L76

ECL Comfort
User's Guide



VI.KM.K2.02
2006.12

* 0 8 7 R 8 1 7 7 *
* V I K M K 2 0 2 *

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Installer's Guide

User's Guide

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* V I K M K 2 0 2 *

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L76

Heating and DHW controller

ECL Comfort
Installer's Guide

Controller mode

- Manual operation (used only at maintenance and service)
- Scheduled operation
- Constant comfort temperature
- Constant setback temperature
- Standby mode
- Arrow buttons. Switch between the lines of the ECL Card.
- Shift button. Switches between temperatures, changeover points etc.
- Adjust temperatures and values etc.
- Circuit selector for switching between the circuits.

Display indications, controlled units, L76

	A	B	C	D	E
	1	1	2	2	3
	ON	▲	ON	▲	ON

A: P1	Blank = OFF	ON = ON
B: M1	▲ = Opens	▲ = Closes
C: P2	Blank = OFF	ON = ON
D: M3	▲ = Opens	▲ = Closes
E: P3	Blank = OFF	ON = ON

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.

This guide is associated with ECL Card 087B4878

Installer:

By:

Date:

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

If the system you are about to install differs from the shown diagram of a standard heating system, feel free to sketch an outline for comparison. Adaptation of systems, see section 10.

List of components:

ECL Comfort 301

S1	Outdoor temperature sensor
S2	Return temperature sensor, circuit I, heating I
S3	Flow temperature sensor, circuit I, heating I
S4	Flow temperature sensor, circuit II, heating II
S5	Flow temperature sensor, circuit III, DHW
S6	Return temperature sensor, circuit II, heating II
S7	Primary flow temperature sensor
P1	Circulation pump, circuit I, heating I
P2	Circulation pump, circuit II, heating II
P3	Circulation pump, circuit III, DHW
M1	Motorized control valve, circuit I, heating I
M2	Motorized control valve, circuit II, heating II
M3	Motorized control valve, circuit III, DHW

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Before you start

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 in section 10, you may want to make a sketch of the system about to be installed. This makes it easier to use the Installer's Guide, which will guide you step-by-step from installation to final adjustments before the end-user takes over.



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

However, you might come across some settings that are not listed in this instruction. These settings could be related either to recent updates or the use of optional modules (which are described in the instructions in question).

How to use this guide

This guide is divided into two parts:
- User's Guide: Yellow sections 1-7
- Installer's Guide: Grey sections 10 and onwards

The application **L76** is very flexible. These are the basic principles:

Heating:
Typically, the flow temperature is adjusted according to your requirements.
The flow temperature sensor, S3, (S4 in circuit 2) is the most important sensor. The desired flow temperature at S3 (S4 in circuit 2) is calculated in the ECL controller, based on the outdoor temperature (S1). The lower the outdoor temperature, the higher the desired flow temperature.
The motorized control valve, M1, (M2 in circuit 2) is opened gradually when the flow temperature is lower than the desired flow temperature and vice versa.
The return temperature, S2, (S6 in circuit 2) 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).
If the measured room temperature does not equal the desired room temperature, the desired flow temperature can be adjusted.
Circulation pumps are ON when the desired flow temperature is higher than 20 °C or the outdoor temperature is lower than 2 °C.
M1 is a 3-point controlled actuator and M2 is a 0 - 10 volt controlled actuator.

DHW:
If the measured DHW temperature (S5) is lower than the desired DHW temperature, the motorized control valve (M3) is opened gradually and vice versa. If the desired DHW temperature cannot be reached, the heating circuits can be closed gradually. The consumption of DHW is flow detected to give an optimum control.
A flow switch (FS) detects DHW consumption, measures the supply temperature (S7), and ensures an optimum control of the DHW temperature. M3 is a 3-point controlled actuator.

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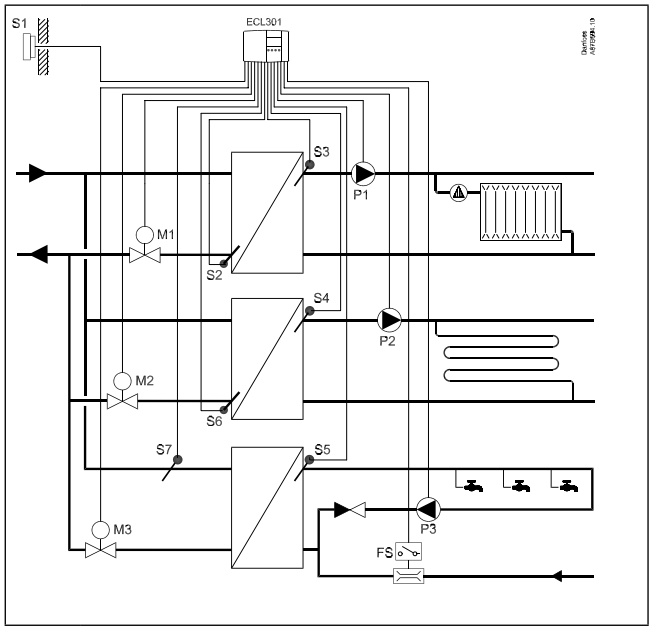
10a Identifying the system type

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 section 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.

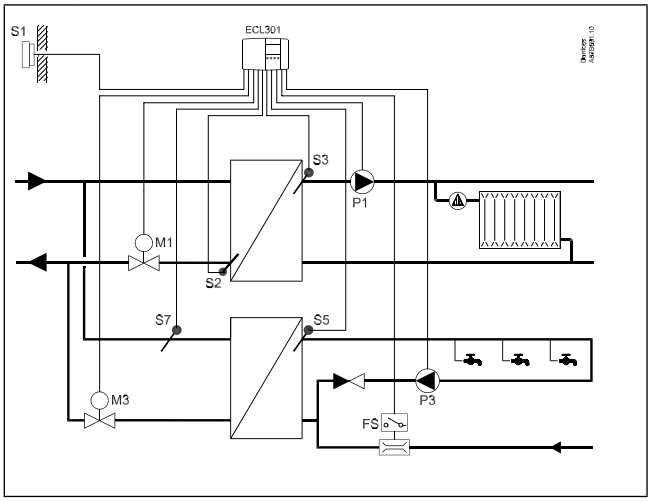
The functions can only be realized with ECL Comfort 301 and as of controller version 2.04.

10.1 Indirectly connected heating systems and DHW circuit according to flow principle



System diagrams in this instruction are principal drawings and do not contain all components which are necessary in your systems.

10.2 Indirectly connected heating system and DHW circuit according to flow principle



11a Mounting the ECL Comfort controller

Installation

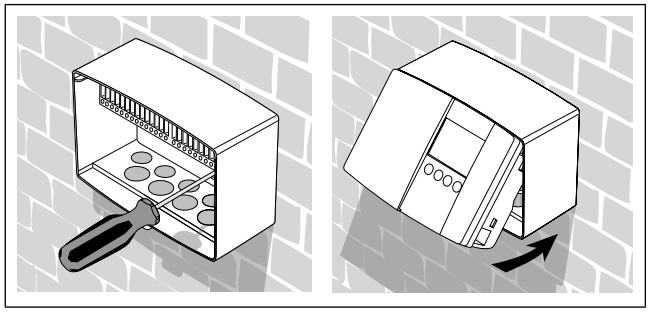
For easy access, you should mount the ECL Comfort controller near the system. Select one of the three following methods:

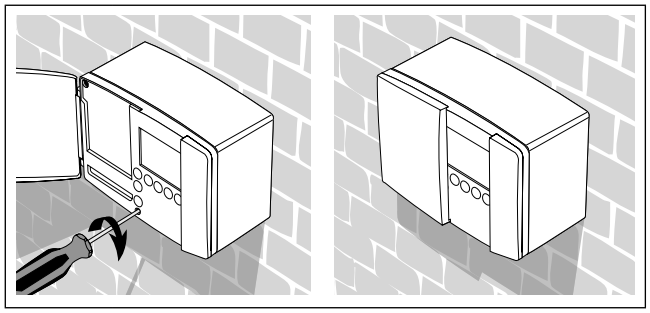
- Mounting on a wall
- Mounting on a DIN rail
- Mounting in a panel

Screws and rawlplugs are not supplied.

Mounting on a wall

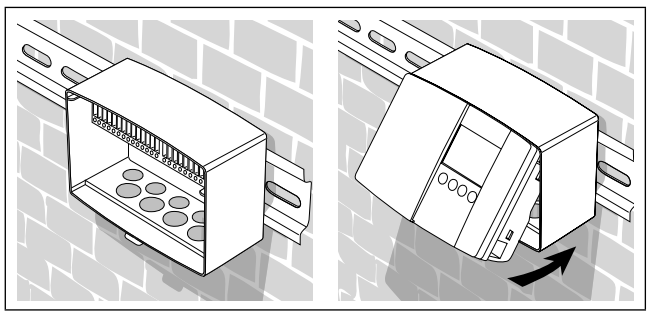
Socket for mounting on wall: Order code No. 087B1149.
Mount the terminal box on a wall with a smooth surface. Establish the electrical connections and position the controller in the box. Secure the controller with the fixing screw.

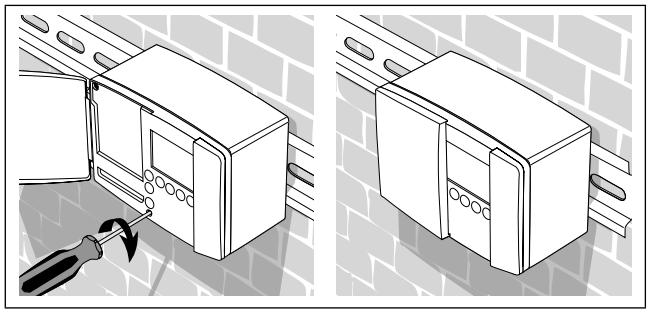




Mounting on a DIN rail

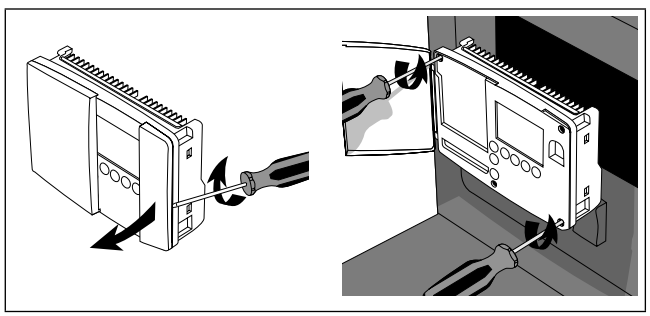
Mounting kit: Order code No. 087B1145.
A mounting kit is necessary to mount the box with the controller on a DIN rail.

