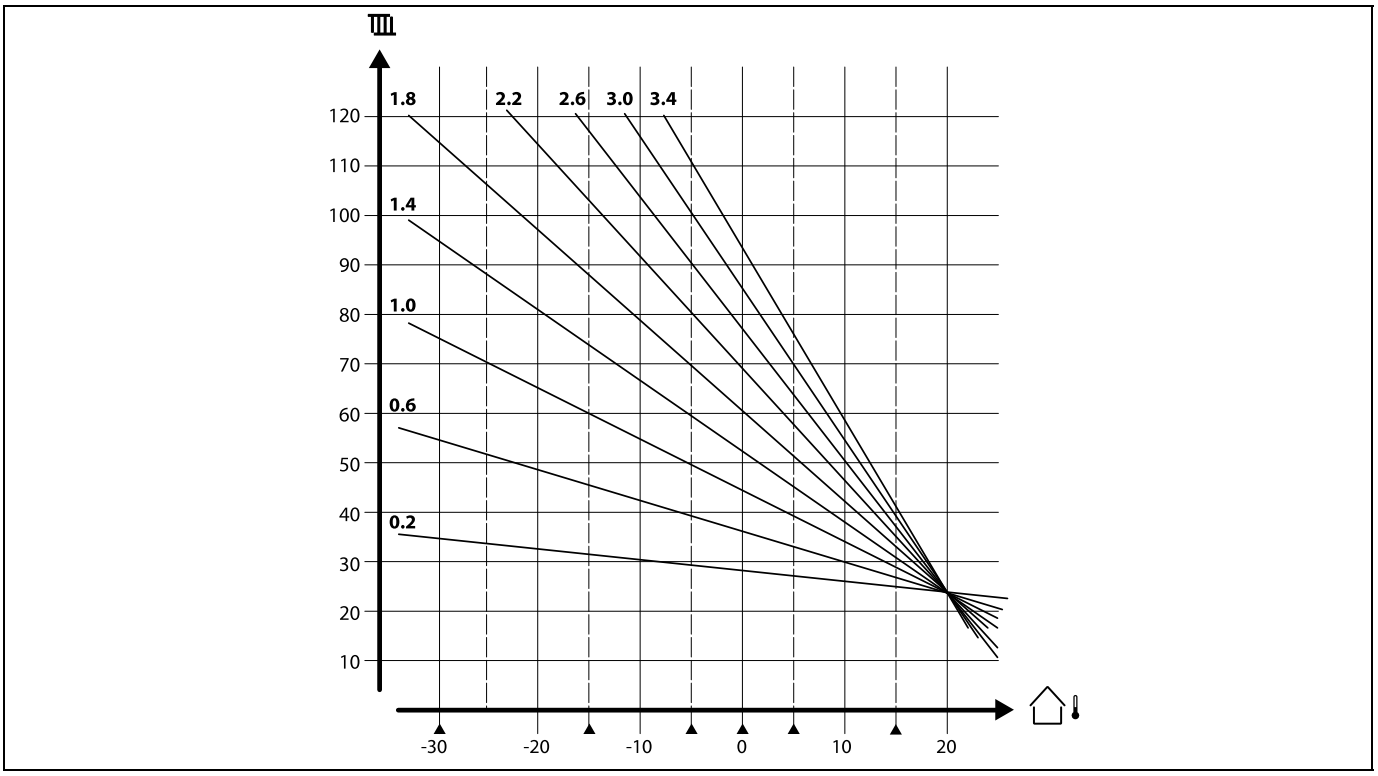
Heat curve:	1.0
Desired flow temp.:	50 °C
Desired room temp.:	22 °C
Calculation (22–20) × 1.0 × 2.5 =	5

Result:

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

Choosing a heat curve slope

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



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

The desired flow temperature is set in 'Des. T comfort' and 'Des. T saving'. Set values for comfort mode could for example be 7.5 °C and for saving mode 25 °C.

Alternatively the desired flow temperature can be set by applying an external signal. The choice is set in 'Ext. signal'.

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

External signal for desired flow temperature (A230.2, A230.4 and A230.5):
A voltage (0 - 10 V) can be applied to the input terminal S8 in order to determine the desired flow temperature.
The measured voltage on input S8 is 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		
Circuit	*Setting range*	*Factory setting*
All	**Read-out only**	
The remotely set value for the desired flow temperature is indicated by the unit °C.		

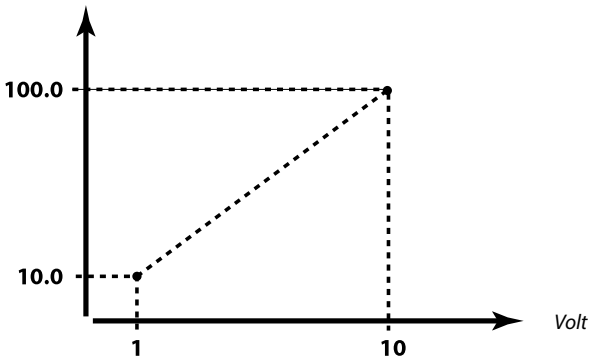
Push the dial to see the graph. Turn the dial to enter the desired flow temperature value for the input voltages (fixed values) at 1 and 10 volt.

Factory settings are different in A230.2, A230.4 and A230.5.

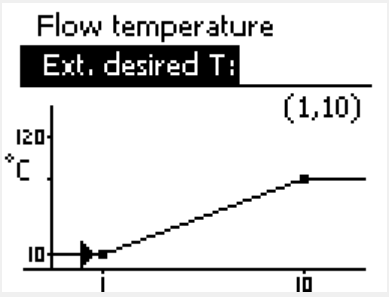
The applied voltage signal must be 1 Volt as a minimum.

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 value for the desired flow temperature



This example shows that 1 volt corresponds to 10.0 °C and 10 volt correspond to 100.0 °C.



A230.2
A value for the desired flow temperature is indicated only when 'Ext. signal' (ID 11084) is set to ON.
The read-out ' -- ' means that 'Ext. signal' is set to OFF.

A230.4 / A230.5
A value for the desired flow temperature is indicated only when 'Input type' (ID 11327) is set to ON.
The read-out ' -- ' means that 'Input type' is set to OFF.

MENU > Settings > Flow temperature

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

See Appendix “Parameter ID overview”

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

The "Desired T" value can be influenced by:

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

MENU > Settings > Flow temperature

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

See Appendix “Parameter ID overview”

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

MENU > Settings > Flow temperature

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

See Appendix “Parameter ID overview”

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

MENU > Settings > Flow temperature

Ext. signal	1x084

See Appendix “Parameter ID overview”

OFF: The desired flow temperature is set in the controller.

ON: The desired flow temperature is applied as a 0 - 10 V signal.

See 'Ext. desired T'. The value is an externally set desired flow temperature.

MENU > Settings > Flow temperature

Dew p. T offset (Dew point temperature, offset)	1x164
The value calculated by the controller for the dew point temperature can be offset adjusted (displaced). The dew point temperature is the temperature at which water in the air condenses. If the ECA 31 is not placed correctly, it can be useful to offset adjust the calculated dew point temperature.	

See Appendix “Parameter ID overview”

Value: Set the offset value

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.

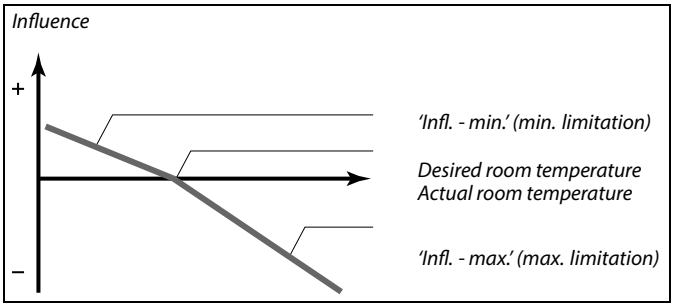
The setting for ‘Temp. max.’ has higher priority than ‘Temp. min.’.

Pressure

See the section "Pressure measuring"

5.3 Room limit

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



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

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

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

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

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

Relative Humidity conversion setting

MENU > Settings > Room limit

Humidity (Relative humidity)
The value for relative humidity is indicated as a % value.

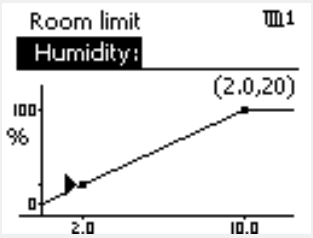
When the Relative Humidity (RH) signal (0 - 10 V) is applied to the input S7, a conversion must be made.

Push the dial to see the graph and, if needed, enter the RH values for the input voltage at 2.0 and 10.0 Volt.

Fixed voltage settings: 2.0 V and 10.0 V

Factory settings: (2.0 , 20) and (10 , 100). This means that the RH is 20 % at 2.0 Volt and 100 % at 10 Volt.

Typically, the higher the voltage, the higher the displayed RH value.



MENU > Settings > Room limit

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

See Appendix “Parameter ID overview”

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

Minor value: The desired room temperature is adapted quickly.

Major value: The desired room temperature is adapted slowly.

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

MENU > Settings > Room limit

Dew p. T offset (Dew point temperature offset)	**1x164**
The calculated dew point temperature can be offset adjusted for compensating the difference between wall and room temperatures. An offset value of +6 K is an experienced and recommendable value.	

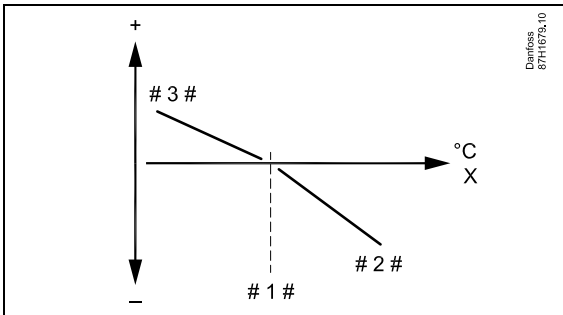
See Appendix “Parameter ID overview”

MENU > Settings > Room limit

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

See Appendix "Parameter ID overview"

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



X = *Room temperature*

 # 1# = *Desired room temperature*

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

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

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

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

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

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

MENU > Settings > Room limit

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

See Appendix "Parameter ID overview"

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

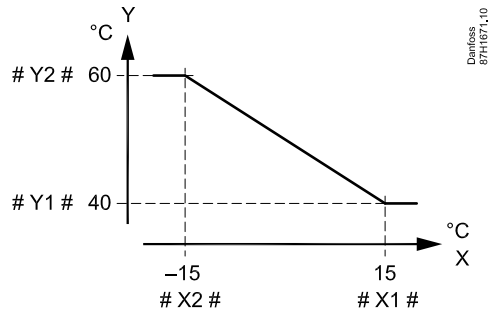
Example
The actual room temperature is 2 degrees too low.
The 'Infl. - min.' is set to 4.0.
The heat curve slope is 1.8 (see 'Heat curve' in 'Flow temperature').
Result:
The desired flow temperature is changed by (2 x 4.0 x 1.8)
14.4 degrees.

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

5.4 Return limit

A230.1, A230.3, A230.4, A230.5

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



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

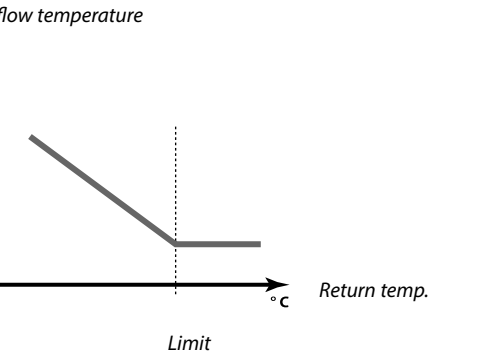
The calculated limit is shown in brackets ( ) in the monitoring display. See the section "Monitoring temperatures and system components".

Application A230.2:

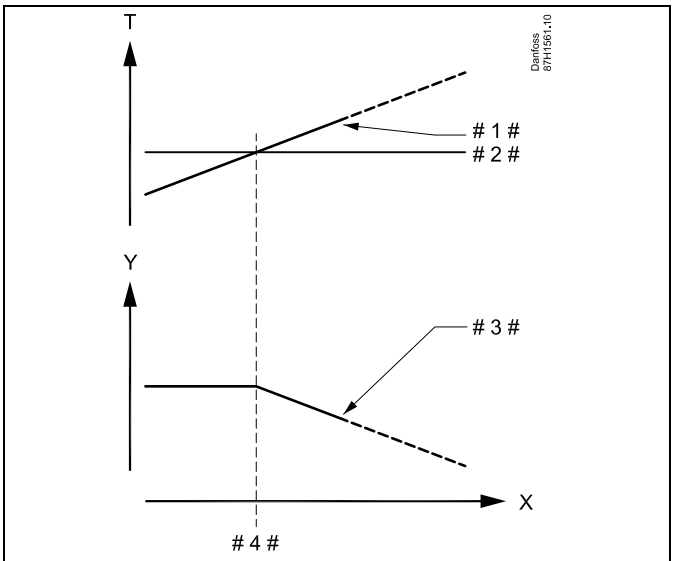
The return temperature limitation is based on a selectable temperature value. The controller automatically changes the desired flow temperature to obtain an acceptable return temperature when the return temperature falls below or gets higher than the set limit.

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.

Typical for cooling systems is that the return temperature must be as high as possible.



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



T = *Temperature*

Y = *Temperature*

X = *Time*

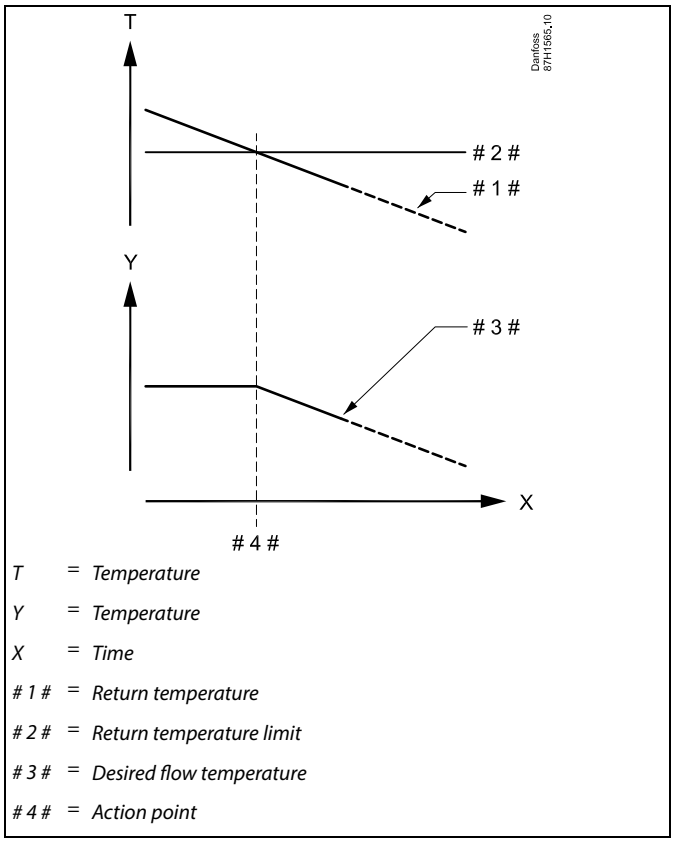
 # 1 # = *Return temperature*

 # 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

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

See Appendix “Parameter ID overview”

Value: Set the return temperature limitation

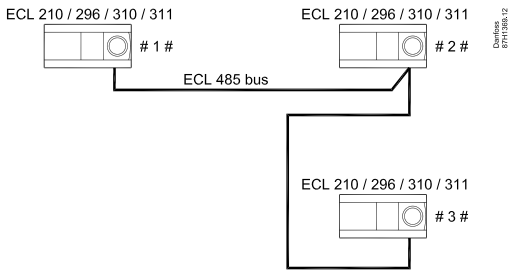
MENU > Settings > Return limit

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

See Appendix “Parameter ID overview”

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

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



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

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

- A217, A237, A247, A367, A377

MENU > Settings > Return limit

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

See Appendix “Parameter ID overview”

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

MENU > Settings > Return limit

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

See Appendix “Parameter ID overview”

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

MENU > Settings > Return limit

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

See Appendix “Parameter ID overview”

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

MENU > Settings > Return limit

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

See Appendix “Parameter ID overview”

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

MENU > Settings > Return limit

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

See Appendix “Parameter ID overview”

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

MENU > Settings > Return limit

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

See Appendix “Parameter ID overview”

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

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

Example
The return limit is active above 50 °C.
The influence is set to 0.5.
The actual return temperature is 2 degrees too high.
Result:
The desired flow temperature is changed by 0.5 x 2 = 1.0 degree.

