Installation Guide

ECL Comfort 310, application A367

1.0 Table of Contents

1.1 Important safety and product information

1.1.1 Important safety and product information

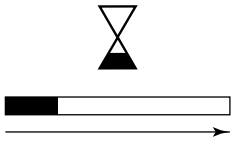
This Installation Guide is associated with ECL Application Key A367 (order code no. 087H3813).

The functions can be realized in ECL Comfort 310 which includes M-bus, Modbus and Ethernet (Internet) communication.

The applications A367.1 and A367.2 comply with ECL Comfort controller 310 as of software version 1.11 (visible at start-up of the controller and in 'Common controller settings' in 'System').

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

Automatic update of controller software:
The software of the controller is updated automatically when the key is inserted (as of controller version 1.11). The following animation will be shown when the software is being updated:



Progress bar

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.

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.

As this Installation 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) is a number of degrees.

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).

Disposal Note

This product should be dismantled and its components sorted, if possible, in various groups before recycling or disposal.

Always follow the local disposal regulations.

2.0 Installation

2.1 Before you start

The two applications, **A367.1 and A367.2** are almost identical. However, A367.2 has some extra functions which are described separately.

The applications are very flexible. These are the basic principles:

Heating (circuit 1):
Typically, the flow temperature is adjusted according to your requirements. The flow temperature sensor S3 is the most important sensor. The desired flow temperature at S3 is calculated in the ECL controller, based on the outdoor temperature (S1).

The lower the outdoor temperature, the higher the desired flow temperature. By means of a week schedule (up to 3 'Comfort' periods / day), the heating circuit 1 can be in 'Comfort' or 'Saving' mode (two different temperature values for desired room temperature).

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).

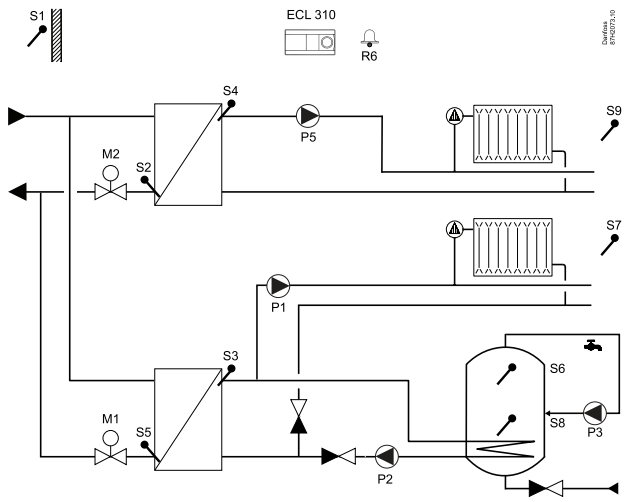
Furthermore, the return temperature limitation can depend on the outdoor temperature. Typically, the lower the outdoor temperature, the higher the accepted return temperature.

If the measured room temperature (S7) 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 circulation pump (P1) is switched OFF when heating the DHW. If the system has a changeover valve (P2 / M3) between the heating and DHW circuit, the circulation pump (P1) is ON when heating the DHW.

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

Typical A367 application:



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

All named components are connected to the ECL Comfort controller.

List of components:

S1	*Outdoor temperature sensor*
S2	*Return temperature sensor, circuit 2*
S3	*Flow temperature sensor, circuit 1*
S4	*Flow temperature sensor, circuit 2*
S5	*Return temperature sensor, circuit 1*
S6	*DHW tank temperature sensor, upper*
S7	*Room temperature sensor, circuit 1*
S8	*DHW tank temperature sensor, lower*
S9	*Room temperature sensor, circuit 2*
P1	*Circulation pump, heating, circuit 1*
P2	*DHW heating pump, circuit 3*
P3	*DHW circulation pump, circuit 3*
P5	*Circulation pump, heating, circuit 2*
M1	*Motorized control valve, circuit 1 and DHW*
M2	*Motorized control valve, circuit 2*
(M3)	*(Changeover valve, circuit 1, heating / DHW)*
R6	*Relay output, alarm*

Heating (circuit 2):
This circuit works after same principles as circuit 1.

The flow temperature sensor S4 is the most important sensor.

By means of a week schedule (up to 3 'Comfort' periods / day), the heating circuit 2 can be in 'Comfort' or 'Saving' mode (two different temperature values for desired room temperature). The motorized control valve M2 controls the circuit.

The return temperature (S2) enables limitation as described previously.

If the measured room temperature S9 (S7 in A 367.2) does not equal the desired room temperature, the desired flow temperature can be adjusted.

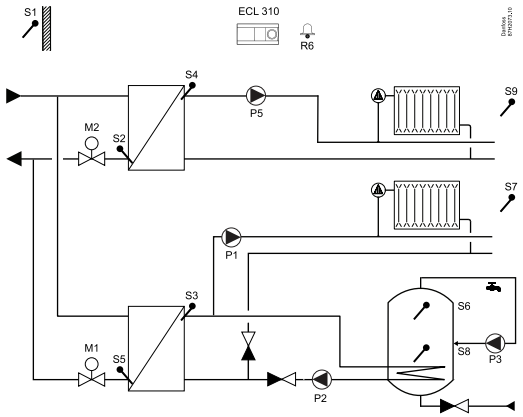
The circulation pump (P5) is ON at heat demand or at frost protection.

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

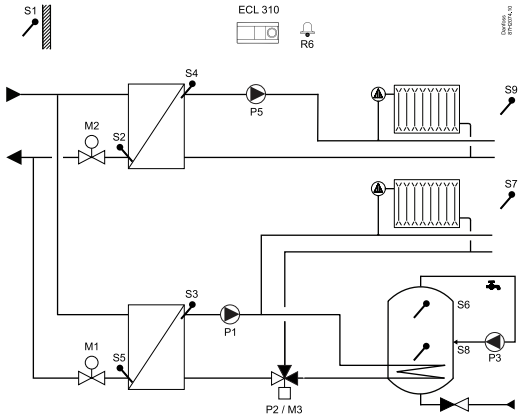
Heating circuit 2 can be connected after heating circuit 1. If so, the desired flow temperature at S3 can be influenced by the desired flow temperature at S4.

A367.2 heating circuit 1 and 2:
The heating circuit 1 and 2 can use the same room temperature sensor (S7). However, each heating circuit can have an ECA 30, Remote Control Unit, in order to have separate room temperature signals. Another solution: Use S7 for one of the heating circuits and ECA 30 for the other heating circuit.

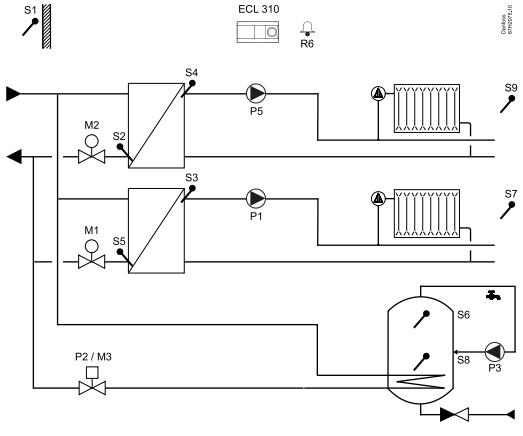
A367.1 example a:



A367.1 example b:



A367.1 example c:



Domestic Hot Water (DHW, circuit 3):
By means of a week schedule (up to 3 Comfort periods / day), the DHW circuit can be in 'Comfort' or 'Saving' mode (two different temperature values for desired DHW temperature).

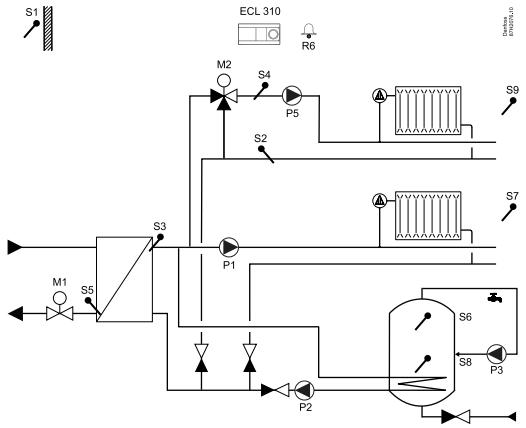
A 367.1:
If the measured DHW temperature (S6) is lower than the desired DHW temperature, the heating circulation pump (P1) is switched OFF and the DHW heating pump (P2) is switched ON. The motorized control valve (M1) is controlled in order to maintain the DHW heating temperature at S3.

The DHW heating temperature is typically 10-15 degrees higher than the desired DHW temperature.

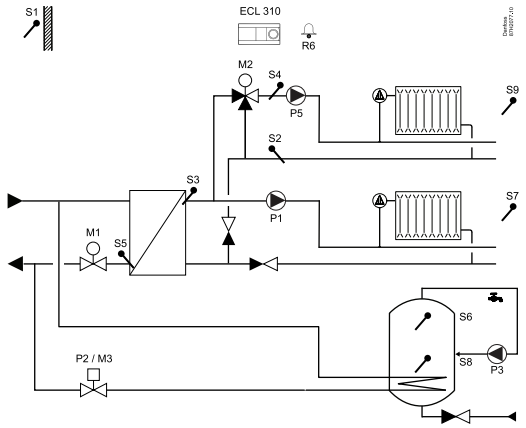
DHW tank with 1 temperature sensor:
When the measured DHW temperature (S6) gets higher than the desired DHW temperature, the DHW heating pump (P2) is switched OFF. A post-run time can be set. The motorized control valve (M1) will hereafter maintain the desired flow temperature in the heating circuit.

DHW tank with 2 temperature sensors:
When the measured DHW temperature (S6) gets higher than the desired DHW temperature and the lower temperature (at S8) gets higher than the cut-out temperature, the DHW heating pump (P2) is switched OFF. A post-run time can be set. The motorized control valve (M1) will hereafter maintain the desired flow temperature in the heating circuit.

A367.1 example d:



A367.1 example e:



A 367.2:
If the measured DHW temperature (S6) is lower than the desired DHW temperature, the heating circulation pump (P1) is switched OFF and the DHW pump (P2) is switched ON. The motorized control valve (M1) is controlled in order to maintain the DHW heating temperature at S3.

The DHW heating temperature is determined by the desired DHW charging temperature at S9. When the DHW heating temperature is reached, (or max. 3 minutes after DHW heating demand), the DHW charging pump P4 is switched ON.

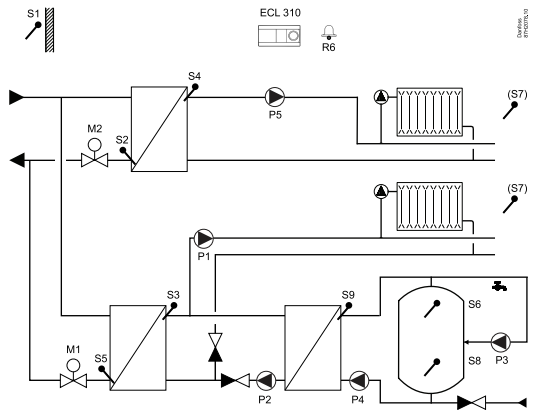
The DHW charging temperature is typically 5 - 10 degrees higher than the desired DHW temperature.

If the DHW charging temperature at S9 can not be reached, the ECL controller gradually increases the desired DHW heating temperature at S3 in order to obtain the charging temperature. A max. value can be set.

DHW tank with 1 temperature sensor:
When the measured DHW temperature (S6) gets higher than the desired DHW temperature, the DHW pump (P2) and DHW charging pump (P4) are switched OFF. Post-run times can be set. The motorized control valve (M1) will hereafter maintain the desired flow temperature in the heating circuit.

DHW tank with 2 temperature sensors:
When the measured DHW temperature (S6) gets higher than the desired DHW temperature and the lower temperature (at S8) gets higher than the cut-out temperature, the DHW pump (P2) and DHW charging pump (P4) are switched OFF. Post-run times can be set. The motorized control valve (M1) will hereafter maintain the desired flow temperature in the heating circuit.

Typical A367.2 application:



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

All named components are connected to the ECL Comfort controller.

List of components:

S1	*Outdoor temperature sensor*
S2	*Return temperature sensor, circuit 2*
S3	*Flow temperature sensor, circuit 1*
S4	*Flow temperature sensor, circuit 2*
S5	*Return temperature sensor, circuit 1*
S6	*DHW tank temperature sensor, upper*
S7	*Room temperature sensor, circuit 1 / 2*
S8	*DHW tank temperature sensor, lower*
S9	*DHW charging temperature sensor, circuit 3*
P1	*Circulation pump, heating, circuit 1*
P2	*DHW heating pump, circuit 3*
P3	*DHW circulation pump, circuit 3*
P4	*DHW charging pump, circuit 3*
P5	*Circulation pump, heating, circuit 2*
M1	*Motorized control valve, circuit 1 and DHW*
M2	*Motorized control valve, circuit 2*
(*M3*)	(*Changeover valve, circuit 1, heating / DHW)*
R6	*Relay output, alarm*

DHW circuit, in general:
If the installation has a changeover valve (P2 / M3), also called priority-valve, between the heating and the DHW circuits, the changeover valve is activated at DHW heating demand. The circulation pump (P1) is ON when heating the DHW.

Parallel mode in two-pump applications:
If the DHW heating temperature has a value close to the desired flow temperature in the heating circuit, the circulation pump (P1) in the heating circuit will not be switched OFF during DHW heating.

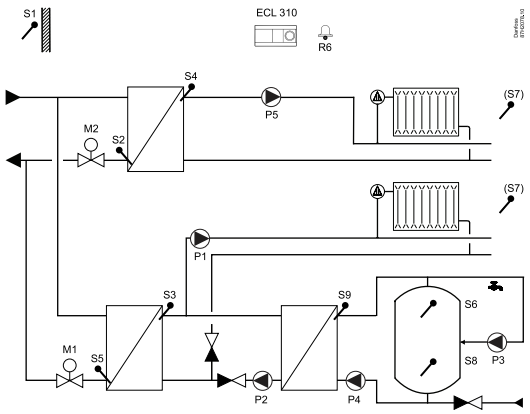
The return temperature (S5), when the DHW heating is active, can be limited to a fixed value.

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

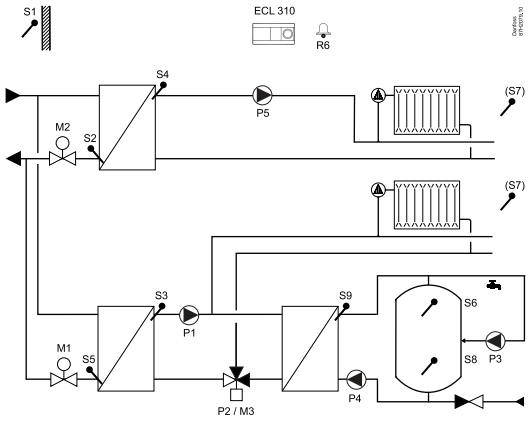
A367.1 only: The DHW circuit can be connected primarily and the valve 'P2 / M3' operates as ON / OFF valve.

The DHW circulation pump (P3) has a week schedule for up to 3 ON-periods / day.

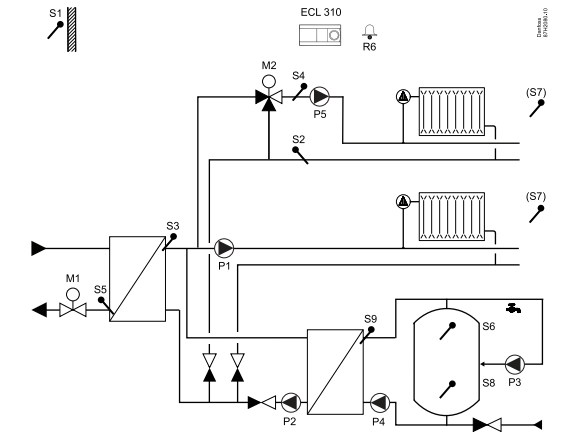
A367.2 example a:



A367.2 example b:



A367.2 example c:



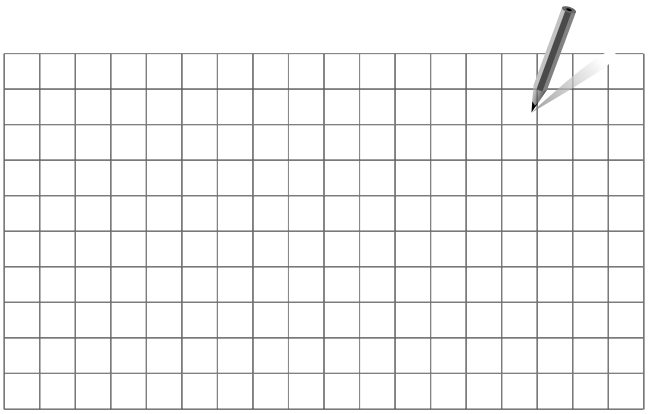
The controller is pre-programmed with factory settings that are shown in the relevant chapters of this guide.

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 Installation Guide, which will guide you step-by-step from installation to final adjustments before the end-user takes over.

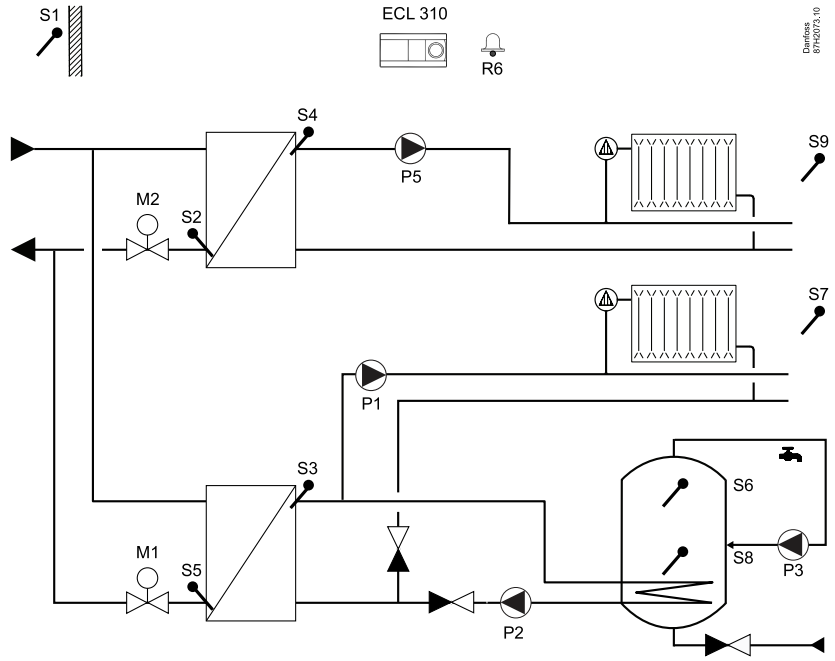
The ECL Comfort controller is a universal controller that can be used for various systems. Based on the shown standard systems, it is possible to configure additional systems. In this chapter you find the most frequently used systems. If your system is not quite as shown below, find the diagram which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



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.

A367.1 example a

Indirectly connected system with 2 heating circuits and secondarily connected DHW tank with internal heat exchanger (optional DHW priority).



Special settings for type A367.1, example a:

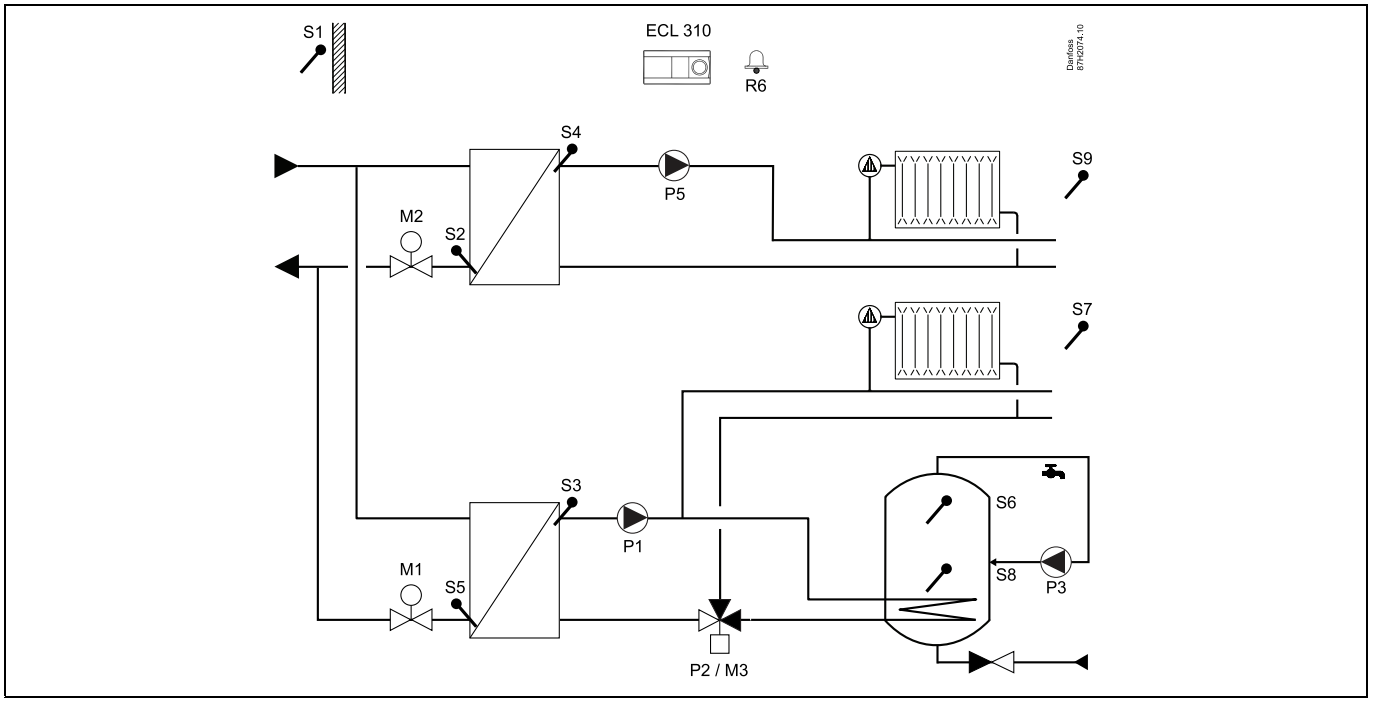
DHW circuit (circuit 3)

The DHW heating is controlled by means of DHW heating pump P2.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Ch.-o. valve / P'	13051	ON
The DHW tank is connected secondarily.		
MENU \ Settings \ Application: 'Tank, sec./prim.'	13053	OFF

A367.1, example b

Indirectly connected system with 2 heating circuits and secondarily connected DHW tank with internal heat exchanger (DHW priority).



Special settings for type A367.1, example b:

DHW circuit (circuit 3)

The DHW heating is controlled by means of changeover valve* P2 / M3.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Ch.-o. valve / P'	13051	OFF
The DHW tank is connected secondarily.		
MENU \ Settings \ Application: 'Tank, sec./prim.'	13053	OFF

*

The changeover valve can be of different types:

A:

Normal power supplied. When the control voltage is applied (from terminal 12), the changeover valve changes flow direction.

Example: Danfoss AMZ 113.

B:

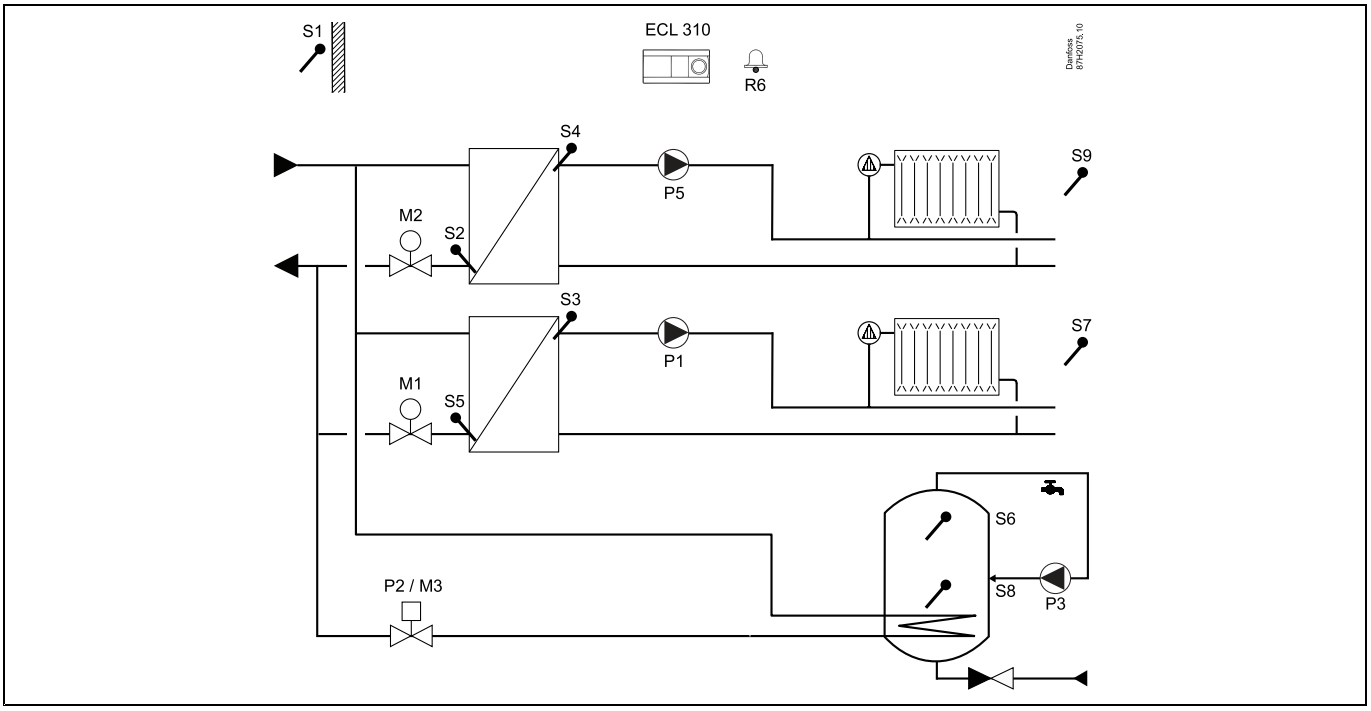
3–point controlled actuator. The control of the M3 actuator follows the control of the P2 output. An OPEN command (from terminal 2) or a CLOSE command (from terminal 1) is constantly applied to actuator M3 in order to determine the flow direction.

Example 1: actuator / valve: Danfoss AMV / VMV — VRB3 — VRG3.

Example 2: actuator / valve: Danfoss AMB / HRB 3 — HFE 3.

A367.1, example c

Indirectly connected system with 2 heating circuits and primarily connected DHW tank with internal heat exchanger (optional DHW priority).



Special settings for type A367.1, example c:

DHW circuit (circuit 3)

The DHW heating is controlled by means of ON / OFF valve* P2 / M3.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Ch.-o. valve / P'	13051	ON
The DHW tank is connected secondarily.		
MENU \ Settings \ Application: 'Tank, sec./prim.	13053	ON

*

The ON / OFF valve can be of different types:

A:

Normal power supplied. When the control voltage is applied (from terminal 12), the ON / OFF valve fully opens the flow.

Example: Danfoss AMZ 112.