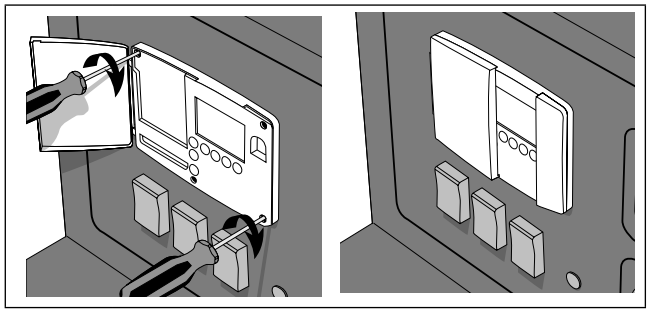




Mounting in a panel

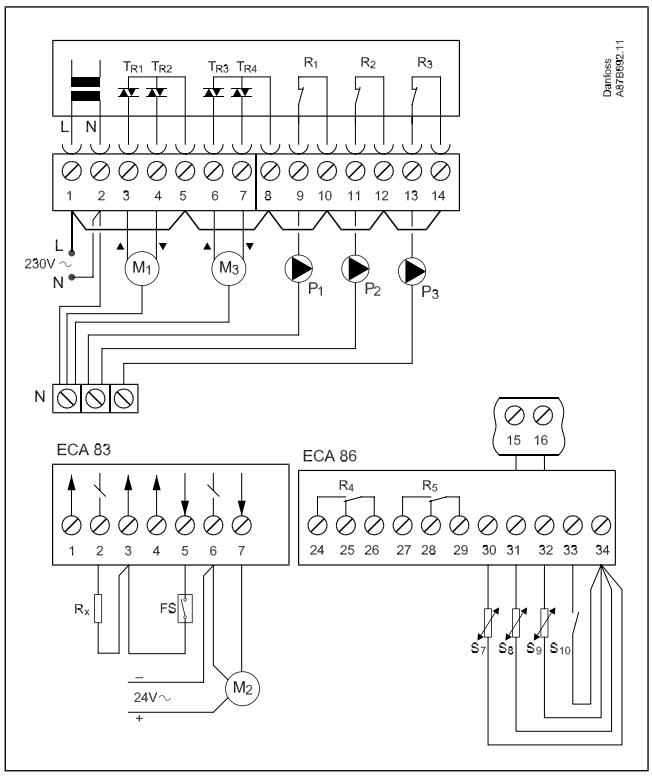
Connector set: Order code No. 087B1148.
The panel plate thickness must not exceed 3 mm.
Prepare a cut-out with the dimensions 93 x 139 mm. Pull off the right side of the lid by means of a screwdriver.
Insert the controller into the panel cut-out and fix it with the two locks which are placed diagonally in two corners of the controller.





12a Electrical connections - 230 V a.c. - in general

230 V a.c. connections



ECA 83 connections

Terminal	Description
2	Analog ground
2 and 3	Rx (resistor 10 kΩ)
3	Analog input
3 and 5	FS (flow switch)
5	Analog output 2
6	Analog ground
7	Analog output 1

ECA 83 is mounted in the controller ex factory.

Terminal	Description	Max. load
1 L	Supply voltage 230 V a.c.	
2 N	Supply voltage 230 V a.c.	
3 M1	Actuator - open, circuit I, heating	0.2 A / 230 V a.c.
4 M1	Actuator - close, circuit I, heating	0.2 A / 230 V a.c.
5	230 V a.c. supply voltage for M1, circuit I, heating	
6 M3	Actuator - open, circuit III	0.2 A / 230 V a.c.
7 M3	Actuator - close, circuit III	0.2 A / 230 V a.c.
8	230 V a.c. supply voltage for M3, circuit III	
9 P1	Circulation pump for circuit I, heating	4(2) A / 230 V a.c.
10	230 V a.c. supply for P1	
11 P2	Circulation pump for circuit II, heating	4(2) A / 230 V a.c.
12	230 V a.c. supply for P2	
13 P3	Circulation pump for circuit III	4(2) A / 230 V a.c.
14	230 V a.c. supply for P3	

ECA 83

Terminal	Description	Max. load
6 M2	Actuator control, circuit II, heating	
7 M2	Actuator control, circuit II, heating	5 mA / 10 V d.c.
External source	24 V a.c. supply voltage for M2 from external source	0.2 A / 24 V a.c.

ECA 86

Terminal	Description	Max. load
24 R4	Relay, NO, alarm	4(2) A / 230 V a.c.
25 R4	Relay, NC, alarm	4(2) A / 230 V a.c.
26 R4	Relay, common	4(2) A / 230 V a.c.

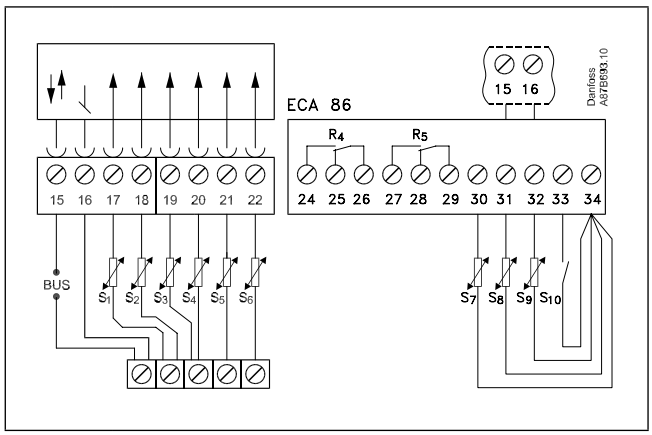
Wire cross section: 0.75 - 1.5 mm^2

Electrical connections
Max. 2 x 1.5 mm^2 wires can be inserted into each screw terminal.

Incorrect connection can damage the TRIAC outputs. Max. load (terminals 3, 4, (6 and 7)) 0.2 A / 230 V a.c.!

14a Connecting and placing the temperature sensors

Connecting the temperature sensors and the bus



Terminal		Description	Type (recomm.)
15 and 16		System device bus*, connections for room panel / remote control / (relay module)	ECA 60 / 62 ECA 61 / 63
17 and 16	S1	Outdoor temperature sensor	ESMT
18 and 16	S2	Return temperature sensor, circuit I, heating I	ESM-11 / ESMC / ESMU
19 and 16	S3	Flow temperature sensor, circuit I, heating I	ESM-11 / ESMC / ESMU
20 and 16	S4	Flow temperature sensor, circuit II, heating II	ESM-11 / ESMC / ESMU
21 and 16	S5	Flow temperature sensor, circuit III, DHW	ESM-11 / ESMC / ESMU
22 and 16	S6	Return temperature sensor, circuit II, heating II	ESM-11 / ESMC / ESMU
30 and 34	S7	Primary flow temperature sensor	AKS 21 M
31 and 34	S8	Temperature readout	
32 and 34	S9	Temperature readout	
33 and 34	S10	External alarm input**	

* *The system device bus / room panel / remote control is only active when the outdoor temperature sensor is connected.*

** *S10 operates as a digital input for an external alarm which activates relay R4 which again gives the alarm signal. The readout sequence is 28 seconds. Please note that the contacts should be goldplated.*

Establish the jumper from 16 to common terminal.

Wire cross section for sensor connections:
Min. 0.4 mm^2
Total cable length: Max. 125 m (all sensors incl. system device bus)

Cable lengths of more than 125 m may cause noise sensibility (EMC).

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

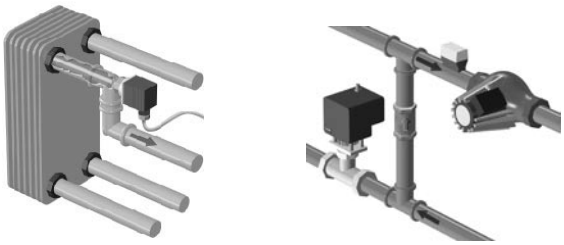
The temperature sensor mentioned below are sensors used for the ECL Comfort 200 and 300 series which not all will be needed for your application!

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.



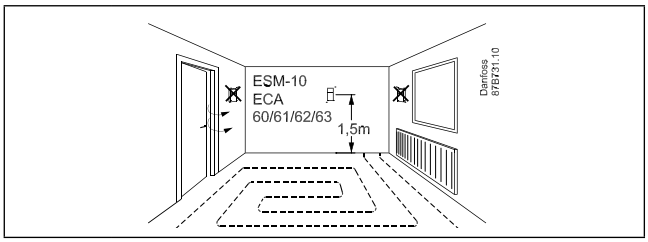
Make sure that the surface of the pipe is clean and even where the sensor is mounted.

Return temperature sensor (ESMU, ESM-11 or ESMC)

The return sensor should always be placed in / on a pipe with return water flow.

Room temperature sensor (ESM-10, ECA 60 / 62 room panel or ECA 61 / 63 remote control)

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.



DHW temperature sensor (ESMU or ESMB-12)

Place the DHW temperature sensor according to the manufacturer's specification.

Boiler temperature sensor (ESMU, ESM-11 or ESMC)

Place the sensor according to the boiler manufacturer's specification.

Flow / air duct temperature sensor (ESM-11, ESMB-12, ESMC or ESMU types)

Place the sensor so that it measures a representative temperature.

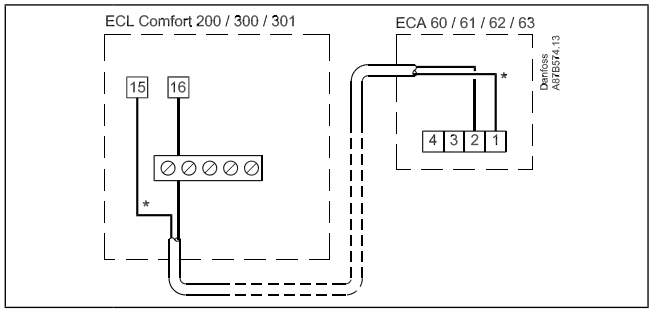
Slab temperature sensor (ESMB-12)

Place the sensor in the slab.

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

Installation

Connecting the room panel / remote control



The ECA 60 / 61 / 62 / 63 is activated by the setting in line 10 (section 32).