MENU > Settings > Return limit

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

See Appendix “Parameter ID overview”

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

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

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

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

MENU > Settings > Return limit

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

See Appendix "Parameter ID overview"

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

Minor value: The desired temperature is adapted quickly.

Major value: The desired temperature is adapted slowly.

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

MENU > Settings > Return limit

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

See Appendix "Parameter ID overview"

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

ON: The min. flow temperature limit is overruled.

5.5 Flow / power limit

Heating circuit

A230.1, A230.2, A230.4

A flow or energy meter can be connected to the ECL controller in order to limit the flow or consumed power. The signal from the flow or energy meter is a pulse signal.
Alternatively, the flow or power signal can come from an M-Bus connected meter.

A230.3 and A230.5

Flow or power limitation only via M-Bus.

When the application runs in an ECL Comfort 296 / 310 controller, the flow / power signal can be obtained from a flow / energy meter via the M-bus connection.

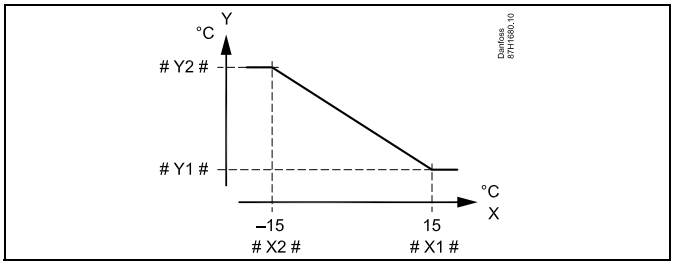
The flow / power limitation can be based on the outdoor temperature. Typically, in district heating systems a higher flow or power is accepted at lower outdoor temperatures.

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

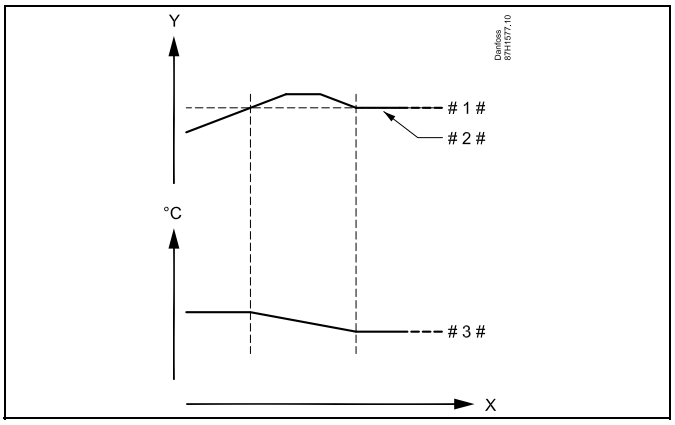
The outdoor temperature coordinates are set in 'High T out X1' and 'Low T out X2'.

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

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



X	=	Outdoor temperature
Y	=	Limitation, flow or power
# X1 #	=	High T out (1x119)
# X2 #	=	Low T out (1x118)
# Y1#	=	Low limit (1x117)
# Y2#	=	High limit (1x116)



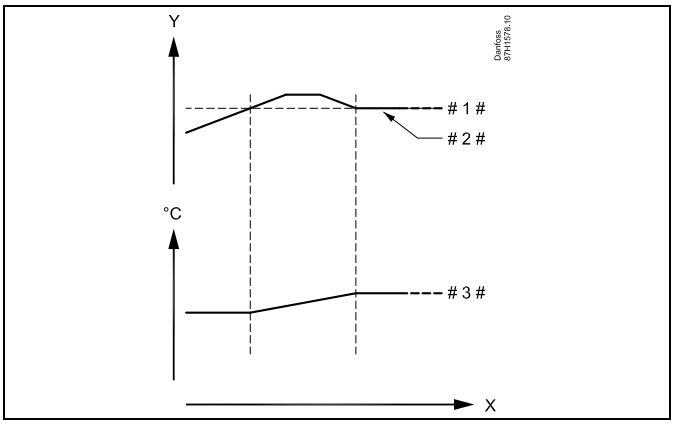
X	=	Time
Y	=	Flow or power
# 1 #	=	Flow or power limit
# 2 #	=	Actual flow or energy
# 3 #	=	Desired flow temperature

Cooling circuit

A flow or energy meter can be connected to the ECL controller in order to limit the flow or consumed power. The signal from the flow or energy meter is a pulse signal.

When the application runs in an ECL Comfort 296 / 310 controller, the flow / power signal can be obtained from a flow / energy meter via the M-bus connection.

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



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

The parameter 'Units' (ID 1x115) has a reduced setting range when the flow / energy signal comes via M-bus.

Pulse based signal for flow / power, applied to input S7
For monitoring:
Frequency range is 0.01 - 200 Hz

For limitation:
Minimum frequency is recommended to be 1 Hz in order to have a stable control. Furthermore, the pulses must appear regularly.

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

MENU > Settings > Flow / power limit

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

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

See Appendix “Parameter ID overview”

OFF: No input

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

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

MENU > Settings > Flow / power limit

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

MENU > Settings > Flow / power limit

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

See Appendix “Parameter ID overview”

MENU > Settings > Flow / power limit

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

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

See Appendix “Parameter ID overview”

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

Minor value: The desired temperature is adapted quickly.

Major value: The desired temperature is adapted slowly.

MENU > Settings > Flow / power limit

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

See Appendix “Parameter ID overview”

Minor value: Lower dampening

Major value: Higher dampening

MENU > Settings > Flow / power limit

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

Example :

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

See Appendix “Parameter ID overview”

OFF: No input.

1 ... 9999: Pulse value.

MENU > Settings > Flow / power limit

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

See Appendix “Parameter ID overview”

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

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

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

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

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

Example 1:

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

'Pulse' (11114): 10

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

Example 2:

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

'Pulse' (11114): 1

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

List for setting range of 'Units' when M-bus connection to flow or energy meter:
l / h
m^3/h
kW
MW
GW

MENU > Settings > Flow / power limit

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

See Appendix “Parameter ID overview”

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

MENU > Settings > Flow / power limit

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

See Appendix “Parameter ID overview”

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

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

MENU > Settings > Flow / power limit

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

See Appendix “Parameter ID overview”

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

MENU > Settings > Flow / power limit

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

See Appendix “Parameter ID overview”

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

5.6 Wind influence

A230.1, A230.3

A wind speed sensor can be connected to the ECL controller in order to increase the desired flow temperature when it is windy outside the building.

The signal from the wind speed sensor is a 0 - 10 volt signal which is applied directly to input S8. The voltage rises at higher wind speeds.

The measured voltage on input S8 must be converted to a wind speed value by the controller. When the wind speed gets higher than the set limit, the controller gradually increases the desired flow temperature to compensate for the higher heat loss from the building.

The following settings set up the scaling and influence.

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

MENU > Settings > Wind influence

Infl. — max.	**1x057**
If the wind speed is higher than the set value in 'Limit', the desired flow temperature will be increased by the number of degrees per 1 m/s.	

See Appendix "Parameter ID overview"

Example:

The wind limit is active at wind speed higher than 10 m/s.

The max. influence is set to 2.0.

The actual wind speed is 2 m/s over limit.

Result:

The desired flow temperature is increased by 2.0 × 2 = 4.0 degrees.

MENU > Settings > Wind influence

Filter constant	**1x081**
The filter constant dampens the measured input data by the set factor.	

See Appendix "Parameter ID overview"

Minor value: Minor dampening (low filter constant)

Major value: Major dampening (high filter constant)

MENU > Settings > Wind influence

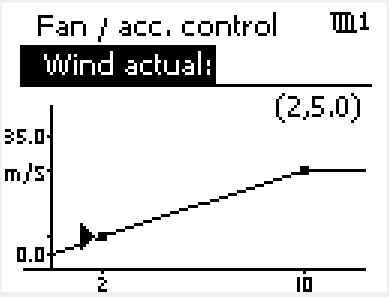
Wind actual
The actual wind speed is indicated by the unit 'm/s' (meter per second).

Push the dial to see the graph and enter the value sets for the input voltage (2 and 10 volt) and displayed wind speed.

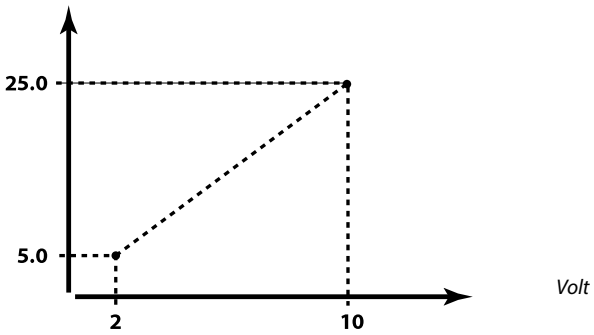
Wind speed:	0.0 ... 75.0 m/s
Fixed voltage settings:	2 V and 10 V
Factory settings:	(2 , 5.0) and (10 , 25.0)

This means that the 'Wind actual' is 5.0 m/s at 2.0 volt and 25.0 m/s at 10 volt.

Typically, the higher the voltage, the higher the displayed wind speed.



Example: Relationship between input voltage and displayed wind speed



This example shows that 2 volt correspond to 5.0 m/s and 10 volt correspond to 25.0 m/s.

MENU > Settings > Wind influence

Limit	**1x099**
If the wind speed exceeds the set value, the desired flow temperature will be increased.	

See Appendix "Parameter ID overview"

5.7 Optimization

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

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

MENU > Settings > Optimization

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

See Appendix "Parameter ID overview"

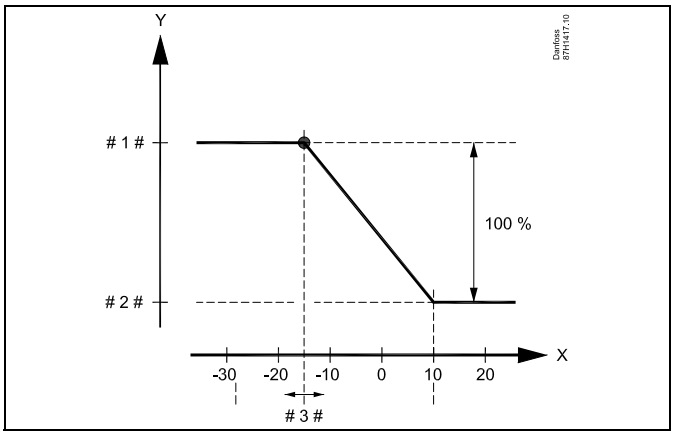
OFF: The saving temperature does not depend on the outdoor temperature; the reduction is 100%.

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

Comfort temperature: The desired room temperature in Comfort mode

Saving temperature: The desired room temperature in Saving mode

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



X = Outdoor temperature (°C)

Y = Desired room temperature (°C)

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

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

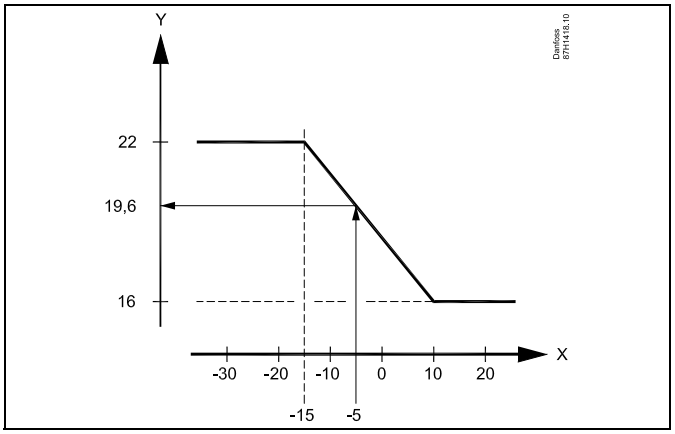
3 # = Auto saving temperature (°C), ID 11011

Example:

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

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

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



X = Outdoor temperature (°C)

Y = Desired room temperature (°C)

MENU > Settings > Optimization

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

See Appendix "Parameter ID overview"

OFF: The boost function is not active.

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

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

MENU > Settings > Optimization

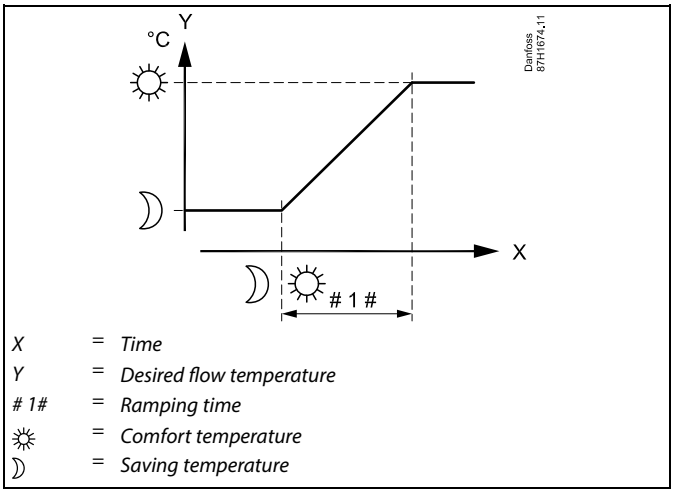
Ramp (reference ramping)	**1x013**
The time (minutes) in which the desired flow temperature increases gradually to avoid load peaks in the heat supply.	

See Appendix "Parameter ID overview"

OFF: The ramping function is not active.

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

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



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

MENU > Settings > Optimization

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

See Appendix "Parameter ID overview"

Adjust the optimizing time constant.

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

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

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

Table I:

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

Table II:

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

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

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

MENU > Settings > Optimization

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

See Appendix "Parameter ID overview"

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

ROOM: Optimization based on room temperature, if measured.

MENU > Settings > Optimization

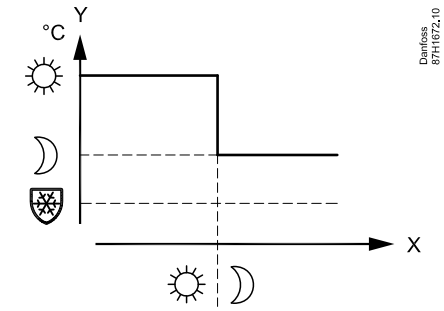
Total stop	**1x021**
Decide whether you want a total stop during the saving temperature period.	