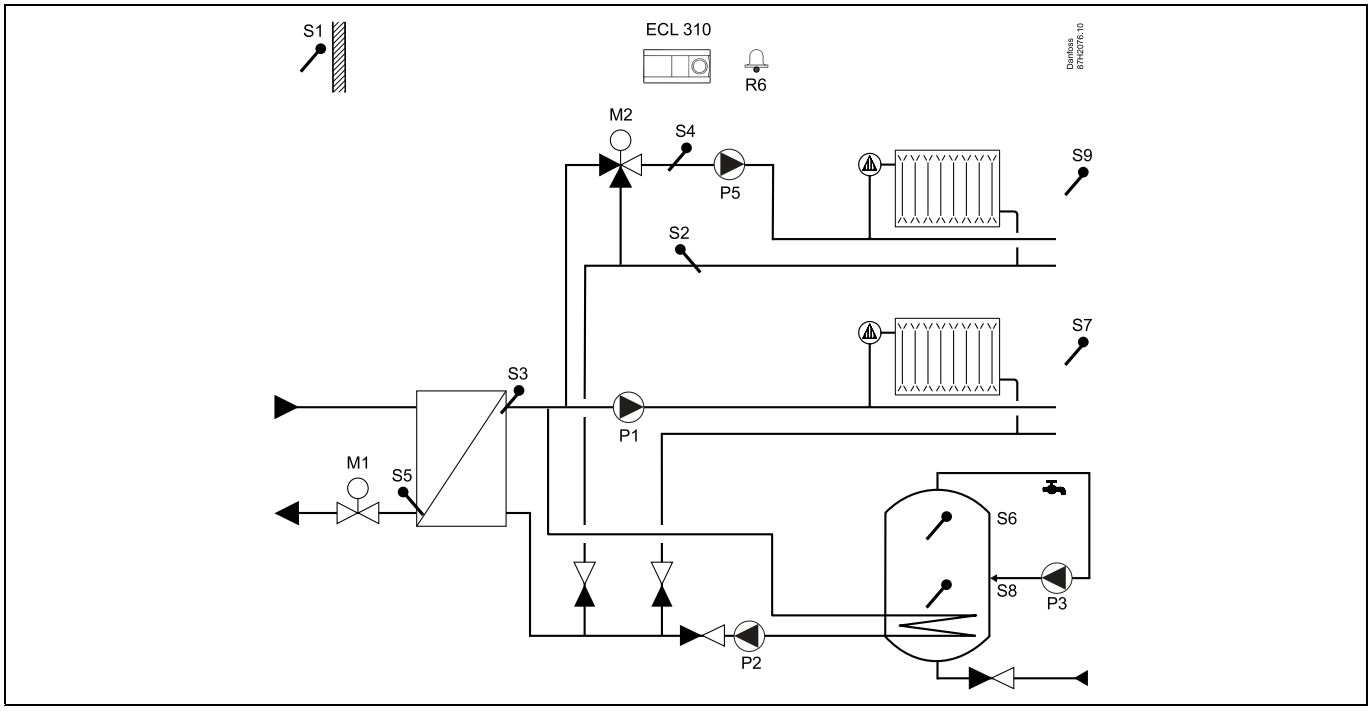
B:

3–point controlled actuator. The control of the M3 actuator follows the control of the P2 output. An OPEN command (from terminal 2) or a CLOSE command (from terminal 1) is constantly applied to actuator M3 in order to fully open or fully close the flow.

Example: actuator / valve: Danfoss AMV / VS 2 - VZ 2 - VRB 2.

A367.1, example d

Indirectly connected system with 2 heating circuits (1 connected as sub circuit) and secondarily connected DHW tank with internal heat exchanger (optional DHW priority).



Special settings for type A367.1, example d:

Heating circuit 1

Heating circuit 1 must receive information about and react on the desired flow temperature from heating circuit 2.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Demand offset'	11017	5 K*

*
The desired flow temperature in heating circuit 1 is 5 K above the desired flow temperature in heating circuit 2.

Heating circuit 2

Heating circuit 2 is connected secondarily and must send information about its desired flow temperature to heating circuit 1.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Send desired T'	12500	ON

DHW circuit (circuit 3)

The DHW heating is controlled by means of DHW heating pump P2.

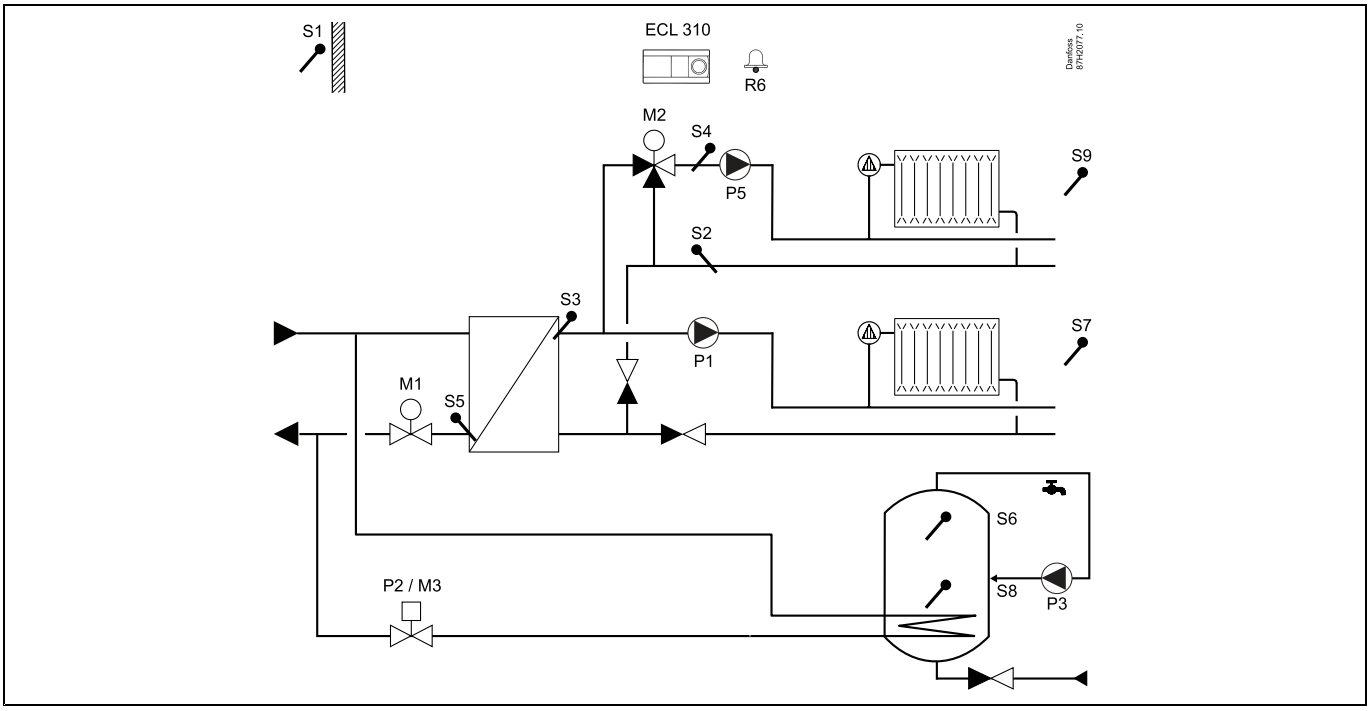
Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Ch.-o. valve / P'	13051	ON

The DHW tank is connected secondarily.

MENU \ Settings \ Application: 'Tank, sec./prim.'	13053	OFF

A367.1, example e

Indirectly connected system with 2 heating circuits (1 connected as sub circuit) and primarily connected DHW tank with internal heat exchanger (optional DHW priority).



Special settings for type A367.1, example e:

Heating circuit 1

Heating circuit 1 must receive information about and react on the desired flow temperature from heating circuit 2.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Demand offset'	11017	5 K*

*

The desired flow temperature in heating circuit 1 is 5 K above the desired flow temperature in heating circuit 2.

Heating circuit 2

Heating circuit 2 is connected secondarily and must send information about its desired flow temperature to heating circuit 1.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Send desired T'	12500	ON

DHW circuit (circuit 3)

The DHW heating is controlled by means of ON / OFF valve** P2 / M3.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Ch.-o. valve / P'	13051	ON
The DHW tank is connected secondarily.		
MENU \ Settings \ Application: 'Tank, sec./prim.'	13053	ON

**

The ON / OFF valve can be of different types:

A:

Normal power supplied. When the control voltage is applied (from terminal 12), the ON / OFF valve fully opens the flow.

Example: Danfoss AMZ 112.

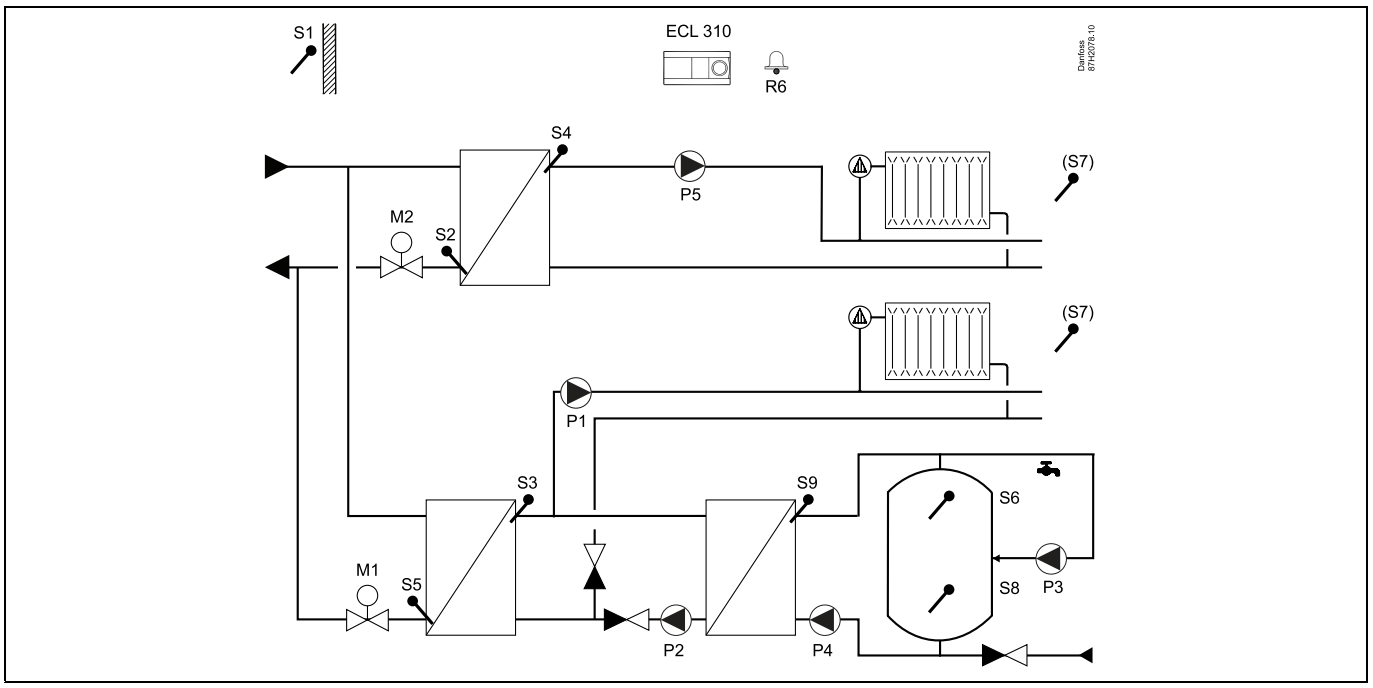
B:

3–point controlled actuator. The control of the M3 actuator follows the control of the P2 output. An OPEN command (from terminal 2) or a CLOSE command (from terminal 1) is constantly applied to actuator M3 in order to fully open or fully close the flow.

Example: actuator / valve: Danfoss AMV / VS 2 - VZ 2 - VRB 2.

A367.2, example a

Indirectly connected system with 2 heating circuits and secondarily connected DHW charging system (optional DHW priority).



Special settings for type A367.2, example a:

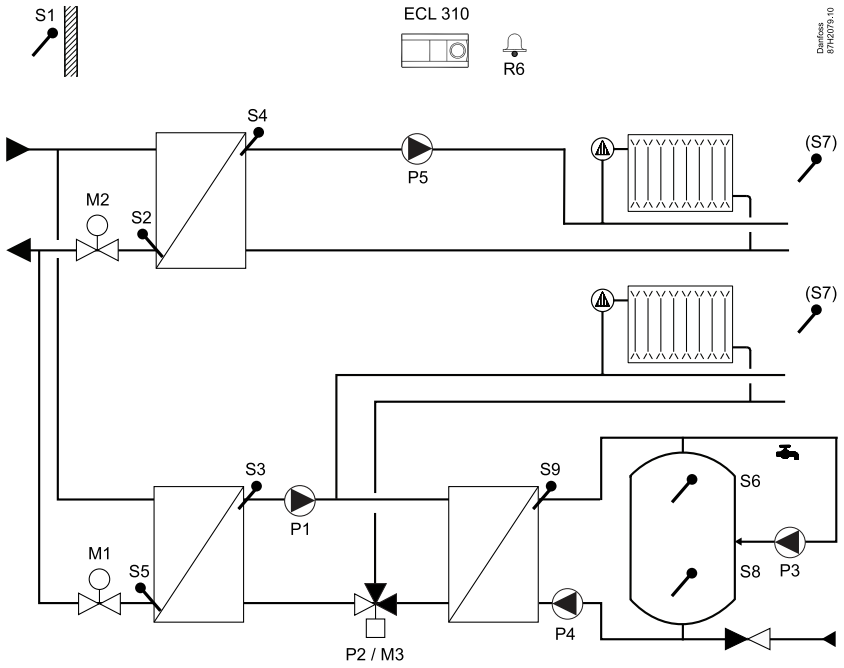
DHW circuit (circuit 3)

The DHW heating is controlled by means of DHW heating pump P2.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Ch.-o. valve / P'	13051	ON

A367.2, example b

Indirectly connected system with 2 heating circuits and secondarily connected DHW charging system (DHW priority).



Special settings for type A367.2, example b:

DHW circuit (circuit 3)

The DHW heating is controlled by means of changeover valve* P2 / M3.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Ch.-o. valve / P'	13051	OFF

*

The changeover valve can be of different types:

A:

Normal power supplied. When the control voltage is applied (from terminal 12), the changeover valve changes flow direction.

Example: Danfoss AMZ 113.

B:

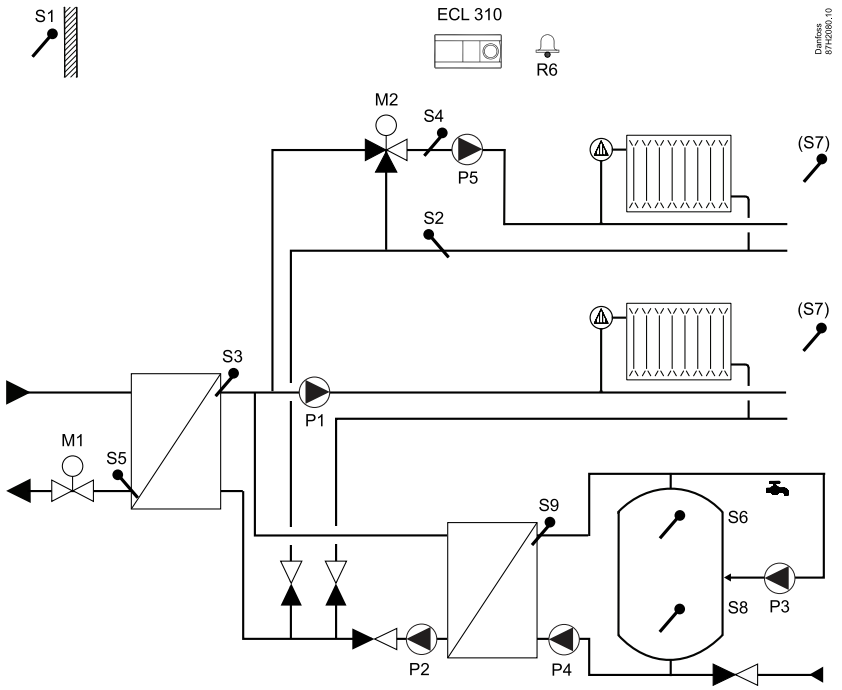
3–point controlled actuator. The control of the M3 actuator follows the control of the P2 output. An OPEN command (from terminal 2) or a CLOSE command (from terminal 1) is constantly applied to actuator M3 in order to determine the flow direction.

Example 1: actuator / valve: Danfoss AMV / VMV — VRB3 — VRG3.

Example 2: actuator / valve: Danfoss AMB / HRB 3 — HFE 3.

A367.2, example c

Indirectly connected system with 2 heating circuits (1 connected as sub circuit) and secondarily connected DHW charging system (optional DHW priority).



Special settings for type A367.2, example c:

Heating circuit 1

Heating circuit 1 must receive information about and react on the desired flow temperature from heating circuit 2.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Demand offset'	11017	5 K*

*
The desired flow temperature in heating circuit 1 is 5 K above the desired flow temperature in heating circuit 2.

Heating circuit 2

Heating circuit 2 is connected secondarily and must send information about its desired flow temperature to heating circuit 1.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Send desired T'	12500	ON

DHW circuit (circuit 3)

The DHW heating is controlled by means of DHW heating pump P2.

Navigation:	ID no.:	Recommended setting:
MENU \ Settings \ Application: 'Ch.-o. valve / P'	13051	ON

2.3 Mounting

2.3.1 Mounting the ECL Comfort controller

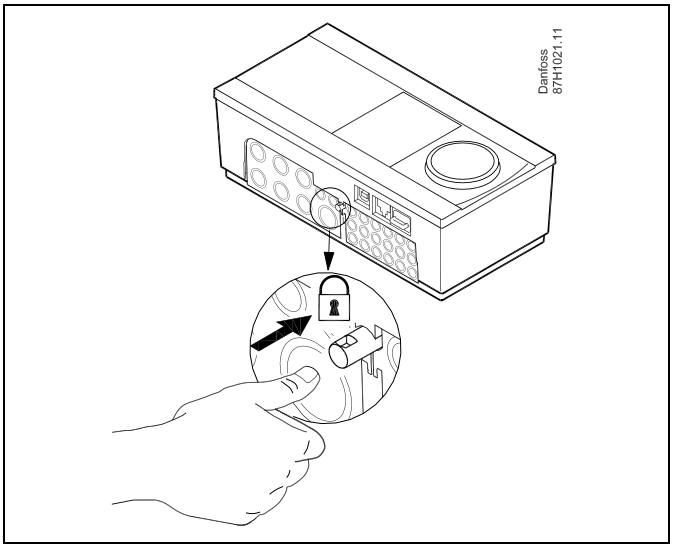
For easy access, you should mount the ECL Comfort controller near the system. Select one of the following methods using the same base part (code no. 087H3220 (ECL Comfort 210) or 087H3230 (ECL Comfort 310):

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

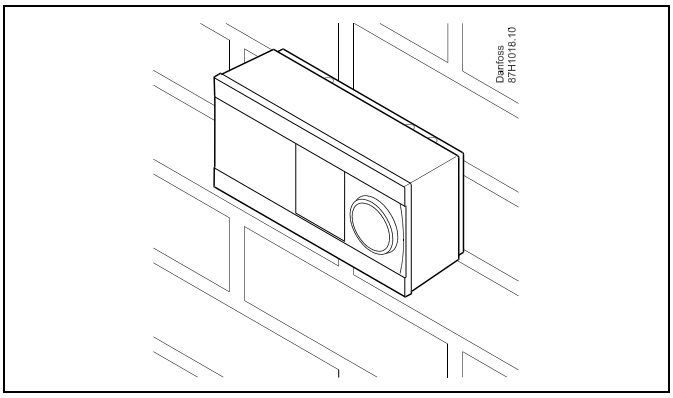
The ECL Comfort 210 can be mounted in the ECL Comfort 210 / 310 base part.
The ECL Comfort 310 can only be mounted in the ECL Comfort 310 base part.

Screws, PG cable glands and rawlplugs are not supplied.

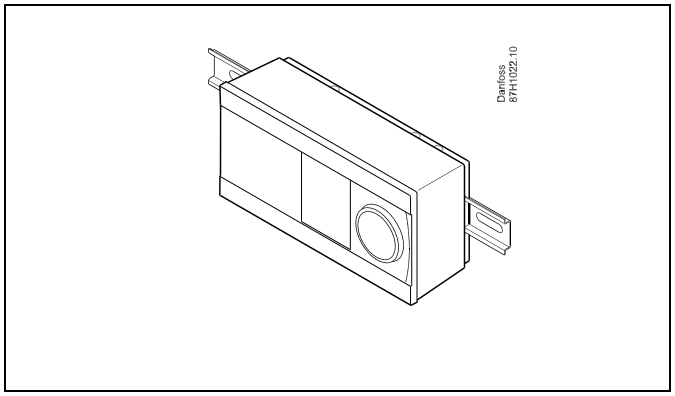
Locking the ECL Comfort controller
In order to fasten the ECL Comfort controller to its base part, secure the controller with the locking pin.



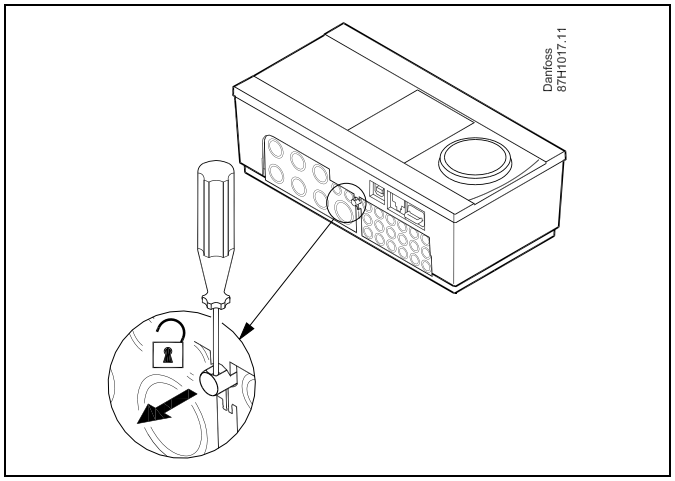
Mounting on a wall
Mount the base part on a wall with a smooth surface. Establish the electrical connections and position the controller in the base part. Secure the controller with the locking pin.



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.



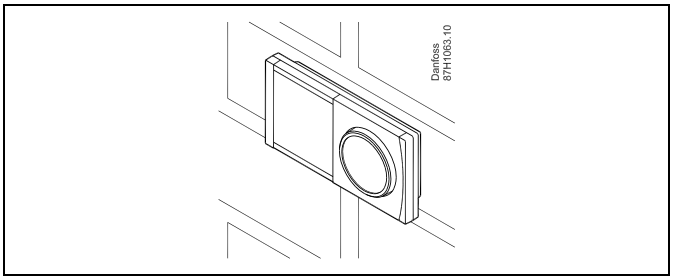
2.3.2 Mounting the Remote Control Units ECA 30/31

Select one of the following methods:

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

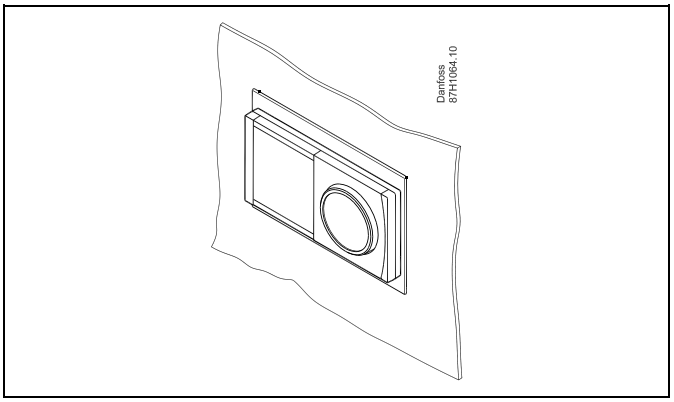
Screws and rawlplugs are not supplied.

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.



2.4 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.

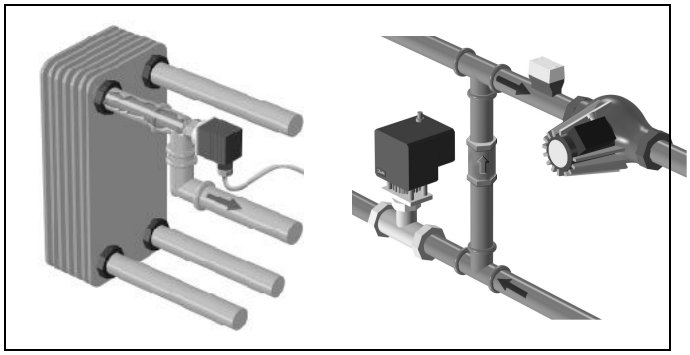
The temperature sensor mentioned below are sensors used for the ECL Comfort 210 and 310 series which not all will be needed for your application!

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.

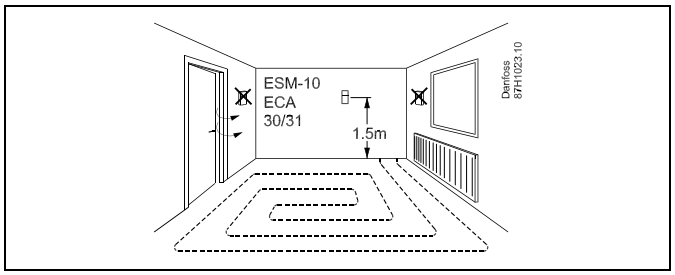
Flow temperature sensor (ESMU, ESM-11 or ESMC)
Place the sensor max. 15 cm from the mixing point. In systems with heat exchanger, Danfoss recommends that the ESMU-type to be inserted into the exchanger flow outlet.

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.

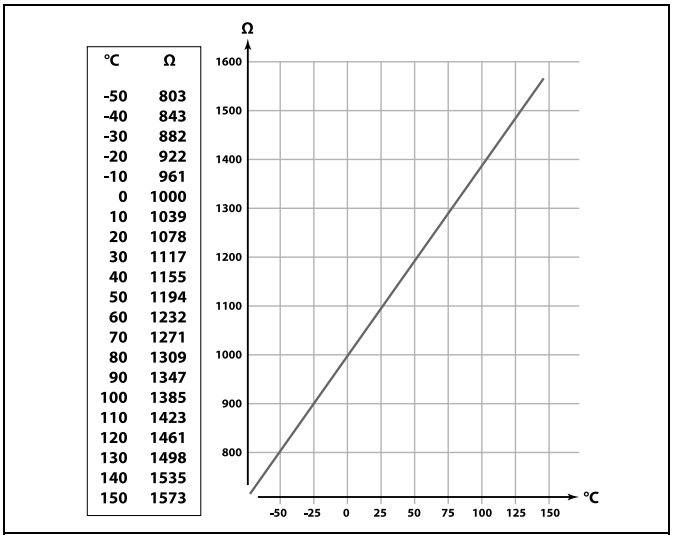
Slab temperature sensor (ESMB-12)
Place the sensor in a protection tube in the slab.

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

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

Relationship between temperature and ohmic value:

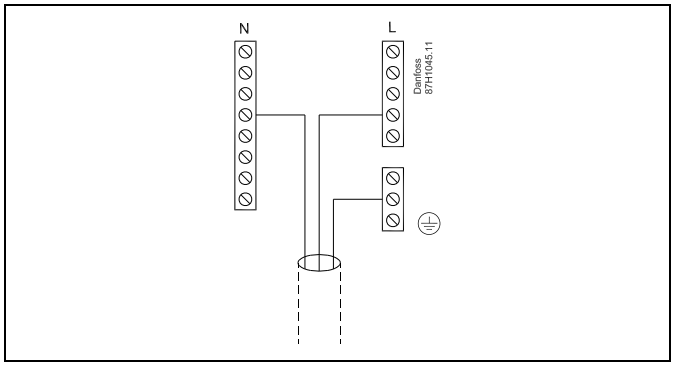
°C	Ω
-50	803
-40	843
-30	882
-20	922
-10	961
0	1000
10	1039
20	1078
30	1117
40	1155
50	1194
60	1232
70	1271
80	1309
90	1347
100	1385
110	1423
120	1461
130	1498
140	1535
150	1573



2.5 Electrical connections

2.5.1 Electrical connections 230 V a.c. in general

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



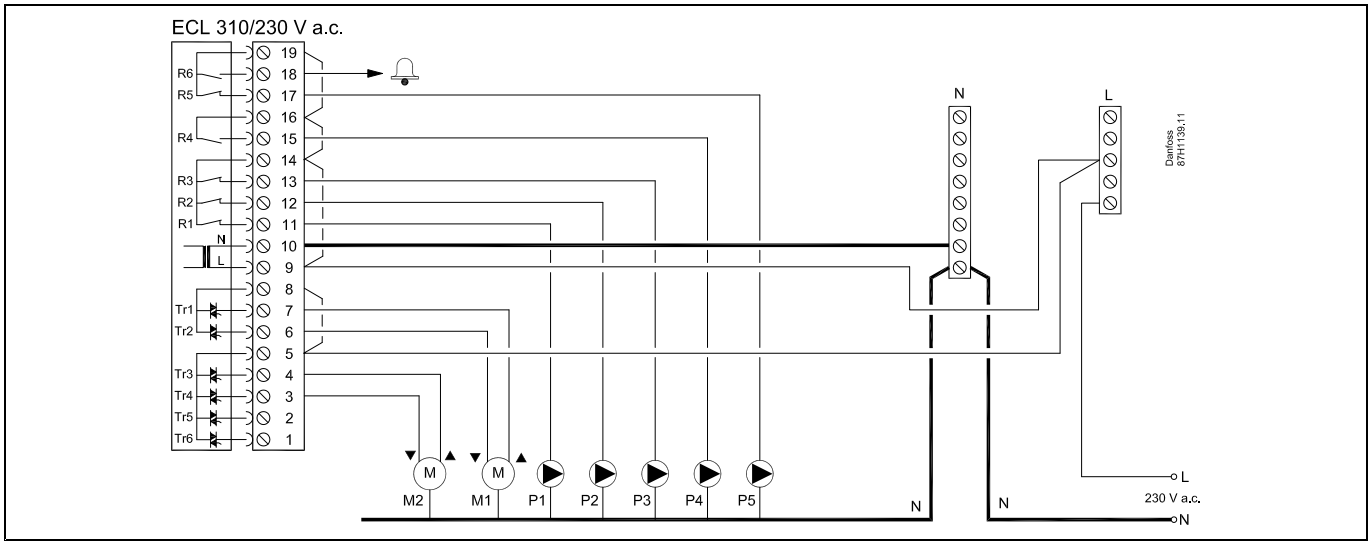
2.5.2 Electrical connections, 230 V a.c., power supply, pumps, motorized control valves etc.