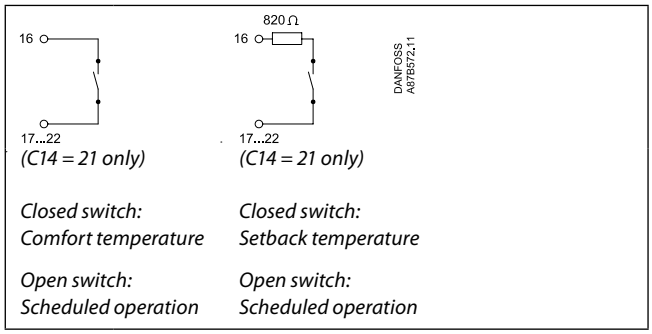
The ECA 60 / 61 / 62 / 63 is powered by the system device bus which means that the bus must be active. The bus is activated by setting the controller address to 15 (section 32, line 199).

Override

For an active override, you have to choose the mode "scheduled operation"! Input S1 ... S6 (ECL Card C14 only uses S5) can be used for override purposes (section 32, line 141).

Connection example without ECA 9010

If the override switch has goldplated contacts, you can choose one of the following solutions or a combination of both:



(C14 = 21 only)

Closed switch:
Comfort temperature

Open switch:
Scheduled operation

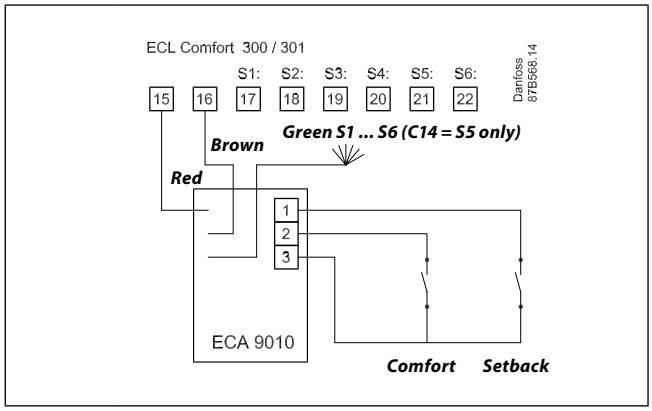
(C14 = 21 only)

Closed switch:
Setback temperature

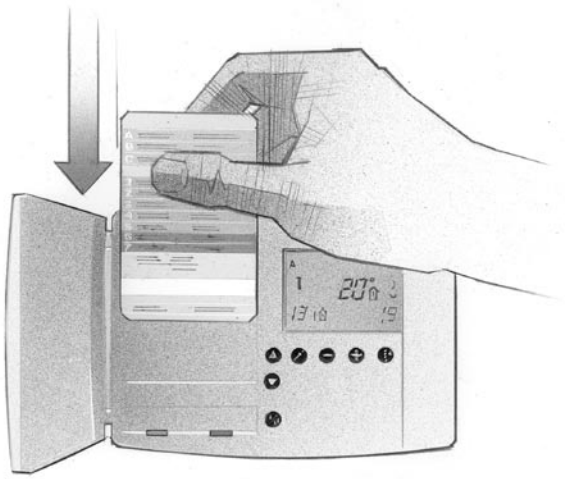
Open switch:
Scheduled operation

Connection example with ECA 9010

The ECA 9010 module is powered by the system device bus, which means that the bus must be active. The bus is activated by setting the controller address to 15 (line 199). To avoid influence from contact resistance, the use of ECA 9010 is recommended.



15a Inserting the ECL Card

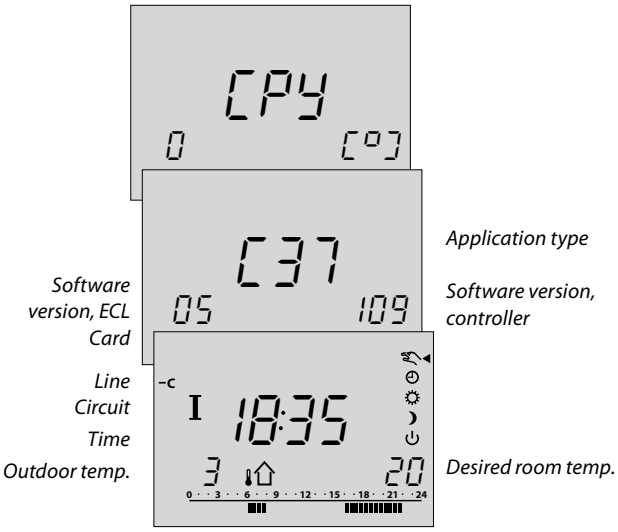


How to insert your ECL Card the first time

After the power has been switched on, open the lid on the front side of the controller.

Place the ECL Card with the yellow side facing you. This enables the controller to read the ECL Card data. The controller immediately starts to copy the application type and factory settings from the ECL Card. After copying, the display will show you the application type. After approx. 10 sec. the display will change to display line C.

Display example:



The controller is now ready to be set to control your system.

If the display keeps showing CPY, see section 34b.

Understanding the ECL Card

The ECL Card contains factory settings for a standard system. If the actual system differs from the standard system, the controller must be adjusted accordingly. After the adjustment, the new settings should be stored on the ECL Card.

For ECL Card copying and daily use including adjustment of temperatures and schedules, insert the ECL Card with the yellow side facing you.

For system set-up adjustments, the grey side of the ECL Card - the installer's side - must be facing you.

As a main rule, the ECL Card should always remain in the controller during service, maintenance and setting.

If the card is removed or left in the controller with the grey side facing you, please note that:

- After approx. 25 min.:
  - The controller cannot be operated.
  - The controller reverts to display C (section 1).
- The ECL Card must not be exposed to direct heat or sunshine.



If several controllers are installed in the system you can write a title on the ECL Card with a permanent ink pen.

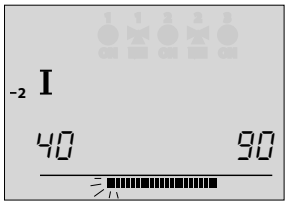
Do not remove the ECL Card while copying. The data on the ECL Card can be damaged!

When you store your personal settings on your ECL Card, the factory settings will be overridden.

Adjusting the ECL Card settings

General principles
When the controller is connected and operating you can check and adjust all or some of the basic settings. Turn the ECL Card so that the grey side is facing you (see the example below).

Use the arrow buttons to move from line to line of the ECL Card, for example line 2:



Value in range indicator

Use the plus / minus buttons to adjust the settings.

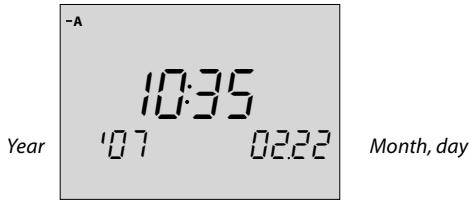
In some displays more than one setting or value can be adjusted. Use the shift button to switch between the options.

The circuit selector shifts between circuit I and II. You can adjust all settings and service parameters individually.

Update of the ECL Card after maintenance and service
All new settings can be stored on the ECL Card. For details about copying, see section 34.

Setting the time and date - line A

Actual time



Year *Month, day*

Use the shift button to switch between minutes, hours, years, months and days.

Set the correct time and date.

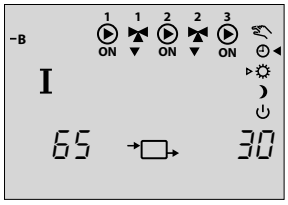
In case of a power break, which lasts longer than 12 hours, the time and the date have to be set again. All other settings are stored as programmed.

Use the yellow side of the card to change the schedules.

See User's Guide, section 4.

Monitoring temperatures and system units - line B

Controlled units



Flow temp. (S3)

Return temp. (S2)

Push and hold the shift button to see:
- the calculated flow temperature
- the desired return temperature limitation.

In circuit III, the motorized control valve no. 2 actually symbolizes the motorized control valve no. 3.

In circuit II, controlled units are not shown. Instead the position of the motorized control valve is displayed.

The activity of the motorized control valve is shown as arrows below the valve symbol. When the circulation pump is operating, it is indicated as ON below the pump symbol.

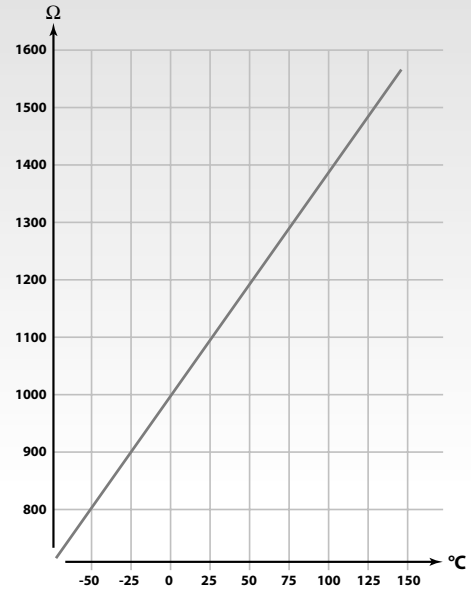
If a sensor is not mounted or is disconnected, the display will indicate it as "- -".

If the sensor is short-circuited, the display will indicate it as "- - -".

If you are in doubt, remove the controller and check the ohmic value between the relevant terminals.

Relationship between temperature and ohmic value

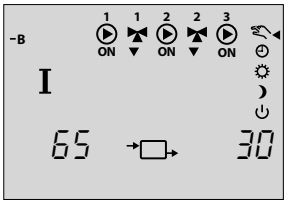
°C	Ω
-50	805
-40	845
-30	883
-20	922
-10	961
0	1000
10	1039
20	1078
30	1117
40	1155
50	1194
60	1232
70	1271
80	1309
90	1347
100	1385
110	1423
120	1462
130	1501
140	1539
150	1578



Manual control - line B

Shift to manual mode.

Controlled units



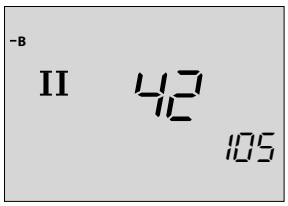
Controller mode

Choose the unit you want to control. The selected unit symbol will blink.

Controlled units are switched OFF or ON when the relevant button is pushed.

In circuit III, the motorized control valve no. 2 actually symbolizes the motorized control valve no. 3 but circuit III can be controlled manually as in circuit I.

Opening percentage (0 - 100%)



Desired opening (0 - 250)

In circuit II, controlled units are not shown. Instead the position of the motorized control valve is displayed. The motorized control valve of circuit II is voltage controlled (0 - 10 V). It can be controlled manually by pressing the shift button and the plus / minus buttons.