See Appendix "Parameter ID overview"

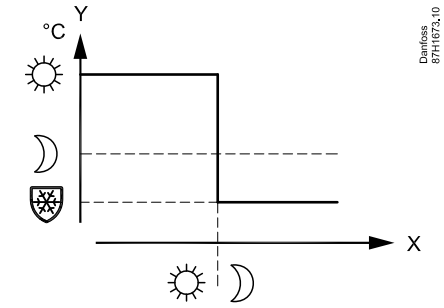
OFF: No total stop. The desired flow temperature is reduced according to:
- desired room temperature in saving mode
- auto saving

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

Total stop = OFF



Total stop = ON



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

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

MENU > Settings > Optimization

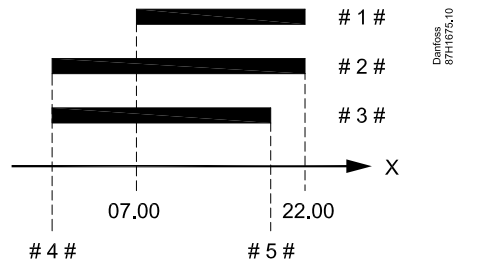
Pre-stop (optimized stop time)	**1x026**
Disable the optimized stop time.	

See Appendix "Parameter ID overview"

OFF: The optimized stop time is disabled.

ON: The optimized stop time is enabled.

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



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

MENU > Settings > Optimization

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

See Appendix “Parameter ID overview”

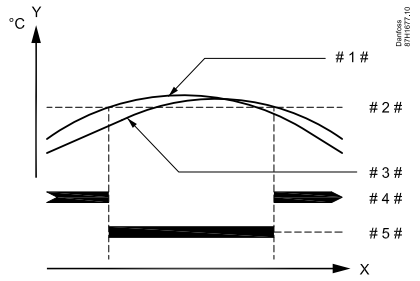
The heating can be switched OFF when the outdoor temperature is higher than the set value. The valve closes and after the post-run time, the heating circulation pump stops. ‘Temp. min.’ will be overruled.

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

This function can save energy.

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

Summer, cut-out



X = *Time*

Y = *Temperature*

 # 1# = *Actual outdoor temperature*

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

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

 # 4 # = *Heating enabled*

 # 5 # = *Heating disabled*

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

5.8 Control parameters

Control of valve

The motorized control valve is controlled by means of 3-point control or a 0 - 10 volt control signal.

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

Valve control (cooling):
The motorized control valve is operated oppositely in relation to heating application.
The following explanations for actuator types are related to heating applications.

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

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

Thermo-hydraulic actuator, ABV

Danfoss thermo-actuator type ABV is a slow acting valve actuator. Inside the ABV an electric heat coil will heat a thermostatic element when an electric signal is applied. When heating the thermostatic element it expands in order to manage the control valve.

Two basic types are available: ABV NC (Normal Closed) and ABV NO (normal open). For example, ABV NC keeps a 2-port control valve closed when no open-signals are applied.

Electric open-signals come from the electronic output of the ECL Comfort controller in order to manage the control valve. When open-signals are applied to the ABV NC, the valve gradually opens.

Open-signals are in the ECL Comfort controller expressed as "Arrow-up" (open) and displayed at the valve symbol.

When the flow temperature (for example at S3) is lower than the desired flow temperature, relatively long open-signals come from the ECL Comfort controller in order to increase the flow. By this, the flow temperature will over time be aligned with the desired temperature.

Oppositely, when the flow temperature is higher than the desired flow temperature, relatively short open-signals come from the ECL Comfort controller in order to reduce the flow. Again, the flow temperature aligns, over time, with the desired temperature.

The control of the Danfoss thermo-actuator type ABV uses a unique designed algorithm and is based on the PWM principle (Pulse Width Modulation), where the duration of the pulse determines the management of the control valve. The pulses are repeated each 10 sec.

As long as the flow temperature corresponds to the desired temperature, the duration of the open-signals will remain constant.

Bypass function (A230.1 and A230.4)
For having an acceptable temperature (supply temperature) present in an installation where DHW heating also is present, the Bypass function is useful for minimizing the DHW heat-up time. The Bypass function ensures an acceptable temperature at a selected temperature sensor. In other words: The Bypass function keeps the pipe connection between District Heating network and house / flat connection warm.
Temperature sensors S3, S4 or S5 can be used for the Bypass function.
The desired temperature for Bypass function can be set.
Furthermore, a week schedule ("Schedule, bypass") can be set to activate the Bypass in set periods.
The Bypass function is not active when a heat demand is present.

Bypass function, settings
The related settings are found in the ECL, (MENU > Settings > Control parameters) two lines below "Actuator".

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

MENU > Settings > Control parameters

Await time (read-out only)
Information is valid only when "Control, delay" is set to ON. *It indicates the number of minutes the control valve is closed between two Bypass based openings. Initial time at power-up is 15 minutes. If time gets higher, the setting of "Wake up level" should be increased or the setting of "Supply T (idle)" should be decreased.* *Calculated "Await time" can be reset to 15 minutes by re-powering the ECL.*

See Appendix “Parameter ID overview”

MENU > Settings > Control parameters

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

Selection of valve actuator type.

ABV: Danfoss type ABV (thermo actuator).

GEAR: Gear motor based actuator.

When selecting "ABV", the control parameters:

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

are not considered.

MENU > Settings > Control parameters

Supply T (idle)	**1x097**
Setting the desired Bypass temperature.	

See Appendix “Parameter ID overview”

OFF: Bypass function is disabled.

Value: Desired temperature to be maintained at S3, S4 or S5.

MENU > Settings > Control parameters

Mon. T select (Monitoring temperature, selection of monitoring temperature sensor)	**1x145**
S3, S4 or S5 can be selected.	

See Appendix “Parameter ID overview”

S3 Selected in a direct installation, f. ex. A230.1, ex. b.

S4 Selected in an indirect installation where S3 is not influenced by a supply temperature, f. ex. A230.1, ex. a.

S5 Selected in an indirect installation and connected as return temperature sensor.

MENU > Settings > Control parameters

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

See Appendix "Parameter ID overview"

OFF: Motor protection is not activated.

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

MENU > Settings > Control parameters

Xp (proportional band)	1x184

See Appendix "Parameter ID overview"

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

MENU > Settings > Control parameters

Tn (integration time constant)	1x185

See Appendix "Parameter ID overview"

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

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

MENU > Settings > Control parameters

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

See Appendix "Parameter ID overview"

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

How to calculate the running time of a motorized control valve

The running time of the motorized control valve is calculated using the following methods:

Seated valves

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

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

Rotating valves

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

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

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.

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

MENU > Settings > Control parameters

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

See Appendix “Parameter ID overview”

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

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

MENU > Settings > Control parameters

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

See Appendix “Parameter ID overview”

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

MENU > Settings > Control parameters

Control, delay	1x364
Functionality of Bypass function.	

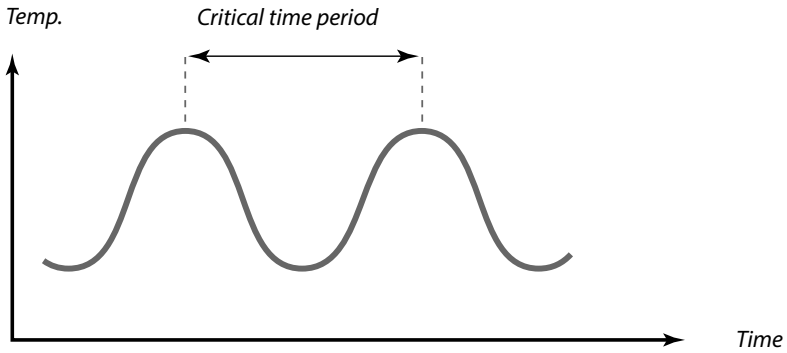
See Appendix “Parameter ID overview”

OFF: M1 opens the control valve when the Monitoring temperature gets more than 5 degrees below "Supply T (idle)".
M1 closes the control valve when temperature gets above "Supply T (idle)".

ON: Adaptive adjustment.
An adaptive function detects the progress of the Monitoring temperature and makes change of the period ("Await time") between two Bypass openings.

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.

5.9 Compensation 1

The desired flow temperature can be influenced by a compensation temperature, measured by S1.

This application contains 2 compensation temperature limits: Compensation 1 (Comp. 1) and Compensation 2 (Comp. 2).

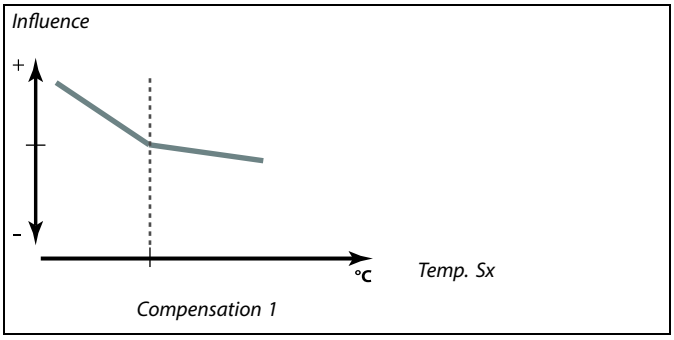
Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

MENU > Settings > Compensation 1

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

See Appendix “Parameter ID overview”

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



MENU > Settings > Compensation 1

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

See Appendix “Parameter ID overview”

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

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

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

Value: Set the adaptation time

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

MENU > Settings > Compensation 1

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

See Appendix "Parameter ID overview"

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

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

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

MENU > Settings > Compensation 1

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

See Appendix "Parameter ID overview"

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

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

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

5.10 Compensation 2

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

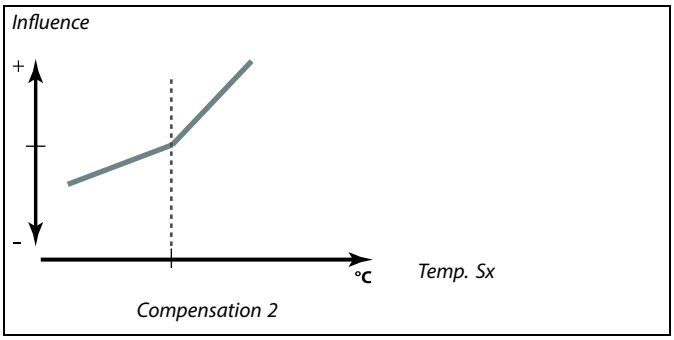
Parameters indicated with an ID no. like "1x607" mean a universal parameter.
x stands for circuit / parameter group.

MENU > Settings > Compensation 2

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

See Appendix “Parameter ID overview”

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



Compensation 2

MENU > Settings > Compensation 2

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

See Appendix “Parameter ID overview”

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

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

MENU > Settings > Compensation 2

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

See Appendix “Parameter ID overview”

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

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

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

MENU > Settings > Compensation 2

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

See Appendix "Parameter ID overview"

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

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

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

5.11 Application

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

A230.5
A special function prevents heated water in the heating installation to flow back (discharge) into the district heating network if the supply temperature is too low. The function is based on the value of the flow temperature sensor S3.
At heat demand, the circulation pump P1 can be switched OFF if the flow temperature S3 gets lower than a set value (f. ex. 28 °C). The motorized control valve remains open.
The circulation pump will be switched ON when the flow temperature S3 gets above another set value (f. ex. 32 °C).

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

MENU > Settings > Application

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

See Appendix “Parameter ID overview”

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

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

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

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

MENU > Settings > Application

Demand offset	**1x017**
The desired flow temperature in the master circuit can be influenced by the demand for a desired flow temperature in another controller (slave) or another circuit. *The 'Demand offset' can compensate for heating or cooling losses between master and slave controlled systems.* *Circuit 1 is the master circuit in most applications.*	

See Appendix "Parameter ID overview"

Setting range heating applications: OFF / 1 . . . 20 K
cooling applications: - 20 . . . -1 K / OFF

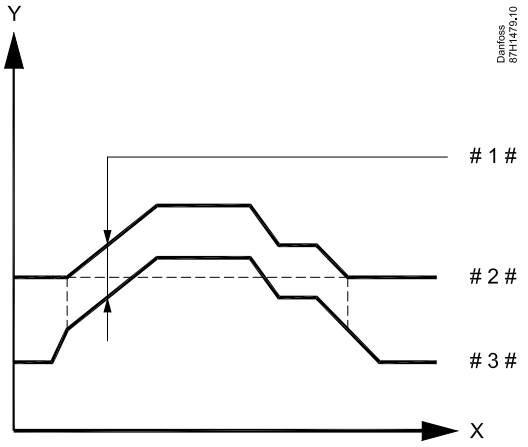
Factory setting heating applications: OFF
cooling applications: OFF

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

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

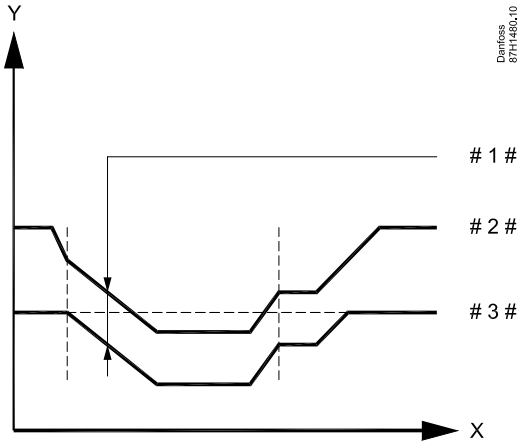
Note
Master controller must have the ECL 485 bus address 15.
Slave controllers must have an ECL 485 bus address (1 - 9) for sending the reference temperature to the master.

Heating application



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

Cooling application



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

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

MENU > Settings > Application

P exercise (pump exercise)	1x022
Exercises the pump to avoid blocking in periods without heat or cool demand.	

See Appendix "Parameter ID overview"

OFF: The pump exercise is not active.

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

MENU > Settings > Application

M exercise (valve exercise)	1x023
Exercises the valve to avoid blocking in periods without heat or cool demand.	

See Appendix "Parameter ID overview"

OFF: The valve exercise is not active.

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

MENU > Settings > Application

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

See Appendix "Parameter ID overview"

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

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

MENU > Settings > Application

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

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

See Appendix "Parameter ID overview"

Heating applications:

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

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

Cooling applications:

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

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

MENU > Settings > Application

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

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

See Appendix "Parameter ID overview"

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

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

MENU > Settings > Application

P cool T (cooling demand)	1x070
When the desired flow temperature is below the set temperature in 'P cool T', the controller automatically switches ON the circulation pump.	

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

See Appendix "Parameter ID overview"

Value: The circulation pump is switched ON when the desired flow temperature is below the set value.

MENU > Settings > Application

P frost T (circulation pump, frost protection temp.)	1x077
Frost protection, based on the outdoor temperature. When the outdoor temperature gets below the set temperature value in 'P frost T', the controller automatically switches ON the circulation pump (for example P1 or X3) to protect the system.	

See Appendix "Parameter ID overview"

OFF: No frost protection.

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

⚠

Under normal conditions, your system is not frost protected if your setting is below 0 °C or OFF.
For water-based systems, a setting of 2 °C is recommended.

⚠

If the outdoor temperature sensor is not connected and the factory setting has not been changed to 'OFF', the circulation pump is always ON.