Application A367.1 example a: Without P4

Application A367.1 example d: Without P4

Application A367.2 example a: With P4

Application A367.2 example c: With P4



Terminal	Description	Max. load-
19	Phase for circulation pump and alarm output	
18	Alarm	4 (2) A / 230 V a.c.*
17 P5	Circulation pump, heating, ON / OFF, circuit 2	4 (2) A / 230 V a.c.*-
16	Phase for circulation pump, heating, circuit 2	
15 P4	DHW charging pump, circuit 3 (used only in A367.2 ex. a and A367.2 ex. c)	4 (2) A / 230 V a.c.*
14	Phase for circulation pumps / changeover valve	
13 P3	DHW circulation pump, ON / OFF, circuit 3	4 (2) A / 230 V a.c.*
12 P2	DHW heating pump, circuit 3	4 (2) A / 230 V a.c.*
11 P1	Circulation pump, heating, ON / OFF, circuit 1	4 (2) A / 230 V a.c.*
10	Supply voltage 230 V a.c. - neutral (N)	
9	Supply voltage 230 V a.c. - live (L)	
8 M1	Phase for motorized control valve output, circuit 1	
7 M1	Motorized control valve - opening	0.2 A / 230 V a.c.
6 M1	Motorized control valve - closing	0.2 A / 230 V a.c.
5 M2	Phase for motorized control valve output, circuit 2	
4 M2	Motorized control valve - opening	0.2 A / 230 V a.c.
3 M2	Motorized control valve - closing	0.2 A / 230 V a.c.
2	Do not use	
1	Do not use	
* Relay contacts: 4 A for ohmic load, 2 A for inductive load		

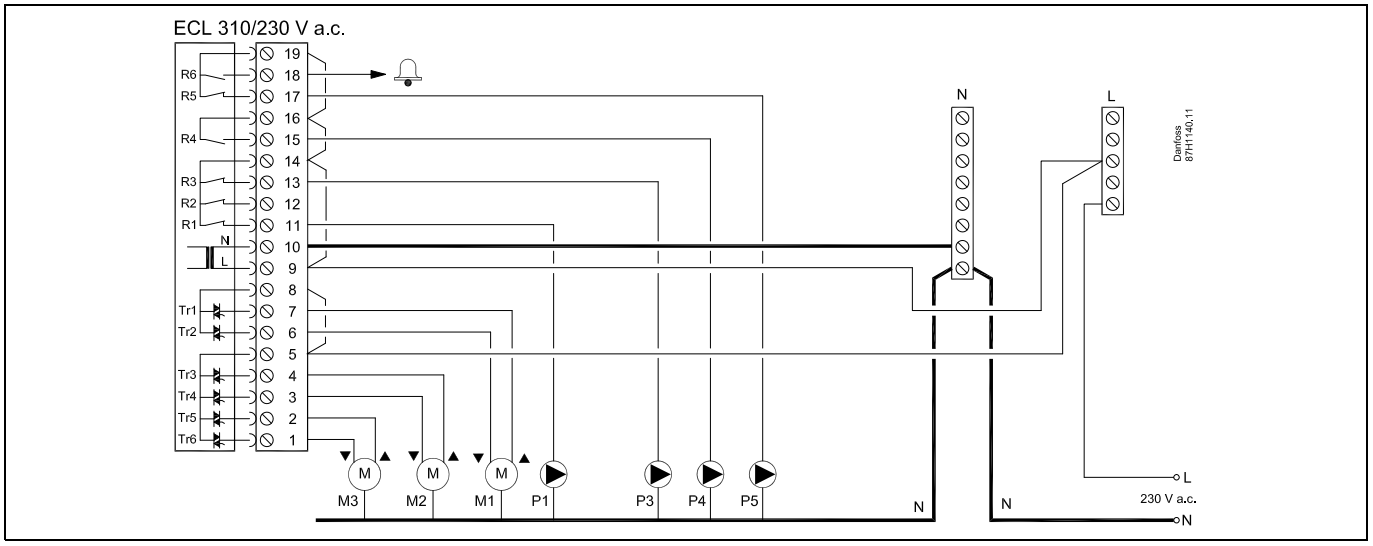
Factory established jumpers:
5 to 8, 9 to 14, L to 5 and L to 9, N to 10

Application A367.1 example b: Without P4

Application A367.1 example c: Without P4

Application A367.1 example e: Without P4

Application A367.2 example b: With P4

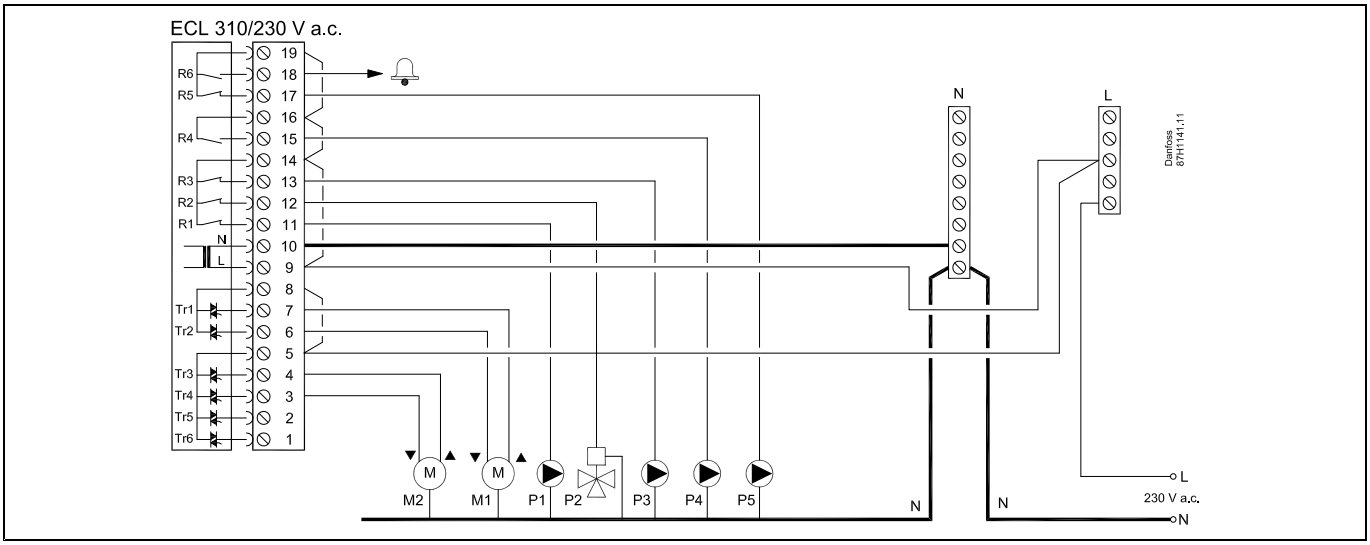


Terminal	Description	Max. load-
19	Phase for circulation pump and alarm output	
18	Alarm	4 (2) A / 230 V a.c.*
17 P5	Circulation pump, heating, ON / OFF, circuit 2	4 (2) A / 230 V a.c.*
16	Phase for circulation pump, heating, circuit 2	
15 P4	DHW charging pump, circuit 3 (used only in A367.2 ex. b)	4 (2) A / 230 V a.c.*
14	Phase for circulation pumps / changeover valve	
13 P3	DHW circulation pump, ON / OFF, circuit 3	4 (2) A / 230 V a.c.*
12	Do not use	4 (2) A / 230 V a.c.*
11 P1	Circulation pump, heating, ON / OFF, circuit 1	4 (2) A / 230 V a.c.*
10	Supply voltage 230 V a.c. - neutral (N)	
9	Supply voltage 230 V a.c. - live (L)	
8 M1	Phase for motorized control valve output, circuit 1	
7 M1	Motorized control valve - opening	0.2 A / 230 V a.c.
6 M1	Motorized control valve - closing	0.2 A / 230 V a.c.
5 M2	Phase for motorized control valve output, circuit 2 and motorized changeover valve, circuit 3	
4 M2	Motorized control valve - opening	0.2 A / 230 V a.c.
3 M2	Motorized control valve - closing	0.2 A / 230 V a.c.
2 M3	Motorized changeover valve - DHW circuit direction	0.2 A / 230 V a.c.
1 M3	Motorized changeover valve - heating circuit direction	0.2 A / 230 V a.c.
* Relay contacts: 4 A for ohmic load, 2 A for inductive load		

Factory established jumpers:
5 to 8, 9 to 14, L to 5 and L to 9, N to 10

Application A367.1 example b: Without P4

Application A367.2 example b: With P4

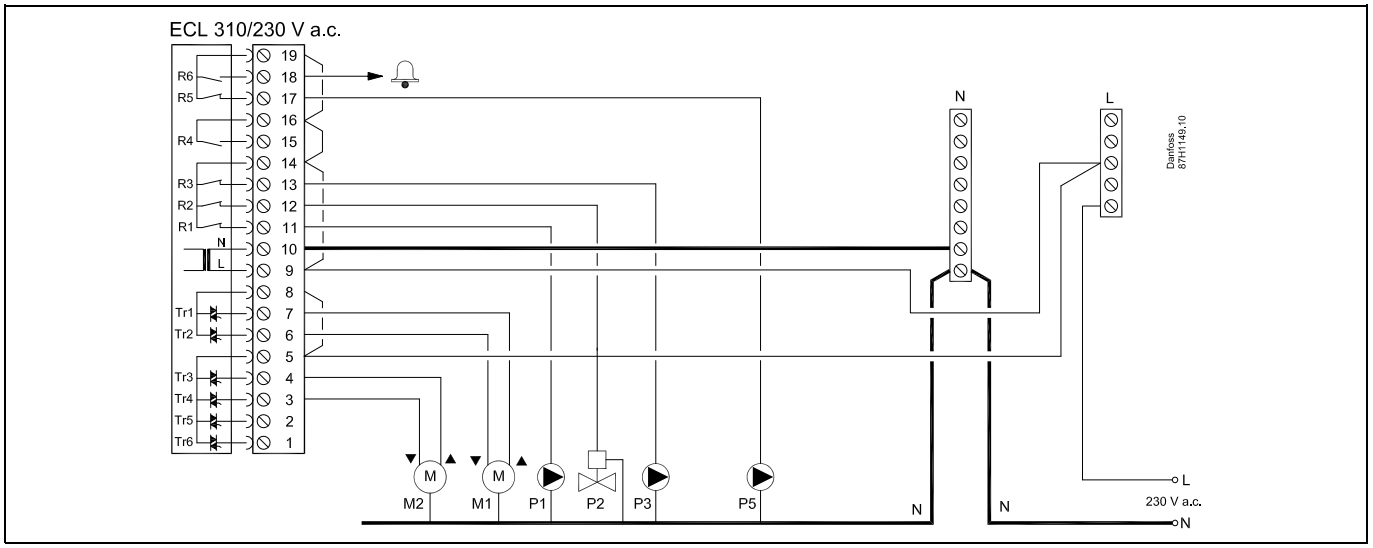


Terminal	Description	Max. load-
19	Phase for circulation pump and alarm output	
18	Alarm	4 (2) A / 230 V a.c.*
17 P5	Circulation pump, heating, ON / OFF, circuit 2	4 (2) A / 230 V a.c.*
16	Phase for circulation pump, heating, circuit 2	
15 P4	DHW charging pump, circuit 3 (used only in A367.2 example b)	4 (2) A / 230 V a.c.*
14	Phase for circulation pumps / changeover valve	
13 P3	DHW circulation pump, ON / OFF, circuit 3	4 (2) A / 230 V a.c.*
12 P2	Changeover valve , circuit 3	4 (2) A / 230 V a.c.*
11 P1	Circulation pump, heating, ON / OFF, circuit 1	4 (2) A / 230 V a.c.*
10	Supply voltage 230 V a.c. - neutral (N)	
9	Supply voltage 230 V a.c. - live (L)	
8 M1	Phase for motorized control valve output, circuit 1	
7 M1	Motorized control valve - opening	0.2 A / 230 V a.c.
6 M1	Motorized control valve - closing	0.2 A / 230 V a.c.
5 M2	Phase for: Motorized control valve output, circuit 2, Changeover valve (A367.1 ex. b and A367.2 ex. b), circuit 3	
4 M2	Motorized control valve - opening	0.2 A / 230 V a.c.
3 M2	Motorized control valve - closing	0.2 A / 230 V a.c.
2	Do not use	
1	Do not use	
* Relay contacts: 4 A for ohmic load, 2 A for inductive load		

Factory established jumpers:
5 to 8, 9 to 14, L to 5 and L to 9, N to 10

Application A367.1 example c: Without P4

Application A367.1 example e: Without P4



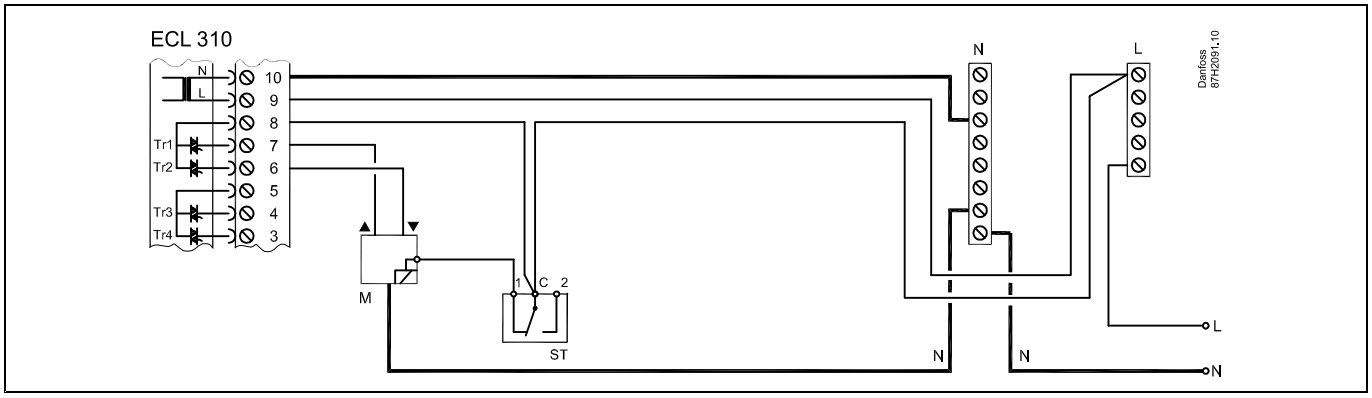
Terminal	Description	Max. load-
19	Phase for circulation pump and alarm output	
18	Alarm	4 (2) A / 230 V a.c.*
17 P5	Circulation pump, heating, ON / OFF, circuit 2	4 (2) A / 230 V a.c.*
16	Phase for circulation pump, heating, circuit 2	
15	Do not use	
14	Phase for pumps / DHW ON / OFF valve	
13 P3	DHW circulation pump, ON / OFF, circuit 3	4 (2) A / 230 V a.c.*
12 P2	DHW ON / OFF valve, circuit 3	4 (2) A / 230 V a.c.*
11 P1	Circulation pump, heating, ON / OFF, circuit 1	4 (2) A / 230 V a.c.*
10	Supply voltage 230 V a.c. - neutral (N)	
9	Supply voltage 230 V a.c. - live (L)	
8 M1	Phase for motorized control valve output, circuit 1	
7 M1	Motorized control valve - opening	0.2 A / 230 V a.c.
6 M1	Motorized control valve - closing	0.2 A / 230 V a.c.
5 M2	Phase for motorized control valve output, circuit 2	
4 M2	Motorized control valve - opening	0.2 A / 230 V a.c.
3 M2	Motorized control valve - closing	0.2 A / 230 V a.c.
2	Do not use	
1	Do not use	
* Relay contacts: 4 A for ohmic load, 2 A for inductive load		

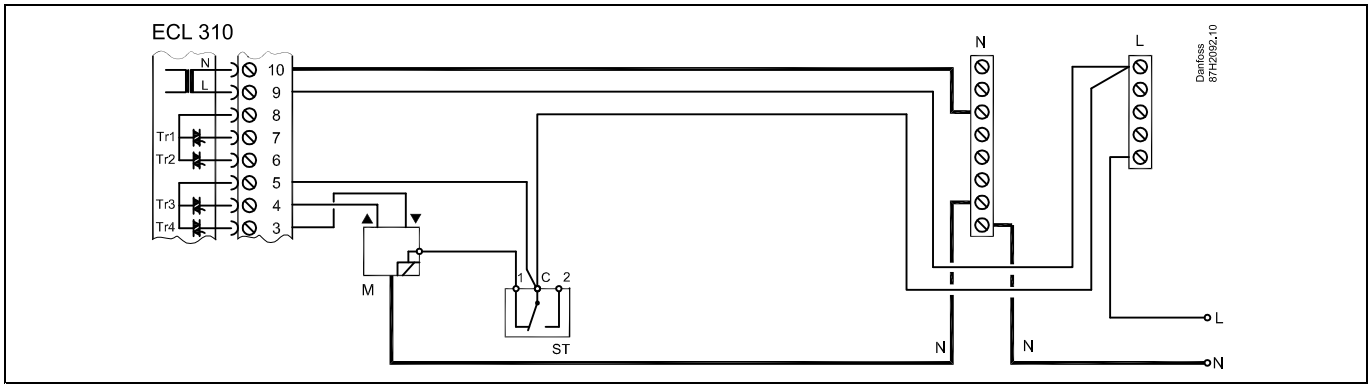
Factory established jumpers:
5 to 8, 9 to 14, L to 5 and L to 9, N to 10

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.

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

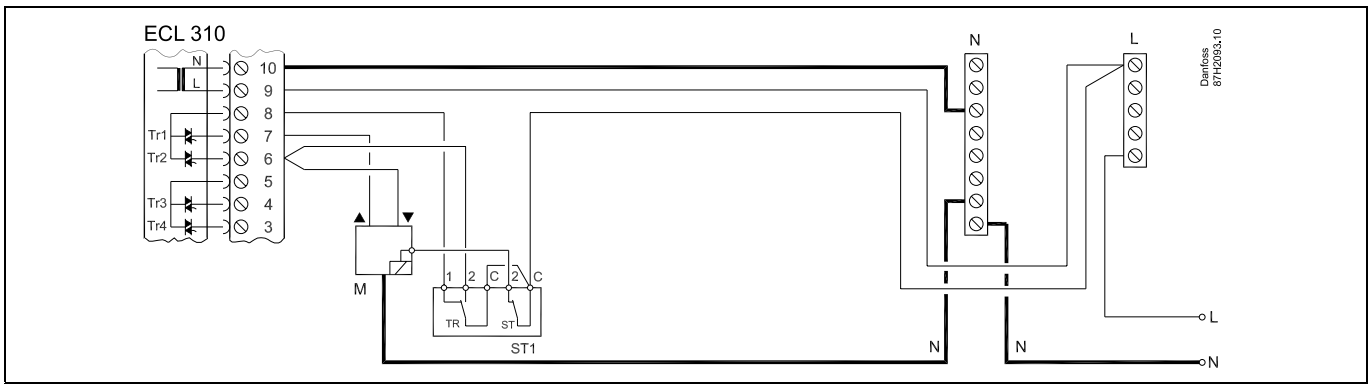
With safety thermostat, 1–step closing:

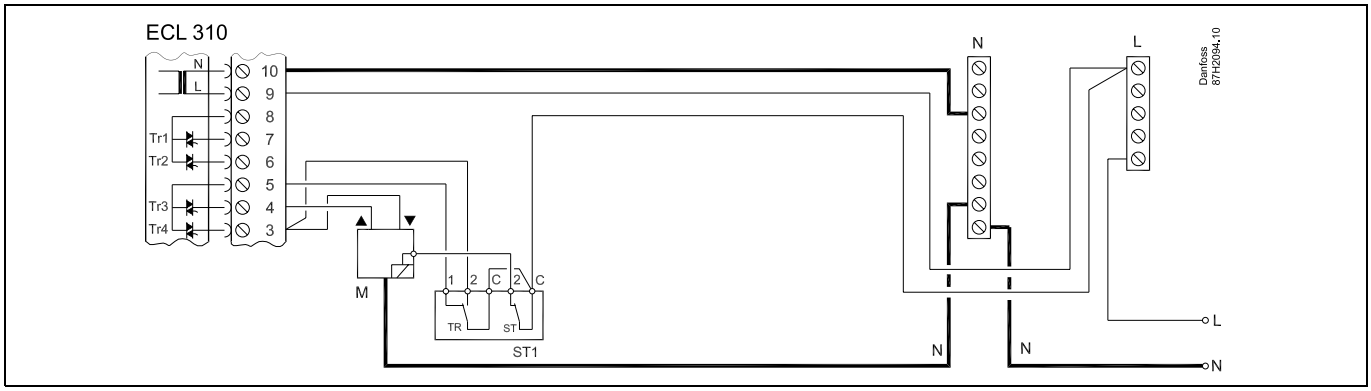




When ST is activated by a high temperature, the safety circuit in the motorized control valve closes the valve immediately

With safety thermostat, 2–step closing:





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.

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.

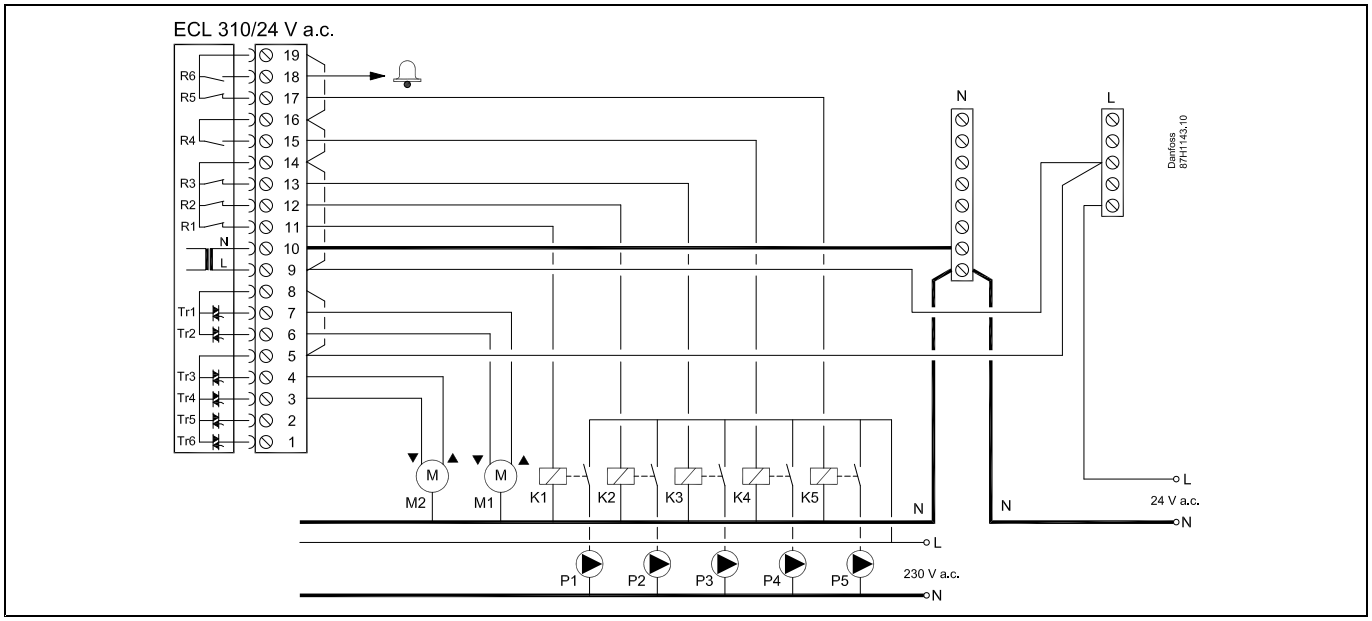
2.5.4 Electrical connections, 24 V a.c., power supply, pumps, motorized valves etc.