The motorized actuator (gear motor)

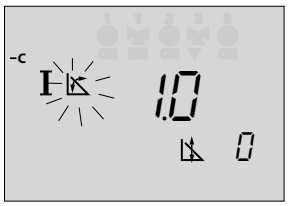
closes or opens the controlled unit as long as the relevant button is pushed. If pushed for more than 3 seconds, the actuator continues to close or open the valve.

Check the activation direction of the actuator either by looking at it or by feeling whether the temperature of the actual pipe changes as expected.

This operation applies to all circuits.

During manual operation, all control functions are deactivated.

20a Setting the heat curve - line C

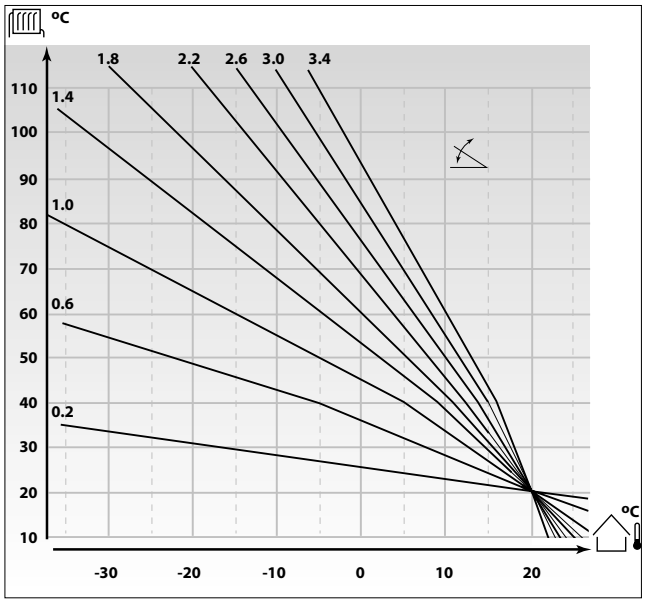


Slope

Displacement

Slope		
Circuit	*Setting range*	*Factory setting*
I / II	**0.2 ... 3.4**	**1.0 / 0.4**

The symbol for the slope of the heat curve will blink. Adjust the slope of the heat curve, if required.



How to determine another heat curve, if necessary:
Choose the calculated flow temperature for your system and the determined min. outdoor temperature for your area. Pick the heat curve closest to the crossing point of these two values.

The setting of the desired room temperature has an influence on the calculated flow temperature (heat curve), no matter if a room temperature sensor is connected or not.

Floor heating systems
This controller is factory set for radiator systems, which typically are high flow temperature systems.
To control floor heating systems, which typically are low flow temperature systems, you need to change the heat curve according to your type of system.

Slope		
Circuit	*Setting range*	*Typical setting*
I / II	**0.2 ... 3.4**	**0.4 / 0.4**

Whether it is reasonable to change the slope or parallel displacement will depend on the individual heat requirement.

Small increases or reductions in the heating temperature can be implemented by means of the parallel displacement.

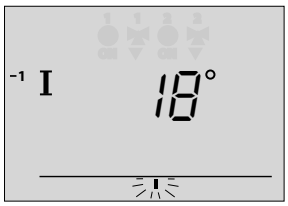
Parallel displacement		
Circuit	*Setting range*	*Factory setting*
I / II	**-9 ... 9 K**	**0 / 0 K**

If you want to adjust the parallel displacement of the heat curve, push the shift button. The symbol for the parallel displacement will blink.

Make your adjustments.

The grey side of the ECL Card

Heating cut-out - line 1

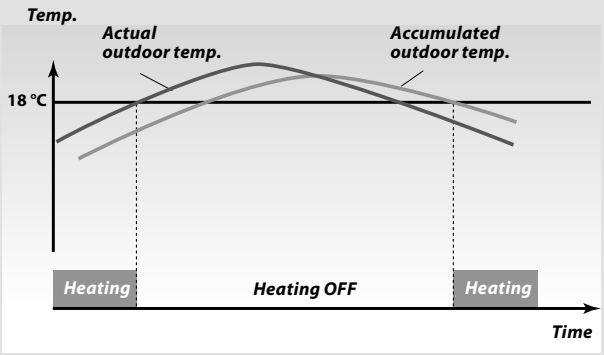


1 Limit for heating cut-out		
Circuit	*Setting range*	*Factory setting*
I / II	**10 ... 30 °C**	**18 / 18 °C**

Set the outdoor temperature limit at which you want the heating system to stop.

The valve closes and after about 3 min. the heating circulation pump stops.

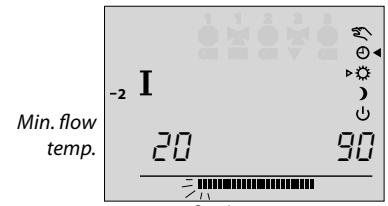
The min. limitation set in line 2 will be ignored.



This function can save energy by stopping the heating system when the outdoor temperature gets above a set limit. The heating system switches ON again when the outdoor temperature and the accumulated outdoor temperature become lower than the set limit.

The heating cut-out is only active when the controller mode is scheduled operation. When the limit value is set to 30, there is no heating cut-out.

Flow temperature limits - line 2



Min. flow temp.

Max. flow temp.

Setting range

2 Flow temperature limits, min. and max.		
Circuit	*Setting range*	*Factory setting*
I / II	**10 ... 110 °C**	**min. 20 / 20, max. 90 / 50 °C**

The mentioned setting range and factory settings may vary from the settings on your ECL Card.

The left end of the setting range blinks. Adjust the min. limit of your system temperature.

Choose the max. limit. The right end of the setting range blinks.

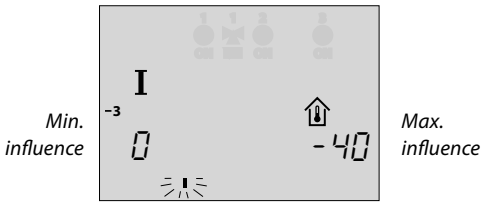
Adjust the max. limit.

Basic set-up

The grey side of the ECL Card

Room temperature influence - line 3

This section is only relevant if you have installed a room temperature sensor or ECA 60 / ECA 61 / ECA 62 / ECA 63.



3 Room temperature influence		
Circuit	*Setting range*	*Factory setting*
I / II	**0 ... 99 / -99 ... 0**	**min. 0, max. -40**

The bar below the min. value blinks. Adjust the min. influence.

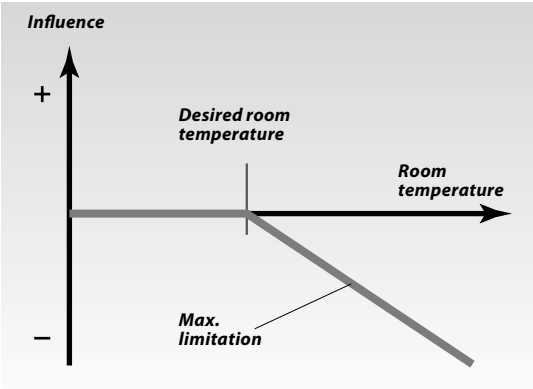
Select the max. influence.
The bar below the max. value blinks.

Adjust the max. influence.

There are two basic principles for control of the room temperature influence:

A: Max. room temperature limitation

Use this limitation if your system is fully equipped with thermostats and you also want to obtain a max. limitation of the room temperature. The controller will allow for free heat gains, i.e. solar radiation or heat from a fire place, etc.



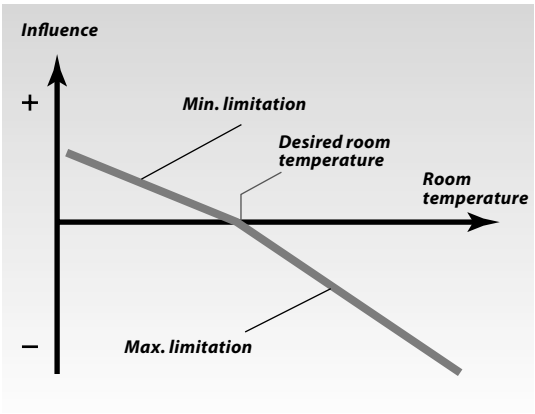
The max. influence determines how much the room temperature should influence the desired flow temperature.

Example
The actual room temperature is 2 degrees too high.
The influence at max. limitation (right corner of the display) is set to -40.
The influence at min. limitation (left corner of the display) is set to 0.
Heat curve H is 1.8.
Result:
The desired flow temperature is changed by
2 x -40 x 1.8 x 0.1 = -14.4 degrees.

B: Reference room temperature control

Used if your system is not equipped with thermostats and you select the room with room temperature sensor as a temperature reference for the rest of the rooms.

Set a positive value for the min. influence and a negative value for the max. influence.



The room temperature sensor in the reference room registers the difference between the desired and the actual room temperature. The desired flow temperature will be corrected to eliminate this difference.

Example 1
The actual room temperature is 2 degrees too low.
The influence at max. limitation (right corner of the display) is set to -35.
The influence at min. limitation (left corner of the display) is set to 20.
Heat curve H is 1.8.
Result:
The desired flow temperature is changed by
2 x 20 x 1.8 x 0.1 = 7.2 degrees.

Example 2
The actual room temperature is 2 degrees too high.
The influence at max. limitation (right corner of the display) is set to -35.
The influence at min. limitation (left corner of the display) is set to 20.
Heat curve H is 1.8.
Result:
The desired flow temperature is changed by
2 x (-35) x 1.8 x 0.1 = -12.6 degrees.

Basic set-up

The grey side of the ECL Card

Control parameters - lines 4-7, circuit I / II (heating)

4 Proportional band, Xp		
Circuit	*Setting range*	*Factory setting*
I	**1 ... 250 K**	**200 K**

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

In circuit II, the proportional band, Xp, is set in line 184.

5 Integration time constant, Tn		
Circuit	*Setting range*	*Factory setting*
I	**5 ... 999 sec.**	**55 sec.**

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

A small integration constant will make the controller react fast but with less stability

In circuit II, the integration time constant, Tn, is set in line 185.

6 Running time of the motorized control valve		
Circuit	*Setting range*	*Factory setting*
I	**5 ... 250 sec.**	**56 sec.**

Set the running time of the motorized control valve according to the example. This is the time it takes the controlled unit to move from fully closed to fully open position.