MENU > Settings > Application

P heat T (heat demand)	1x078
When the desired flow temperature is above the set temperature in 'P heat T', the controller automatically switches ON the circulation pump.	

See Appendix "Parameter ID overview"

Value: The circulation pump is switched ON when the desired flow temperature is above the set value.

☝

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

MENU > Settings > Application

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

See Appendix "Parameter ID overview"

Value: Desired flow temperature at standby.

MENU > Settings > Application

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

See Appendix "Parameter ID overview"

☝

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

Override mode functions:

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

MENU > Settings > Application

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

See Appendix "Parameter ID overview"

OFF: No inputs have been selected for external override.

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

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

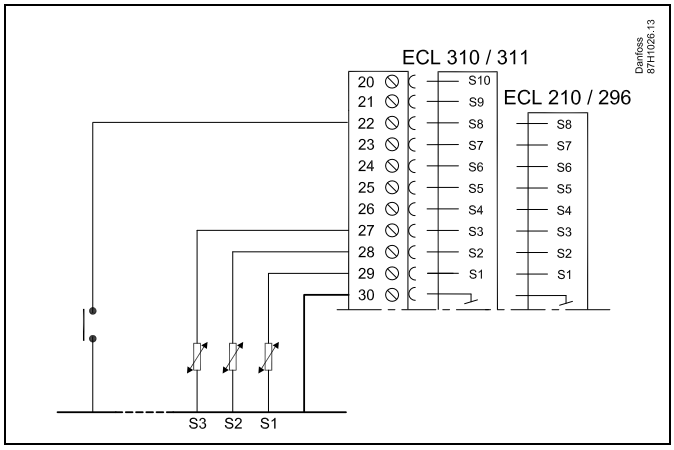
See the drawings for connection examples of override switch and override relay to input S8.

S7...S16 are recommended for override switch.

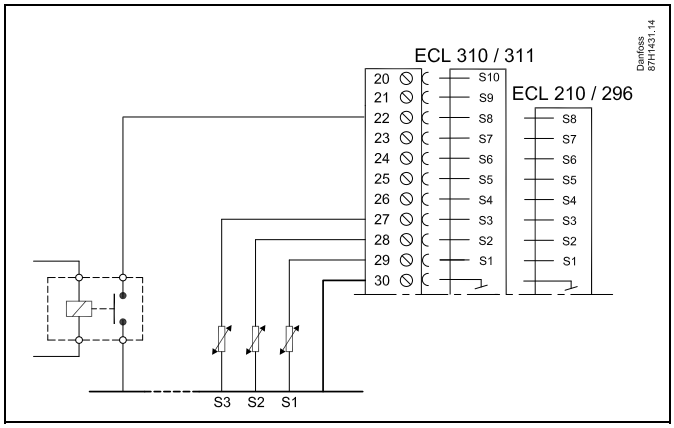
If ECA 32 is mounted, also S11... S16 can be used.

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

Example: Connection of an override switch



Example: Connection of an override relay



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

See also 'Ext. mode'.

MENU > Settings > Application

Ext. mode (external override mode)	**1x142**
The mode override can be activated for Saving, Comfort, Frost pr. or Constant T mode. *For override, the controller mode must be in scheduled mode.*	

See Appendix “Parameter ID overview”

Choose an override mode:

SAVING: The circuit in question is in saving mode when the override switch is closed.

COMFORT: The circuit in question is in comfort mode when the override switch is closed.

FROST PR.: The heating or DHW circuit closes, but is still frost protected.

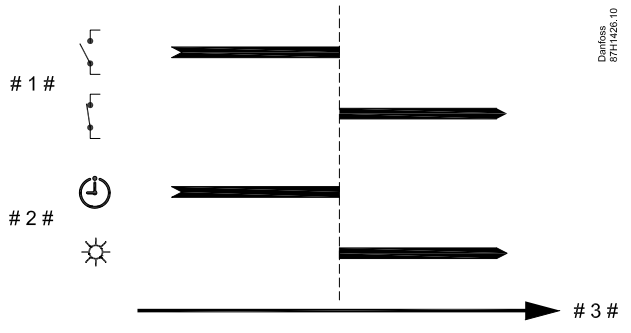
CONSTANT T: The circuit in question controls a constant temperature *)

*) See also 'Desired T' (1x004), setting of desired flow temperature (MENU > Settings > Flow temperature)
See also ' Con. T, ret. T lim.' (1x028), setting of return temperature limitation (MENU > Settings > Return limit)

The process diagrams show the functionality.

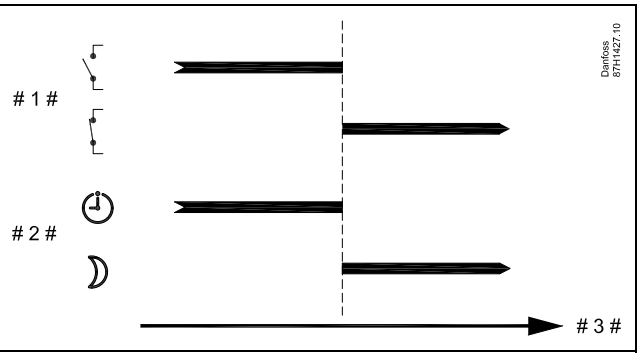
See also ‘Ext. input’.

Example: Override to Comfort mode



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

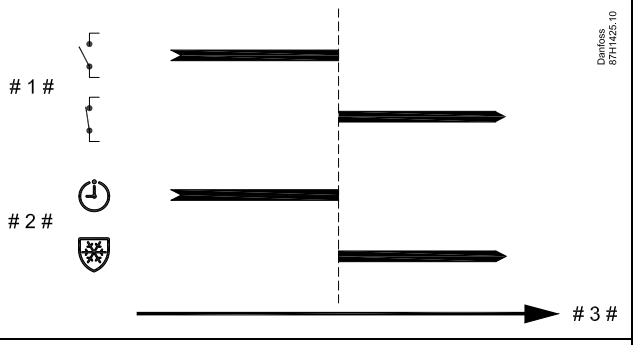
Example: Override to Saving mode



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

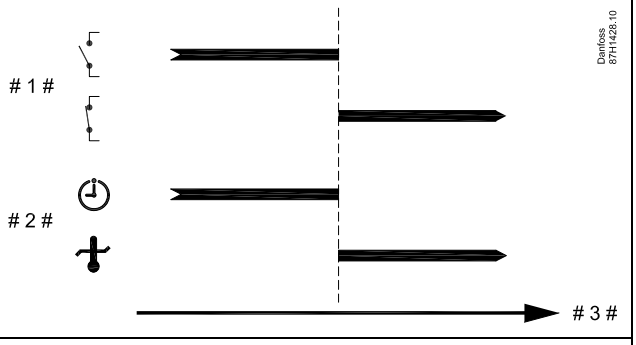
The result of override to 'Saving' mode depends on the setting in 'Total stop'.
Total stop = OFF: Heating reduced
Total stop = ON: Heating stopped

Example: Override to Frost protection mode



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

Example: Override to Constant temperature mode



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

The "Const. T" value can be influenced by:

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

MENU > Settings > Application

Input type	**1x327**
Function selection for input S8.	

See Appendix “Parameter ID overview”

OFF: S8 receives 0 - 10 Volt from a pressure transmitter.

ON: S8 receives 0 - 10 Volt as external setting for desired flow temperature.

MENU > Settings > Application

Start heat	**1x342**
When flow temperature S3 gets higher than the set value, the circulation pump is switched ON.	

See Appendix “Parameter ID overview”

Value: Set the S3 value for switching the circulation pump ON.

MENU > Settings > Application

Stop heat	**1x344**
When flow temperature S3 gets lower than the set value, the circulation pump is switched OFF.	

See Appendix “Parameter ID overview”

Value: Set the S3 value for switching the circulation pump OFF.

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’).

5.12 Heat cut-out

MENU > Settings > Heat cut-out

The setting “Summer cut-out” under “Optimization” for the heating circuit in question determines a heating cut-out when the outdoor temperature exceeds the set value.

A filtering constant for calculating the accumulated outdoor temperature is internally set to a value of "250". This filtering constant represents an average building with solid outer and inner walls (bricks).

An option for differentiated cut-out temperatures, based on a set summer period, can be utilized in order to avoid discomfort at falling outdoor temperature. Furthermore, separate filtering constants can be set.

The factory set values for Summer period start and Winter period start are set to same date: May, 20 (Date = 20, Month = 5).
This means:

- "Differentiated cut-out temperatures" are disabled (not active)
- Separate "Filtering constant" values are disabled (not active)

In order to enable differentiated

- cut-out temperature based on summer / winter period
- filtering constants

the start dates for the periods must be different.

5.12.1 Differentiated heat cut-out

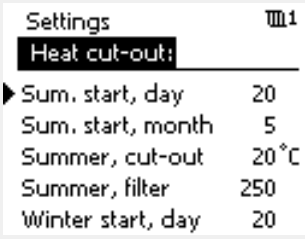
To set differentiated cut-out parameters for a heating circuit for "Summer" and "Winter" go to "Heat cut-out":
(MENU > Settings > Heat cut-out)
This function is active when the dates for "Summer" and "Winter" are different in the "Heat cut-out" menu.

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

MENU > Settings > Heat cut-out

Extended heat cut-out setting			
Parameter	*ID*	*Setting range*	*Factory setting*
Summer day	**1x393**	*	*
Summer month	**1x392**	*	*
Summer cut-out	**1x179**	*	*
Summer filter	**1x395**	*	*

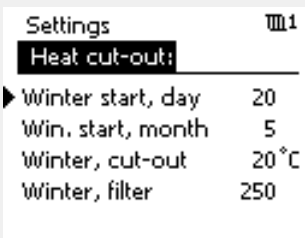
See Appendix "Parameter ID overview"



MENU > Settings > Heat cut-out

Extended winter cut-out setting			
Parameter	*ID*	*Setting range*	*Factory setting*
Winter day	**1x397**	*	*
Winter month	**1x396**	*	*
Winter cut-out	**1x398**	*	*
Winter filter	**1x399**	*	*

See Appendix "Parameter ID overview"



The above settings of the dates for the cut-out function are only to be done in the heating circuit 1 and are valid for other heating circuits in the controller as well, if applicable.

The cut-out temperatures as well as the filter constant are to be set individually per heating circuit.

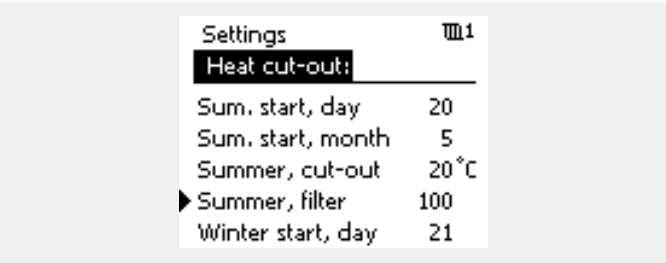
The heating cut-out is only active when the controller mode is in scheduled operation. When the cut-out value is set to OFF, there is no heating cut-out.

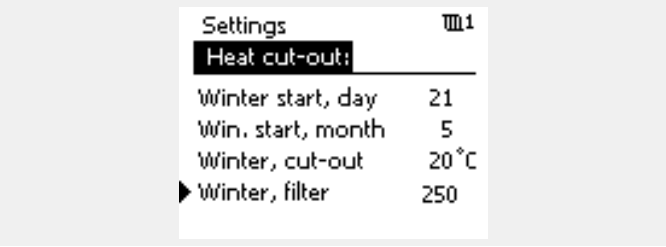
5.12.2 Summer/winter filter constant

The filter constant of 250 is applicable for average buildings. A filter constant of 1 is close switching according to actual outdoor temperature meaning low filtering (very “light” building).

A filter constant of 300 is then to be chosen if a big filtering is needed (very heavy building).

For heating circuits where the heat cut-out is demanded according to the same outdoor temperature for the whole year, but different filtering is wanted, different dates have to be set in the “Heat cut-out” menu enabling a selection of a filter constant different from the factory setting.
These different values have to be set in both the “Summer” and “Winter” menu.





5.13 Alarm

The section "Alarm" describes specific application related issues.
Application A230 offers two types of alarms:

Type:	Description:
1	A230.1, A230.3, A230.4 and A230.5 Actual flow temperature differs from the desired flow temperature
1	A230.4 and A230.5 Actual pressure is outside the set pressure range A230.5 Alarm input is activated
2	All subtypes Disconnection or short-circuiting of a temperature sensor or its connection

Note: A230.2 (cooling application) has no alarm function related to temperatures.

The alarm functions activate the alarm bell symbol.
The alarm functions activate A1 (Relay 4).

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

The alarm symbol / relay is activated:

- (type 1) as long as the alarm reason is present (automatic reset).
- (type 2) even if the alarm reason disappears again (manual reset).

Alarm type 1:
If the flow temperature deviates more than the set differences from the desired flow temperature, the alarm symbol / relay will be activated.
If the flow temperature becomes acceptable, the alarm symbol / relay will be de-activated.

If the pressure S8 gets higher than a set value (bar) or gets lower than another set value (bar), the alarm symbol / relay will be activated.
If the pressure becomes acceptable, the alarm symbol / relay will be de-activated.

If the alarm input S7 is activated, the alarm symbol / relay will be activated.
If the alarm input S7 is de-activated, the alarm symbol / relay will be de-activated.

Alarm type 2:
Selected temperature sensors can be monitored.
Should the connection to the temperature sensor be disconnected, short-circuited or the sensor gets defective, the alarm symbol / relay will be activated. In the "Raw input overview" (MENU > Common controller settings > System > Raw input overview) the sensor in question is marked and the alarm can be reset.

When an alarm is activated, the bell-symbol appears in the right favorite display.

Monitoring and alarm related to connected temperature sensors:

At start-up, the ECL controller detects which temperature sensors are connected.
Should the connection to a temperature sensor be disconnected or short-circuited after start-up, the sensor alarm function can be activated.
This function is helpful at service situations where periodic malfunctions can occur.

The following procedure describes the function:

1. Go to "Raw input overview" (MENU > Common controller settings > System > Raw input overview).
2. Place the cursor at the sensor number, which could be suspicious for correct connection and click the dial; a symbol for a magnifying glass appears.
3. Repeat step 2 if other temperature sensor connections are to be monitored.
4. The selected temperature sensor(s) is / are now being monitored and you can leave the menu.
5. Should the connection to the temperature sensor for a short while (more than 3 seconds) be disconnected or short-circuited, the sensor alarm function is activated. An alarm bell symbol appears in the display and the alarm relay is activated.
6. Verification which sensor connection has activated the alarm:

   Go to "Raw input overview" (MENU > Common controller settings > System > Raw input overview).

   Look for (by moving the cursor down) the sensor line which is marked with a magnifying glass and a bell-symbol (alarm).
7. Resetting the alarm:

   Mark the line by means of the cursor and click the dial. The symbols for alarm and magnifying glass disappears.

   Reset of sensor alarm can also be made in Alarm overview (MENU > Alarm > Alarm overview: Alarm number 32: T sensor defect). Click the dial and the alarm bell symbol disappears.

Alarm overview, list:

Alarm no.:	Description:	Alarm type:	Sensor ref.:
2	A230.1, A230.3 and A230.4: Temp. monitor, circuit 1	1	S3
3	A230.5 Circ. pumps (Alarm input)	1	S7
9	A230.4: Pressure (See section 'Pressure measuring')	1	S8
16	A230.1, A230.3 and A230.4: Floor drying, circuit 1	1	S3
32	All subtypes: T sensor defect	2	all

To find the reason for an alarm:

- select MENU
- select 'Alarm'
- select 'Alarm overview'. A "bell" will be shown at the alarm in question.