Application A367.1 example a: Without P4

Application A367.1 example d: Without P4

Application A367.2 example a: With P4

Application A367.2 example c: With P4



Terminal	Description	Max. load-
19	Phase for circulation pump and alarm output	
18	Alarm	4 (2) A / 24 V a.c.*
17 K5	Circulation pump, heating, ON / OFF, circuit 2	4 (2) A / 24 V a.c.*
16	Phase for circulation pump, heating, circuit 2	
15 K4	DHW charging pump, circuit 3 (used only in A367.2 ex. a and A367.2 ex. c)	4 (2) A / 24 V a.c.*
14	Phase for circulation pumps / changeover valve	
13 K3	DHW circulation pump, ON / OFF, circuit 3	4 (2) A / 24 V a.c.*
12 K2	DHW heating pump, circuit 3	4 (2) A / 24 V a.c.*
11 K1	Circulation pump, heating, ON / OFF, circuit 1	4 (2) A / 24 V a.c.*
10	Supply voltage 24 V a.c. - (N)	
9	Supply voltage 24 V a.c. - (L)	
8 M1	Phase for motorized control valve output, circuit 1	
7 M1	Motorized control valve - opening	1 A / 24 V a.c.
6 M1	Motorized control valve - closing	1 A / 24 V a.c.
5 M2	Phase for motorized control valve output, circuit 2	
4 M2	Motorized control valve - opening	1 A / 24 V a.c.
3 M2	Motorized control valve - closing	1 A / 24 V a.c.
2	Do not use	
1	Do not use	
* Relay contacts: 4 A for ohmic load, 2 A for inductive load		

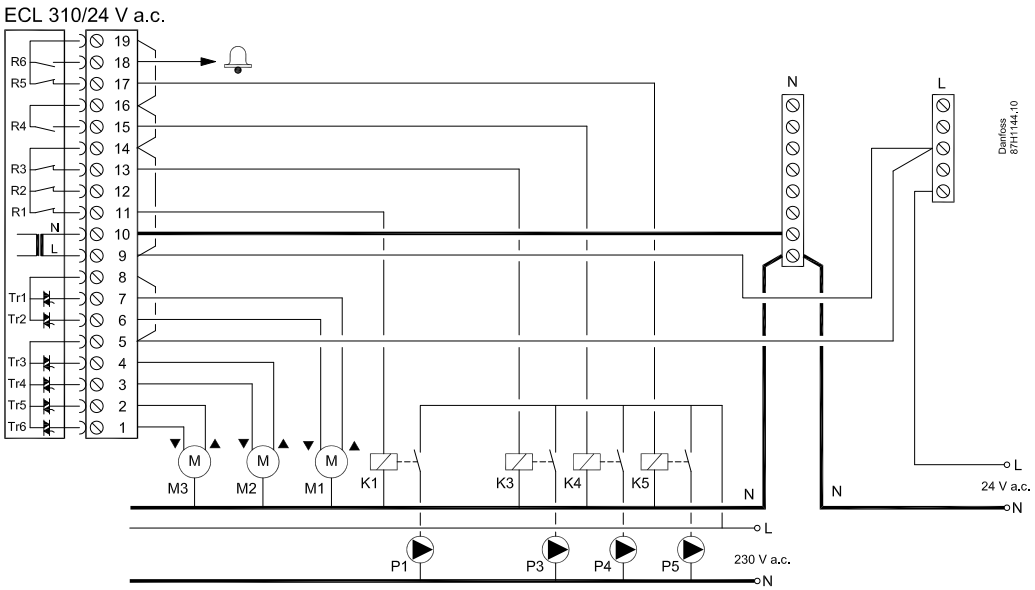
Factory established jumpers:
5 to 8, 9 to 14, L to 5 and L to 9, N to 10

Application A367.1 example b: Without P4

Application A367.1 example c: Without P4

Application A367.1 example e: Without P4

Application A367.2 example b: With P4

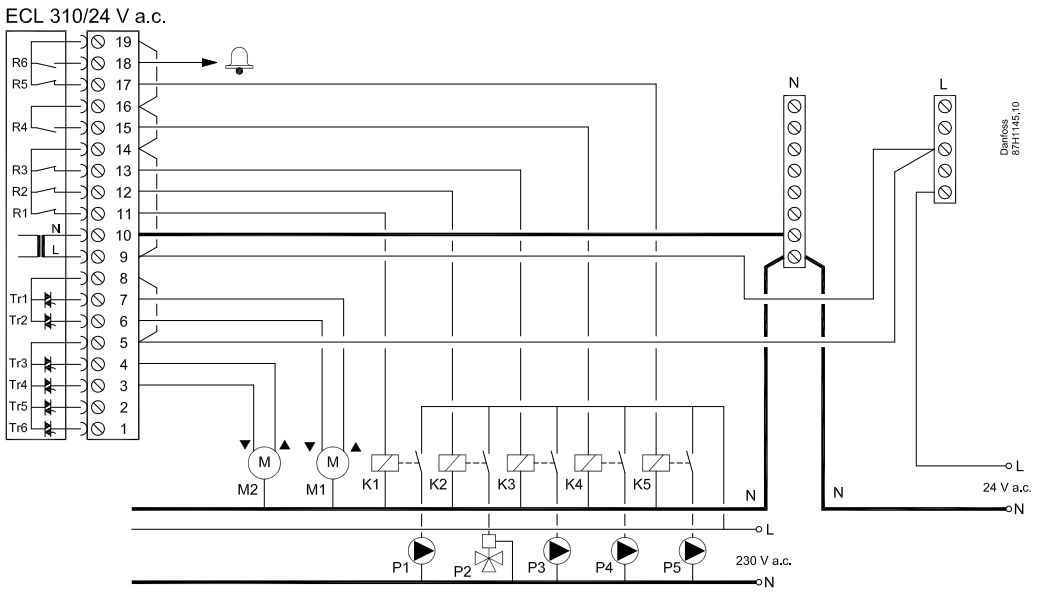


Terminal	Description	Max. load-
19	Phase for circulation pump and alarm output	
18	Alarm	4 (2) A / 24 V a.c.*
17 K5	Circulation pump, heating, ON / OFF, circuit 2	4 (2) A / 24 V a.c.*
16	Phase for circulation pump, heating, circuit 2	
15 K4	DHW charging pump, circuit 3 (used only in A367.2 ex. b)	4 (2) A / 24 V a.c.*
14	Phase for circulation pumps / changeover valve	
13 K3	DHW circulation pump, ON / OFF, circuit 3	4 (2) A / 24 V a.c.*
12	Do not use	4 (2) A / 24 V a.c.*
11 K1	Circulation pump, heating, ON / OFF, circuit 1	4 (2) A / 24 V a.c.*
10	Supply voltage 24 V a.c. - (N)	
9	Supply voltage 24 V a.c. - (L)	
8 M1	Phase for motorized control valve output, circuit 1	
7 M1	Motorized control valve - opening	1 A / 24 V a.c.
6 M1	Motorized control valve - closing	1 A / 24 V a.c.
5 M2	Phase for motorized control valve output, circuit 2 and motorized changeover valve, circuit 3	
4 M2	Motorized control valve - opening	1 A / 24 V a.c.
3 M2	Motorized control valve - closing	1 A / 24 V a.c.
2 M3	Motorized changeover valve - DHW circuit direction	1 A / 24 V a.c.
1 M3	Motorized changeover valve - heating circuit direction	1 A / 24 V a.c.
* Relay contacts: 4 A for ohmic load, 2 A for inductive load		

Factory established jumpers:
5 to 8, 9 to 14, L to 5 and L to 9, N to 10

Application A367.1 example b: Without P4

Application A367.2 example b: With P4

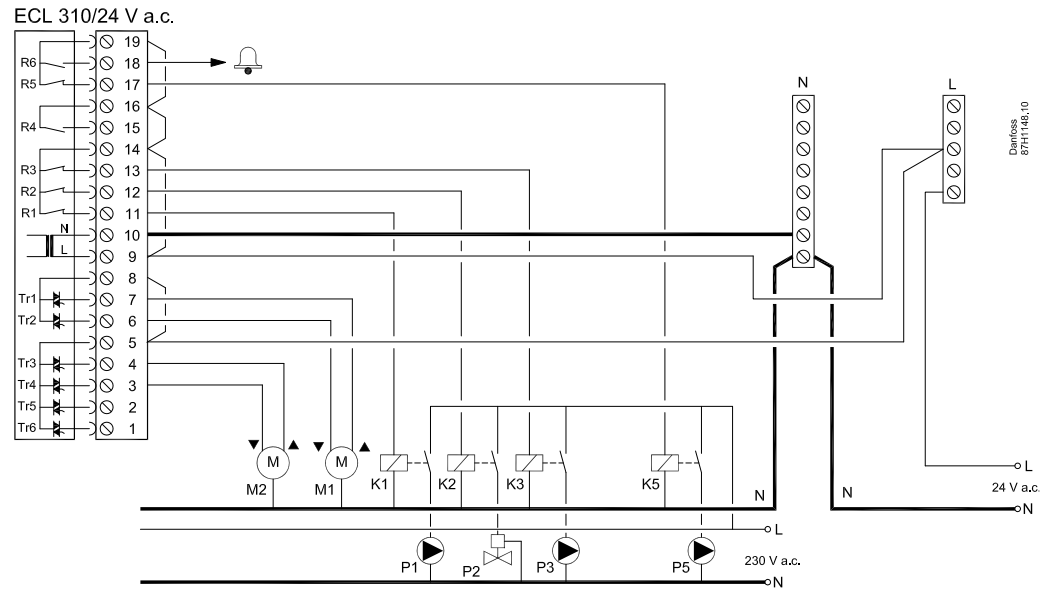


Terminal	Description	Max. load-
19	Phase for circulation pump and alarm output	
18	Alarm	4 (2) A / 24 V a.c.*
17 K5	Circulation pump, heating, ON / OFF, circuit 2	4 (2) A / 24 V a.c.*
16	Phase for circulation pump, heating, circuit 2	
15 K4	DHW charging pump, circuit 3 (used only in A367.2 example b)	4 (2) A / 24 V a.c.*
14	Phase for circulation pumps / changeover valve	
13 K3	DHW circulation pump, ON / OFF, circuit 3	4 (2) A / 24 V a.c.*
12 K2	Changeover valve , circuit 3	4 (2) A / 24 V a.c.*
11 K1	Circulation pump, heating, ON / OFF, circuit 1	4 (2) A / 24 V a.c.*
10	Supply voltage 24 V a.c. - (N)	
9	Supply voltage 24 V a.c. - (L)	
8 M1	Phase for motorized control valve output, circuit 1	
7 M1	Motorized control valve - opening	1 A / 24 V a.c.
6 M1	Motorized control valve - closing	1 A / 24 V a.c.
5 M2	Phase for: Motorized control valve output, circuit 2, Changeover valve (A367.1 ex. b and A367.2 ex. b), circuit 3	
4 M2	Motorized control valve - opening	1 A / 24 V a.c.
3 M2	Motorized control valve - closing	1 A / 24 V a.c.
2	Do not use	
1	Do not use	
* Relay contacts: 4 A for ohmic load, 2 A for inductive load		

Factory established jumpers:
5 to 8, 9 to 14, L to 5 and L to 9, N to 10

Application A367.1 example c: Without P4

Application A367.1 example e: Without P4



Terminal	Description	Max. load-
19	Phase for circulation pump and alarm output	
18	Alarm	4 (2) A / 24 V a.c.*
17 K5	Circulation pump, heating, ON / OFF, circuit 2	4 (2) A / 24 V a.c.*
16	Phase for circulation pump, heating, circuit 2	
15	Do not use	
14	Phase for pumps / DHW ON / OFF valve	
13 K3	DHW circulation pump, ON / OFF, circuit 3	4 (2) A / 24 V a.c.*
12 K2	DHW ON / OFF valve, circuit 3	4 (2) A / 24 V a.c.*
11 K1	Circulation pump, heating, ON / OFF, circuit 1	4 (2) A / 24 V a.c.*
10	Supply voltage 24 V a.c. - (N)	
9	Supply voltage 24 V a.c. - (L)	
8 M1	Phase for motorized control valve output, circuit 1	
7 M1	Motorized control valve - opening	1 A / 24 V a.c.
6 M1	Motorized control valve - closing	1 A / 24 V a.c.
5 M2	Phase for motorized control valve output, circuit 2	
4 M2	Motorized control valve - opening	1 A / 24 V a.c.
3 M2	Motorized control valve - closing	1 A / 24 V a.c.
2	Do not use	
1	Do not use	
* Relay contacts: 4 A for ohmic load, 2 A for inductive load		

Factory established jumpers:
5 to 8, 9 to 14, L to 5 and L to 9, N to 10

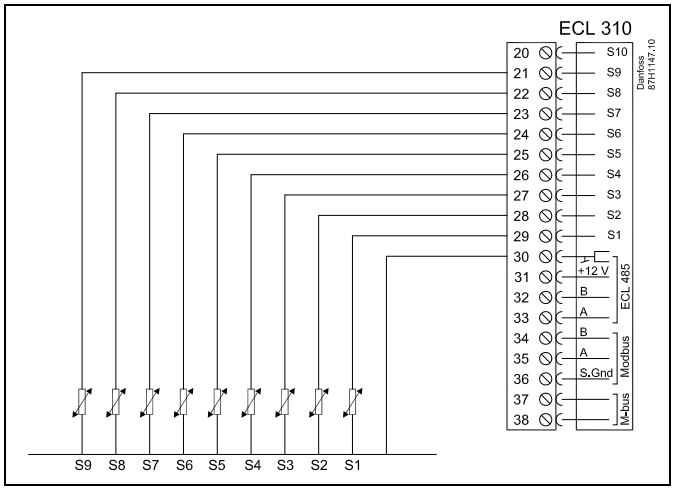
Wire cross section: 0.5 - 1.5 mm^2
Incorrect connection can damage the electronic outputs.
Max. 2 x 1.5 mm^2 wires can be inserted into each screw terminal.

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

2.5.5 Electrical connections, Pt 1000 temperature sensors and signals

A367:

Terminal	Sensor / description		Type (recomm.)
29 and 30	S1	Outdoor temperature sensor*	ESMT
28 and 30	S2	Return temperature sensor, heating circuit 2	ESM-11 / ESMB / ESMC / ESMU
27 and 30	S3	Flow temperature sensor, heating circuit 1**	ESM-11 / ESMB / ESMC / ESMU
26 and 30	S4	Flow temperature sensor, heating circuit 2**	ESM-11 / ESMB / ESMC / ESMU
25 and 30	S5	Return temperature sensor, heating circuit 1	ESM-11 / ESMB / ESMC / ESMU
24 and 30	S6	DHW tank temperature sensor, upper***	ESMB / ESMU
23 and 30	S7	Room temperature sensor****: A367.1: heating circuit 1 A367.2: heating circuit 1 / heating circuit 2	ESM-10
22 and 30	S8	DHW tank temperature sensor, lower	ESMB / ESMU
21 and 30	S9	Room temperature sensor****: A367.1 heating circuit 2 only	ESM-10
		DHW charging temperature sensor: A367.2 DHW circuit only	ESM-11 / ESMB / ESMC / ESMU
20 and 30	S10	Voltage signal (0 - 10 V) for external control of desired flow temperature, heating circuit 1	



* 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. The outdoor temperature sensor is common for both heating circuits.

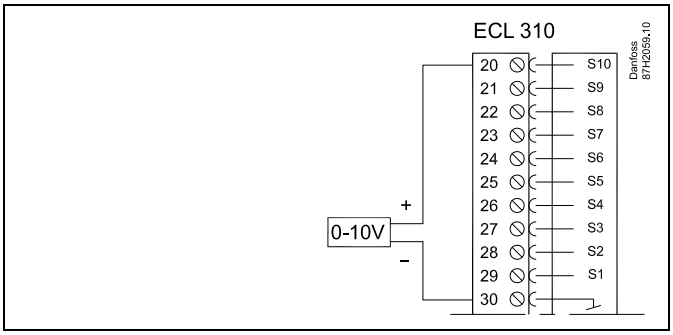
** The flow temperature sensor must always be connected in order to have the desired functionality. If the sensor is not connected or the cable is short-circuited, the motorized control valve closes (safety function).

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

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

Factory established jumper:
30 to common terminal.

Connection of voltage signal (0–10 V) for external control of desired flow temperature in heating circuit 1



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

2.5.6 Electrical connections, ECA 30 / 31

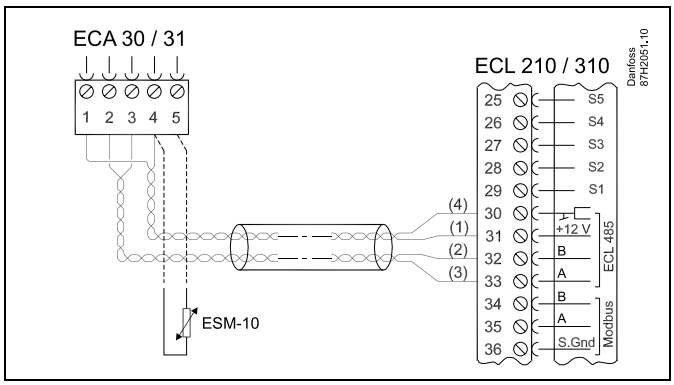
Terminal	Terminal ECA 30 / 31	Description	Type (recomm.)
30	4	Twisted pair	Cable 2 x twisted pair
31	1		
32	2	Twisted pair	
33	3		
	4	Ext. room temperature sensor*	ESM-10
	5		

* 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.



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

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

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

Max. two ECA 30 / 31 can be connected to an ECL Comfort controller.

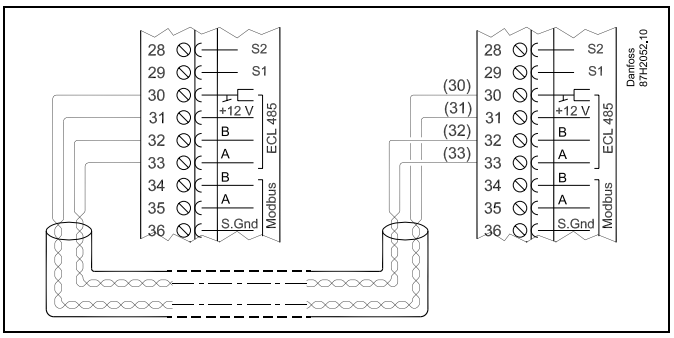
An ECA 30 / 31 can be connected to each of the heating circuits.

2.5.7 Electrical connections, master / slave systems

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

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

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

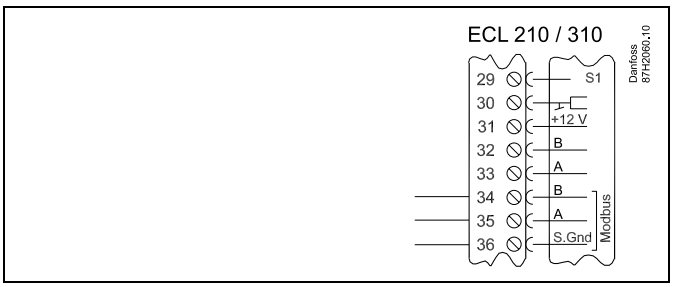


Settings related to master / slave communication:
See 'Several controllers in the same system' in 'Miscellaneous'.

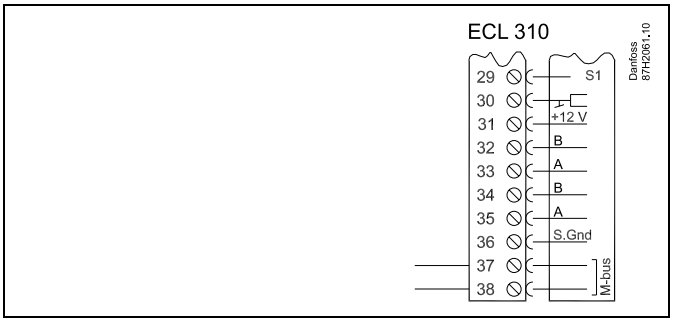
Total cable length: Max. 200 m (all sensors incl. internal ECL 485 communication bus).
Cable lengths of more than 200 m may cause noise sensibility (EMC).

2.5.8 Electrical connections, communication

Electrical connections, Modbus



Electrical connections, M-bus



2.6 Inserting the ECL Application Key

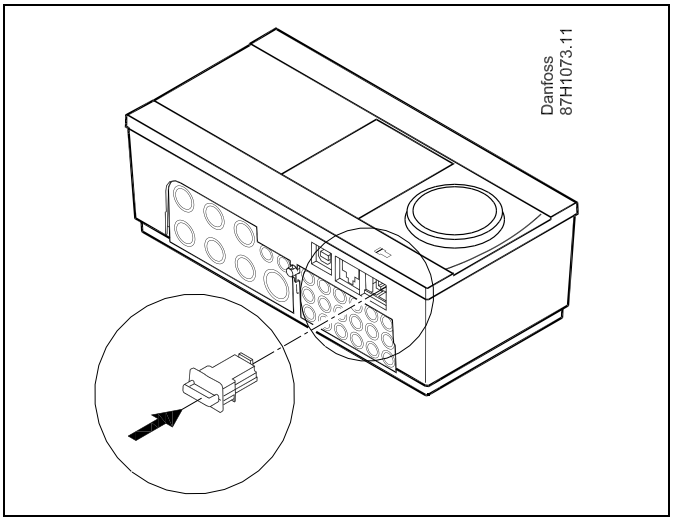
2.6.1 Inserting the ECL Application Key

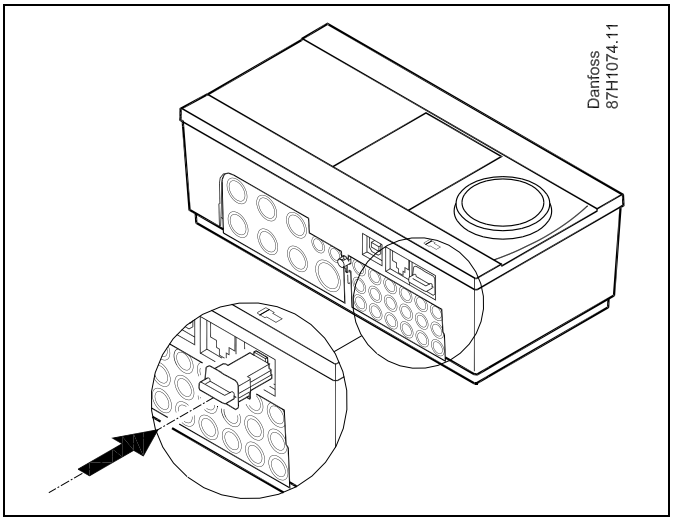
The ECL Application Key contains

- 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.





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:
The software of the controller is updated automatically when the key is inserted (as of controller version 1.11). The following animation will be shown when the software is being updated:

Progress bar

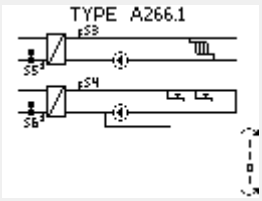
Application Key: Situation 1
The controller is new from the factory, the ECL Application Key is not inserted.

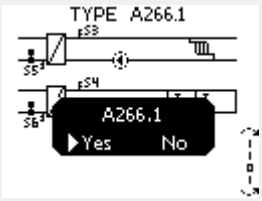
An animation for the ECL Application Key insertion is displayed. Insert the Application Key .

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.

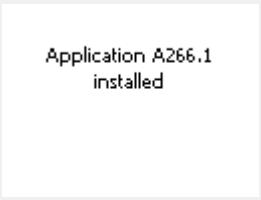
Action:	Purpose:	Examples:
	Select language	
	Confirm	
	Select application	
	Confirm with 'Yes'	
	Set 'Time & Date' Turn and push the dial to select and change 'Hours', 'Minutes', 'Date', 'Month' and 'Year'. Choose "Next"	
	Confirm with 'Yes'	
	Go to 'Aut. daylight'	
	Choose whether 'Aut. daylight´ * should be active or not	YES or NO





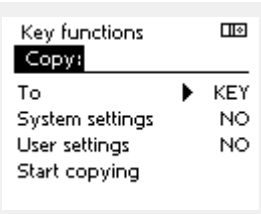
* 'Aut. daylight' is the automatic changeover between summer and winter time.

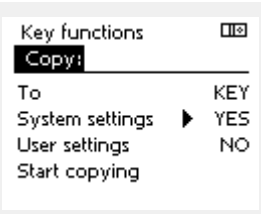
Depending on the contents of the ECL Application Key, procedure A or B is taking place:



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

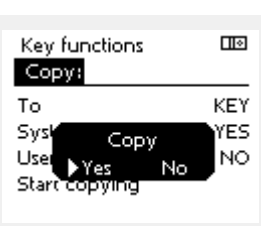
The application is installed, and the controller resets and starts up.

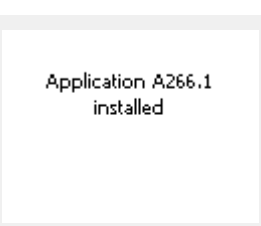




B
The ECL Application key contains changed system settings:
Push the dial repeatedly.

'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.

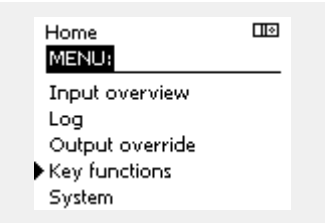
Choose 'Start copying' and confirm with 'Yes'.

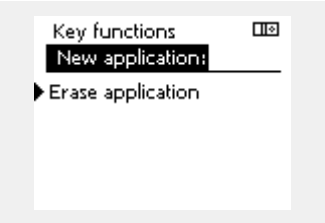
Application Key: Situation 2
The controller already runs an application. The ECL Application Key is inserted, but the application needs to be changed.

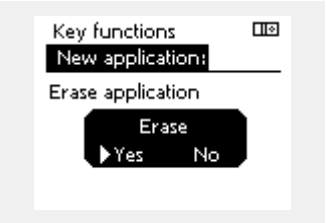
To change to another application on the ECL Application Key, the current application in the controller must be erased (deleted).

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 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:

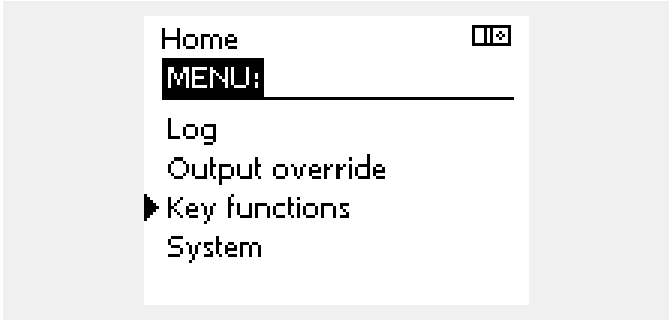
Action:	Purpose:	Examples:
	Choose 'MENU'	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose 'Common controller settings'	
	Confirm	
	Go to 'Key functions'	
	Confirm	
	Choose 'Copy'	
	Confirm	
	Choose 'To'. 'ECL' or 'KEY' will be indicated. Choose 'ECL'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

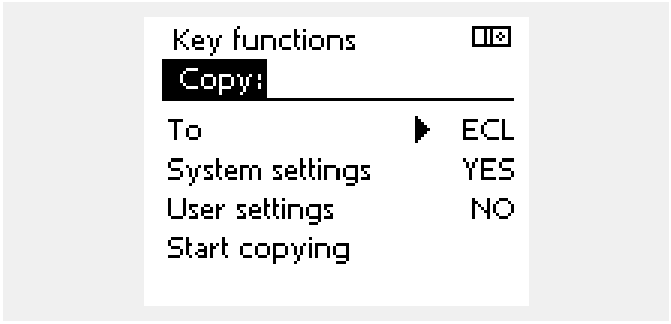
*

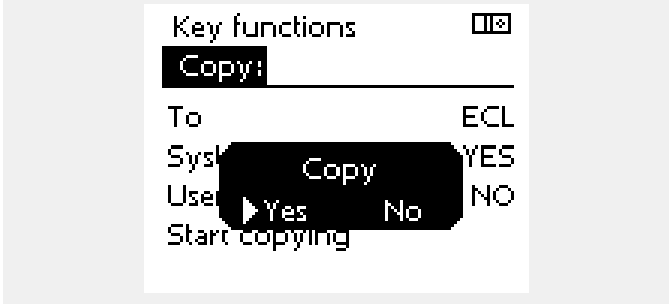
'ECL': Data will be copied from the Application Key to the ECL Controller.
'KEY': Data will be copied from the ECL Controller to the Application Key.

**

'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.







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).

2.7 Check list

Is the ECL Comfort controller ready for use?