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 degrees x 2 = 180 sec.*

7 Neutral zone, Nz		
Circuit	*Setting range*	*Factory setting*
I	**0 ... 9 K**	**3 K**

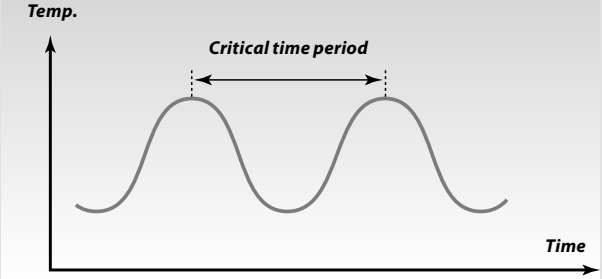
Set the neutral zone to a high value if you can accept a high variation in flow temperature.
When the actual flow temperature is within the neutral zone, the controller does not activate the motorized valve.

In circuit II, the neutral zone, Nz, is set in line 187.

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.

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

- Set the integration time (line 5) to its max. value (999 sec.).
- Decrease the value for the proportional band (line 4) until the system starts hunting with a constant amplitude (it might be necessary to force the system by setting an extreme value).
- Find the critical time period on the temperature recording or use a stop watch.



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

Integration time = 0.85 x critical time period
Proportional band = 2.2 x proportional band value in the critical time period.

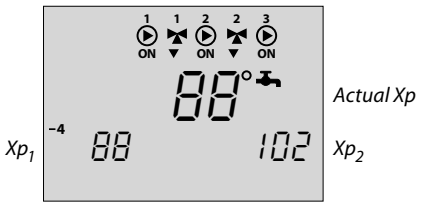
If the regulation seems to be too slow, you can decrease the proportional band value by 10%.

Make sure there is a consumption when you set the parameters.

Basic set-up

The grey side of the ECL Card

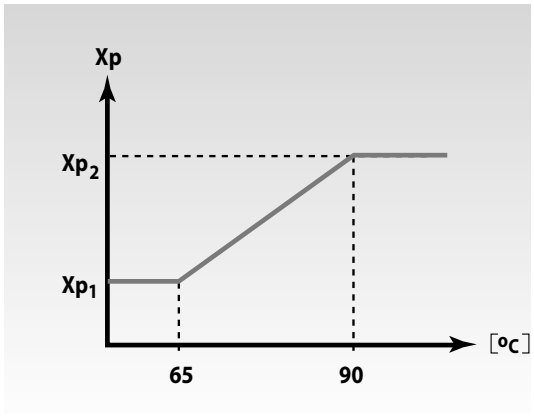
27a Control parameters - lines 4-7, circuit III



4 Proportional band, Xp		
Circuit	*Setting range*	*Factory setting*
III	1 ... 250 K	88 K / 102 K

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

If you want to adjust Xp_1 and Xp_2, push the shift button once or twice.



Xp is a function of the supply temperature sensor S7. If the sensor S7 is not connected, the Xp value will equal Xp_1.

5 Integration time constant, Tn		
Circuit	*Setting range*	*Factory setting*
III	5 ... 999 sec.	16 sec.

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

A small integration constant will make the controller react fast but with less stability

6 Running time of the motorized control valve		
Circuit	*Setting range*	*Factory setting*
III	5 ... 250 sec.	15 sec.

Set the running time of the motorized control valve. This is the time it takes the controlled unit to move from fully closed to fully open position.

7 Neutral zone, Nz		
Circuit	*Setting range*	*Factory setting*
III	0 ... 9 K	3 K

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 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.

Control & overviews

29a Check list

Is the ECL Comfort controller ready for use?

- ☐ Make sure that the correct power supply is connected to terminals 1 (Live) and 2 (Neutral). See section 12 or 13.
- ☐ Check that the required actuators, pumps, fans, dampers and burners are connected to the correct terminals. See sections 12 or 13.
- ☐ Check that all sensors are connected to the correct terminals. See section 14.
- ☐ Mount the controller and switch on the power.
- ☐ Insert the ECL Card with the yellow side facing you and push ⏎, if necessary. See section 15.
- ☐ Choose manual operation as controller mode. See section 2.
- ☐ Check that valves open and close, and that required pumps, fans, dampers and burners start and stop when operated manually. See section 19.
- ☐ Having completed the manual operation check, choose scheduled operation as controller mode.
- ☐ Check that the temperatures shown in display A and B match the actual sensors. See section 1.

Adapting the ECL Comfort controller to the system

- ☐ Turn the ECL Card so that the grey side faces you and push ⏎, if necessary.
- ☐ Set the time and the date (line A). See section 17.
- ☐ Check that all settings in the controller (sections 30 and 31) are set or that the factory settings comply with your requirements.

If your system differs from the diagram shown on the cover, you should check and alter your service parameters, if necessary.

- ☐ Check that the system settings mentioned in section 10 have been set correctly.

Control & overviews

ECL Card settings (circuit I)

A Time and date — Section 17

B System information — Sections 18 & 19

C Heat curve — Section 20

Setting ranges	*Factory settings*	*Your settings*
Slope		
0.2 ... 3.4	1.0	
See section 20		
Parallel displacement		
-9 ... 9	0 K	
See section 20		
1		
Limit for heating cut-out		
10 ... 30 °C	18 °C	
See section 21		
2		
Flow temperature , min. / max. limits		
10 ... 110 °C	min. 20, max. 90 °C	
See section 22		
3		
Room temperature influence		
0 ... 99 / -99 ... 0	min. 0, max. -40	
See section 23		
4		
Proportional band, Xp		
1 ... 250 K	200 K	
See section 26		
5		
Integration time constant, Tn		
5 ... 999 sec.	55 sec.	
See section 26		
6		
Running time of the motorized control valve		
5 ... 250 sec.	56 sec.	
See section 26		
7		
Neutral zone, Nz		
0 ... 9 K	3 K	
See section 26		

ECL Card settings (circuits II / 🚰 III)

A Time and date — Section 17

B System information — Sections 18 & 19

C Heat curve — Section 20

Setting ranges	*Factory settings*	*Your settings*
Slope II		
0.2 ... 3.4	0.4	
See section 20		
Parallel displacement II		
-9 ... 9	0 K	
See section 20		
1 **II**		
Limit for heating cut-out		
10 ... 30 °C	18 °C	
See section 21		
2 **II**		
Flow temperature , min. / max. limits		
10 ... 110 °C	min. 20, max. 50 °C	
See section 22		
3 **II**		
Room temperature influence		
0 ... 99 / -99 ... 0	min. 0, max. -40	
See section 23		
4 🚰 **III**		
Proportional band, Xp		
1 ... 250 K	88 / 102 K	
See section 27		
5 🚰 **III**		
Integration time constant, Tn		
5 ... 999 sec.	16 sec.	
See section 27		
6 🚰 **III**		
Running time of the motorized control valve		
5 ... 250 sec.	15 sec.	
See section 27		
7 🚰 **III**		
Neutral zone, Nz		
0 ... 9 K	3 K	
See section 27		

Circuit I (Heating I)

Lines	Setting ranges	Factory settings	Your settings	
10	Choice of room panel / remote control **1 ... 8**	**5**		
13	Reference ramping **0 ... 99 min.**	**0 min.**		**min.**
14	Optimizing time constant **OFF / 10 ... 59**	**OFF**		
15	Adaptive function of room temperature **OFF / 1 ... 30**	**OFF**		
17	Influence on desired flow temperature **OFF / 1 ... 20 K**	**OFF**		**K**
21	Total stop **ON / OFF**	**OFF**		
22	Pump exercise **ON / OFF**	**ON**		
23	Valve exercise **ON / OFF**	**OFF**		
31	Return temperature limitation - upper limit (X-axis) **-30 ... 15 °C**	**15 °C**		**°C**
32	Return temperature limitation - upper limit (Y-axis) **10 ... 110 °C**	**40 °C**		**°C**
33	Return temperature limitation - lower limit (X-axis) **-30 ... 15 °C**	**-15 °C**		**°C**
34	Return temperature limitation - lower limit (Y-axis) **10 ... 110 °C**	**60 °C**		**°C**
35	Return temperature influence - max. limitation **-9.9 ... 0 ... 9.9**	**-2.0**		
37	Time constant for return temperature limitation **OFF / 1 ... 50**	**25**		
43	Parallel operation of DHW and heating circuits **OFF / 1 ... 99 K**	**OFF**		**K**
52	Closed valve / normal operation **ON / OFF**	**OFF**		
141	Override input selection **OFF / 1 ... 6**	**OFF**		
147	Acceptable temperature deviation below desired flow temperature ($\Delta T1_{ALARM}$) **OFF / 1 ... 30 K**	**OFF**		
148	Acceptable temperature deviation above the desired flow temperature ($\Delta T2_{ALARM}$) **1 ... 30 K**	**15 K**		**K**
149	Time interval Δt_{ALARM} before activation of alarm function **1 ... 99 min.**	**10 min.**		**min.**
196	Service pin LON **ON / OFF**	**OFF**		
197	LON reset **ON / OFF**	**ON**		
198	Daylight saving time changeover **ON / OFF**	**ON**		
199	Slave address **0 ... 9, 15**	**15**		

Circuit II (Heating II)

Lines	Setting ranges	Factory settings	Your settings	
10	Choice of room panel / remote control **1 ... 8**	**5**		
13	Reference ramping **0 ... 99 min.**	**0 min.**		**min.**
14	Optimizing time constant **OFF / 10 ... 59**	**OFF**		
15	Adaptive function of room temperature **OFF / 1 ... 30**	**OFF**		
21	Total stop **ON / OFF**	**OFF**		
22	Pump exercise **ON / OFF**	**ON**		
31	Return temperature limitation - upper limit (X-axis) **-30 ... 15 °C**	**15 °C**		**°C**
32	Return temperature limitation - upper limit (Y-axis) **10 ... 110 °C**	**40 °C**		**°C**
33	Return temperature limitation - lower limit (X-axis) **-30 ... 15 °C**	**-15 °C**		**°C**
34	Return temperature limitation - lower limit (Y-axis) **10 ... 110 °C**	**60 °C**		**°C**
35	Return temperature influence - max. limitation **-9.9 ... 0 ... 9.9**	**-2.0**		
37	Time constant for return temperature limitation **OFF / 1 ... 50**	**25**		
43	Parallel operation of DHW and heating circuits **OFF / 1 ... 99 K**	**OFF**		**K**
52	Closed valve / normal operation **ON / OFF**	**OFF**		
141	Override input selection **OFF / 1 ... 6**	**OFF**		
147	Acceptable temperature deviation below desired flow temperature ($\Delta T1_{ALARM}$) **OFF / 1 ... 30 K**	**OFF**		
148	Acceptable temperature deviation above the desired flow temperature ($\Delta T2_{ALARM}$) **1 ... 30 K**	**15 K**		**K**
149	Time interval Δt_{ALARM} before activation of alarm function **1 ... 99 min.**	**10 min.**		**min.**
184	Proportional band, Xp **1 ... 250 K**	**200 K**		**K**
185	Integration time constant, Tn **5 ... 999 sec.**	**55 sec.**		**sec.**
187	Neutral zone, Nz **0 ... 9 K**	**3 K**		**K**