Alarm overview (example):
2: Max. temp.
32: T sensor defect

The numbers in the 'Alarm overview' refer to the alarm number in the Modbus communication.

To reset an alarm:
When the "bell" is present to the right of the alarm line, place the cursor at the alarm line in question and press the dial.

To reset alarm 32:
MENU > Common controller settings > System > Raw input overview: The sensor in question is marked and the alarm can be reset.

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

MENU > Settings > Alarm

Alarm high	**1x614**
When the measured value gets higher than the set value, the alarm will be activated.	

See Appendix "Parameter ID overview"

Value: Set the alarm value

MENU > Settings > Alarm

Alarm low	**1x615**
When the measured value gets lower than the set value, the alarm will be activated.	

See Appendix “Parameter ID overview”

Value: Set the alarm value

MENU > Settings > Alarm

Alarm time-out	**1x617**
When the alarm input is activated, the set "Alarm time-out" time must elapse before the alarm signal is activated. *Furthermore, when the alarm input is de-activated, the alarm signal is active for the set "Alarm time-out" time.*	

See Appendix “Parameter ID overview”

Value: Set the alarm time-out time

MENU > Settings > Alarm

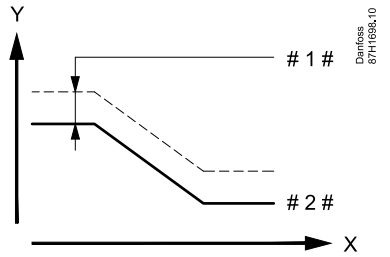
Upper difference	**1x147**
The alarm is activated if the actual flow temperature increases more than the set difference (acceptable temperature difference above the desired flow temperature). See also 'Delay'.	

See Appendix “Parameter ID overview”

OFF: The related alarm function is not active.

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

Upper difference



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

MENU > Settings > Alarm

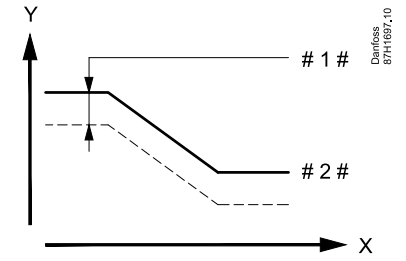
Lower difference	1x148
The alarm is activated if the actual flow temperature decreases more than the set difference (acceptable temperature difference below the desired flow temperature). See also 'Delay'.	

See Appendix "Parameter ID overview"

OFF: The related alarm function is not active.

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

Lower difference



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

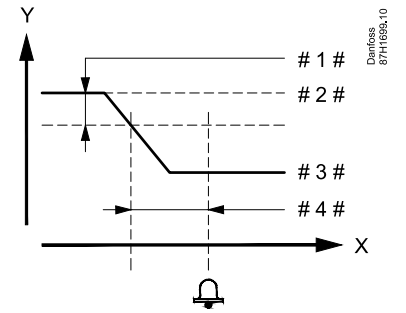
MENU > Settings > Alarm

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

See Appendix "Parameter ID overview"

Value: The alarm function will be activated if the alarm condition remains after the set delay.

Delay, example



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

MENU > Settings > Alarm

Lowest temp.	1x150
The alarm function will not be activated if the desired flow temperature is lower than the set value.	

See Appendix "Parameter ID overview"

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

MENU > Settings > Alarm

Alarm value	**1x616**
Setting the function of the alarm input.	

See Appendix “Parameter ID overview”

0: Alarm is activated when input S7 is connected to Common terminal (30).

1: Alarm is activated when input S7 is dis-connected from Common terminal (30).

MENU > Settings > Alarm

Alarm time-out	**1x617**
When the alarm input is activated, the set "Alarm time-out" time must elapse before the alarm signal is activated. *Furthermore, when the alarm input is de-activated, the alarm signal is active for the set "Alarm time-out" time.*	

See Appendix “Parameter ID overview”

Value: Set the alarm time-out time

5.14 Alarm overview

MENU > Alarm > Alarm overview
This menu shows the alarm types, for example:

- "2: Temp. monitor"
- "32: T sensor defect"

The alarm has been activated if the alarm symbol (a bell) (🔔) is present to the right of the alarm type.

Resetting an alarm, in general:

MENU > Alarm > Alarm overview:
Look for alarm symbol in specific line.

(Example: "2: Temp. monitor")
Move cursor to the line in question.
Push dial.

Alarm overview:

Alarm sources are listed in this overview menu.

Some examples:
"2: Temp. monitor"
"5: Pump 1"
"10: Digital S12"
"32: T sensor defect"

Related to the examples, the numbers 2, 5 and 10 are used in the alarm communication to the BMS / SCADA system.
Related to the examples, "Temp. monitor", "Pump 1" and "Digital S12" are the alarm points.
Related to the examples, "32: T sensor defect" indicates the monitoring of connected sensors.
Alarm numbers and alarm points might differ depending on actual application.

5.15 Two circulation pumps in sequence

Application A230.2:

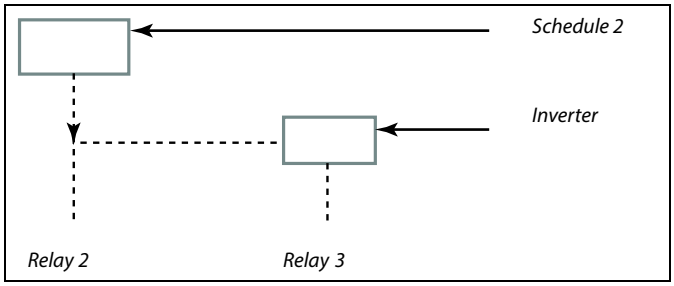
See also the Installation Guide (delivered with the application key) for application specific connections.

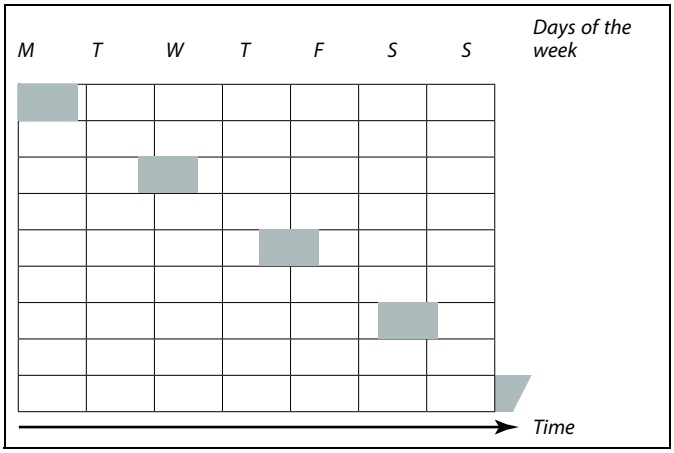
By means of Schedule 2 (placed in Common controller settings) it can be arranged to control the shift of 2 circulation pumps.

Control of P1 is based on the cooling demand and determines via K1 the ON / OFF control of the pumps P2 and P3. P2 and P3 are related to the output of the Schedule 2.

Schedule 2 is factory set to change every 21 hours during the week. This can give an approximate even ON-time for each of the two circulation pumps.
The factory setting can, of course, be changed.

Monday (M), 1:	00.00 - 21.00
Monday (M), 2:	21.00 - 21.00
Monday (M), 3:	21.00 - 21.00
Tuesday (T), 1:	18.00 - 24.00
Tuesday (T), 2:	24.00 - 24.00
Tuesday (T), 3:	24.00 - 24.00
Wednesday (W), 1:	00.00 - 15.00
Wednesday (W), 2:	15.00 - 15.00
Wednesday (W), 3:	15.00 - 15.00
Thursday (T), 1:	12.00 - 24.00
Thursday (T), 2:	24.00 - 24.00
Thursday (T), 3:	24.00 - 24.00
Friday (F), 1:	00.00 - 09.00
Friday (F), 2:	09.00 - 09.00
Friday (F), 3:	09.00 - 09.00
Saturday (S), 1:	06.00 - 24.00
Saturday (S), 2:	24.00 - 24.00
Saturday (S), 3:	24.00 - 24.00
Sunday (S), 1:	00.00 - 03.00
Sunday (S), 2:	03.00 - 03.00
Sunday (S), 3:	03.00 - 03.00





When Start and Stop times are set to the same time, there is no comfort period.

6.0 Common controller settings

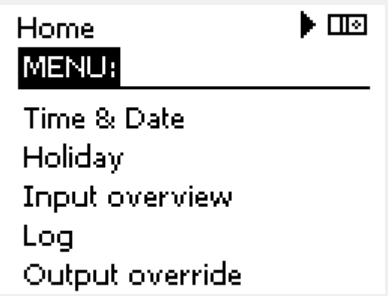
6.1 Introduction to 'Common controller settings'

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

To enter 'Common controller settings':

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

Circuit selector



6.2 Time & Date

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

The controller has a 24 hour clock.

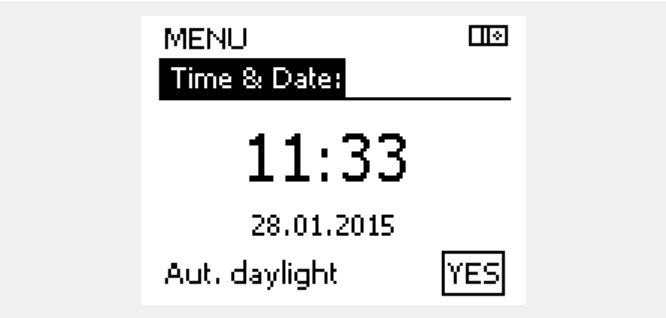
Aut. daylight (Daylight saving time changeover)

YES: The controller's built-in clock automatically changes + / - one hour on the standardized days for daylight saving time changeover for Central Europe.

NO: You change manually between summer and winter time by setting the clock backward or forward.

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	



When controllers are connected as slaves in a master / slave system (via ECL 485 communication bus), they will receive 'Time & Date' from the master.

6.3 Holiday

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

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

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

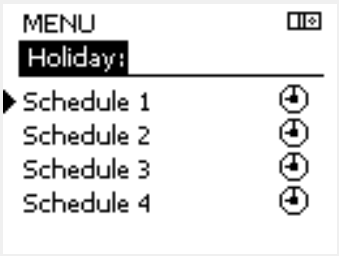
Selectable modes are Comfort, Saving, Frost protection or Comfort 7-23 (before 7 and after 23, the mode is scheduled).

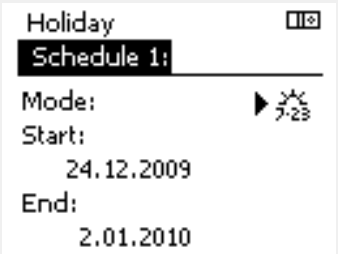
How to set your holiday schedule:

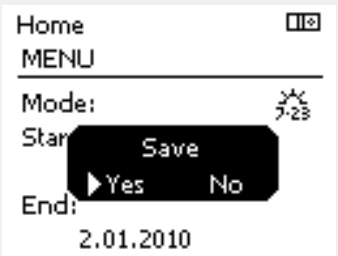
Action:	Purpose:	Examples:
	Choose 'MENU'	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose a circuit or 'Common controller settings'	
	Heating	
	DHW	
	Common controller settings	
	Confirm	
	Go to 'Holiday'	
	Confirm	
	Choose a schedule	
	Confirm	
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

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

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







Holiday, specific circuit / Common Controller

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

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

Holiday, deleting a set period:

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

Example 1:

Circuit 1:
Holiday set to "Saving"

Common Controller:
Holiday set to "Comfort"

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

Example 2:

Circuit 1:
Holiday set to "Comfort"

Common Controller:
Holiday set to "Saving"

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

Example 3:

Circuit 1:
Holiday set to "Frost protection"

Common Controller:
Holiday set to "Saving"

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

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

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

 Day off

 Holiday

 Relaxing (extended comfort period)

 Going out (extended saving period)

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

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

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

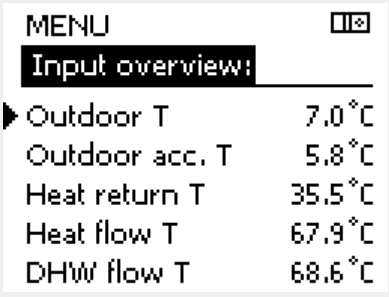
1. Go to ECA MENU
2. Move cursor to "Clock" symbol
3. Select the "Clock" symbol
4. Choose and select one of 4 override functions
5. Below the override symbol: Set hours or date
6. Below hours / date: Set desired room temperature for the override period

6.4 Input overview

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

The input overview is located in the common controller settings.

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



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

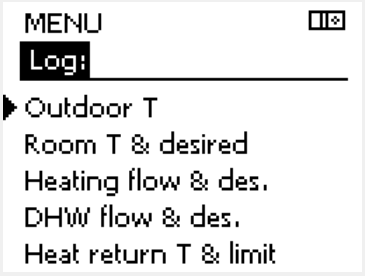
6.5 Log

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

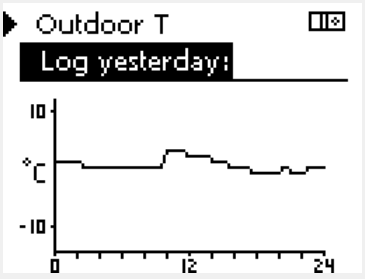
The log function (temperature history) allows you to monitor the logs of today, yesterday, the past 2 days as well as the past 4 days for the connected sensors.

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

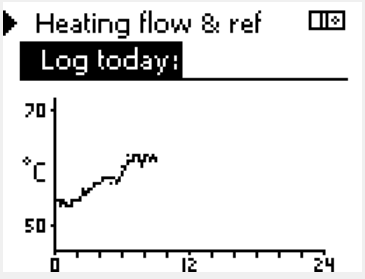
The log function is only available in the 'Common controller settings'.



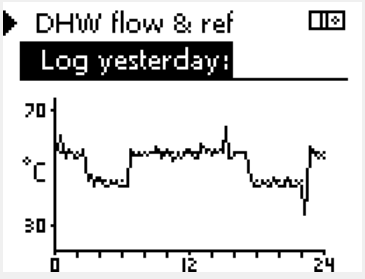
Example 1:
1 day log for yesterday showing the development in outdoor temperature during the past 24 hours.



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



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



6.6 Output override

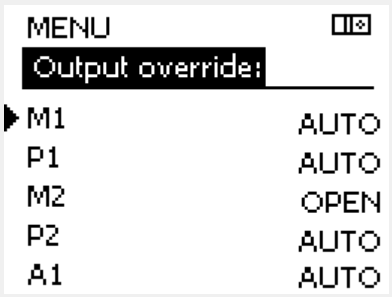
This section describes the function in general for the ECL Comfort 210 / 296 / 310 series. The shown displays are typical and not application related. They might differ from the displays in your application.