- ☐ Make sure that the correct power supply is connected to terminals 9 (Live) and 10 (Neutral).
- ☐ 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').
- ☐ 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 A367

Navigation, application A367.1 and A367.2 (* A367.2 only)

Home		Heating, circuit 1		Heating, circuit 2		DHW, circuit 3	
		ID no.	Function	ID no.	Function	ID no.	Function
MENU							
Schedule			Selectable		Selectable		Selectable
Schedule circ. P							Selectable
Settings	Flow temperature (circuit 1) Tank temperature (circuit 3)		Heat curve		Heat curve	13193	Charge difference
		11178	Temp. max.	12178	Temp. max.	13195	Start difference
		11177	Temp. min.	12177	Temp. min.	13194	Stop difference
			Ext. desired T			13152	Max. charge T
						13068	Flow T adapt time*
	Room limit	11182	Infl. — max.	12182	Infl. — max.		
		11183	Infl. — min.	12183	Infl. — min.		
		11015	Adapt. time	12015	Adapt. time		
	Return limit	11031	High T out X1	11031	High T out X1	13030	Limit
		11032	Low limit Y1	12032	Low limit Y1		
		11033	Low T out X2	12033	Low T out X2		
		11034	High limit Y2	12034	High limit Y2		
		11035	Infl. - max.	12035	Infl. - max.		
		11036	Infl. - min.	12036	Infl. - min.		
		11037	Adapt. time	12037	Adapt. time		
		11085	Priority	12085	Priority		
	Flow / power limit		Actual		Actual		Actual
			Actual limit		Actual limit	13111	Limit
		11119	High T out X1	12119	High T out X1		
		11117	Low limit Y1	12117	Low limit Y1		
		11118	Low T out X2	12118	Low T out X2		
		11116	High limit Y2	12116	High limit Y2		
		11112	Adapt. time	12112	Adapt. time		
		11113	Filter constant	12113	Filter constant		
		11109	Input type	12109	Input type		
		11115	Units	12115	Units		
	Optimization	11011	Auto saving	12011	Auto saving		
		11012	Boost	12012	Boost		
		11013	Ramp	12013	Ramp		
		11014	Optimizer	12014	Optimizer		
		11026	Pre stop	12026	Pre stop		
		11020	Based on	12020	Based on		
		11021	Total stop	12021	Total stop		
		11179	Cut-out	12179	Cut-out		
		11043	Parallel operation				
	Control par.	11174	Motor pr.	12174	Motor pr.		
		11184	Xp	12184	Xp		
		11185	Tn	12185	Tn		
		11186	M run	12186	M run		
		11187	Nz	12187	Nz		
		11189	Min. act. time	12189	Min. act. time		

Navigation, application A367.1 and 367.2 continued (* A367.1 only, ** A367.2 only)

Home		Heating, circuit 1		Heating, circuit 2		DHW, circuit 3	
		ID no.	Function	ID no.	Function	ID no.	Function
MENU							
Settings	Application	11010	ECA addr.	12010	ECA addr.	13051	Ch.-o. valve / P
		11017	Demand offset			13053	Tank, sec. / prim.*
		11050	P demand			13055	Circ. P priority
		11500	Send desired T	12500	Send desired T	13044	Max. DHW time
		11022	P exercise	12022	P exercise	13045	DHW deact. time
		11023	M exercise	12023	M exercise	13041	DHW P post-run
		11052	DHW priority	12052	DHW priority	13042	Char. P post-run**
		11077	P frost T	12077	P frost T	13500	Send desired T
		11078	P heat T	12078	P heat T	13076	Circ. P frost T
		11040	P post-run	12040	P post-run	13093	Frost pr. T
		11093	Frost pr. T	12093	Frost pr. T	13141	Ext. input
		11141	Ext. input	12141	Ext. input	13142	Ext. mode
		11142	Ext. mode	12142	Ext. mode		
	Anti-bacteria						Selectable
Holiday			Selectable		Selectable		Selectable
Alarm	Temp. monitor.	11147	Upper difference	12147	Upper difference		
		11148	Lower difference	12148	Lower difference		
		11149	Delay	12149	Delay		
		11150	Lowest temp.	12150	Lowest temp.		
	Alarm overview		Selectable		Selectable		
Influence overview	Des. flow T (circuits 1 & 2) Des. DHW T (circuit 3)		Return lim.		Return lim.		Holiday
			Room lim.		Room lim.		Ext. override
			Flow / power lim.		Flow / power lim.		Anti-bacteria
			Holiday		Holiday		SCADA override
			Ext. override		Ext. override		
			ECA override		ECA override		
			Boost		Boost		
			Ramp		Ramp		
			Slave, demand				
			Heating cut-out		Heating cut-out		
			DHW priority		DHW priority		
			DHW influence				
			SCADA offset		SCADA offset		
			Ext. desired T				

Navigation, application A367.1 and A367.2 (* A367.2 only), Common controller settings

Home		Common controller settings			
MENU		ID no.	Function		
Time & Date			Selectable		
Holiday			Selectable		
Input overviews			Circuit 1	Circuit 2	Circuit 3
			Outdoor T	Outdoor T	Tank upper T
			Outdoor acc. T	Outdoor acc. T	Tank lower T
			Room T	Room T	Charge T*
			Flow T	Flow T	
			Return T	Return T	
			Ext. desired T		
Log 1, 2 & 3 (sensors)	Log today		Outdoor T	Outdoor T	Tank T up. & des.
	Log yesterday		Room T	Room T	Tank T up. & low.
	Log 2 days		Flow T & desired	Flow T & desired	
	Log 4 days		Return T & limit	Return T & limit	
Output override			M1, P1, M2, P5, P2, P3, P4*, A1		
Key functions	New application		Erase application		
	Application				
	Factory setting		System settings User settings Go to factory		
	Copy		To System settings User settings Start copying		
	Key overview				
System	ECL version		Code no. Hardware Software Build no. Serial no. MAC Production week		
	Extension				
	Ethernet				
	M-bus config		Selectable		
	Energy Meters		Selectable		
	Display	60058	Backlight		
		60059	Contrast		
	Communication	38	Modbus addr.		
		2048	ECL 485 addr.		
		2150	Service pin		
		2151	Ext. reset		
	Language	2050	Language		

3.0 Daily use

3.1 How to navigate

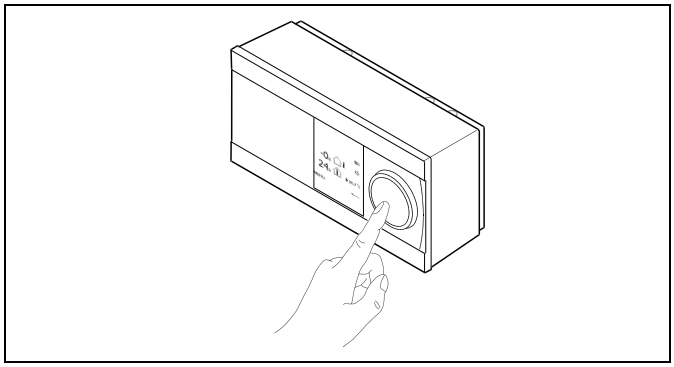
You navigate in the controller by turning the dial left or right to the desired position (↻).

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

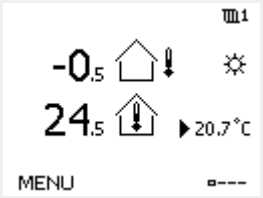
The position indicator in the display (▶) will always show you where you are.

Push the dial to confirm your choices (☝).

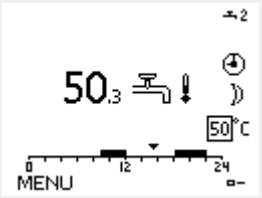
The display examples are from a two-circuit application: One heating circuit (▥) and one domestic hot-water (DHW) circuit (🚿). The examples might differ from your application.



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

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.

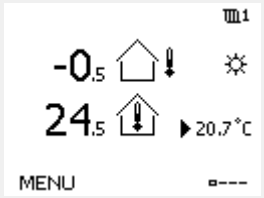
If the dial has not been activated for 20 min., the controller will revert to the overview display you have chosen as favorite.

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.

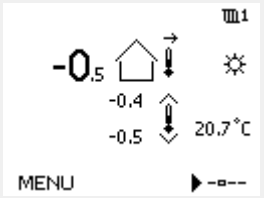
Heating circuit
Overview display 1 informs about:
actual outdoor temperature, controller mode,
actual room temperature, desired room temperature.

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:



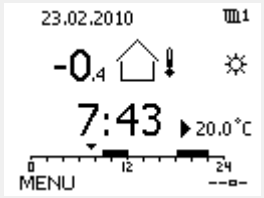
Overview display 2:



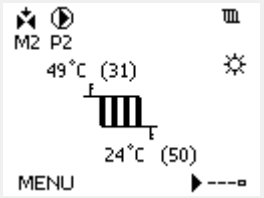
Overview display 3 informs about:
date, actual outdoor temperature, controller mode, time, desired room temperature as well as shows the comfort schedule of the current day.

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

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))

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

If the temperature value is displayed as

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

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

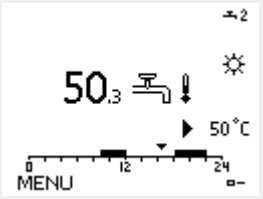
DHW circuit

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

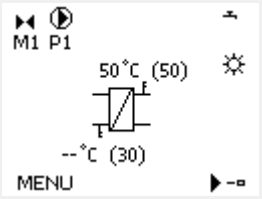
Overview display 2 informs about:
state of the controlled components, actual DHW temperature, (desired DHW temperature), controller mode, return temperature (limitation value).

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

Overview display 1:



Overview display 2:

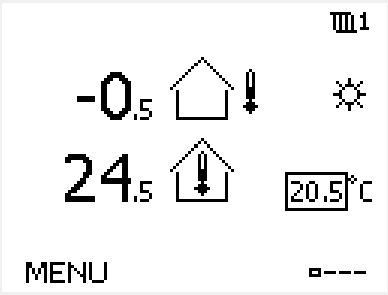


Setting the desired temperature

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.

Overview of setting range and settings for desired room temperature:

Mode	Setting range	Factory setting
Comfort	5... 40 °C	20 °C
Saving	5... 40 °C	16°C
Frost protection*	5 ... 40 °C	10 °C

* related to desired flow temperature

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

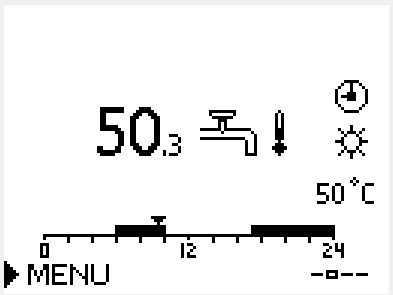
The room desired temperature can be set exactly as in the controller. However, other symbols can be present in the display (please see 'What do the symbols mean?').

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

Setting the desired DHW temperature

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

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



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

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

Overview of setting range and settings for DHW modes:

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

* related to desired flow temperature

3.3 What do the symbols mean?

Symbol	Description	
	Outdoor temp.	Temperature
	Room temp.	
	DHW temp.	
	Position indicator	
	Scheduled mode	Mode
	Comfort mode	
	Saving mode	
	Frost protection mode	
	Manual mode	
	Heating	Circuit
	DHW	
	Common controller settings	
	Pump ON	Controlled component
	Pump OFF	
	Actuator opens	
	Actuator closes	
	Alarm	
	Display selector	
	Max. and min. value	
	Trend in outdoor temperature	
	Wind speed sensor	

Symbol	Description
--	Sensor not connected or not used
---	Sensor connection short-circuited
	Fixed comfort day (holiday)
	Active influence
	No influence

Additional symbols, ECA 30 / 31:

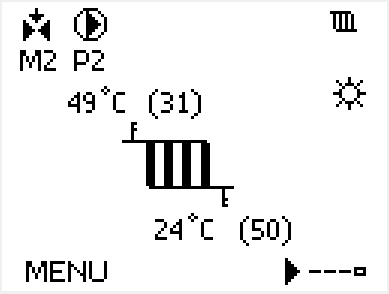
Symbol	Description
	ECA Remote Control Unit
	Relative humidity indoor
	Day off
	Holiday
	Relaxing (extended comfort period)
	Going out (extended saving period)

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:

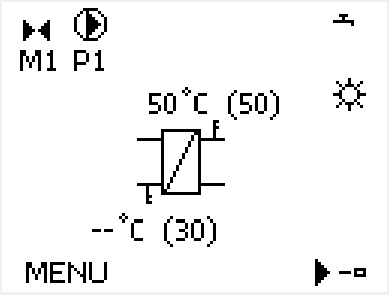


49 °C	Flow temperature
(31)	Desired flow temperature
24 °C	Return temperature
(50)	Return temperature limitation

DHW circuit

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

Display example:

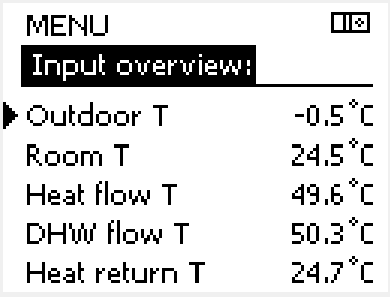


50 °C	Flow temperature
(50)	Desired flow temperature
- -	Return temperature: sensor not connected
(30)	Return temperature limitation

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

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.

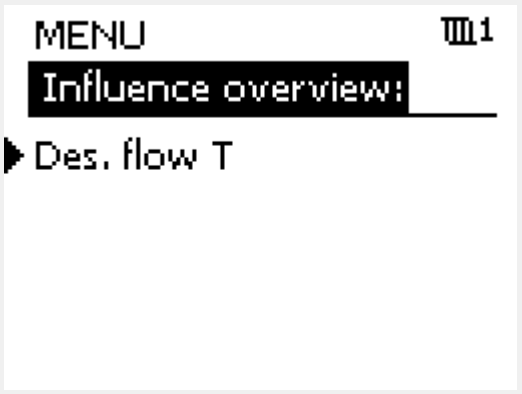
If the desired flow temperature is influenced (corrected) by one or more parameters, it is indicated by a small line with arrow-down, arrow-up or double-arrow:

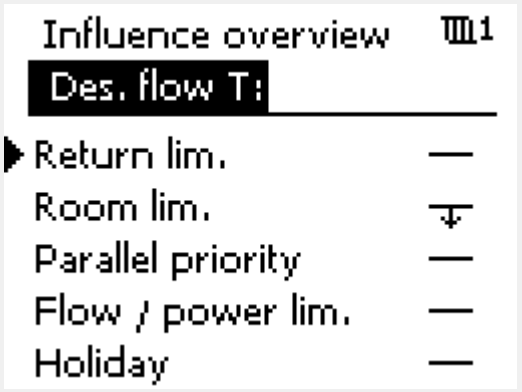
Arrow-down:
The parameter in question reduces the desired flow temperature.

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

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

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.





3.6 Manual control

It is possible to manually control the installed components.

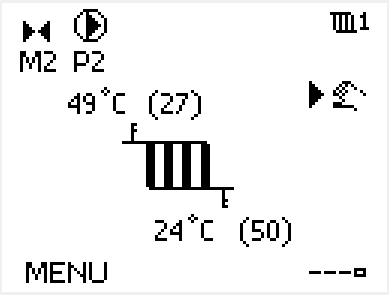
Manual control can only be selected in favorite displays in which the symbols for the controlled components (valve, pump etc.) are visible.

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

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

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

Controlled components *Circuit selector*



During manual operation, all control functions are deactivated. Frost protection is not active.

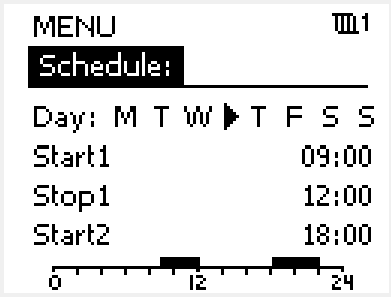
When manual control is selected for one circuit, it is automatically selected for all circuits!

3.7 Schedule

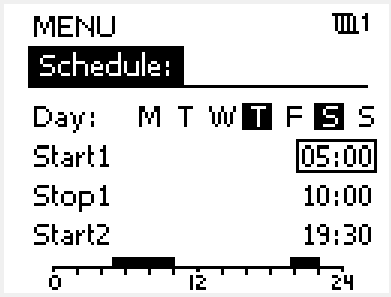
3.7.1 Set your schedule

The schedule consists of a 7-day week:

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

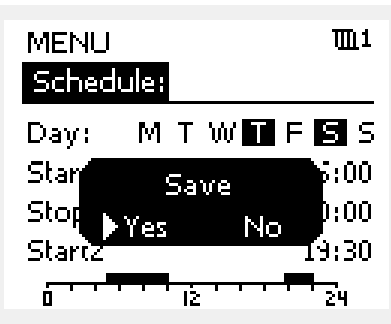


The schedule will day-by-day show you the start and stop times of your comfort periods (heating / DHW circuits).



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

It is recommendable to make a note of any changed settings in the empty columns.

Setting	ID	Page	Factory settings in circuit(s)							
			1		2		3			
Heat curve		63								
Temp. max. (flow temp. limit, max.)	11178	64	90 °C							
Temp. min. (flow temp. limit, min.)	11177	64	10 °C							
Ext. desired T — (ECL Comfort 310)		64								
Infl. - max. (room temp. limitation, max.) — A367.1	11182	65	–4.0							
Infl. - max. (room temp. limitation, max.) — A367.2	11182	66	0.0							
Infl. - min. (room temp. limitation, min.)	11183	66	0.0							
Adapt. time (adaption time)	11015	66	OFF							
High T out X1 (return temp. limitation, high limit, X-axis)	11031	67	15 °C							
Low limit Y1 (return temp. limitation, low limit, Y-axis)	11032	67	40 °C							
Low T out X2 (return temp. limitation, low limit, X-axis)	11033	67	-15 °C							
High limit Y2 (return temp. limitation, high limit, Y-axis)	11034	68	60 °C							
Infl. - max. (return temp. limitation - max. influence)	11035	68	-2.0							
Infl. - min. (return temp. limitation - min. influence)	11036	68	0.0							
Adapt. time (adaptation time)	11037	68	25 s							
Priority (priority for return temp. limitation)	11085	69	OFF							
High T out X1 (flow / power limitation, high limit, X-axis)	11119	70	15 °C							
Low limit Y1 (flow / power limitation, low limit, Y-axis)	11117	71	999.9 l/h							
Low T out X2 (flow / power limitation, low limit, X-axis)	11118	71	-15 °C							
High limit Y2 (flow / power limitation, high limit, Y-axis)	11116	71	999.9 l/h							
Adapt. time (adaptation time)	11112	71	OFF							
Filter constant	11113	71	10							
Input type	11109	72	OFF							
Units	11115	72	l/h							
Auto saving (saving temp. dependent on outdoor temp.)	11011	73	-15 °C							
Boost	11012	73	OFF							
Ramp (reference ramping)	11013	74	OFF							
Optimizer (optimizing time constant)	11014	74	OFF							
Pre-stop (optimized stop time)	11026	75	ON							
Based on (optimization based on room / outdoor temp.)	11020	75	OUT							
Total stop	11021	75	OFF							
Cut-out (limit for heating cut-out)	11179	76	20 °C							
Parallel operation	11043	76	OFF							
Motor pr. (motor protection)	11174	77	OFF							
Xp (proportional band)	11184	77	80 K							
Tn (integration time constant)	11185	77	30 s							
M run (running time of the motorized control valve)	11186	77	30 s							
Nz (neutral zone)	11187	78	3 K							
Min. act. time (min. activation time gear motor)	11189	78	3							
ECA addr. (choice of Remote Control Unit)	11010	79	OFF							
Demand offset	11017	79	OFF							

Setting	ID	Page	Factory settings in circuit(s)							
			1		2		3			
P demand	11050	79	OFF							
Send desired T	11500	80	ON							
P exercise (pump exercise)	11022	80	ON							
M exercise (valve exercise)	11023	80	OFF							
DHW priority (closed valve / normal operation)	11052	80	OFF							
P frost T	11077	81	2 °C							
P heat T (heat demand)	11078	81	20 °C							
P post-run	11040	81	3 m							
Frost pr. T (frost protection temperature)	11093	81	10 °C							
Ext. input (external override) — ECL 310	11141	82	OFF							
Ext. mode (external override mode)	11142	82	COM-FORT							
Upper difference	11147	83	OFF							
Lower difference	11148	83	OFF							
Delay	11149	84	10 m							
Lowest temp.	11150	84	30 °C							
Heat curve		85								
Temp. max. (flow temp. limit, max.)	12178	86			90 °C					
Temp. min. (flow temp. limit, min.)	12177	86			10 °C					
Adapt. time (adaption time)	12015	87			OFF					
Infl. - max. (room temp. limitation, max.) — A367.1	12182	88			-4.0					
Infl. - max. (room temp. limitation, max.) — A367.2	12182	88			0.0					
Infl. - min. (room temp. limitation, min.)	12183	88			0.0					
High T out X1 (return temp. limitation, high limit, X-axis)	12031	89			15 °C					
Low limit Y1 (return temp. limitation, low limit, Y-axis)	12032	89			40 °C					
Low T out X2 (return temp. limitation, low limit, X-axis)	12033	89			-15 °C					
High limit Y2 (return temp. limitation, high limit, Y-axis)	12034	90			60 °C					
Infl. - max. (return temp. limitation - max. influence)	12035	90			-2.0					
Infl. - min. (return temp. limitation - min. influence)	12036	90			0.0					
Adapt. time (adaptation time)	12037	90			25 s					
Priority (priority for return temp. limitation)	12085	91			OFF					
High T out X1 (flow / power limitation, high limit, X-axis)	12119	92			15 °C					
Low limit Y1 (flow / power limitation, low limit, Y-axis)	12117	93			999.9 l/h					
Low T out X2 (flow / power limitation, low limit, X-axis)	12118	93			-15 °C					
High limit Y2 (flow / power limitation, high limit, Y-axis)	12116	93			999.9 l/h					
Adapt. time (adaptation time)	12112	93			OFF					
Filter constant	12113	93			10					
Input type	12109	94			OFF					
Units	12115	94			l/h					
Auto saving (saving temp. dependent on outdoor temp.)	12011	95			-15 °C					
Boost	12012	95			OFF					
Ramp (reference ramping)	12013	96			OFF					
Optimizer (optimizing time constant)	12014	96			OFF					
Pre-stop (optimized stop time)	12026	97			ON					
Based on (optimization based on room / outdoor temp.)	12020	97			OUT					

Setting	ID	Page	Factory settings in circuit(s)							
			1		2		3			
Total stop	12021	97			OFF					
Cut-out (limit for heating cut-out)	12179	98			20 °C					
Motor pr. (motor protection)	12174	99			OFF					
Xp (proportional band)	12184	99			80 K					
Tn (integration time constant)	12185	99			30 s					
M run (running time of the motorized control valve)	12186	99			30 s					
Nz (neutral zone)	12187	100			3 K					
Min. act. time (min. activation time gear motor)	12189	101			10					
ECA addr. (choice of Remote Control Unit)	12010	102			OFF					
Send desired T	12500	102			ON					
P exercise (pump exercise)	12022	102			ON					
M exercise (valve exercise)	12023	102			OFF					
DHW priority (closed valve / normal operation)	12052	103			OFF					
P frost T	12077	103			2 °C					
P heat T (heat demand)	12078	103			20 °C					
Frost pr. T (frost protection temperature)	12093	103			10 °C					
Ext. input (external override) — ECL 310	12141	104			OFF					
Ext. mode (external override mode)	12142	104			COM-FORT					
Upper difference	12147	105			OFF					
Lower difference	12148	105			OFF					
Delay	12149	106			10 m					
Lowest temp.	12150	106			30 °C					
Charge difference	13193	107					15 K			
Start difference	13195	107					–3 K			
Stop difference	13194	108					3 K			
Max. charge T	13152	109					80 °C			
Flow T adapt time — A367.2	13068	109					20 s			
Limit (return temp. limitation)	13030	110					40 °C			
Ch.-o. valve / P (changeover valve / pump)	13051	112					ON			
Tank, sec. / prim. — A367.1	13053	112					OFF			
Circ. P priority	13055	112					OFF			
Max. DHW time	13044	112					OFF			
DHW deact. time	13045	113					60 m			
DHW P post-run	13041	113					0 m			
Char. P post-run – A367.2	13042	113					0 m			
Send desired T	13500	113					ON			
Circ. P frost T	13076	113					2 °C			
Frost pr. T (frost protection temperature)	13093	114					10 °C			
Ext. input (external override) — ECL 310	13141	114					OFF			
Ext. mode (external override mode)	13142	115					COM-FORT			
Day		116								
Start time		117					00:00			
Duration		117					120 m			
Desired T		117					OFF			

Setting	ID	Page	Factory settings in circuit(s)							
			1		2		3			
Backlight (display brightness)	60058	126							5	
Contrast (display contrast)	60059	126							3	
Modbus addr.	38	126							1	
ECL 485 addr. (master / slave address)	2048	127							15	
Service Pin	2150	127							0	
Ext. reset	2151	127							0	
Language	2050	127							English	

5.0 Settings, circuit 1

5.1 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)

Heat curve		
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	

The heat curve can be changed in two ways:
1. The value of the slope is changed
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).

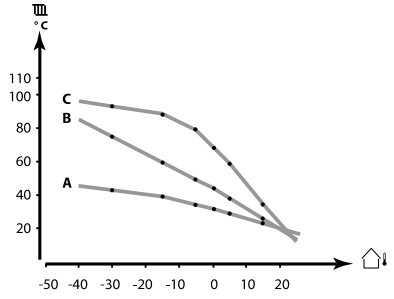
When the slope of the heat curve is changed by means of the slope value, the common point for all heat curves will be a desired flow temperature = 24.6 °C at an outdoor temperature = 20 °C

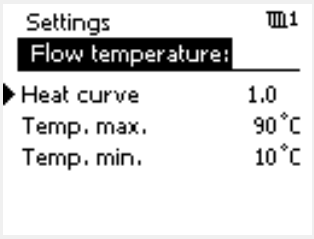
Change the coordinates:
Push the dial to enter / change the coordinates of the heat curve (example: -30,75).

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

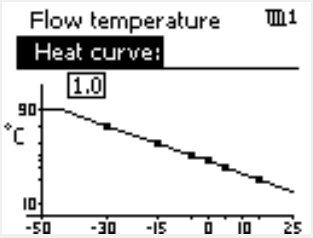
If the desired room temperature is changed, the desired flow temperature also changes:
(Desired room T - 20) × HC × 2.5
where "HC" is the Heat Curve slope and "2.5" is a constant.

Desired flow temperature

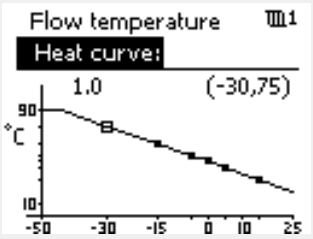




Slope changes



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.

Temp. max. (flow temp. limit, max.)		11178
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**90 °C**

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

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

Temp. min. (flow temp. limit, min.)		11177
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**10 °C**

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.'.

External signal for desired flow temperature

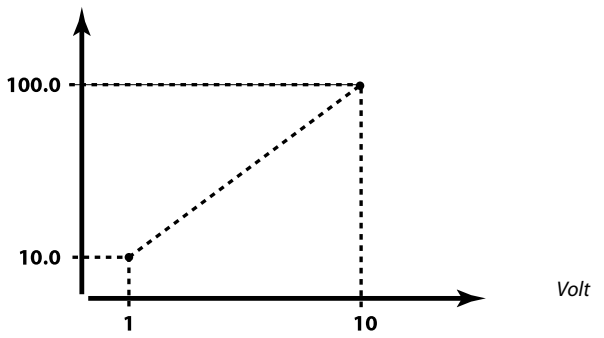
A voltage (0 - 10 V) can be applied to the input terminal S10 in order to determine the desired flow temperature.

The measured voltage on input S10 must be converted to a temperature value by the controller. When the voltage gets higher, the desired flow temperature increases.

The following settings set up the scaling.

Ext. desired T — (ECL Comfort 310)		
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	
The actual desired flow temperature is indicated by the unit ' °C.		

Example: Relationship between input voltage and displayed desired flow temperature



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

Read-out:

- - : External voltage signal is not connected..

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

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

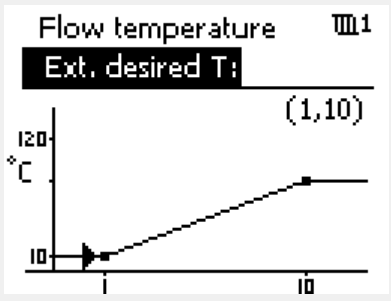
Desired flow temperature: 10 ... 120 °C

Fixed voltage settings: 1 V and 10 V

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

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

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



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

5.2 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.

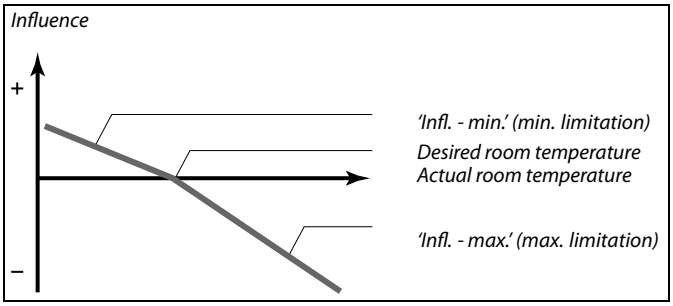
Use this influence type to avoid a too high room temperature. The controller will allow for free heat gains, i.e. solar radiation or heat from a fire place etc.

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 type to avoid a too low room temperature. This could e.g. be caused by windy surroundings.

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 0.0.
The slope is 1.8 (see 'Heat curve' in 'Flow temperature').
Result:
The desired flow temperature is decreased by 2 x -4.0 x 1.8 = 14.4 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 2.0.
The slope is 1.8 (see 'Heat curve' in 'Flow temperature').
Result:
The desired flow temperature is increased by 3 x 2.0 x 1.8 = 10.8 degrees.

Infl. - max. (room temp. limitation, max.) — A367.1		**11182**
Circuit	*Setting range*	*Factory setting*
1	**-9.9 ... 0.0**	**–4.0**
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).		

-9.9: The room temperature has a big influence.

0.0: The room temperature has no influence.

Infl. - max. (room temp. limitation, max.) — A367.2		11182
Circuit	*Setting range*	*Factory setting*
1	**-9.9 ... 0.0**	**0.0**
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).		

-9.9: The room temperature has a big influence.

0.0: The room temperature has no influence.

Infl. - min. (room temp. limitation, min.)		11183
Circuit	*Setting range*	*Factory setting*
1	**0.0 .... 9.9**	**0.0**
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).		

0.0: The room temperature has no influence.

9.9: The room temperature has a big influence.

Adapt. time (adaption time)		11015
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 50 s**	**OFF**
Controls how fast the actual room temperature adapts to the desired room temperature (I control).		

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

1: The desired room temperature is adapted quickly.

50: The desired room temperature is adapted slowly.