Control & overviews

31c Service parameters (10-199)

Circuit III DHW			
Lines	*Setting ranges*	*Factory settings*	*Your settings*
78	Desired temperature for anti-bacteria function **OFF / 1 ... 100 °C**	**OFF**	**°C**
80	Anti-bacteria function period **5 ... 250 min.**	**120 min.**	**min.**
138	Forced running time of the motorized control valve at DHW demand **OFF / 0.1 ... 10.0 sec.**	**1.6 sec.**	**sec.**
157	Acceptable temperature deviation below desired flow temperature ($\Delta T1_{ALARM}$) **OFF / 1 ... 30 K**	**OFF**	
158	Acceptable temperature deviation above desired flow temperature ($\Delta T2_{ALARM}$) **1 ... 30 K**	**15 K**	**K**
159	Time interval Δt_{ALARM} before activation of alarm function **1 ... 99 min.**	**10 min.**	**min.**

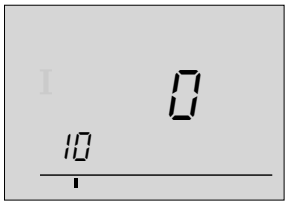
All the above parameters will be shown in circuit II (light in circuit indicator to the right) and will be displayed with a water tap.

Control & overviews

32 Adjusting the service parameters

In addition to the settings in line 1 to 7 on the grey side of the ECL Card, there is an extended service menu from line 10 and onwards.

Push repeatedly to reach the lines numbered 10 and onwards.



Now you can move to any line of your choice.

Set the parameter value.

You can select any of the two circuits no matter what line you are in. You will not necessarily enter the same line number. See the service parameters in section 31.

Check that you have entered all the required settings in circuit I - and circuit II, if available.

If you want to copy the new settings to the ECL Card (recommended by Danfoss), see section 34.

Make a note of your new settings in the parameter list in section 31.

When you have entered all your personal settings, turn the ECL Card over so that the yellow side faces you.

10 Choice of room panel / remote control		
Circuit	*Setting range*	*Factory setting*
I / II	**1 ... 8**	**5 / 5**
Decides the communication with the room panel or remote control. *Please note that the room panel / remote control is only active if the system device bus is active. The bus is active when the outdoor temperature sensor is connected.*		

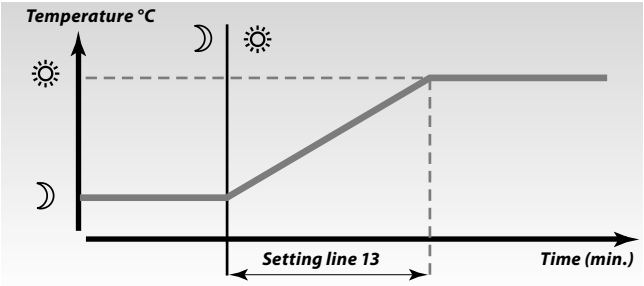
Choose between

- **1:** Room panel ECA 60 / 62 or remote control ECA 61 / 63 with address A
- **2:** Room panel ECA 60 / 62 or remote control ECA 61 / 63 with address B
- **3 ... 4:** Not used
- **5:** No room panel or remote control
- **6 ... 8:** Not used

The room panel / remote control has no influence on the DHW control.

13 Reference ramping		
Circuit	*Setting range*	*Factory setting*
I / II	**0 ... 99 min.**	**0 / 0 min.**
The time in which the desired flow temperature increases slowly to avoid load peaks in the heat supply.		

Set the ramping time for the controller.



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

14 Optimizing time constant		
Circuit	*Setting range*	*Factory setting*
I / II	**OFF / 10 ... 59**	**OFF / 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.		

Adjust the optimizing time constant. The value consists of a two digit number.

The two digits have the following meaning:

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

Digit 2	Dimensioning temperature	Capacity
0	- 50 °C	large
1	- 45 °C	•
•	•	•
5	- 25 °C	normal
•	•	•
9	- 5 °C	small

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

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.

15 Adaptive function of room temperature		
Circuit	*Setting range*	*Factory setting*
I / II	**OFF / 1 ... 30**	**OFF / OFF**
Controls how fast the room temperature adapts to the desired room temperature.		

The adaptive funtion will eliminate the difference between the desired and the actual room temperature. This is done by integrating the difference and adjusting the desired flow temperature.

OFF: The adaptive funtion is cancelled.

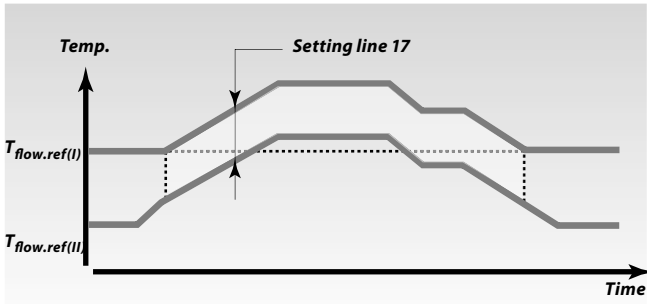
1: The desired temperature is adapted quickly.

30: The desired temperature is adapted slowly.

17 Influence on desired flow temperature ($T_{flow.ref(I)}$)		
Circuit	*Setting range*	*Factory setting*
I	**OFF / 1 ... 20 K**	**OFF**
The desired flow temperature in heating circuit I can be influenced by an external reference.		

OFF: The desired flow temperature in circuit I is not influenced by any other controller (slave or circuit II).

1 ... 20:
The desired flow temperature is increased by the set value (line 17), if the demand of a slave / circuit II is higher.



Example:
If a slave controller (or circuit II) demands a higher temperature than that of the master controller ($T_{flow.ref(I)}$), the temperature of the master will be increased accordingly ($T_{flow.ref(II)}$) + the setting (line 17).

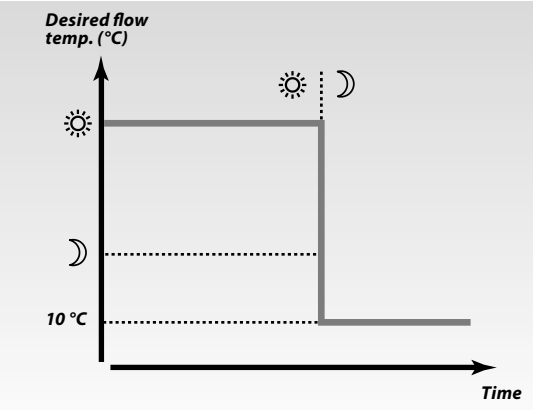
The function of line 17 can compensate for heat losses between master and slave controlled systems.

Extended service

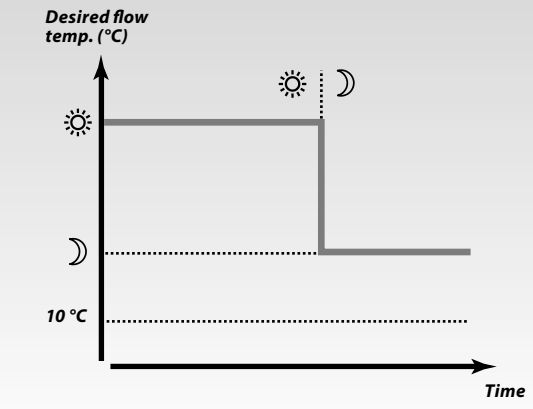
The grey side of the ECL Card

21 Total stop		
Circuit	*Setting range*	*Factory setting*
I / II	**ON / OFF**	**OFF / OFF**
Decide whether you want a total stop during the setback temperature period.		

⊕ **ON:** The desired flow temperature is lowered to 10 °C. The min. setting of the flow temperature (line 2, section 22) is overruled.



⊖ **OFF:** No total stop



22 Pump exercise		
Circuit	*Setting range*	*Factory setting*
I / II	**ON / OFF**	**ON / ON**
Exercises the pump to avoid blocking in periods without heat demand.		

⊕⊖ **ON:** The pump is switched ON for 1 minute every third day around noon.

OFF: The pump exercise is not active.

23 Valve exercise		
Circuit	*Setting range*	*Factory setting*
I	**ON / OFF**	**OFF**
Exercises the valve to avoid blocking in periods without heat demand.		

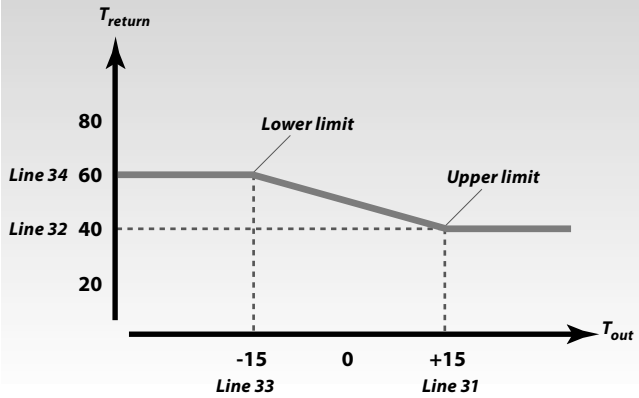
⊕⊖ **ON:** The valve receives a signal to open and close every third day around noon.

OFF: The valve exercise is not active.

Extended service

31-34 Return temperature limitation

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 upper limit coordinate is set in lines 31 and 32 and the lower limit coordinate in lines 33 and 34.



31 Return temperature limitation - upper limit (X-axis)		
Circuit	*Setting range*	*Factory setting*
I / II	**-30 ... 15 °C**	**15 / 15 °C**
Set the outdoor temperature value (see drawing).		

Set the outdoor temperature value (X coordinate) for the upper limit.
(The corresponding Y coordinate is set in line 32).

32 Return temperature limitation - upper limit (Y-axis)		
Circuit	*Setting range*	*Factory setting*
I / II	**10 ... 110 °C**	**40 / 40 °C**
Set the return temperature limitation referring to the outdoor temperature value set in line 31 (see drawing).		

Set the return temperature (Y coordinate) for the upper limit.
(The corresponding X coordinate is set in line 31).