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

Action:	Purpose:	Examples:
	Choose 'MENU' in any of the overview displays	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose common controller settings	
	Confirm	
	Choose 'Output override'	
	Confirm	
	Choose a controlled component	M1, P1 etc.
	Confirm	
	Adjust the status of the controlled component: Motorized control valve: AUTO, STOP, CLOSE, OPEN Pump: AUTO, OFF, ON	
	Confirm status change	

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

Controlled components *Circuit selector*



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

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

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

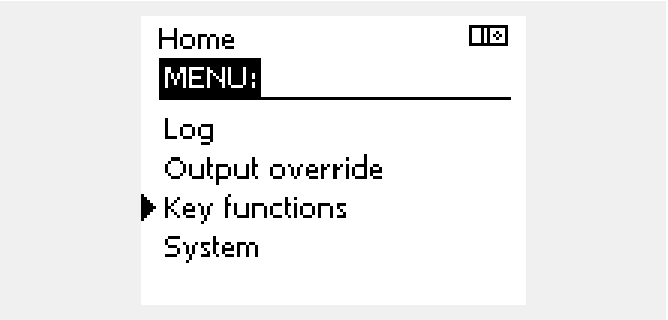
The motorized control valve M1 can be controlled by 0 – 10 volt (0 - 100 %) signal as V1.
V1 can be set to AUTO or ON.

AUTO: Normal control (0–100%)

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

6.7 Key functions

New application	**Erase application:** Removes the existing application. As soon as the ECL key is inserted, another application can be chosen.
Application	Gives an overview over the actual application in the ECL controller. Push the dial again to exit the overview.
Factory setting	**System settings:** System settings are, among others, communication set-up, display brightness etc.
	User settings: User settings are, among others, desired room temperature, desired DHW temperature, schedules, heat curve, limitation values etc.
	Go to factory: Restores the factory settings.
Copy	**To:** Copy direction
	System settings
	User settings
	Start copying
Key overview	Gives an overview over the inserted ECL key. (Example: A266 Ver. 2.30). Turn the dial to see the subtypes. Push the dial again to exit the overview.



A more detailed description of how to use the individual 'Key functions' can also be seen in 'Inserting the ECL application key'.

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

Key inserted / not inserted, description:

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

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

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

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

ECL Comfort 296, controller versions 1.58 and up:

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

6.8 System

6.8.1 ECL version

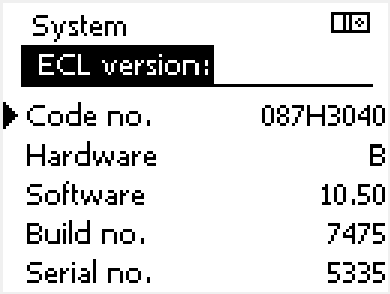
In 'ECL version' you will always be able to find an overview of the data related to your electronic controller.

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

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

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

Example, ECL version



6.8.2 Extension

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

6.8.3 Ethernet

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

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

6.8.4 Portal config

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

ECL Portal related parameters are set here.

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

6.8.5 M-bus config

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

M-bus related parameters are set here.

6.8.6 Energy meter and M-bus, general information

ECL Comfort 296 / 310 / 310B only

When using the Application Key in the ECL Comfort 296 / 310 / 310B, up to 5 energy meters can be connected to the M-bus connections.

Connection of energy meter can:

- limit the flow
- limit the power
- transfer energy meter data to the ECL Portal, via Ethernet, and / or a SCADA system, via Modbus.

Many applications with control of heating, DHW or cooling circuit have the possibility to react on energy meter data.
To verify if actual application key can be set to react on energy meter data:
See Circuit > MENU > Settings > Flow / power.

The ECL Comfort 296 / 310 / 310B can always be used for monitoring purpose of up to 5 energy meters.

The ECL Comfort 296 / 310 / 310B act as an M-bus master and must be set to communicate with connected energy meter(s).
See MENU > Common controller > System > M-bus config.

Technical info:

- The M-bus data are based on standard EN-1434.
- Danfoss recommends AC supplied energy meters in order to avoid battery draining.

Energy meter data acquisition from ECL Portal is possible without setting up the M-bus configuration.

MENU > Common controller > System > M-bus config.

State		**Read-out**
Circuit	*Setting range*	*Factory setting*
-	-	-
Information about the current M-bus activity.		

IDLE: Normal state

INIT: The command for initialization has been activated

SCAN: The command for scanning has been activated

GATEW: The command Gateway has been activated

The ECL Comfort 296 / 310 / 310B will return to IDLE when commands have been completed.
Gateway is used for read-out of energy meter via ECL Portal.

MENU > Common controller > System > M-bus config.

Baud (bits per second)		**5997**
Circuit	*Setting range*	*Factory setting*
-	300 / 600 / 1200 / 2400	300
The communication speed between ECL Comfort 296 / 310 / 310B and the connected energy meter(s).		

Typically, 300 or 2400 baud is used.
If ECL Comfort 296 / 310 / 310B are connected to the ECL Portal, a baud rate of 2400 is recommendable, provided the energy meter allows this.

MENU > Common controller > System > M-bus config.

Command		**5998**
Circuit	*Setting range*	*Factory setting*
-	NONE / INIT / SCAN / GATEW	NONE
The ECL Comfort 296 / 310 / 310B are M-bus masters. In order to verify connected energy meters, different commands can be activated.		

NONE: No command activated

INIT: Initialization is activated

SCAN: Scanning is activated in order to search for connected energy meters. The ECL Comfort 296 / 310 / 310B detect the M-bus addresses of up to 5 connected energy meters and place these automatically in the "Energy meters" section. The verified address is placed after "Energy meter 1 (2, 3, 4, 5)"

GATEW: The ECL Comfort 296 / 310 / 310B act as a gateway between energy meters and ECL Portal. Used only for service.

Scan time can take up to 12 minutes.
When all energy meters are found, the command can be changed to INIT or NONE.

MENU > Common controller > System > M-bus config.

M-bus address Energy meter 1 (2, 3, 4, 5)		**6000**
Circuit	*Setting range*	*Factory setting*
-	0 - 255	255
The set or verified address of energy meter 1 (2, 3, 4, 5).		

0: Normally not used

1 - 250: Valid M-bus addresses

251 - 254: Special functions. Use only M-bus address 254 when one energy meter is connected.

255: Not used

MENU > Common controller > System > M-bus config.

Type Energy meter 1 (2, 3, 4, 5)		**6001**
Circuit	*Setting range*	*Factory setting*
-	0 - 4	0
Selecting data range from the M-bus telegram..		

0: Small data set, small units

1: Small data set, large units

2: Large data set, small units

3: Large data set, large units

4: Volume and energy data only (example: HydroPort Pulse)

Data examples:

0:
Flow temp., return temp., flow, power, acc. volume, acc. energy.

3:
Flow temp., return temp., flow, power, acc. volume, acc. energy, tariff 1, tariff 2.

See also the "Instructions, ECL Comfort 210 / 310, communication description" for further details.

See also Appendix for detailed description of "Type".

MENU > Common controller > System > M-bus config.

Scan time **Energy meter 1 (2, 3, 4, 5)**		**6002**
Circuit	*Setting range*	*Factory setting*
-	1 - 3600 sec	60 sec
Setting the scanning time for acquiring data of connected energy meter(s).		

If the energy meter is battery powered, the scan time should be set to a high value to prevent a too fast battery draining.
Oppositely, if the flow / power limitation function is used in the ECL Comfort 310, the scan time should be set to a low value in order to have quick limitation.

MENU > Common controller > System > M-bus config.

ID **Energy meter 1 (2, 3, 4, 5)**		**Read-out**
Circuit	*Setting range*	*Factory setting*
-	-	-
Information about the energy meter's serial no.		

MENU > Common controller > System > Energy meters

Energy meter 1 (2, 3, 4, 5)		**Read-out**
Circuit	*Setting range*	*Factory setting*
-	0 - 4	0
Information from actual energy meter about, for example, ID, temperatures, flow / volume, power / energy. *The shown information depends on the settings made in the "M-bus config." menu.*		

6.8.7 Raw input overview

Measured temperatures, input status and voltages are displayed.

In addition, a detection of malfunctions can be chosen for activated temperature inputs.

Monitoring the sensors:
Choose the sensor which measures a temperature, for example the S5. When the dial is pressed, a magnifying glass appears in the selected line. The S5 temperature is now being monitored.

Alarm indication:
Should the connection to the temperature sensor be disconnected, short-circuited or the sensor itself be defective, the alarm function is activated.

In the "Raw input overview" an alarm symbol is shown at the defective temperature sensor in question.

Resetting the alarm:
Choose the sensor (S number) for which you want to clear the alarm. Press the dial. The magnifying glass and alarm symbols disappear.

When the dial is pressed again, the monitoring function is reactivated.

The temperature sensor inputs have a measuring range from -60 ... 150 ° C.

If a temperature sensor or its connection breaks, the value indication is " - - ".

If a temperature sensor or its connection is short-circuited, the value indication is " - - - ".

6.8.8 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

6.8.9 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.

6.8.10 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.

6.8.11 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.

7.0 Miscellaneous

7.1 ECA 30 / 31 setup procedures

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

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

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

Connections: See the section 'Electrical connections'.

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

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

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

Menu structure

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

The ECA MENU contains:

- ECA settings
- ECA system
- ECA factory

ECA settings: Offset adjustment of the measured room temperature.

Offset adjustment of relative humidity (ECA 31 only).

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

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

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

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

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

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

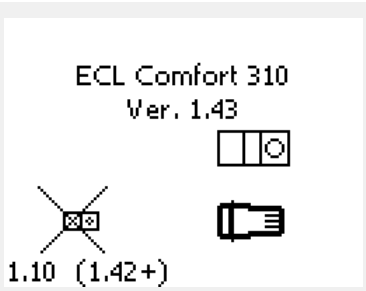
The ECL menus are as described for the ECL controller.

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

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

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

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



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

Display part of ECA 30 / 31:

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

Display part of ECA 30 / 31:

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

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

ECA MENU > ECA settings > ECA sensor

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

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

7.2 Override function

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

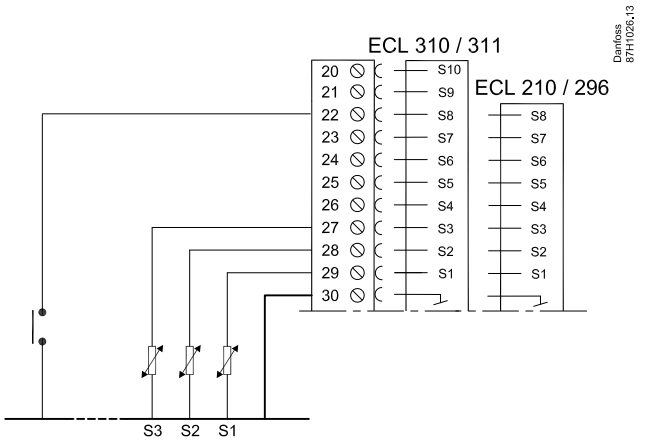
Different override modes can be selected, depending on application key type.

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

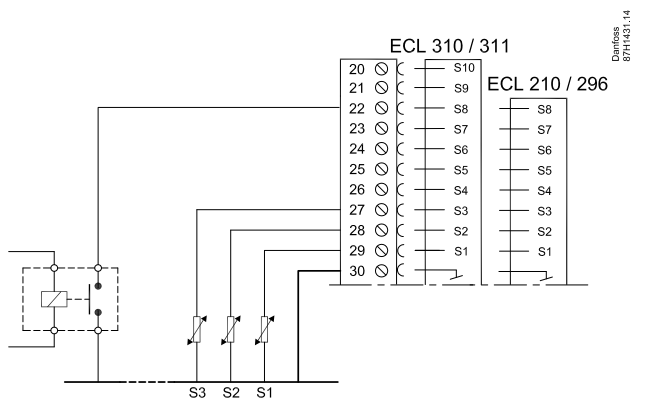
"Comfort" is also called normal heating temperature.
"Saving" can be reduced heating or heating stopped.
"Constant temperature" is a desired flow temperature, set in the menu "Flow temperature".
"Frost protection" stops the heating totally.

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

Example, override switch connected to S8:



Example, override relay connected to S8:



Example 1

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

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

Settings in ECL:

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

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

   Select COMFORT
3. Select circuit > MENU > Schedule:

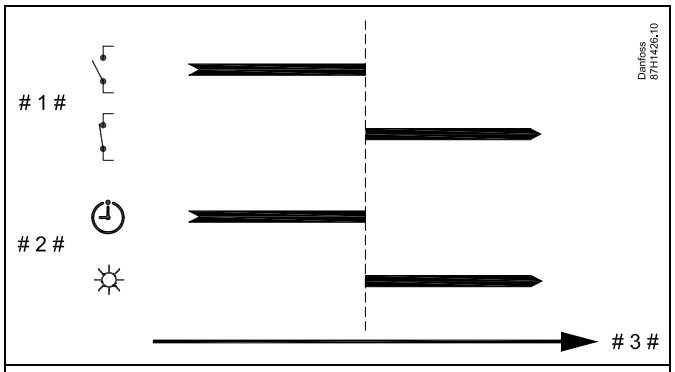
   Select all weekdays

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

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

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

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



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

Example 2

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

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

Settings in ECL:

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

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

   Select SAVING
3. Select circuit > MENU > Schedule:

   Select all weekdays

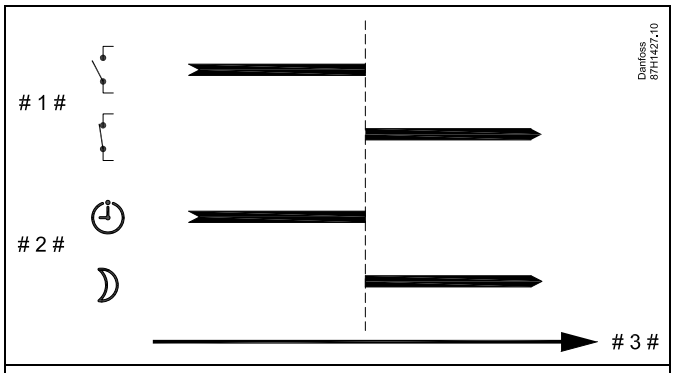
   Set "Start1" to 00.00

   Set "Stop1" to 24.00

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

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

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



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

Example 3

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

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

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

Settings in ECL:

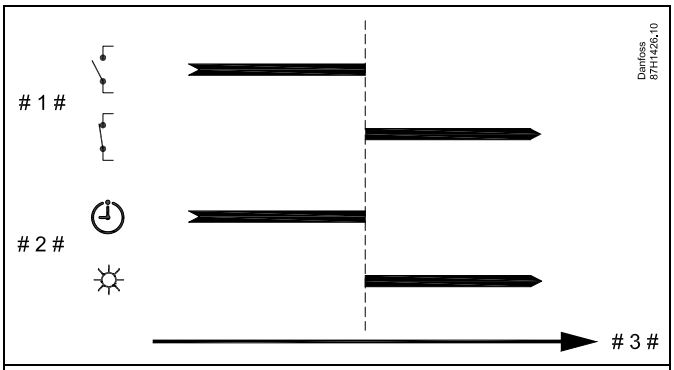
1. Select circuit > MENU > Settings > Application > Ext. input:

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

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

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

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



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

Example 4

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

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

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

Settings in ECL:

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

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

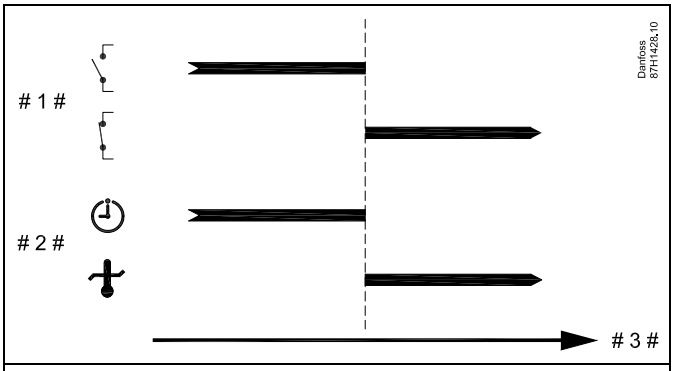
   Select CONST. T
3. Select circuit > MENU > Settings > Flow temperature >

   Desired T (ID 1x004):

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

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

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



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

7.3 Several controllers in the same system

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

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

Furthermore, the master controller can receive information about:

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

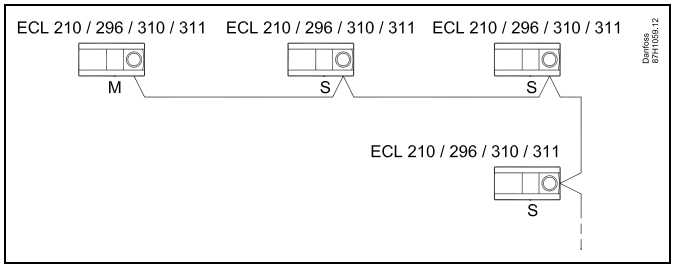
Situation 1:
SLAVE controllers: How to make use of the outdoor temperature signal sent from the MASTER controller

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SLAVE controller:
Set the desired function:

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

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

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

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

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

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

SLAVE controller:

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

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

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

SLAVE controller:

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

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

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

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

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

7.4 Frequently asked questions

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

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

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

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

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

The room temperature is too low?
Make sure that the radiator thermostat does not limit the room temperature.
If you still cannot obtain the desired room temperature by adjusting the radiator thermostats, the flow temperature is too low. Increase the desired room temperature (display with desired room temperature). If this does not help, adjust the 'Heat curve' ('Flow temp.').