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

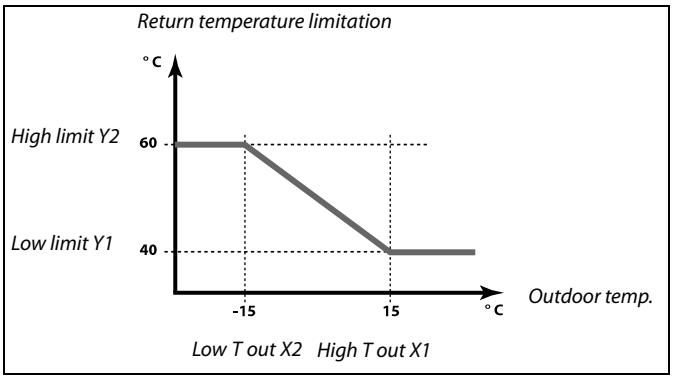
5.3 Return limit

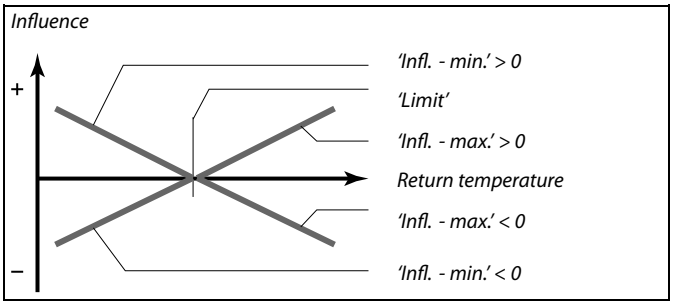
The return temperature limitation is based on the outdoor temperature. Typically in district heating systems a higher return temperature is accepted at a decrease in outdoor temperature. The relationship between the return temperature limits and outdoor temperature is set in two coordinates.

The outdoor temperature coordinates are set in 'High T out X1' and 'Low T out X2'. The return temperature coordinates are set in 'High limit Y2' and 'Low limit Y1'.

The controller automatically changes the desired flow temperature to obtain an acceptable return temperature when the return temperature falls below or gets higher than the calculated limit.

This limitation is based on a PI regulation where P ('Infl.' factor) responds quickly to deviations and I ('Adapt. time') responds slower and over time removes the small offsets between the desired and actual values. This is done by changing the desired flow temperature.





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

High T out X1 (return temp. limitation, high limit, X-axis)		**11031**
Circuit	*Setting range*	*Factory setting*
1	**-60 ... 20 °C**	**15 °C**
Set the outdoor temperature for the low return temperature limitation.		

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

Low limit Y1 (return temp. limitation, low limit, Y-axis)		**11032**
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**40 °C**
Set the return temperature limitation referring to the outdoor temperature set in 'High T out X1'.		

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

Low T out X2 (return temp. limitation, low limit, X-axis)		**11033**
Circuit	*Setting range*	*Factory setting*
1	**-60 ... 20 °C**	**-15 °C**
Set the outdoor temperature for the high return temperature limitation.		

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

High limit Y2 (return temp. limitation, high limit, Y-axis)		11034
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**60 °C**
Set the return temperature limitation referring to the outdoor temperature set in 'Low T out X2'.		

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

Infl. - max. (return temp. limitation - max. influence)		11035
Circuit	*Setting range*	*Factory setting*
1	**-9.9 ... 9.9**	**-2.0**
Determines how much the desired flow temperature will be influenced if the return temperature is higher than the calculated limit.		

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

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

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

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

Infl. - min. (return temp. limitation - min. influence)		11036
Circuit	*Setting range*	*Factory setting*
1	**-9.9 ... 9.9**	**0.0**
Determines how much the desired flow temperature will be influenced if the return temperature is lower than the calculated limit.		

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.').

Adapt. time (adaptation time)		11037
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 50 s**	**25 s**
Controls how fast the return temperature adapts to the desired return temperature limit (I control).		

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

1: The desired temperature is adapted quickly.

50: The desired temperature is adapted slowly.

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

Priority (priority for return temp. limitation)		**11085**
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**OFF**
Choose whether the return temperature limitation should overrule the set min. flow temperature 'Temp. min.' .		

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

ON: The min. flow temperature limit is overruled.

5.4 Flow / power limit

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

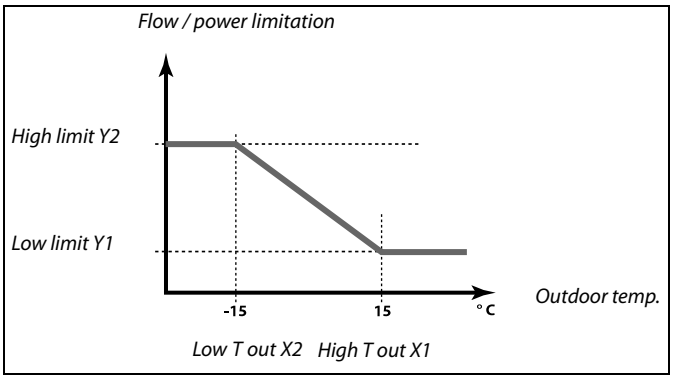
The flow / power limitation can be based on the outdoor temperature. Typically, in district heating systems a higher flow or power is accepted at lower outdoor temperatures.

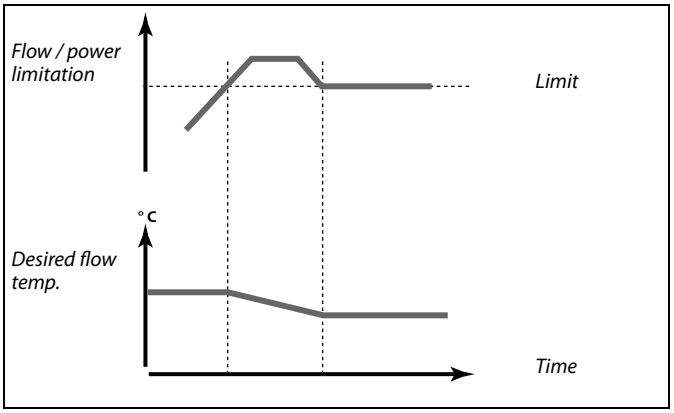
The relationship between the flow or power limits and the outdoor temperature is set in two coordinates.

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

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

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





Actual (actual flow or power)		**11110**
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	
The value is the actual flow or power based on the signal from flow / energy meter.		

Actual limit (limitation value)		**11111**
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	
The value is the calculated limitation value.		

High T out X1 (flow / power limitation, high limit, X-axis)		**11119**
Circuit	*Setting range*	*Factory setting*
1	**-60 ... 20 °C**	**15 °C**
Set the outdoor temperature value for the low flow / power limitation.		

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

Low limit Y1 (flow / power limitation, low limit, Y-axis)		11117
Circuit	*Setting range*	*Factory setting*
1	**0.0 ... 999.9 l/h**	**999.9 l/h**
Set the flow / power limitation referring to the outdoor temperature set in 'High T out X1'.		

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.

Low T out X2 (flow / power limitation, low limit, X-axis)		11118
Circuit	*Setting range*	*Factory setting*
1	**-60 ... 20 °C**	**-15 °C**
Set the outdoor temperature value for the high flow / power limitation.		

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

High limit Y2 (flow / power limitation, high limit, Y-axis)		11116
Circuit	*Setting range*	*Factory setting*
1	**0.0 ... 999.9 l/h**	**999.9 l/h**
Set the flow / power limitation referring to the outdoor temperature set in 'Low T out X2'.		

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

Adapt. time (adaptation time)		11112
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 50 s**	**OFF**
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.

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

1: The desired temperature is adapted quickly.

50: The desired temperature is adapted slowly.

Filter constant		11113
Circuit	*Setting range*	*Factory setting*
1	**1 ... 50**	**10**
The actual filter dampens the flow / power input data by the set factor.		

1: Minor dampening (low filter constant)

50: Major dampening (high filter constant)

Input type		11109
Circuit	*Setting range*	*Factory setting*
1	**OFF / EM1 ... EM5**	**OFF**
Choice of M-bus signal from energy meter number 1 ... 5.		

OFF: No M-bus signal acquired.

EM1 ... EM5: Energy meter number.

Units		11115
Circuit	*Setting range*	*Factory setting*
1	**See the list**	**l/h**
Choice of units for measured values.		

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

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

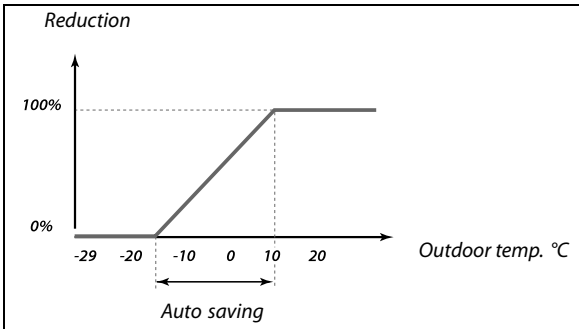
5.5 Optimization

Auto saving (saving temp. dependent on outdoor temp.)		11011
Circuit	*Setting range*	*Factory setting*
1	**OFF / -29 ... 10 °C**	**-15 °C**
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.		

OFF: The saving temperature does not depend on the outdoor temperature.

-29 ... 10: 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. When the outdoor temperature is below the set limit, there is no temperature reduction.

The comfort and the saving temperatures are set in the display overviews. The difference between the comfort and the saving temperature is considered to be 100%. Depending on the outdoor temperature, the percentage value can be lower according to the set value in 'Auto saving'.



Example:

Outdoor temp.:	–5 °C
Desired room temp. in Comfort mode:	22 °C
Desired room temp. in Saving mode:	16 °C
Setting in 'Auto saving':	–15 °C

The drawing above illustrates that the reduction percentage at an outdoor temperature of –5 °C is 40%.

The difference between Comfort and Saving temperature is (22–16) = 6 degrees.

40% of 6 degrees = 2.4 degrees

The 'Auto saving' temperature is corrected to (22–2.4) = 19.6 °C.

Boost		11012
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 99%**	**OFF**
Shortens the heating-up period by increasing the desired flow temperature by the percentage you set.		

OFF: The boost function is not active.

1-99%: 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').

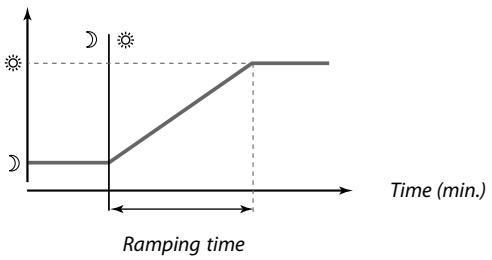
If a room temperature sensor or an ECA 30 / 31 is connected, the boost stops when the room temperature is reached.

Ramp (reference ramping)		11013
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 99 m**	**OFF**
The time (minutes) in which the desired flow temperature increases gradually to avoid load peaks in the heat supply.		

OFF: The ramping function is not active.

1-99 m: 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.



Optimizer (optimizing time constant)		11014
Circuit	*Setting range*	*Factory setting*
1	**OFF / 10 ... 59**	**OFF**
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.		

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.

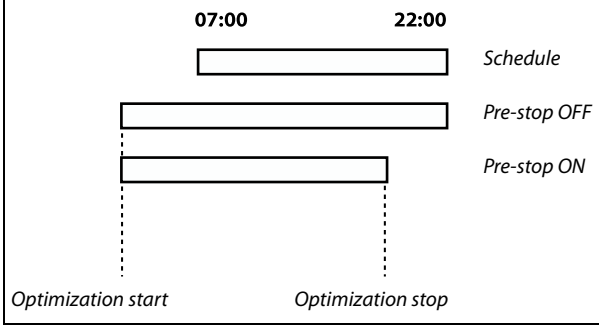
Result:
The setting is to be changed to 25.

Pre-stop (optimized stop time)		11026
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**ON**
Disable the optimized stop time.		

OFF: The optimized stop time is disabled.

ON: The optimized stop time is enabled.

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



Based on (optimization based on room / outdoor temp.)		11020
Circuit	*Setting range*	*Factory setting*
1	**OUT / ROOM**	**OUT**
The optimized start and stop time can be based on either room or outdoor temperature.		

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

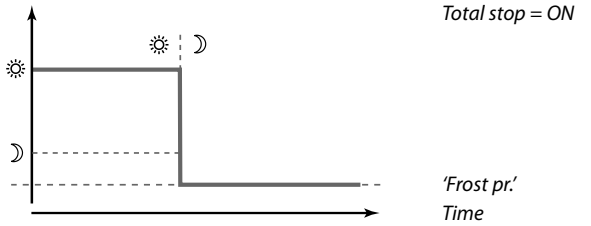
ROOM: Optimization based on room temperature, if measured.

Total stop		11021
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**OFF**
Decide whether you want a total stop during the saving temperature period.		

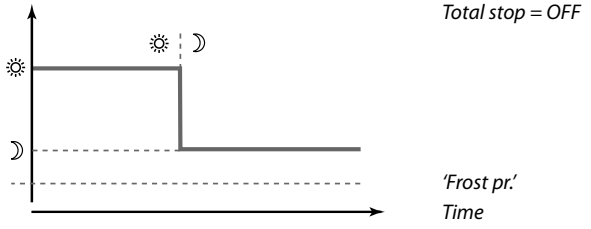
OFF: No total stop. The desired flow temperature is reduced according to:
- desired room temperature in saving mode
- auto saving

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'.

Desired flow temp. °C



Desired flow temp. °C



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

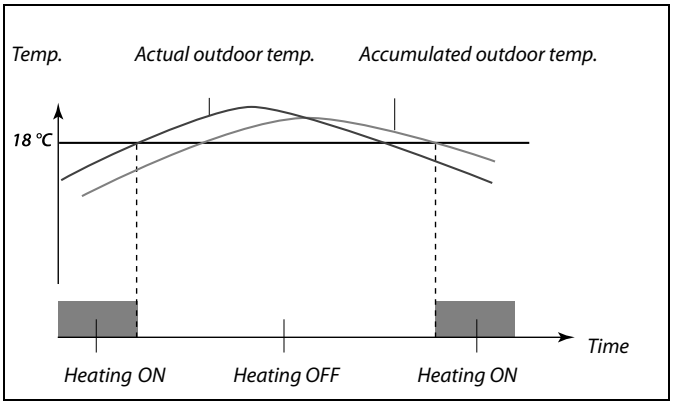
Cut-out (limit for heating cut-out)		11179
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 50 °C**	**20 °C**

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.

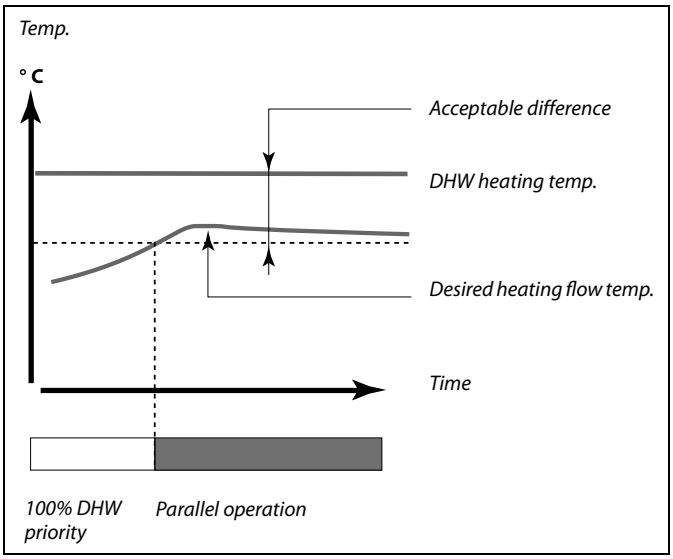


The heating cut-out is only active when the controller mode is in scheduled operation. When the cut-out value is set to OFF, there is no heating cut-out.

Parallel operation		11043
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 99 K**	**OFF**
Choose whether the heating circuit is to operate parallel to the DHW circuit.		

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

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



5.6 Control parameters

Motor pr. (motor protection)		11174
Circuit	*Setting range*	*Factory setting*
1	**OFF / 10 ... 59 m**	**OFF**
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.		

OFF: Motor protection is not activated.

10 ... 59: Motor protection is activated after the set activation delay in minutes.

Recommended for heating systems with variable load.

Xp (proportional band)		11184
Circuit	*Setting range*	*Factory setting*
1	**5 ... 250 K**	**80 K**

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

Tn (integration time constant)		11185
Circuit	*Setting range*	*Factory setting*
1	**1 ... 999 s**	**30 s**

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.

M run (running time of the motorized control valve)		11186
Circuit	*Setting range*	*Factory setting*
1	**5 ... 250 s**	**30 s**

'M run' is the time in seconds it takes the controlled component to move from fully closed to fully open position. 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.

Nz (neutral zone)		11187
Circuit	*Setting range*	*Factory setting*
1	**1 ... 9 K**	**3 K**

Set the acceptable flow temperature deviation.

Set the neutral zone to a high value if you can accept a high variation in flow temperature. When the actual flow temperature is within the neutral zone, the controller does not activate the motorized control valve.

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

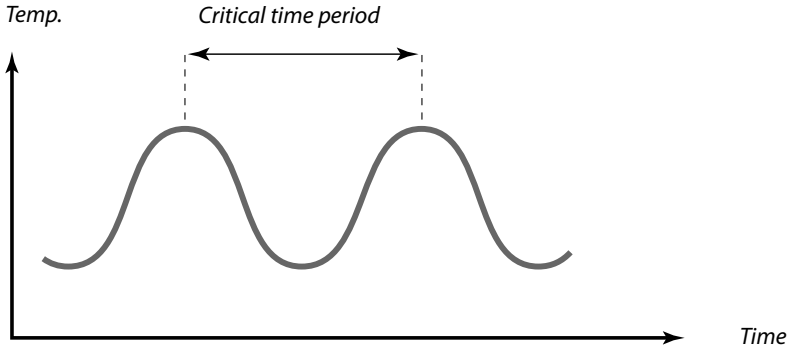
Min. act. time (min. activation time gear motor)		11189
Circuit	*Setting range*	*Factory setting*
1	**2 ... 50**	**3**
The min. pulse period of 20 ms (milliseconds) for activation of the gear motor.		

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

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

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

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



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

'Tn' = 0.85 x critical time period

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

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

5.7 Application

ECA addr. (choice of Remote Control Unit)		11010
Circuit	*Setting range*	*Factory setting*
1	**OFF / A / B**	**OFF**
Decides the communication with the Remote Control Unit.		

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.

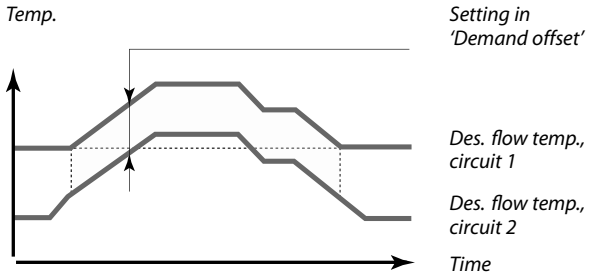
The Remote Control Unit has no influence on the DHW control.

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

Demand offset		11017
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 20 K**	**OFF**
The desired flow temperature in heating circuit 1 can be influenced by the demand for a desired flow temperature from another controller (slave) or another circuit.		

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

1 ... 20: The desired flow temperature is increased by the set value in 'Demand offset', if the demand of the slave / circuit 2 is higher.



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

P demand		11050
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**OFF**
Choose conditions for the circulation pump in the heating circuit.		

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'.

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

Send desired T		11500
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**ON**
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.		

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.

P exercise (pump exercise)		11022
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**ON**
Exercises the pump to avoid blocking in periods without heat demand.		

OFF: The pump exercise is not active.

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

M exercise (valve exercise)		11023
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**OFF**
Exercises the valve to avoid blocking in periods without heat demand.		

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).

DHW priority (closed valve / normal operation)		11052
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**OFF**
The heating circuit can be closed when the controller acts as slave and when DHW heating / charging is active in the master.		

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'*

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

P frost T		11077
Circuit	*Setting range*	*Factory setting*
1	**OFF / -10 ... 20 °C**	**2 °C**
When the outdoor temperature is below the set temperature in 'P frost T', the controller automatically switches ON the circulation pump to protect the system.		

OFF: No frost protection.

-10 ... 20: The 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.

P heat T (heat demand)		11078
Circuit	*Setting range*	*Factory setting*
1	**5 ... 40 °C**	**20 °C**
When the desired flow temperature is above the set temperature in 'P heat T', the controller automatically switches ON the circulation pump.		

5 ... 40: 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.

P post-run		11040
Circuit	*Setting range*	*Factory setting*
1	**0 ... 99 m**	**3 m**
The circulation pump in the heating circuit can be ON for a number of minutes (m) after heating stop (the desired flow temperature gets lower than the setting in 'P heat T' (ID no. 11078)). This function can utilize the remaining heat in e.g.a heat exchanger.		

0: The circulation pump stops immediately after the heating stop.

1 ... 99: The circulation pump is ON for the set time after the heating stop.

Frost pr. T (frost protection temperature)		11093
Circuit	*Setting range*	*Factory setting*
1	**5 ... 40 °C**	**10 °C**
Set the desired flow temperature for example at heating cut-out, total stop etc. to protect the system against frost.		

5 ... 40: Desired frost protection temperature.

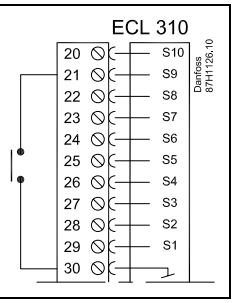
Ext. input (external override) — ECL 310		11141
Circuit	*Setting range*	*Factory setting*
1	**OFF / S1 ... S10**	**OFF**
Choose the input for 'Ext. input' (external override). By means of a switch the controller can be overridden to 'Comfort' or 'Saving' mode.		

OFF: No inputs have been selected for external override.

S1 ... S10: Input selected for external override.

If S1... S6 is chosen as override input, the override switch must have gold-plated contacts.
If S7 ... S10 is chosen as override input, the override switch can be a standard contact.

See the drawing for a connection example of an override switch to input S9.

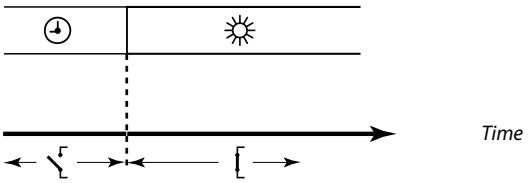


Choose only an unused input for override. If an already used input is applied for override, the functionality of this input is also neglected.

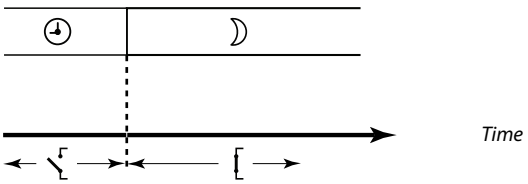
See also 'Ext. mode'.

The two drawings (override to comfort mode and override to saving mode) show the functionality.

Override to 'Comfort' mode



Override to 'Saving' mode



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

Ext. mode (external override mode)		11142
Circuit	*Setting range*	*Factory setting*
1	**COMFORT / SAVING**	**COMFORT**
Choose external override mode.		

The mode override can be activated for saving or comfort mode. For override, the controller mode must be scheduled mode.

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

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

See also 'Ext. input'.

5.8 Alarm

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

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

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

Typical alarms:

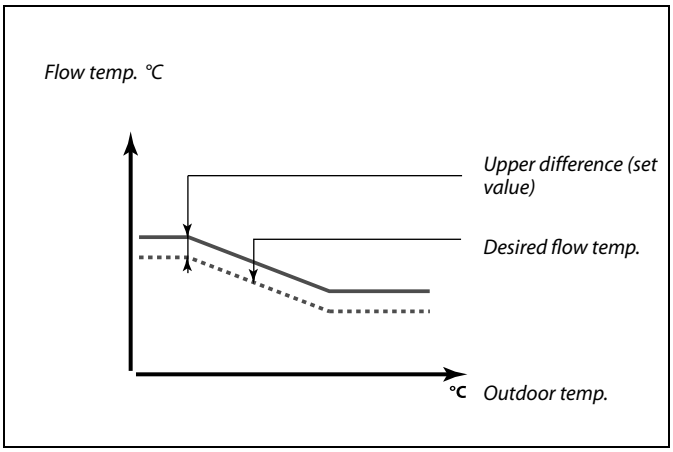
- Actual flow temperature differs from the desired flow temperature.

5.8.1 Temp. monitor.

Upper difference		**11147**
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 30 K**	**OFF**
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'.		

OFF: The alarm function is not active.

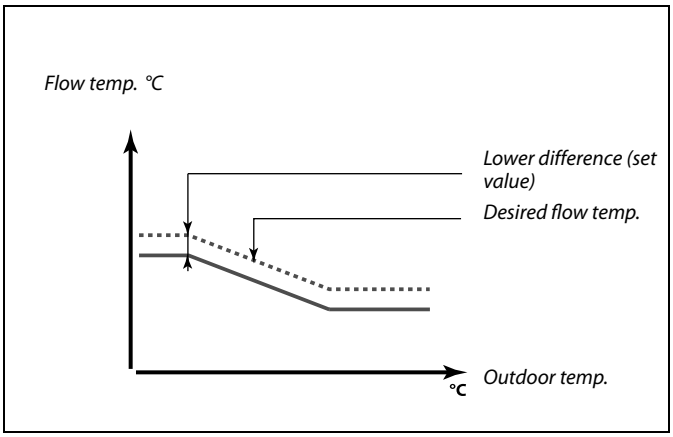
1 ... 30 K: The alarm function is active if the actual temperature gets above the acceptable difference.



Lower difference		**11148**
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 30 K**	**OFF**
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'.		

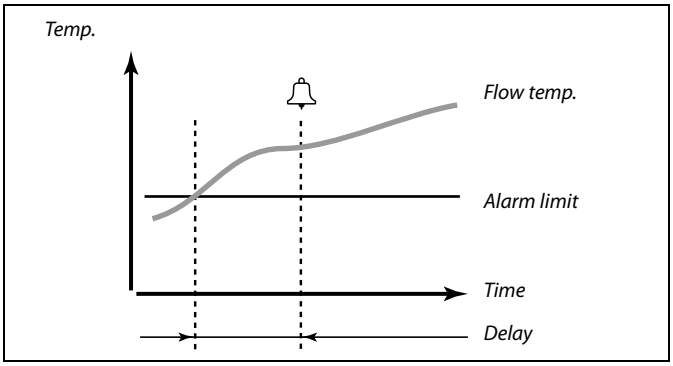
OFF: The alarm function is not active.

1 ... 30 K: The alarm function is active if the actual temperature gets below the acceptable difference.



Delay		**11149**
Circuit	*Setting range*	*Factory setting*
1	**1 ... 99 m**	**10 m**
If an alarm condition from either 'Upper difference' or 'Lower difference' is present for a longer time than the set delay (in min.), the alarm function is activated.		

1 ... 99 m: The alarm function will be activated if the alarm condition remains after the set delay.



Lowest temp.		**11150**
Circuit	*Setting range*	*Factory setting*
1	**10 ... 50 °C**	**30 °C**
The alarm function will not be activated if the desired flow temperature is lower than the set value.		

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

6.0 Settings, circuit 2

6.1 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	

Adjust the desired flow temperature at -30, -15, -5, 0, 5, and 15 °C, if required.

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

Heat curve		
Circuit	*Setting range*	*Factory setting*
2	**Read-out only**	

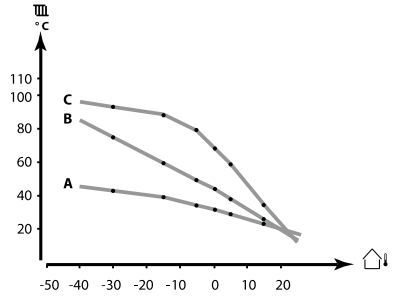
Push the dial to enter / change the coordinates of the heat curve.

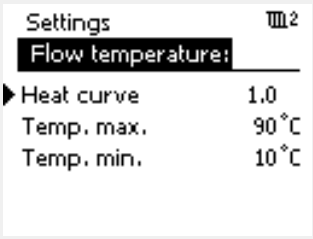
The heat curve represents the desired flow temperatures at different outdoor temperature and at a desired room temperature of 20 °C.

If the desired room temperature is changed, the desired flow temperature also changes:

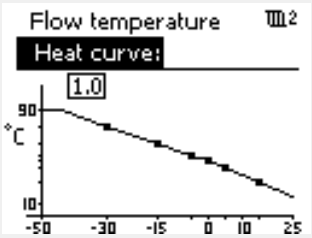
(Desired room T - 20) × HC × 2.5
where "HC" is the Heat Curve slope and "2.5" is a constant.

Desired flow temperature

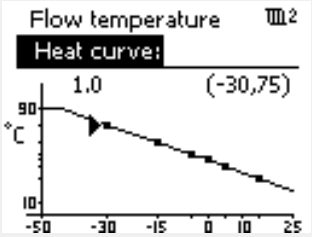




Slope changes



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.