33 Return temperature limitation - lower limit (X-axis)		
Circuit	*Setting range*	*Factory setting*
I / II	**-30 ... 15 °C**	**-15 / -15 °C**
Set the outdoor temperature value (see drawing).		

Set the outdoor temperature value (X coordinate) for the lower limit.
(The corresponding Y coordinate is set in line 34).

34 Return temperature limitation - lower limit (Y-axis)		
Circuit	*Setting range*	*Factory setting*
I / II	**10 ... 110 °C**	**60 / 60 °C**
Set the return temperature limitation (see drawing).		

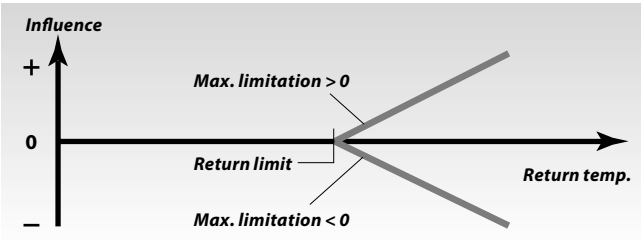
Set the return temperature (Y coordinate) for the lower limit.
(The corresponding X coordinate is set in line 33).

35 Return temperature influence - max. limitation		
Circuit	*Setting range*	*Factory setting*
I / II	**-9.9 ... 0 ... 9.9**	**-2.0 / -2.0**
Set the influence from the return temperature on the desired flow temperature.		

Set the influence of the max. return temperature limitation (set in line 30 or lines 31-34).

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

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



Example
The return limit is active from 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 degrees.

Normally, the setting in line 35 is lower than 0 in district heating systems to avoid a too high return temperature.
Typically, the setting in line 35 is 0 in boiler systems because a higher return temperature is acceptable (see also line 36).

37 Time constant for return temperature limitation		
Circuit	*Setting range*	*Factory setting*
I / II	**OFF / 1 ... 50**	**25 / 25**
Controls how fast the actual return temperature adapts to the desired return temperature limitation.		

Adjust the time constant for the return limitation. The setting will eliminate the difference between the acceptable and the actual return temperature.
The difference is integrated to adjust the desired flow temperature.

OFF: The desired flow temperature will not be adjusted any further.

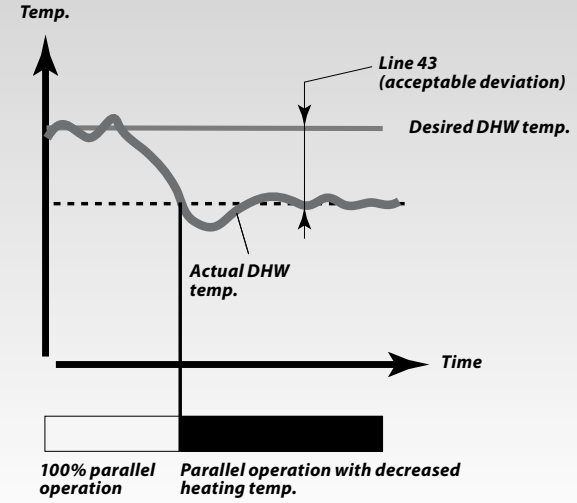
1: The desired flow temperature will be adjusted quickly.

50: The desired flow temperature will be adjusted slowly.

43 Parallel operation of DHW and heating circuits		
Circuit	*Setting range*	*Factory setting*
I / II	**OFF / 1 ... 99 K**	**OFF / OFF**
Choose whether the heating circuit is to operate in dependence of the DHW circuit.		

OFF: Independent parallel operation, i.e. the DHW and the heating circuits operate independently of each other. It makes no difference whether the desired DHW temperature can be reached.

1 ... 99:
Dependent parallel operation, i.e. the desired heating temperature depends on the DHW demand.
Choose how much the DHW temperature (circuit III) can drop before the desired heating temperature (circuit I / II) has to be decreased.



If the actual DHW temperature deviates more than the set value (line 43), the gear motors M1 / M2 in the heating circuits will close to such an extent that the DHW temperature stabilizes at the lowest acceptable value.

Extended service

The grey side of the ECL Card

52 Closed valve / normal operation		
Circuit	*Setting range*	*Factory setting*
I / II	**ON / OFF**	**OFF / OFF**
The heating circuit can be closed when the controller acts as slave and when DHW charging is active in the master.		

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

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

*) The desired flow temperature is set to 10 °C.

The setting in line 52 must be considered if this controller is a slave.

78 Desired temperature for anti-bacteria function		
Circuit	*Setting range*	*Factory setting*
III	**OFF / 1 ... 100 °C**	**OFF**
Set the desired temperature for the anti-bacteria function. The DHW will be heated once a week at the set temperature to protect against bacteria (at 00:00 on Mondays).		

OFF: The anti-bacteria function is not active.

1 ... 100:
The anti-bacteria function is active at the desired temperature.

80 Anti-bacteria function period		
Circuit	*Setting range*	*Factory setting*
III	**5 ... 250 min.**	**120 min.**
Set the period for the anti-bacteria function. When the set time expires, the anti-bacteria function is stopped.		

5 ... 250:
The anti-bacteria function is active for the set period.

The function is activated in line 78 by setting the desired anti-bacteria temperature.

138 Forced running time of the motorized control valve at DHW demand		
Circuit	*Setting range*	*Factory setting*
III	**OFF / 0.1 ... 10.0 sec.**	**1.6 sec.**
Forces the motorized control valve to open the valve for the set period of time.		

Adjust the time to ensure a quick reaction at DHW demand.

The set period of time will be activated when the flow switch short-circuits terminals 3 and 5 in module ECA 83.

Extended service

The grey side of the ECL Card

141 Override input selection		
Circuit	*Setting range*	*Factory setting*
I / II	**OFF / 1 ... 6**	**OFF / OFF**
Choose an unused temperature sensor input for overriding the schedule for circuit I and / or circuit II.		

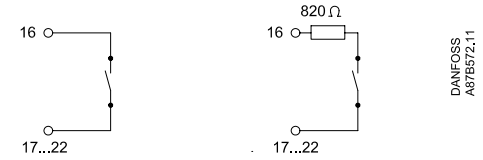
The override can be activated for comfort or setback mode. For override the controller's mode must be in 'scheduled operation'!

OFF: The controller's schedule is not overridden.

1 ... 6: Select an unused sensor input S1 ... S6 for the override of the circuit in question.

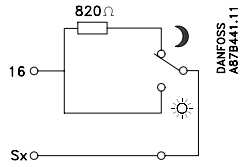
Connection example

If the override switch has gold-plated contacts, you can choose one of the following solutions:



Closed switch: Comfort temperature

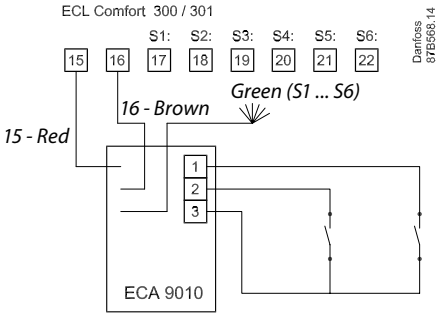
Closed switch: Setback temperature



Changeover switch: Setback or comfort temperature

Connection example with ECA 9010

(used if the override switch does not have gold-plated contacts).

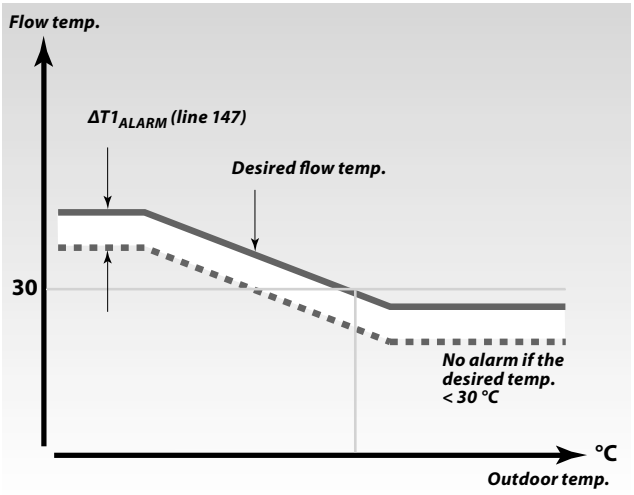


The ECA 9010 module is powered by the system device bus, which means that the bus must be active. The bus is activated by setting the controller address to 15 (line 199).

147 Acceptable temperature deviation below desired flow temperature ($\Delta T1_{ALARM}$)		
Circuit	*Setting range*	*Factory setting*
I / II	**OFF / 1 ... 30 K**	**OFF / OFF**
The alarm is activated if the actual flow temperature (S3 / S4) drops too much below the desired flow temperature. The max. deviation $\Delta T1_{ALARM}$ is set here. This condition must last longer than the time interval Δt_{ALARM} (line 149). See also line 148.		

OFF: The alarm function and the alarm relay of the additional module ECA 86 are not active.

1 ... 30:
The alarm function is active if the actual temperature falls below the acceptable deviation.



The alarm signal can only be sent via the module ECA 86 by means of relay R4.

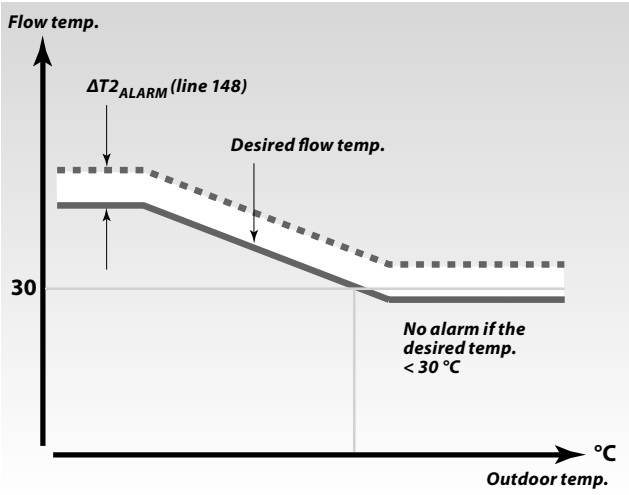
Extended service

Extended service

148 Acceptable temperature deviation above the desired flow temperature ($\Delta T2_{ALARM}$)		
Circuit	*Setting range*	*Factory setting*
I / II	**1 ... 30 K**	**15 K / 15 K**

The alarm is activated if the actual flow temperature (S3 / S4) rises too much above the desired flow temperature. The max. deviation $\Delta T2_{ALARM}$ is set here.
This condition must last longer than the time interval Δt_{ALARM} (line 149).
This alarm can only be activated if the value in line 147 is set to 1 ... 30 K.