The room temperature is too high during saving periods?
Make sure that the min. flow temperature limitation ('Temp. min.') is not too high.

The temperature is unstable?
Check that the flow temperature sensor is correctly connected and in the right place. Adjust the control parameters ('Control par.').
If the controller has a room temperature signal, see 'Room limit'.

The controller does not operate and the control valve is closed?
Check that the flow temperature sensor is measuring the correct value, see 'Daily use' or 'Input overview'.
Check the influence from other measured temperatures.

How to make an extra comfort period in the schedule?
You can set an additional comfort period by adding new 'Start' and 'Stop' times in 'Schedule'.

How to remove a comfort period in the schedule?
You can remove a comfort period by setting start and stop times to the same value.

How to restore your personal settings?
Please read the chapter concerning 'Inserting the ECL Application Key'.

How to restore the factory settings?
Please read the chapter concerning 'Inserting the ECL Application Key'.

Why can't the settings be changed?
The ECL Application Key has been removed.

Why can't an application be selected when inserting the ECL application key into the controller?
The actual application in the ECL Comfort controller must be deleted before a new application (subtype) can be selected.

How to react on alarms?
An alarm indicates that the system is not operating satisfactorily. Please contact your installer.

What does P and PI control mean?
P control: Proportional control.
By using a P control, the controller will change the flow temperature proportional to the difference between a desired and an actual temperature, e.g. a room temperature.
A P control will always have an offset which not will disappear over time.

PI control: Proportional and Integrating control.
A PI control does the same as a P control, but the offset will disappear over time.
A long 'Tn' will give a slow but stable control, and a short 'Tn' will result in a fast control but with a higher risk of unstability.

What does the "i" in the upper right corner of the display mean?
When uploading an application (subtype) from the application key into the ECL Comfort controller, the "**i**" in the upper right corner indicates that - besides the factory settings - the subtype also contains special user / systems settings.

Why can't the ECL 485 Bus (used in ECL 210 / 296 / 310) and the ECL Bus (used in ECL 100 / 110 / 200 / 300) communicate?
These two communication busses (Danfoss proprietary) are different in connection form, telegram form and speed.

Why can't I select a language when uploading an application?
Reason can be that the ECL 310 is powered with 24 Volt d.c.

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?

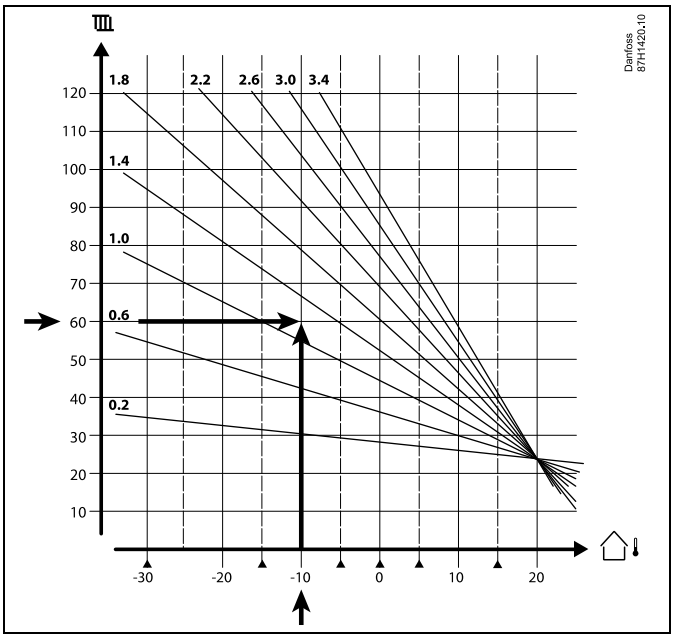
Short answer:
Set the heat curve to the lowest possible value, but still having comfortable room temperature.

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.



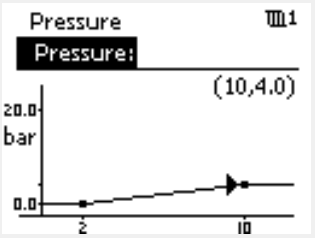
Choose the desired flow temperature (vertical axis) for your heating system at the expected lowest outdoor temperature (horizontal axis) for your area. Pick the heat curve closest to the common point of these two values.

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.

Pressure measuring



Voltage (0 - 10 V) converted to a displayed Pressure (Bar)
(A230.4)
The conversion scale for applied voltage (to terminal S8) into Bar is found:
(Navigation: Circuit 1 > MENU > Alarm > Pressure > Pressure)
Click the Pressure line and the scale diagram appears.

The pressure at 2 Volts and 10 Volts can be set.
In the screen dump to the right the pressure at 2 Volt is 0.0 Bar and at 10 Volt the pressure is 4.0 Bar.
Follow the examples below for setting the pressure values.

Example 1:
The pressure transmitter generates 1 Volt at 0,5 Bar and 8 Volts at 6 Bar.

Relationship between Bar and Volt:
(6 Bar - 0.5 Bar) / (8 Volt - 1 Volt)
5.5 / 7 = 0.8 Bar / Volt

To get value for Bar at the "2 Volt" point and set into the scale diagram:
0.5 Bar (at 1 Volt) + 0.8 = 1.3 Bar

To get value for Bar at the "10 Volt" point and set into the scale diagram:
6 Bar (at 8 Volt) + (2 x 0.8) = 7.6 Bar

Example 2:
The pressure transmitter generates 0 Volt at 0 Bar and 8 Volts at 5 Bar.

Relationship between Bar and Volt:
(5 Bar - 0 Bar) / (8 Volt - 0 Volt)
5 / 8 = 0.6 Bar / Volt

To get value for Bar at the "2 Volt" point and set into the scale diagram:
0 Bar (at 0 Volt) + (2 x 0.6) = 1.2 Bar

To get value for Bar at the "10 Volt" point and set into the scale diagram:
5 Bar (at 8 Volt) + (2 x 0.6) = 6.2 Bar

Relationship between Bar and Volt:
(6 Bar - 0 Bar) / (5 Volt - 1 Volt)
6 / 4 = 1.5 Bar / Volt.

To get value for Bar at the "2 Volt" point and set into the scale diagram:
0 Bar (at 1 Volt) + 1.5 = 1.5 Bar

To get value for Bar at the "10 Volt" point and set into the scale diagram:
6 Bar (at 5 Volt) + (5 x 1,5) = 13.5 Bar

7.5 Definitions

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

Accumulated temperature value
A filtered (dampened) value, typically for room and outdoor temperatures. Is calculated in the ECL controller and is used to express the heat stored in the walls of the house. The accumulated value does not change so rapidly as the actual temperature.

Air duct temperature
Temperature measured in the air duct where the temperature is to be controlled.

Alarm function
Based on the alarm settings, the controller can activate an output.

Anti-bacteria function
For a defined period, the DHW temperature is increased in order to neutralize dangerous bacteria, e.g. Legionella.

Balance temperature
This setpoint is the basis for the flow / air duct temperature. The balance temperature can be adjusted by the room temperature, the compensation temperature and the return temperature. The balance temperature is only active if a room temperature sensor is connected.

BMS
Building Management System. A supervisory system for remote control and monitoring.

Comfort operation
Normal temperature in the system controlled by the schedule. During heating the flow temperature in the system is higher to maintain the desired room temperature. During cooling the flow temperature in the system is lower to maintain the desired room temperature.

Comfort temperature
Temperature maintained in the circuits during comfort periods. Normally during daytime.

Compensation temperature
A measured temperature influencing the flow temperature reference / balance temperature.

Desired flow temperature
Temperature calculated by the controller on basis of the outdoor temperature and influences from the room and / or return temperatures. This temperature is used as a reference for the control.

Desired room temperature
Temperature which is set as the desired room temperature. The temperature can only be controlled by the ECL Comfort controller if a room temperature sensor is installed.
If a sensor is not installed, the set desired room temperature however still influences the flow temperature.
In both cases the room temperature in each room is typically controlled by radiator thermostats / valves.

Desired temperature
Temperature based on a setting or a controller calculation.

Dew point temperature
Temperature at which the humidity in the air condensates.

DHW circuit
The circuit for heating the domestic hot water (DHW).

Duct temperature
Temperature measured in the air duct where the temperature is to be controlled.

ECL 485 Bus
This communication bus is Danfoss proprietary and used for internal communication between ECL 210, ECL 210B, ECL 296, ECL 310, ECL 310B, ECA 30 and ECA 31.
Communication with "ECL Bus", used in ECL 100, ECL 110, ECL 200, ECL 300 and ECL 301, is not possible.

ECL Portal
A supervisory system for remote control and monitoring, locally and via Internet.

EMS
Energy Management System. A supervisory system for remote control and monitoring.

Factory settings
Settings stored on the ECL Application Key to simplify the set up of your controller the first time.

Firmware
is used by the ECL Comfort controller and ECA 30 / 31 to manage display, dial and program execution.

Flow temperature
Temperature measured in the water flow where the temperature is to be controlled.

Flow temperature reference
Temperature calculated by the controller on basis of the outdoor temperature and influences from the room and / or return temperatures. This temperature is used as a reference for the control.

Heat curve
A curve showing the relationship between actual outdoor temperature and desired flow temperature.

Heating circuit
The circuit for heating the room / building.

Holiday schedule
Selected days can be programmed to be in comfort, saving or frost protection mode. Besides this, a day schedule with comfort period from 07.00 to 23.00 can be selected.

Humidistat
A device, which reacts on the air's humidity. A switch can go ON if the measured humidity gets above a set point.

Humidity, relative
This value (stated in %) refers to the indoor moisture content compared to the max. moisture content. The relative humidity is measured by the ECA 31 and is used for the calculation of the dew point temperature.

Inlet temperature
Temperature measured in the inlet air flow where the temperature is to be controlled.

Limitation temperature
Temperature that influences the desired flow / balance temperature.

Log function
The temperature history is displayed.

Master / slave
Two or more controllers are interconnected on the same bus, the master sends out e.g. time, date and outdoor temperature. The slave receives data from master and sends e.g. desired flow temperature value.

Modulating control (0 - 10 V control)
Positioning (by means of a 0 - 10 V control signal) of the actuator for the motorized control valve in order to control the flow.

Optimization
The controller optimizes the start time of the scheduled temperature periods. Based on the outdoor temperature, the controller automatically calculates when to start in order to reach the comfort temperature at the set time. The lower the outdoor temperature, the earlier the start time.

Outdoor temperature trend
The arrow indicates the tendency, i.e. whether the temperature rises or falls.

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

Pt 1000 sensor
All sensors used with the ECL Comfort controller are based on the Pt 1000 type (IEC 751B). The resistance is 1000 ohm at 0 °C and it changes with 3.9 ohm / degree.

Pump control
One circulation pump is working and the other is the spare circulation pump. After a set time, the roles are exchanged.

Refill water function
If the measured pressure in the heating system is too low (e.g. due to a leakage), water can be supplemented.

Return temperature
The temperature measured in the return influences the desired flow temperature.

Room temperature
Temperature measured by the room temperature sensor or the Remote Control Unit. The room temperature can only be controlled directly if a sensor is installed. The room temperature influences the desired flow temperature.

Room temperature sensor
Temperature sensor placed in the room (reference room, typically the living room) where the temperature is to be controlled.

Saving temperature
Temperature maintained in the heating / DHW circuit during saving temperature periods. Typically, the Saving temperature is lower than the Comfort temperature in order to save energy.

SCADA
Supervisory Control And Data Acquisition. A supervisory system for remote control and monitoring.

Schedule
Schedule for periods with comfort and saving temperatures. The schedule can be made individually for each week day and may consist of up to 3 comfort periods per day.

Software
is used in the ECL Comfort controller to do the application related processes.

Weather compensation
Flow temperature control based on the outdoor temperature. The control is related to a user-defined heat curve.

2-point control
ON / OFF control, e.g. circulation pump, ON / OFF valve, change-over valve or damper control.

3-point control
Actuator positioning by means of Opening, Closing or No-action signals for the motorized control valve in order to control the flow. No-action means that the actuator remains in its current position.

7.6 Type (ID 6001), overview

	Type 0	Type 1	Type 2	Type 3	Type 4
Address	✓	✓	✓	✓	✓
Type	✓	✓	✓	✓	✓
Scan time	✓	✓	✓	✓	✓
ID / Serial	✓	✓	✓	✓	✓
Reserved	✓	✓	✓	✓	✓
Flow temp. [0.01 °C]	✓	✓	✓	✓	-
Return temp. [0.01 °C]	✓	✓	✓	✓	-
Flow [0.1 l/h]	✓	✓	✓	✓	-
Power [0.1 kW]	✓	✓	✓	✓	-
Acc. Volume	[0.1 m3]	[0.1 m3]	[0.1 m3]	[0.1 m3]	-
Acc. Energy	[0.1 kWh]	[0.1 MWh]	[0.1 kWh]	[0.1 MWh]	-
Tariff1 Acc. Energy	-	-	[0.1 kWh]	[0.1 MWh]	-
Tariff2 Acc. Energy	-	-	[0.1 kWh]	[0.1 MWh]	-
Up time [days]	-	-	✓	✓	-
Current time [M-bus defined structure]	-	-	✓	✓	✓
Error status [energy meter defined bitmask]	-	-	✓	✓	-
Acc. Volume	-	-	-	-	[0.1 m3]
Acc. Energy	-	-	-	-	[0.1 kWh]
Acc. Volume2	-	-	-	-	[0.1 m3]
Acc. Energy2	-	-	-	-	[0.1 kWh]
Acc. Volume3	-	-	-	-	[0.1 m3]
Acc. Energy3	-	-	-	-	[0.1 kWh]
Acc. Volume4	-	-	-	-	[0.1 m3]
Acc. Energy4	-	-	-	-	[0.1 kWh]
Flow MAX	[0.1 l/h]	[0.1 l/h]	[0.1 l/h]	[0.1 l/h]	-
Power MAX	[0.1 kW]	[0.1 kW]	[0.1 kW]	[0.1 kW]	-
Max T forward	✓	✓	✓	✓	-
Max T return	✓	✓	✓	✓	-
Storage * Acc. Energy	[0.1 kWh]	[0.1 kWh]	[0.1 kWh]	[0.1 kWh]	-

7.7 Automatic / manual update of firmware

Info:

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

Situation 1:

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

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

Situation 2:

ECL Comfort controller is installed and runs an application.