Temp. max. (flow temp. limit, max.)		12178
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**90 °C**

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

Choose the allowed max. flow temperature for your system.
Adjust the factory setting, if required.

Temp. min. (flow temp. limit, min.)		12177
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**10 °C**

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

Choose the allowed min. flow temperature for your system.
Adjust the factory setting, if required.

6.2 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.

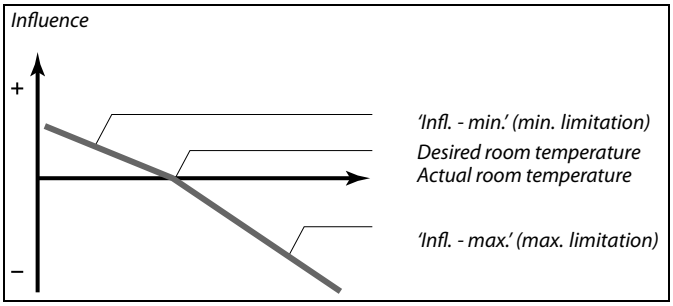
Use this influence type to avoid a too high room temperature. The controller will allow for free heat gains, i.e. solar radiation or heat from a fire place etc.

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 type to avoid a too low room temperature. This could e.g. be caused by windy surroundings.

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 0.0.
The slope is 1.8 (see 'Heat curve' in 'Flow temperature').
Result:
The desired flow temperature is decreased by 2 x -4.0 x 1.8 = 14.4 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 2.0.
The slope is 1.8 (see 'Heat curve' in 'Flow temperature').
Result:
The desired flow temperature is increased by 3 x 2.0 x 1.8 = 10.8 degrees.

Adapt. time (adaption time)		**12015**
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 50 s**	**OFF**
Controls how fast the actual room temperature adapts to the desired room temperature (I control).		

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

1: The desired room temperature is adapted quickly.

50: The desired room temperature is adapted slowly.

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

Infl. - max. (room temp. limitation, max.) — A367.1		12182
Circuit	*Setting range*	*Factory setting*
2	**-9.9 ... 0.0**	**-4.0**
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).		

-9.9: The room temperature has a big influence.

0.0: The room temperature has no influence.

Infl. - max. (room temp. limitation, max.) — A367.2		12182
Circuit	*Setting range*	*Factory setting*
2	**-9.9 ... 0.0**	**0.0**
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).		

-9.9: The room temperature has a big influence.

0.0: The room temperature has no influence.

Infl. - min. (room temp. limitation, min.)		12183
Circuit	*Setting range*	*Factory setting*
2	**0.0 .... 9.9**	**0.0**
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).		

0.0: The room temperature has no influence.

9.9: The room temperature has a big influence.

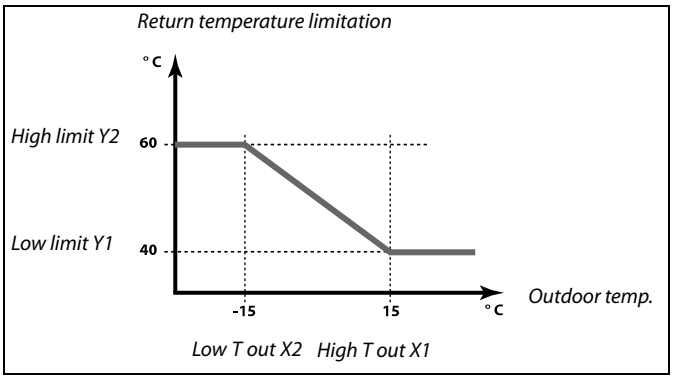
6.3 Return limit

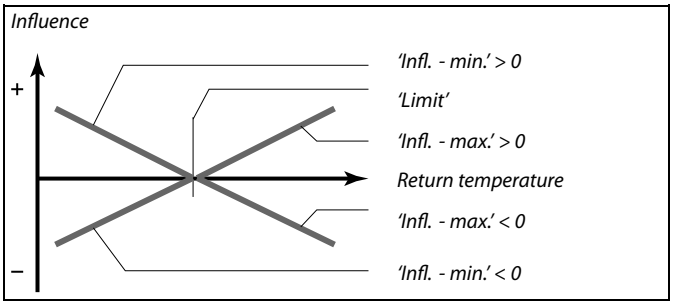
The return temperature limitation is based on the outdoor temperature. Typically in district heating systems a higher return temperature is accepted at a decrease in outdoor temperature. The relationship between the return temperature limits and outdoor temperature is set in two coordinates.

The outdoor temperature coordinates are set in 'High T out X1' and 'Low T out X2'. The return temperature coordinates are set in 'High limit Y2' and 'Low limit Y1'.

The controller automatically changes the desired flow temperature to obtain an acceptable return temperature when the return temperature falls below or gets higher than the calculated limit.

This limitation is based on a PI regulation where P ('Infl.' factor) responds quickly to deviations and I ('Adapt. time') responds slower and over time removes the small offsets between the desired and actual values. This is done by changing the desired flow temperature.





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

High T out X1 (return temp. limitation, high limit, X-axis)		**12031**
Circuit	*Setting range*	*Factory setting*
2	**-60 ... 20 °C**	**15 °C**
Set the outdoor temperature for the low return temperature limitation.		

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

Low limit Y1 (return temp. limitation, low limit, Y-axis)		**12032**
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**40 °C**
Set the return temperature limitation referring to the outdoor temperature set in 'High T out X1'.		

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

Low T out X2 (return temp. limitation, low limit, X-axis)		**12033**
Circuit	*Setting range*	*Factory setting*
2	**-60 ... 20 °C**	**-15 °C**
Set the outdoor temperature for the high return temperature limitation.		

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

High limit Y2 (return temp. limitation, high limit, Y-axis)		12034
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**60 °C**
Set the return temperature limitation referring to the outdoor temperature set in 'Low T out X2'.		

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

Infl. - max. (return temp. limitation - max. influence)		12035
Circuit	*Setting range*	*Factory setting*
2	**-9.9 ... 9.9**	**-2.0**
Determines how much the desired flow temperature will be influenced if the return temperature is higher than the calculated limit.		

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

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

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

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

Infl. - min. (return temp. limitation - min. influence)		12036
Circuit	*Setting range*	*Factory setting*
2	**-9.9 ... 9.9**	**0.0**
Determines how much the desired flow temperature will be influenced if the return temperature is lower than the calculated limit.		

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.').

Adapt. time (adaptation time)		12037
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 50 s**	**25 s**
Controls how fast the return temperature adapts to the desired return temperature limit (I control).		

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

1: The desired temperature is adapted quickly.

50: The desired temperature is adapted slowly.

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

Priority (priority for return temp. limitation)		12085
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**OFF**
Choose whether the return temperature limitation should overrule the set min. flow temperature 'Temp. min.' .		

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

ON: The min. flow temperature limit is overruled.

6.4 Flow / power limit

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

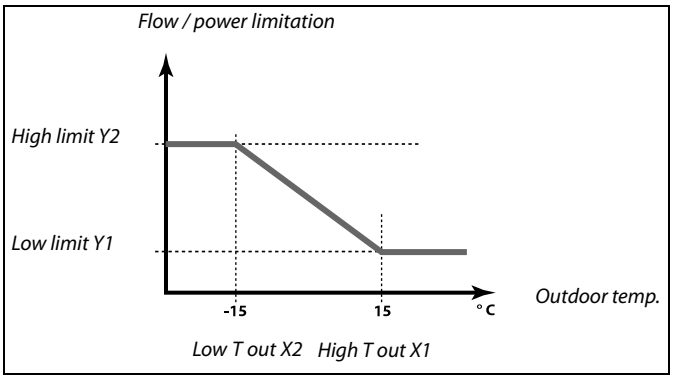
The flow / power limitation can be based on the outdoor temperature. Typically, in district heating systems a higher flow or power is accepted at lower outdoor temperatures.

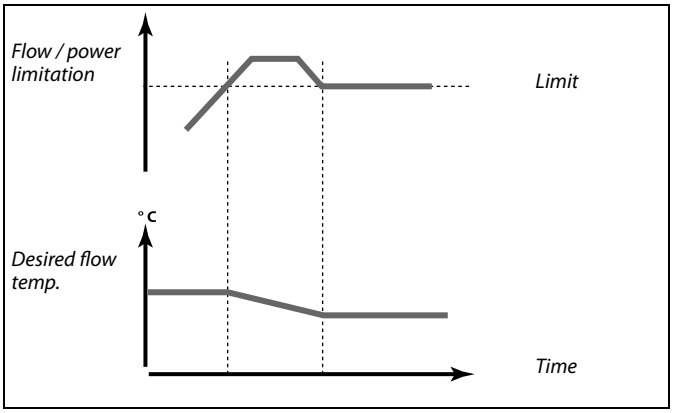
The relationship between the flow or power limits and the outdoor temperature is set in two coordinates.

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

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

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





Actual (actual flow or power)		**12110**
Circuit	*Setting range*	*Factory setting*
2	**Read-out only**	
The value is the actual flow or power based on the signal from flow / energy meter.		

Limit (limitation value)		**12111**
Circuit	*Setting range*	*Factory setting*
2	**Read-out only**	
The value is the calculated limitation value.		

High T out X1 (flow / power limitation, high limit, X-axis)		**12119**
Circuit	*Setting range*	*Factory setting*
2	**-60 ... 20 °C**	**15 °C**
Set the outdoor temperature for the low flow / power limitation.		

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

Low limit Y1 (flow / power limitation, low limit, Y-axis)		12117
Circuit	*Setting range*	*Factory setting*
2	**0.0 ... 999.9 l/h**	**999.9 l/h**
Set the flow / power limitation referring to the outdoor temperature set in 'High T out X1'.		

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

Low T out X2 (flow / power limitation, low limit, X-axis)		12118
Circuit	*Setting range*	*Factory setting*
2	**-60 ... 20 °C**	**-15 °C**
Set the outdoor temperature for the high flow / power limitation.		

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

High limit Y2 (flow / power limitation, high limit, Y-axis)		12116
Circuit	*Setting range*	*Factory setting*
2	**0.0 ... 999.9 l/h**	**999.9 l/h**
Set the flow / power limitation referring to the outdoor temperature set in 'Low T out X2'.		

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

Adapt. time (adaptation time)		12112
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 50 s**	**OFF**
Controls how fast the flow / power limitation adapts to the desired limitation.		

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

1: The desired temperature is adapted quickly..

50: The desired temperature is adapted slowly..

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

Filter constant		12113
Circuit	*Setting range*	*Factory setting*
2	**1 ... 50**	**10**
The actual filter dampens the flow / power input data by the set factor.		

1: Minor dampening (low filter constant)

50: Major dampening (high filter constant)

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

Input type		12109
Circuit	*Setting range*	*Factory setting*
2	**OFF / EM1 ... EM5**	**OFF**
Choice of M-bus signal from energy meter number 1 ... 5.		

OFF: No M-bus signal acquired.

EM1 ... EM5: Energy meter number.

Units		12115
Circuit	*Setting range*	*Factory setting*
2	**See the list**	**l/h**
Choice of units for measured values.		

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

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

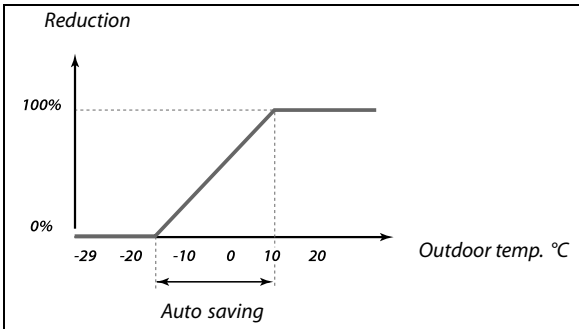
6.5 Optimization

Auto saving (saving temp. dependent on outdoor temp.)		12011
Circuit	*Setting range*	*Factory setting*
2	**OFF / -29 ... 10 °C**	**-15 °C**
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.		

OFF: The saving temperature does not depend on the outdoor temperature.

-29 ... 10: 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. When the outdoor temperature is below the set limit, there is no temperature reduction.

The comfort and the saving temperatures are set in the display overviews. The difference between the comfort and the saving temperature is considered to be 100%. Depending on the outdoor temperature, the percentage value can be lower according to the set value in 'Auto saving'.



Example:

Outdoor temp.:	–5 °C
Desired room temp. in Comfort mode:	22 °C
Desired room temp. in Saving mode:	16 °C
Setting in 'Auto saving':	–15 °C

The drawing above illustrates that the reduction percentage at an outdoor temperature of –5 °C is 40%.

The difference between Comfort and Saving temperature is (22–16) = 6 degrees.

40% of 6 degrees = 2.4 degrees

The 'Auto saving' temperature is corrected to (22–2.4) = 19.6 °C.

Boost		12012
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 99%**	**OFF**
Shortens the heating-up period by increasing the desired flow temperature by the percentage you set.		

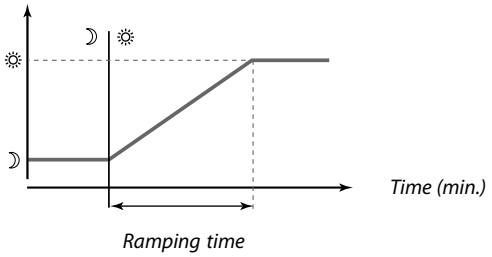
OFF: The boost function is not active.

1-99%: 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.

Ramp (reference ramping)		12013
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 99 m**	**OFF**
The time (minutes) in which the desired flow temperature increases gradually to avoid load peaks in the heat supply.		



OFF: The ramping function is not active.

1-99 m: 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.

Optimizer (optimizing time constant)		12014
Circuit	*Setting range*	*Factory setting*
2	**OFF / 10 ... 59**	**OFF**
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.*		

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.

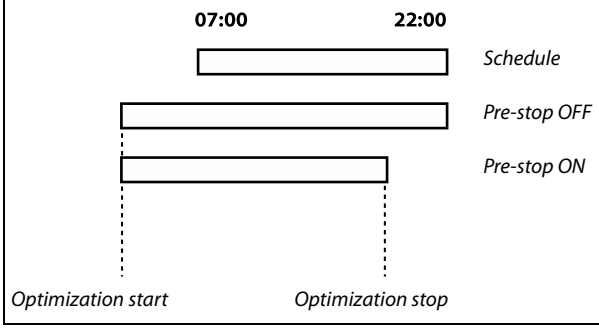
Result:
The setting is to be changed to 25.

Pre-stop (optimized stop time)		12026
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**ON**
Disable the optimized stop time.		

OFF: The optimized stop time is disabled.

ON: The optimized stop time is enabled.

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



Based on (optimization based on room / outdoor temp.)		12020
Circuit	*Setting range*	*Factory setting*
2	**OUT / ROOM**	**OUT**
The optimized start and stop time can be based on either room or outdoor temperature.		

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

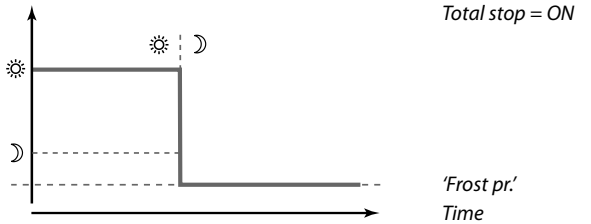
ROOM: Optimization based on room temperature, if measured.

Total stop		12021
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**OFF**
Decide whether you want a total stop during the saving temperature period.		

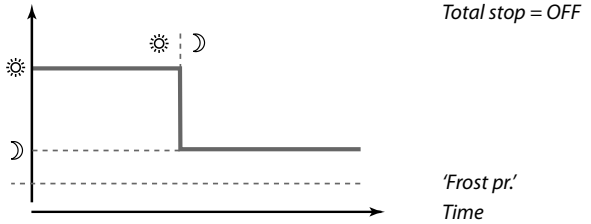
OFF: No total stop. The desired flow temperature is reduced according to:
- desired room temperature in saving mode
- auto saving

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'.

Desired flow temp. °C



Desired flow temp. °C



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

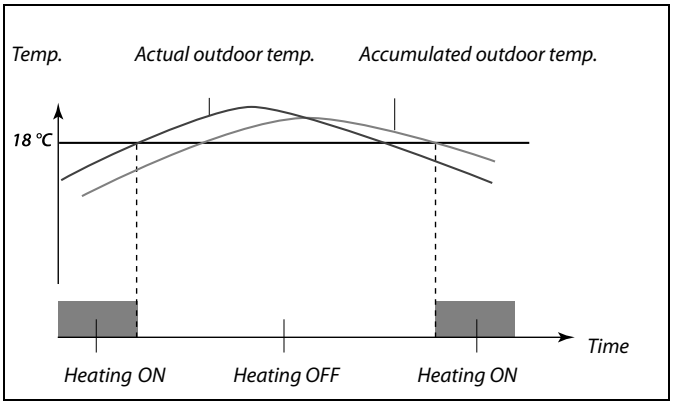
Cut-out (limit for heating cut-out)		12179
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 50 °C**	**20 °C**

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.



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.

6.6 Control parameters

Motor pr. (motor protection)		12174
Circuit	*Setting range*	*Factory setting*
2	**OFF / 10 ... 59 m**	**OFF**
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.		

OFF: Motor protection is not activated.

10 ... 59: Motor protection is activated after the set activation delay (minutes).

Recommended for heating systems with variable load.

Xp (proportional band)		12184
Circuit	*Setting range*	*Factory setting*
2	**5 ... 250 K**	**80 K**

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

Tn (integration time constant)		12185
Circuit	*Setting range*	*Factory setting*
2	**1 ... 999 s**	**30 s**

Set a high integration time constant to obtain a slow but stable reaction to deviations.

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

M run (running time of the motorized control valve)		12186
Circuit	*Setting range*	*Factory setting*
2	**5 ... 250 s**	**30 s**

'M run' is the time in seconds it takes the controlled component to move from fully closed to fully open position. 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.

Nz (neutral zone)		12187
Circuit	*Setting range*	*Factory setting*
2	**1 ... 9 K**	**3 K**

Set the acceptable flow temperature deviation.

Set the neutral zone to a high value if you can accept a high variation in flow temperature. When the actual flow temperature is within the neutral zone, the controller does not activate the motorized control valve.

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

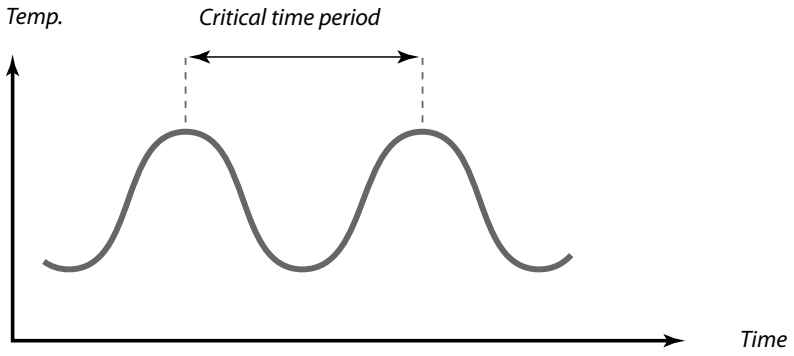
Min. act. time (min. activation time gear motor)		12189
Circuit	*Setting range*	*Factory setting*
2	**2 ... 50**	**10**
The min. pulse period of 20 ms (milliseconds) for activation of the gear motor.		

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

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

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

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



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

'Tn' = 0.85 x critical time period

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

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

6.7 Application

ECA addr. (choice of Remote Control Unit)		12010
Circuit	*Setting range*	*Factory setting*
2	**OFF / A / B**	**OFF**
Decides the communication with the Remote Control Unit.		

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 has no influence on the DHW control.

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

Send desired T		12500
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**ON**
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.		

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.

P exercise (pump exercise)		12022
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**ON**
Exercises the pump to avoid blocking in periods without heat demand.		

OFF: The pump exercise is not active.

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

M exercise (valve exercise)		12023
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**OFF**
Exercises the valve to avoid blocking in periods without heat demand.		

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).

DHW priority (closed valve / normal operation)		12052
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**OFF**
The heating circuit can be closed when the controller acts as slave and when DHW heating / charging is active in the master.		

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'*

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

P frost T		12077
Circuit	*Setting range*	*Factory setting*
2	**OFF / -10 ... 20 °C**	**2 °C**
When the outdoor temperature is below the set temperature in 'P frost T', the controller automatically switches ON the circulation pump to protect the system.		

OFF: No frost protection.

-10 ... 20: The 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.

P heat T (heat demand)		12078
Circuit	*Setting range*	*Factory setting*
2	**5 ... 40 °C**	**20 °C**
When the desired flow temperature is above the set temperature in 'P heat T', the controller automatically switches ON the circulation pump.		

5 ... 40: 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.

Frost pr. T (frost protection temperature)		12093
Circuit	*Setting range*	*Factory setting*
2	**5 ... 40 °C**	**10 °C**
Set the desired flow temperature to protect the DHW system against frost.		

5 ... 40: Desired frost protection temperature.

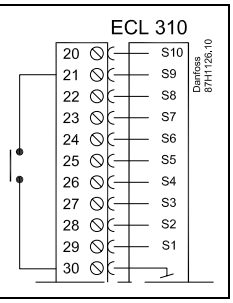
Ext. input (external override) — ECL 310		12141
Circuit	*Setting range*	*Factory setting*
2	**OFF / S1 ... S10**	**OFF**
Choose the input for 'Ext. input' (external override). By means of a switch the controller can be overridden to 'Comfort' or 'Saving' mode.		

OFF: No inputs have been selected for external override.

S1 ... S10: Input selected for external override.

If S1... S6 is chosen as override input, the override switch must have gold-plated contacts.
If S7 ... S10 is chosen as override input, the override switch can be a standard contact.

See the drawing for a connection example of an override switch to input S9.

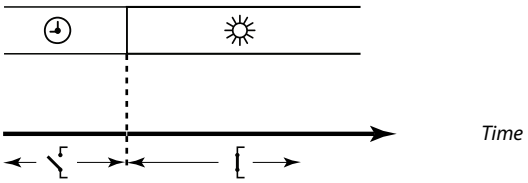


Choose only an unused input for override. If an already used input is applied for override, the functionality of this input is also neglected.

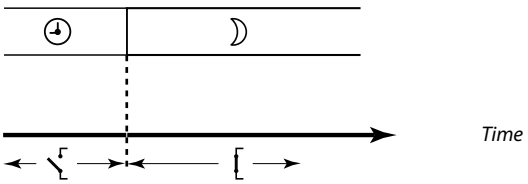
See also 'Ext. mode'.

The two drawings (override to comfort mode and override to saving mode) show the functionality.

Override to 'Comfort' mode



Override to 'Saving' mode



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

Ext. mode (external override mode)		12142
Circuit	*Setting range*	*Factory setting*
2	**COMFORT / SAVING**	**COMFORT**
Choose external override mode.		

The mode override can be activated for saving or comfort mode. For override, the controller mode must be scheduled mode.

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

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

See also 'Ext. input'.

6.8 Alarm

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

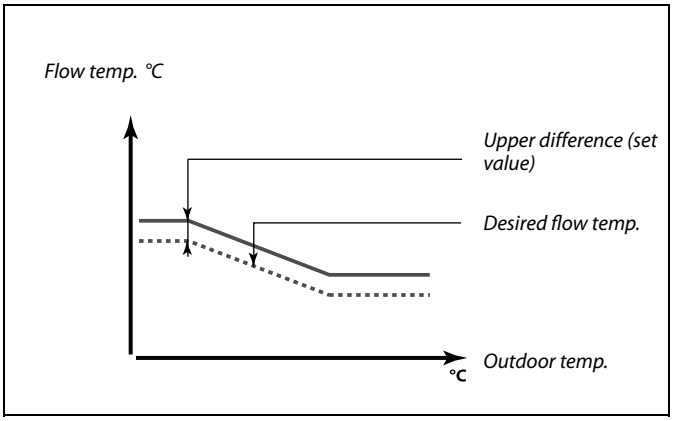
The alarm relay can activate a lamp, a horn, an input to an alarm transmitting device etc. etc.

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

Typical alarms:

- Actual flow temperature differs from the desired flow temperature.
- An activated circulation pump does not generate a pressure difference.
- The refill water function does not generate a pressure within a preset time.
- A universal alarm input (application dependent) is activated.

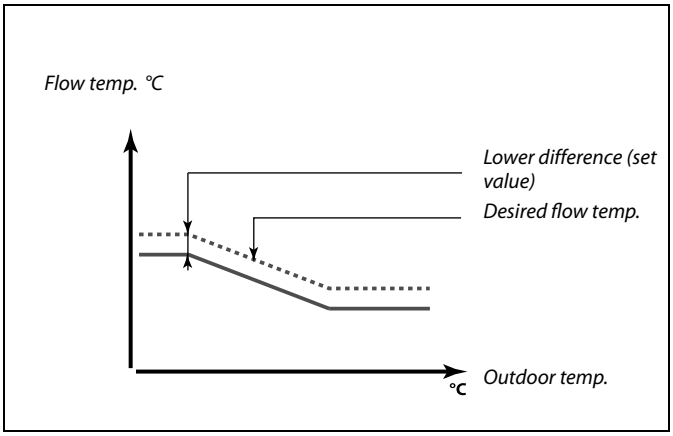
Upper difference		**12147**
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 30 K**	**OFF**
The alarm is activated if the actual flow temperature increases more than the set difference (acceptable temperature difference above the desired flow temperature). See also 'Delay'.		



OFF: The alarm function is not active.

1 ... 30 K: The alarm function is active if the actual temperature gets above the acceptable difference.

Lower difference		**12148**
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 30 K**	**OFF**
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'.		

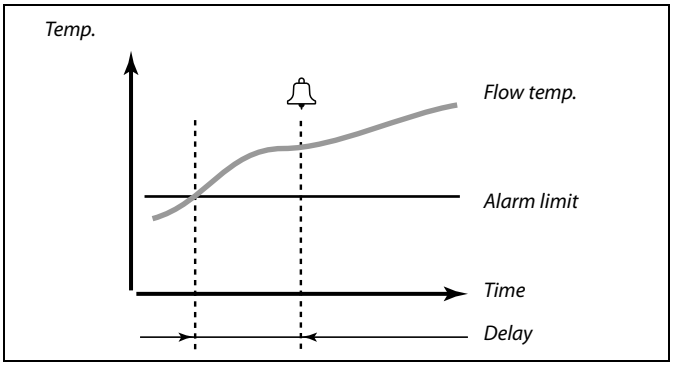


OFF: The alarm function is not active.

1 ... 30 K: The alarm function is active if the actual temperature gets below the acceptable difference.

Delay		**12149**
Circuit	*Setting range*	*Factory setting*
2	**1 ... 99 m**	**10 m**
If an alarm condition from either 'Upper difference' or 'Lower difference' is present for a longer time than the set delay (in min.), the alarm function is activated.		

1 ... 99 m: The alarm function will be activated if the alarm condition remains after the set delay.



Lowest temp.		**12150**
Circuit	*Setting range*	*Factory setting*
2	**10 ... 50 °C**	**30 °C**
The alarm function will not be activated if the desired flow temperature is lower than the set value.		

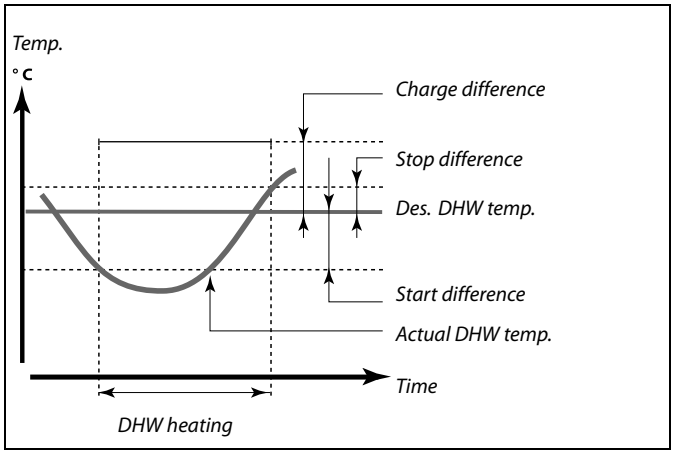
If the cause of the alarm disappears, the alarm indication and output also disappear.