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

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

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

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

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

7.8 Parameter ID overview

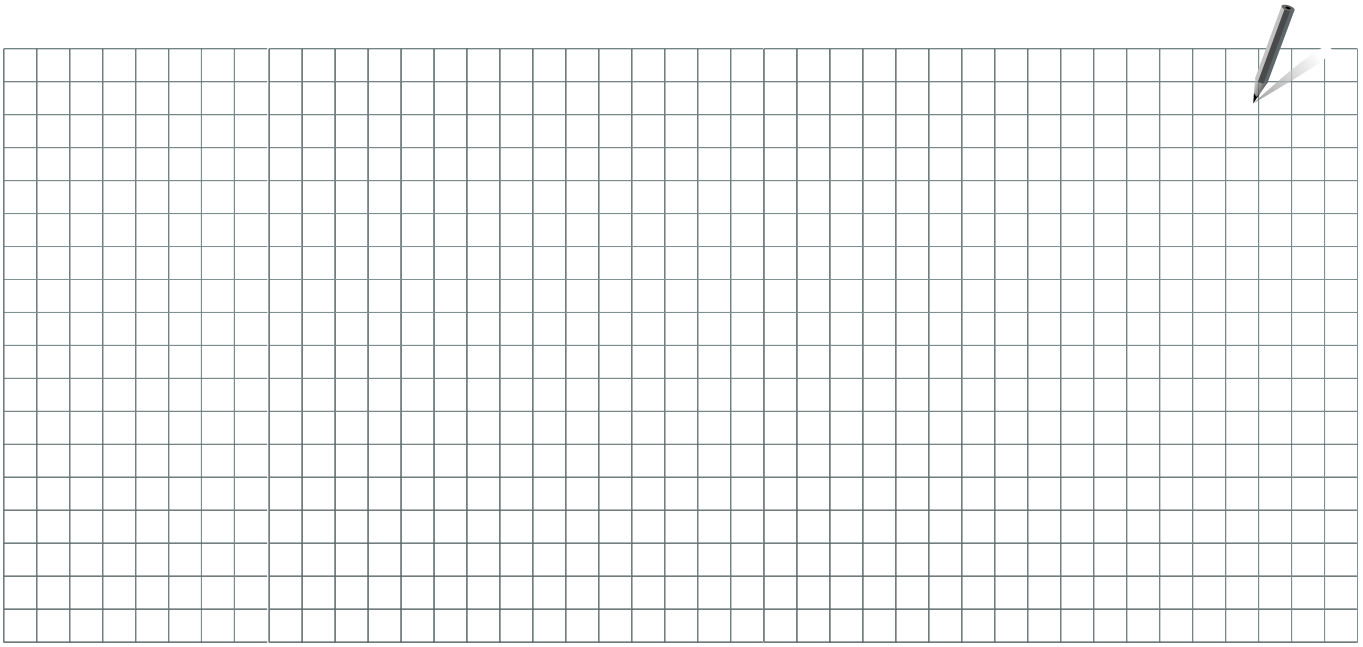
A230.x — **x** refers to the subtypes listed in the column.

ID	Parameter Name	A230.x	Setting range	Factory	Unit	Own settings	
10512	Prog. execution	1, 3, 4	OFF ; ON	OFF			
10514	Max. pwr. failure	1, 3, 4	5 ... 3000	30	Min		
10903	Ramp X5-X6	1, 3, 4	OFF, 1 ... 20	5			
10904	Ramp X7-X8	1, 3, 4	OFF, 1 ... 20	5			
10912	Appl. continue	1, 3, 4	OFF ; ON	OFF			
10913	After power fail.	1, 3, 4	STOP ; START	OFF			
10930	X1	1, 3, 4	0 ... 1200	0	h		
10931	X2	1, 3, 4	0 ... 1200	0	h		
10932	X3	1, 3, 4	0 ... 1200	0	h		
10933	X4	1, 3, 4	0 ... 1200	0	h		
10934	X5	1, 3, 4	0 ... 1200	0	h		
10935	X6	1, 3, 4	0 ... 1200	360	h		
10936	X7	1, 3, 4	0 ... 1200	720	h		
10937	X8	1, 3, 4	0 ... 1200	1080	h		
11004	Desired T	1, 3, 4, 5	5 ... 150	50	°C		83
11010	ECA addr.	1, 2, 3, 4, 5	OFF ; A ; B	OFF			118
11011	Auto saving	1, 3, 4, 5	OFF, -29 ... 10	-15	°C		102
11012	Boost	1, 3, 4, 5	OFF, 1 ... 99	OFF	%		103
11013	Ramp	1, 3, 4, 5	OFF, 1 ... 99	OFF	Min		104
11014	Optimizer	1, 3, 4, 5	OFF, 10 ... 59	OFF			104
11015	Adapt. time	1, 2, 3, 4, 5	OFF, 1 ... 50	OFF	Sec		87
11017	Demand offset	1, 3, 4, 5	OFF, 1 ... 20	OFF	K		118
	-||-	2	-20 ... -1, OFF	OFF	K		
11018	Des. T comfort	2	-30.0 ... 60.0	7.5	°C		84
11019	Des. T saving	2	-30.0 ... 60.0	25.0	°C		84
11020	Based on	1, 3, 4, 5	OUT ; ROOM	OUT			105
11021	Total stop	1, 3, 4, 5	OFF ; ON	OFF			105
11022	P exercise	1, 2, 3, 4, 5	OFF ; ON	ON			119
11023	M exercise	1, 2, 3, 4, 5	OFF ; ON	OFF			120
11024	Actuator	1, 2, 3, 4, 5	ABV ; GEAR	GEAR			110
11026	Pre-stop	1, 3, 4, 5	OFF ; ON	ON			106
11028	Con. T, ret. T lim.	1, 3, 4, 5	10 ... 110	70	°C		91
11029	DHW, ret. T limit	1, 3, 4, 5	OFF, 10 ... 110	OFF	°C		91
11030	Limit	2	-20 ... 80	20	°C		92
11031	High T out X1	1, 3, 4, 5	-60 ... 20	15	°C		92
11032	Low limit Y1	1, 3, 4, 5	10 ... 150	50	°C		92
11033	Low T out X2	1, 3, 4, 5	-60 ... 20	-15	°C		92
11034	High limit Y2	1, 3, 4, 5	10 ... 150	60	°C		93

ID	Parameter Name	A230.x	Setting range	Factory	Unit	Own settings	
11035	Infl. - max.	1, 3, 4	-9.9 ... 9.9	-2.0			93
	-||-	2, 5	-9.9 ... 9.9	0.0			
11036	Infl. - min.	1, 3, 4, 5	-9.9 ... 9.9	0.0			93
	-||-	2	-9.9 ... 9.9	2.0			
11037	Adapt. time	1, 3, 4	OFF, 1 ... 50	25	Sec		93
	-||-	2, 5	OFF, 1 ... 50	OFF	Sec		
11040	P post-run	1, 2, 3, 4	0 ... 99	3	Min		120
	-||-	5	0 ... 99	20	Min		
11050	P demand	1, 2, 3, 4	OFF ; ON	OFF			120
11052	DHW priority	1, 3, 4, 5	OFF ; ON	OFF			121
11057	Infl. - max.	1, 3	0.0 ... 9.9	0.0			100
11060	Limit	2	-20 ... 80	5	°C		114
11061	Adapt. time	2	OFF, 1 ... 50	OFF	Sec		114
11062	Infl. - max.	2	-9.9 ... 9.9	0.0			114
11063	Infl. - min.	2	-9.9 ... 9.9	0.0			115
11064	Limit	2	-20 ... 80	25	°C		116
11065	Adapt. time	2	OFF, 1 ... 50	OFF	Sec		116
11066	Infl. - max.	2	-9.9 ... 9.9	0.0			116
11067	Infl. - min.	2	-9.9 ... 9.9	0.0			116
11070	P cool T	2	5 ... 60	25	°C		121
11077	P frost T	1, 3, 4	OFF, -10 ... 20	2	°C		121
	-||-	5	OFF, -10 ... 20	OFF	°C		
11078	P heat T	1, 3, 4	5 ... 40	20	°C		122
11079	Max. flow T	1, 3, 4, 5	10 ... 110	60	°C		
11080	Delay	1, 3, 4, 5	5 ... 250	30	Sec		
11081	Filter constant	1, 3	1 ... 50	10			100
11084	Ext. signal	2	OFF ; ON	OFF			84
11085	Priority	1, 3, 4, 5	OFF ; ON	OFF			94
11092	Standby T	2	5 ... 40	30	°C		122
11093	Frost pr. T	1, 3, 4, 5	5 ... 40	10	°C		122
11097	Supply T (idle)	1, 4	OFF, 10 ... 100	OFF	°C		110
11099	Limit	1, 3	0.0 ... 35.0	10.0	m/s		101
11109	Input type	1, 2, 4	OFF ; IM1 ; IM2 ; IM3 ; IM4 ; EM1 ; EM2 ; EM3 ; EM4 ; EM5	OFF			96
	-||-	3, 5	EM1 ; EM2 ; EM3 ; EM4 ; EM5 ; OFF	OFF			
11111	Limit	2	0.0 ... 999.9	999.9			97
11112	Adapt. time	1, 2, 3, 4, 5	OFF, 1 ... 50	OFF	Sec		97
11113	Filter constant	1, 2, 3, 4, 5	1 ... 50	10			97

ID	Parameter Name	A230.x	Setting range	Factory	Unit	Own settings	
11114	Pulse	1, 2, 4	OFF, 1 ... 9999	OFF			97
11115	Units	1, 2, 3, 4, 5	ml, l/h ; l, l/h ; ml, m3/h ; l, m3/h ; Wh, kW ; kWh, kW ; kWh, MW ; MWh, MW ; MWh, GW ; GWh, GW	ml, l/h			97
11116	High limit Y2	1, 3, 4, 5	0.0 ... 999.9	999.9			98
11117	Low limit Y1	1, 3, 4, 5	0.0 ... 999.9	999.9			98
11118	Low T out X2	1, 3, 4, 5	-60 ... 20	-15	°C		99
11119	High T out X1	1, 3, 4, 5	-60 ... 20	15	°C		99
11141	Ext. input	1, 2, 3, 4, 5	OFF ; S1 ; S2 ; S3 ; S4 ; S5 ; S6 ; S7 ; S8 ; S9 ; S10 ; S11 ; S12 ; S13 ; S14 ; S15 ; S16	OFF			122
11142	Ext. mode	1, 3, 4, 5	COMFORT ; SAVING ; FROST PR. ; CONST. T	COMFORT			123
	-||-	2	COMFORT ; SAVING	COMFORT			
11145	Mon. T select	1, 4	S3 ; S4 ; S5	S3			110
11147	Upper difference	1, 3, 4, 5	OFF, 1 ... 30	OFF	K		133
11148	Lower difference	1, 3, 4, 5	OFF, 1 ... 30	OFF	K		133
11149	Delay	1, 3, 4, 5	1 ... 99	10	Min		134
11150	Lowest temp.	1, 3, 4, 5	10 ... 50	30	°C		134
11164	Dew p. T offset	3	-9.9 ... 9.9	0.0	K		
11174	Motor pr.	1, 2, 3, 4, 5	OFF, 10 ... 59	OFF	Min		110
11177	Temp. min.	1, 3, 4, 5	10 ... 150	10	°C		85
	-||-	2	-30 ... 50	0	°C		
11178	Temp. max.	1, 3, 4, 5	10 ... 150	90	°C		85
	-||-	2	-30 ... 70	30	°C		
11179	Summer, cut-out	1, 3, 4, 5	OFF, 1 ... 50	20	°C		
11182	Infl. - max.	1, 3, 4	-9.9 ... 0.0	-4.0			87
	-||-	2, 5	-9.9 ... 0.0	0.0			
11183	Infl. - min.	1, 3, 4, 5	0.0 ... 9.9	0.0			88
	-||-	2	0.0 ... 9.9	4.0			
11184	Xp	1, 3, 4, 5	5 ... 250	120	K		111
	-||-	2	5 ... 250	80	K		
11185	Tn	1, 3, 4, 5	1 ... 999	50	Sec		111
	-||-	2	1 ... 999	30	Sec		
11186	M run	1, 3, 4, 5	5 ... 250	60	Sec		111
	-||-	2	5 ... 250	35	Sec		

ID	Parameter Name	A230.x	Setting range	Factory	Unit	Own settings	
11187	Nz	1, 3, 4, 5	1 ... 9	3	K		111
	-||-	2	1 ... 9	2	K		
11189	Min. act. time	1, 2, 3, 4, 5	2 ... 50	10			112
11301	High T max Y2	1, 3	0.0 ... 75.0	25.0	m/s		
	-||-	2	-10.0 ... 40.0	25.0	°C		
11303	Low T max Y1	1, 3	0.0 ... 75.0	0.0	m/s		
	-||-	2	-10.0 ... 40.0	5.0	°C		
11327	Input type	4, 5	OFF ; ON	OFF			125
11330	Wake up level	1, 4	0 ... 100	0	%		112
11342	Start heat	5	10 ... 90	32	°C		125
11344	Stop heat	5	10 ... 90	28	°C		126
11364	Control, delay	1, 4	OFF ; ON	OFF			112
11392	Sum. start, month	1, 3, 4, 5	1 ... 12	5			128
11393	Sum. start, day	1, 3, 4, 5	1 ... 31	20			128
11395	Summer, filter	1, 3, 4, 5	OFF, 1 ... 300	250			128
11396	Win. start, month	1, 3, 4, 5	1 ... 12	5			128
11397	Winter start, day	1, 3, 4, 5	1 ... 31	20			128
11398	Winter, cut-out	1, 3, 4, 5	OFF, 1 ... 50	20	°C		128
11399	Winter, filter	1, 3, 4, 5	OFF, 1 ... 300	250			128
11500	Send desired T	1, 2, 3, 4, 5	OFF ; ON	ON			126
11609	Low Y	3	0 ... 100	20	%		
	-||-	4, 5	10 ... 120	10	°C		
11610	High Y	3	0 ... 100	100	%		
	-||-	4, 5	10 ... 120	100	°C		
11614	Alarm high	4, 5	0.0 ... 20.0	20.0	Bar		132
11615	Alarm low	4, 5	0.0 ... 20.0	0.0	Bar		132
11617	Alarm time-out	4, 5	0 ... 250	10	Sec		
11910	Circuit, Estrich.	1, 3, 4	OFF ; ON	ON			
12616	Alarm value	5	0 ... 1	0			134
12617	Alarm time-out	5	0 ... 200	10	Sec		



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Climate Solutions • danfoss.com • +45 7488 2222