7.0 Settings, circuit 3

7.1 Tank temperature

Charge difference		13193
Circuit	*Setting range*	*Factory setting*
3	**1 ... 50 K**	**15 K**
Set the number of degrees above the desired DHW temperature that will result in the DHW heating (charging) temperature.		

1... 50: Number of degrees to be added to the desired DHW temperature to obtain the DHW heating (charging) temperature.



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

Start difference		13195
Circuit	*Setting range*	*Factory setting*
3	**–50 ... –1 K**	**–3 K**
Set the number of degrees below the desired DHW temperature that will start the DHW heating (charging).		

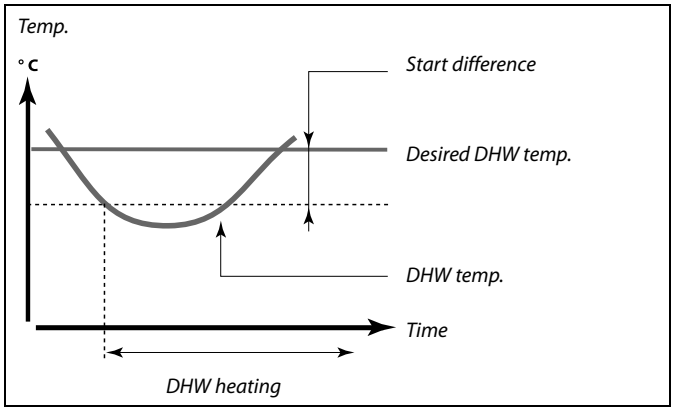
-50 ... –1: Set the number of degrees.

Example:

Desired DHW temp.: 55 °C

Start difference: -3 K

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



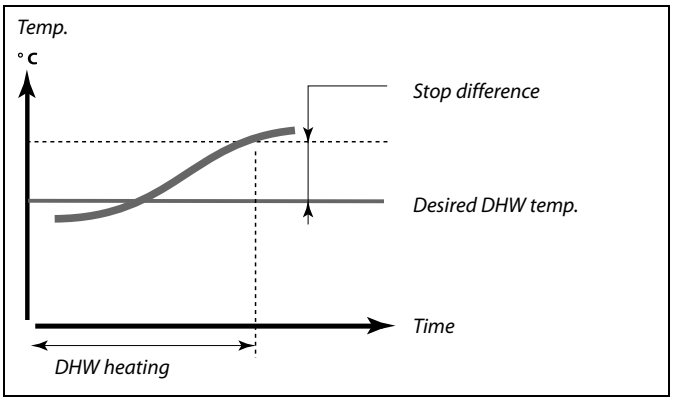
Stop difference		13194
Circuit	*Setting range*	*Factory setting*
3	**–50 ... 50 K**	**3 K**

One DHW tank temperature sensor:
Set the number of degrees above the desired DHW temperature that will stop the DHW heating (charging).

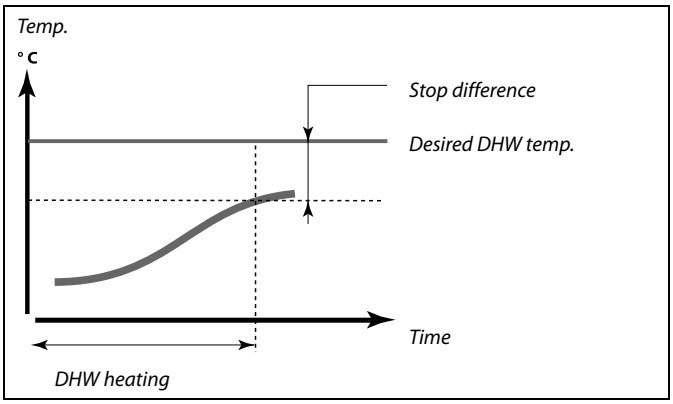
Two DHW tank temperature sensors:
Set the number of degrees above the desired DHW temperature but measured by the lower tank temperature sensor that will stop the DHW heating (charging).

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

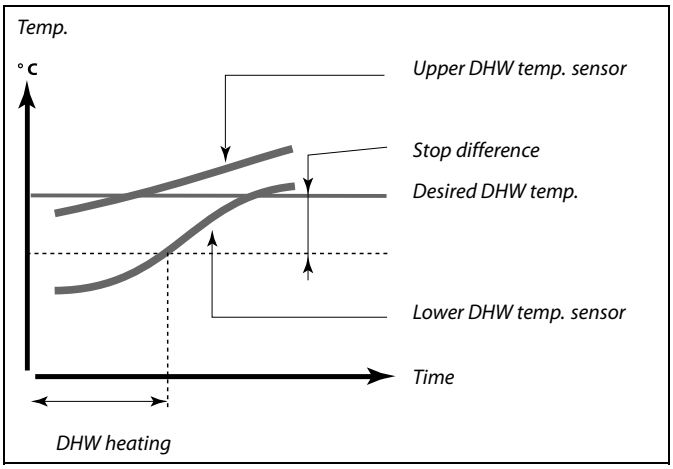
One DHW tank temperature sensor (example with positive 'Stop difference' value):



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



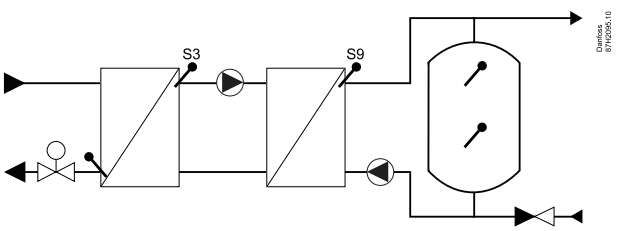
Two DHW tank temperature sensors, upper and lower



Max. charge T		**13152**
Circuit	*Setting range*	*Factory setting*
3	**10 ... 110 °C**	**80 °C**
Set the max. temperature at S3 for heating the DHW.		

10 ... 110: Set the temperature.

Charging principle



Flow T adapt time — A367.2		**13068**
Circuit	*Setting range*	*Factory setting*
3	**OFF / 1 ... 50 s**	**20 s**
Set the adaptation time (seconds) for the desired temperature at S3 based on the desired charging temperature at S9 *The ECL Comfort controller gradually increases the desired temperature at S3 in order to maintain the desired temperature at S9*		

OFF: The desired flow temperature at S3 is not adapted to the desired charging temperature at S9.

1: The adaptation is quick.

50: The adaptation is slow.

The desired flow temperature at S3 cannot be higher than the set temperature in 'Max. charge T'.

7.2 Return limit

The return temperature limitation is based on a constant temperature value.

The controller automatically changes the desired flow temperature to obtain an acceptable return temperature when the return temperature falls below or gets higher than the set limit.

This limitation is based on a PI regulation where P ('Infl.' factor) responds quickly to deviations and I ('Adapt. time') responds slower and over time removes the small offsets between the desired and actual values. This is done by changing the desired flow temperature.

Limit (return temp. limitation)		**13030**
Circuit	*Setting range*	*Factory setting*
3	**10 ... 110 °C**	**40 °C**
Set the return temperature you accept for the system.		

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

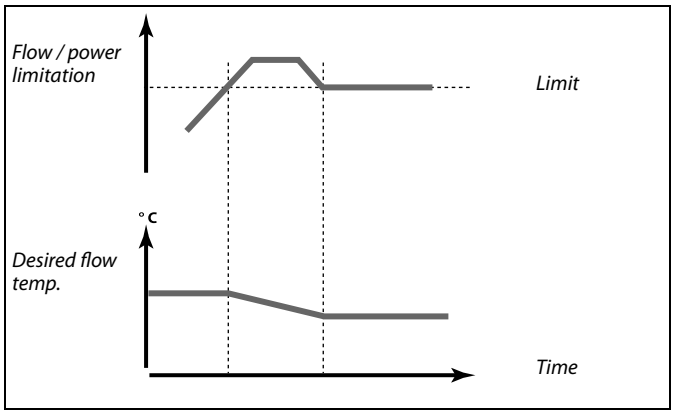
The return temperature limitation for the DHW circuit is based on the setting in 'Limit (return temp. limitation)'.
The influence factors are set in heating circuit 1.

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

7.3 Flow / power limit

Please see the explanation for flow and power limit in circuit 1.

At DHW heating the flow / power limit can be set to a fixed value.



Actual (actual flow or power)		**13110**
Circuit	*Setting range*	*Factory setting*
3	**Read-out only**	
The value is the actual flow or power based on the signal from flow / energy meter.		

Limit (limitation value)		**13111**
Circuit	*Setting range*	*Factory setting*
3	**0.0 ... 999.9 l/h**	**999.9 l/h**
Set the limitation value.		

7.4 Application

Ch.-o. valve / P (changeover valve / pump)		13051
Circuit	*Setting range*	*Factory setting*
3	**OFF / ON**	**ON**
Choose whether the DHW heating control is based on a changeover valve or a pump.		

OFF: Changeover valve

ON: Pump

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

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

Tank, sec. / prim. — A367.1		13053
Circuit	*Setting range*	*Factory setting*
3	**OFF / ON**	**OFF**
Choose whether the heating of the DHW tank is dependent on the flow temperature at S3.		

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

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

Circ. P priority		13055
Circuit	*Setting range*	*Factory setting*
3	**OFF / ON**	**OFF**
Choose whether the DHW circulation pump should be ON during DHW heating.		

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

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

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

Max. DHW time		13044
Circuit	*Setting range*	*Factory setting*
3	**OFF / 1 ... 100 m**	**OFF**
Set the max DHW heating time (minutes). When DHW heating is active and the set 'Max. DHW time' expires, DHW heating is deactivated.		

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

1 ... 100: The DHW heating is deactivated when the set 'Max. DHW time' expires

DHW deact. time		13045
Circuit	*Setting range*	*Factory setting*
3	**1 ... 250 m**	**60 m**
Set the time (minutes) that must elapse after a DHW heating period before a new DHW heating period can be started.		

1 ... 250: When the DHW charging time has reached its maximum, DHW can only be charged again after the set deactivation time has expired.

DHW P post-run		13041
Circuit	*Setting range*	*Factory setting*
3	**0 ... 30 m**	**0 m**
Set the DHW pump (P2) post-run time (minutes). The DHW pump can continue to be switched ON after the DHW heating procedure in order to utilize the remaining heat in the heat exchanger / boiler.		

0 ... 30: Set the number of minutes for the post-run.

Char. P post-run – A367.2		13042
Circuit	*Setting range*	*Factory setting*
3	**0 ... 30 m**	**0 m**
Set the DHW charging pump post-run time (minutes). The DHW charging pump (P4) can continue to be switched ON after the DHW heating procedure in order to utilize the remaining heat in the heat exchanger.		

0 ... 30: Set the number of minutes for the post-run.

Send desired T		13500
Circuit	*Setting range*	*Factory setting*
3	**OFF / ON**	**ON**
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.		

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.

Circ. P frost T		13076
Circuit	*Setting range*	*Factory setting*
3	**OFF / –10 ... 20 °C**	**2 °C**
Set the outdoor temperature value at which the DHW circulation pump is to be active to protect the DHW circuit against frost.		

OFF: The DHW circulation pump is not active.

–10 ... 20: The DHW circulation pump is active when the outdoor temperature is lower than the set value.

Frost pr. T (frost protection temperature)		13093
Circuit	*Setting range*	*Factory setting*
3	**5 ... 40 °C**	**10 °C**
Set the desired flow temperature to protect the DHW system against frost.		

5 ... 40: Desired frost protection temperature.

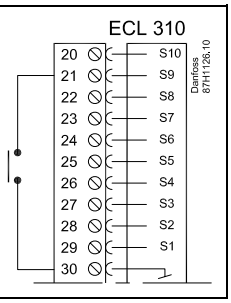
Ext. input (external override) — ECL 310		13141
Circuit	*Setting range*	*Factory setting*
3	**OFF / S1 ... S10**	**OFF**
Choose the input for 'Ext. input' (external override). By means of a switch the controller can be overridden to 'Comfort' or 'Saving' mode.		

OFF: No inputs have been selected for external override.

S1 ... S10: Input selected for external override.

If S1... S6 is chosen as override input, the override switch must have gold-plated contacts.
If S7 ... S10 is chosen as override input, the override switch can be a standard contact.

See the drawing for a connection example of an override switch to input S9.

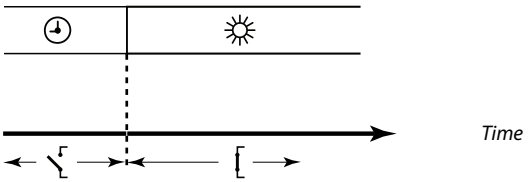


Choose only an unused input for override. If an already used input is applied for override, the functionality of this input is also neglected.

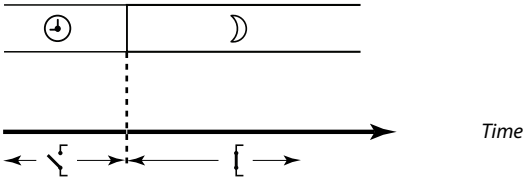
See also 'Ext. mode'.

The two drawings (override to comfort mode and override to saving mode) show the functionality.

Override to 'Comfort' mode



Override to 'Saving' mode



Ext. mode (external override mode)		13142
Circuit	*Setting range*	*Factory setting*
3	**COMFORT / SAVING**	**COMFORT**
Choose external override mode.		

The mode override can be activated for saving or comfort mode. For override, the controller mode must be scheduled mode.

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

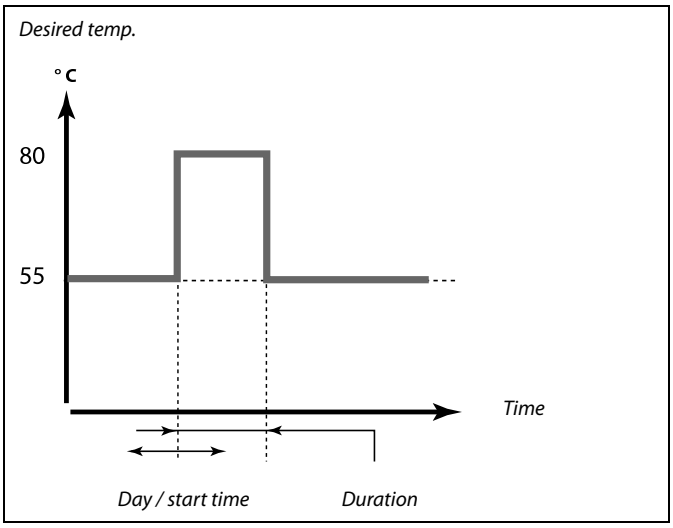
COMFORT: The controller is in comfort mode when the override switch is closed.

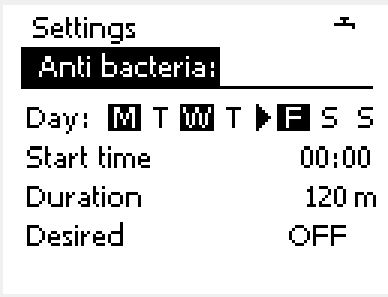
See also 'Ext. input'.

7.5 Anti-bacteria

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

The anti-bacteria function is not active in frost protection mode.





During the anti-bacteria process, the return temperature limitation is not active.

Day		
Circuit	*Setting range*	*Factory setting*
3	**Weekdays**	
Select (mark) the day(s) of the week where the anti-bacteria function must be active.		

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

Start time		
Circuit	*Setting range*	*Factory setting*
3	**00:00 ... 23:30**	**00:00**
Set the start time for the anti-bacteria function.		

Duration		
Circuit	*Setting range*	*Factory setting*
3	**10 ... 600 m**	**120 m**
Set the duration (minutes) for the anti-bacteria function.		

Desired T		
Circuit	*Setting range*	*Factory setting*
3	**OFF / 10 ... 110 °C**	**OFF**
Set the desired DHW temperature for the anti-bacteria function.		

OFF: The anti-bacteria function is not active.

10 ... 110: Desired DHW temperature during the anti-bacteria function period.

8.0 Common controller settings

8.1 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

8.2 Time & Date

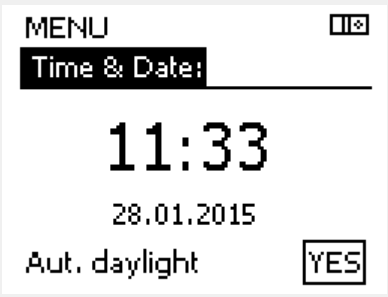
It is only necessary to set the correct date and time in connection with the first use of the ECL Comfort controller or after a power break of more than 72 hours.

The controller has a 24 hour clock.

Aut. daylight (Daylight saving time changeover)

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

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



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

8.3 Holiday

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 end date at 24.00.

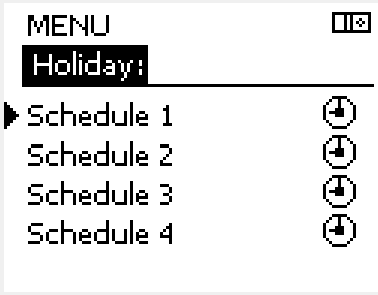
Selectable modes are Comfort, Saving, Frost protection or Comfort 7-23 (before 7 and after 23, the mode is scheduled).

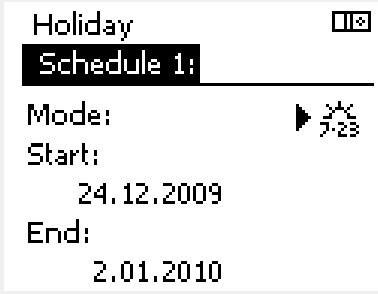
How to set your holiday schedule:

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.





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)

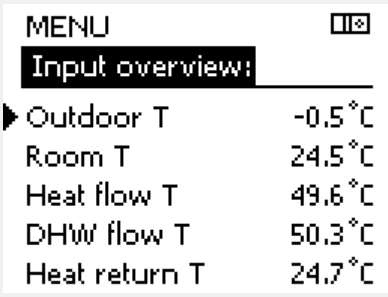
 Going out (extended saving period)

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).

8.4 Input overview

The input overview is located in the common controller settings.

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

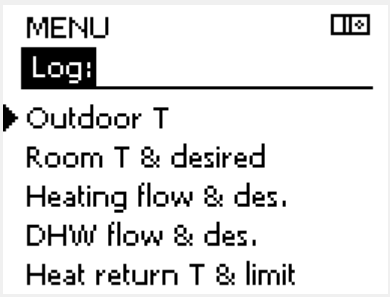


8.5 Log

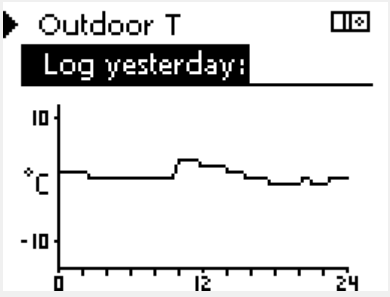
The log function (temperature history) allows you to monitor the logs of today, yesterday, the past 2 days as well as the past 4 days for the connected sensors.

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

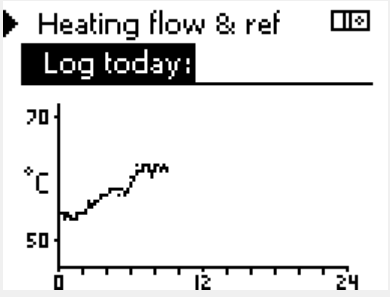
The log function is only available in the 'Common controller settings'.



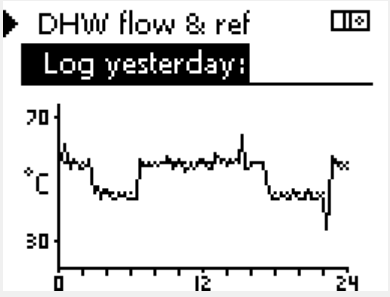
Example 1:
1 day log for yesterday showing the development in outdoor temperature during the past 24 hours.



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.



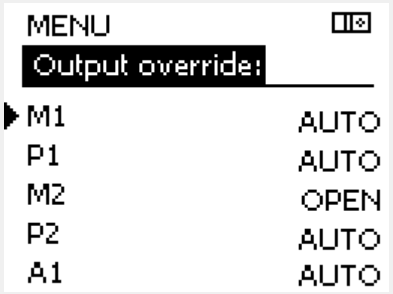
8.6 Output override

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*

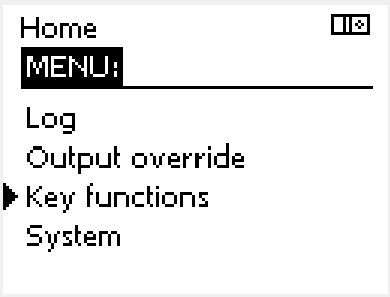


When the selected controlled component (output) is not 'AUTO', the ECL Comfort controller does not control the component in question (pump or motorized control valve e.g.). Frost protection is not active.

M3 cannot be controlled manually as it follows the P2 output.
The setting for P2 to ON or OFF, commands M3 to OPEN or CLOSE.

8.7 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 application and its subtypes of the ECL key in question.
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



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

8.8 System

8.8.1 ECL version

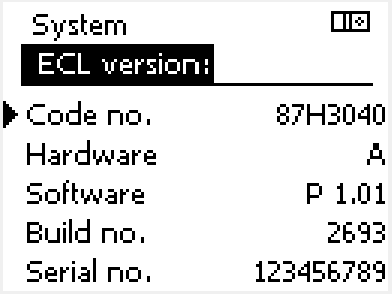
In 'ECL version' you will always be able to find an overview of the data related to your electronic controller.

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 version of the controller
Serial no.:	Unique number for the individual controller
Production week:	Week no. and year (WW.YYYY)

Example, ECL version



8.8.2 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.

8.8.3 Communication

Modbus addr.		**38**
Circuit	*Setting range*	*Factory setting*
	1 ... 247	**1**
Set the Modbus address if the controller is part of a Modbus network.		

1 ... 247: Assign the Modbus address within the stated setting range.

ECL 485 addr. (master / slave address)		2048
Circuit	*Setting range*	*Factory setting*
	0 ... 15	**15**
This settting is relevant if more controllers are working in the same ECL Comfort system (connected via the ECL 485 communication bus) and / or Remote Control Units (ECA 30 / 31) are connected.		

0: The controller works as slave.
The slave receives information about the outdoor temperature (S1), system time, and signal for DHW demand in the master.

1 ... 9: The controller works as slave.
The slave receives information about the outdoor temperature (S1), system time, and signal for DHW demand in the master. The slave sends information about the desired flow temperature to the master.

10 ... 14: Reserved.

15: The ECL 485 communication bus is active.
The controller is master. The master sends information about the outdoor temperature (S1) and system time. Connected Remote Control Units (ECA 30 / 31) are powered.

The ECL Comfort controllers can be connected via the ECL 485 communication bus to perform a larger system (the ECL 485 communication bus can connect to max. 16 devices).

Each slave must be configured with its own address (1 ... 9).

However, more slaves can have the address 0 if they only have to receive information about outdoor temperature and system time (listeners).

The total cable length of max. 200 m (all devices incl. the internal ECL 485 communication bus) should not be exceeded.
Cable lengths of more than 200 m may cause noise sensibility (EMC).

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

Ext. reset		2151
Circuit	*Setting range*	*Factory setting*
	0 / 1	**0**
This setting is only used in connection with set-up of Modbus communication.		

8.8.4 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.

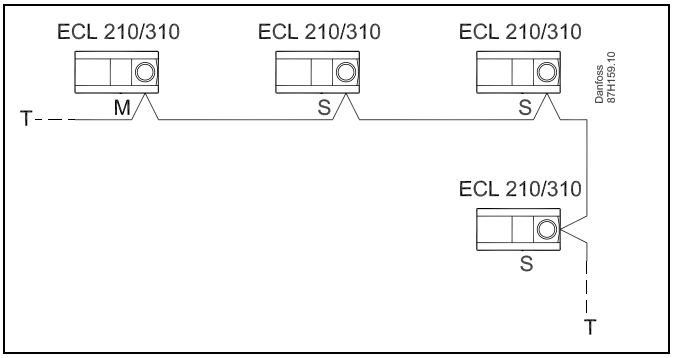
9.0 Miscellaneous

9.1 Several controllers in the same system

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

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

Furthermore, the master controller can receive information about the desired flow temperature (demand) from slave controllers.



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

Situation 1:

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**

SLAVE controller: How to react on a DHW heating demand sent from the MASTER controller

Situation 2:
The slave receives information about a DHW heating activity in the master controller and can be set to close the selected heating circuit.

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 controller.

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

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.

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

Situation 3:

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.

MASTER controller:

- In the circuit 1, go to Settings > Application > Demand offset
- Change OFF to a value (for example 5 K) which is added to the highest demand (desired flow temperature) from the slaves.

Demand offset		**11017**
Circuit	Setting range	**Choose**
1	OFF / 1 ... 20 K	**1 ... 20 K**

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

9.2 Frequently asked questions

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

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 system type and the software generation of the controller 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.

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.

9.3 Definitions

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

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.

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).

Factory settings
Settings stored on the ECL Application Key to simplify the set up of your controller the first time.

Flow temperature
Temperature measured in the flow at any time.

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 required 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.

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.

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.

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.

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.

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 sensor
Temperature sensor placed in the room (reference room, typically the living room) where the temperature is to be controlled.

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.

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.

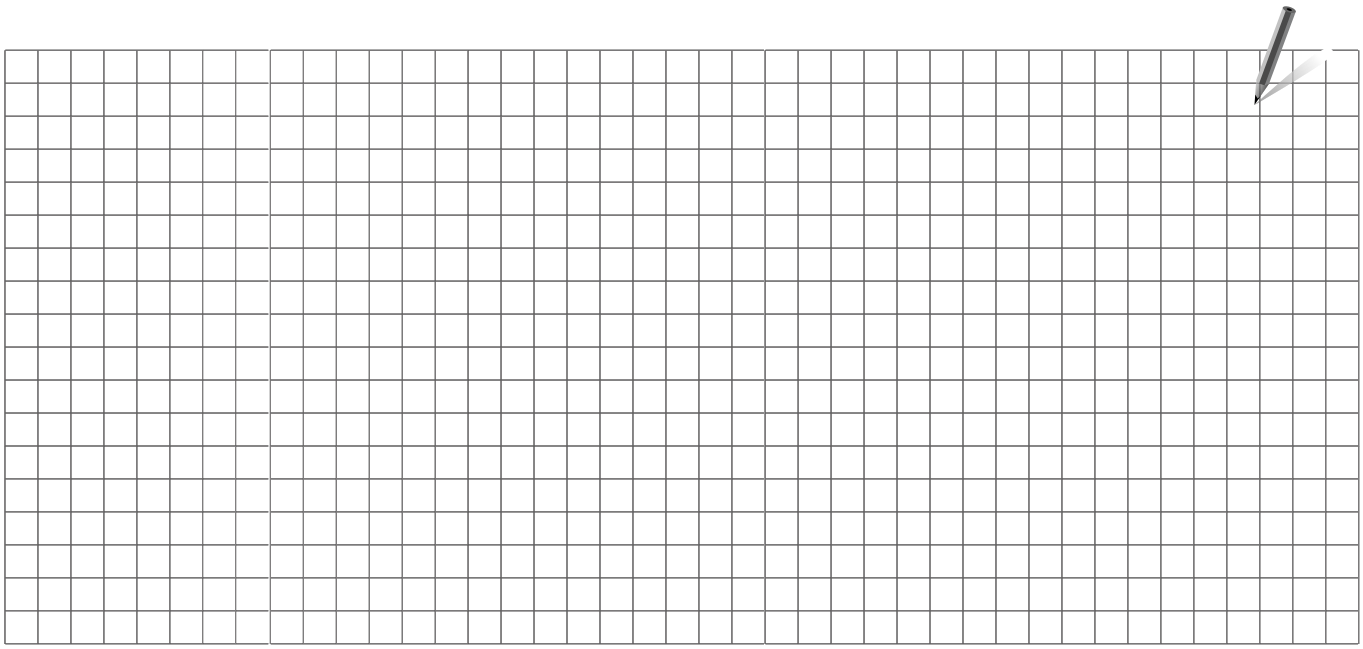
Saving temperature
Temperature maintained in the heating / DHW circuit during saving temperature periods.

Pump control
One circulation pump is working and the other is the spare circulation pump. After a set time, the roles are exchanged.

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, change-over valve or damper control.

3-point control
Opening, closing or no action of the actuator for the motorized control valve. No action means that the actuator remains in its current position.



Installer:
By:
Date:

Installation Guide ECL Comfort 310, application A367

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