⊕⊖ **1 ... 30:**
The alarm function is active if the actual temperature rises above the acceptable deviation.

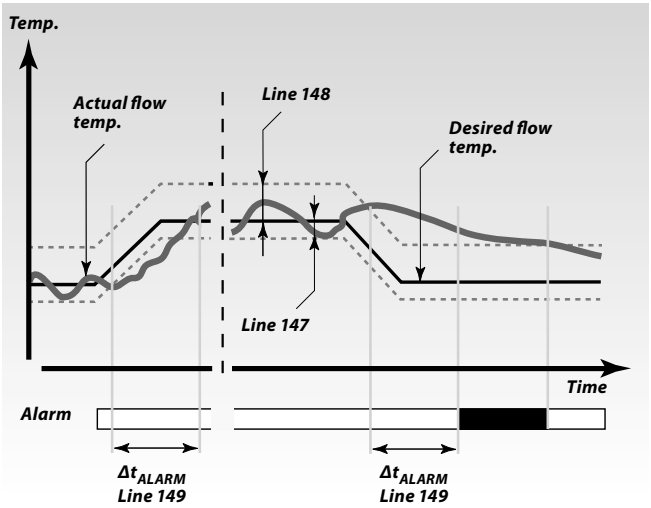


The alarm signal can only be sent via the module ECA 86 by means of relay R4.

149 Time interval Δt_{ALARM} before activation of alarm function		
Circuit	*Setting range*	*Factory setting*
I / II	**1 ... 99 min.**	**10 min. / 10 min.**

If an alarm condition from either line 147 or 148 is present for a longer time than the time interval Δt_{ALARM}, the alarm function is activated.

⊕⊖ **1 ... 99:** Time interval Δt_{ALARM}.



If you choose OFF in line 147, the alarm function in lines 148 and 149 is not activated.

The alarm signal can only be sent via the module ECA 86 by means of relay R4.

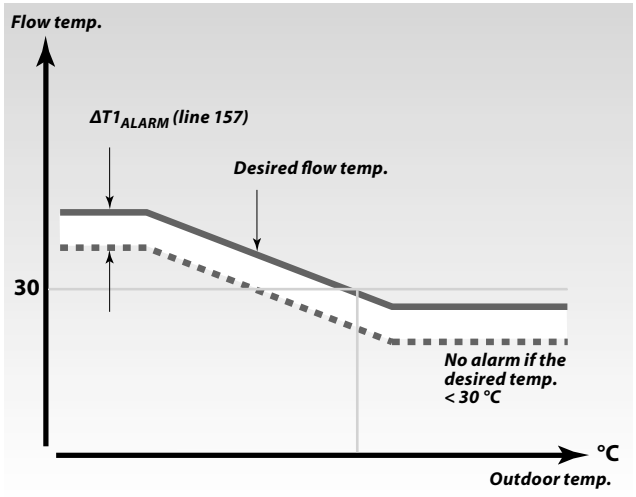
Extended service

157 Acceptable temperature deviation below desired flow temperature ($\Delta T1_{ALARM}$)		
Circuit	*Setting range*	*Factory setting*
III	OFF / 1 ... 30 K	OFF

The alarm is activated if the actual flow temperature (S5) drops too much below the desired flow temperature. The max. deviation $\Delta T1_{ALARM}$ is set here.
This condition must last longer than the time interval Δt_{ALARM} (line 159).
See also line 158.

OFF: The alarm function and the alarm relay of the additional module ECA 86 are not active.

1 ... 30:
The alarm function is active if the actual temperature falls below the acceptable deviation.

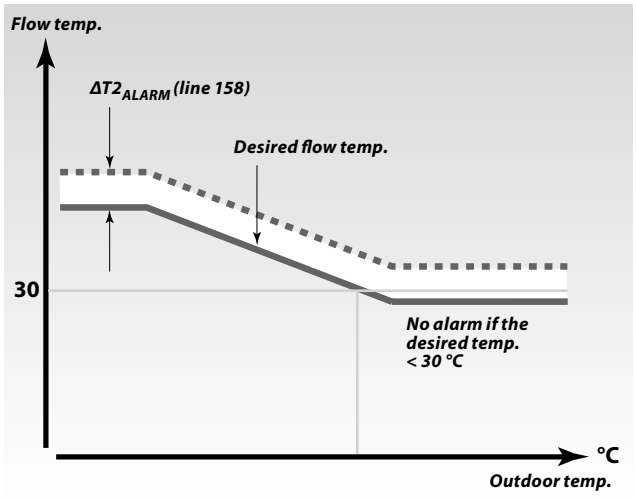


The alarm signal can only be sent via the module ECA 86 by means of relay R4.

158 Acceptable temperature deviation above desired flow temperature ($\Delta T2_{ALARM}$)		
Circuit	*Setting range*	*Factory setting*
III	1 ... 30 K	15 K

The alarm is activated if the actual flow temperature (S5) rises too much above the desired flow temperature. The max. deviation $\Delta T2_{ALARM}$ is set here.
This condition must last longer than the time interval Δt_{ALARM} (line 159).
This alarm can only be activated if the value in line 157 is set to 1 ... 30 K.

1 ... 30:
The alarm function is active if the actual temperature rises above the acceptable deviation.

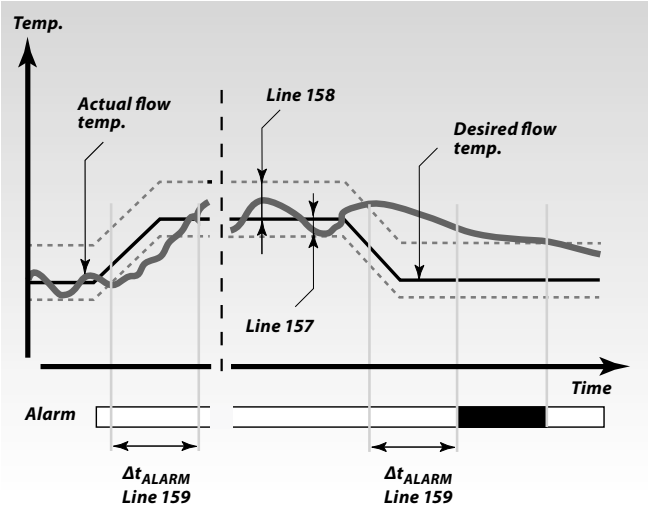


The alarm signal can only be sent via the module ECA 86 by means of relay R4.

Extended service

159 Time interval Δt_{ALARM} before activation of alarm function		
Circuit	*Setting range*	*Factory setting*
III	**1 ... 99 min.**	**10 min.**
If an alarm condition from either line 157 or 158 is present for a longer time than the time interval Δt_{ALARM}, the alarm function is activated.		

⊕⊖ **1 ... 99:** Time interval Δt_{ALARM}.



If you choose OFF in line 157, the alarm function in lines 158 and 159 is not activated.

The alarm signal can only be sent via the module ECA 86 by means of relay R4.

184 Proportional band, Xp		
Circuit	*Setting range*	*Factory setting*
II	**1 ... 250 K**	**200 K**
Set the proportional band. A higher value will result in a stable but slow control of the flow temperature.		

⊕⊖ **1 ... 250:** Set the proportional band.

185 Integration time constant, Tn		
Circuit	*Setting range*	*Factory setting*
II	**5 ... 999 sec.**	**55 sec.**
Set a high integration time constant to obtain a slow but stable reaction to deviations. *A small integration constant will make the controller react fast but with less stability.*		

⊕⊖ **5 ... 999:** Set the integration time constant.

187 Neutral zone, Nz		
Circuit	*Setting range*	*Factory setting*
II	**0 ... 9 K**	**3 K**
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 valve.		

⊕⊖ **0 ... 9:** Set the neutral zone.

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.

Extended service

The grey side of the ECL Card

196 Service pin - LON		
Circuit	*Setting range*	*Factory setting*
I	**ON / OFF**	**OFF**
This setting is only used in connection with LON communication (see the documentation for the used communication unit).		

197 LON reset		
Circuit	*Setting range*	*Factory setting*
I	**ON / OFF**	**ON**
This setting is only used in connection with LON communication (see the documentation for the used communication unit).		

198 Daylight saving time changeover		
Circuit	*Setting range*	*Factory setting*
I	**ON / OFF**	**ON**
Choose whether you want the change to summer / winter time to be automatic or manual.		

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

OFF: You change manually between summer and winter time by setting the clock backward or forward.

199 Master / slave address		
Circuit	*Setting range*	*Factory setting*
I	**0 ... 9, 15**	**15**
The setting is relevant when more controllers are working in the same ECL Comfort system (connected via the system device bus (ECL Comfort BUS)).		

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

1 ... 9: 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.

15: The controller is master. The master sends information about the outdoor temperature (S1), system time, and the DHW demand signal.

The master receives the desired flow temperature information from the slaves with addresses 1 ... 9.

The bus is active and connected ECAs are powered.

The ECL Comfort controllers can be connected via the bus to perform a larger system. The controller, which is physically connected with the outdoor temperature sensor, is the master of the entire system and automatically gets the address 15.

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, system time, and signal for DHW demand in the master.

Extended service

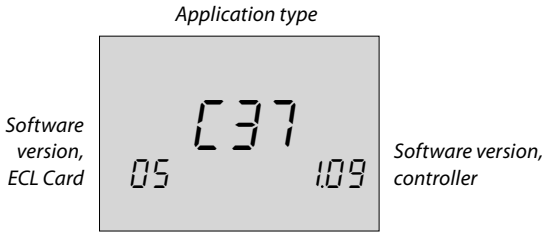
The grey side of the ECL Card

Copying with the ECL Card

Check the ECL Card and the software generations (see following example).

Insert the ECL Card with the yellow side facing you.

Go to line 8 (is not displayed), which is the first line below line 7.



Store new controller settings on the ECL Card

All new settings* can be stored on the ECL Card. Insert the ECL Card with the yellow side facing you.

Go to line 9 (is not displayed), which is the second line below line 7.



Accept to copy settings from controller to ECL Card.

When the copying is finished, the controller returns to display line C.

* *Time and date settings are not stored on the ECL Card.*

Do not remove the ECL Card while copying. The data on the ECL Card can be damaged!

If you have copied your personal settings to the ECL Card, you cannot restore the factory settings!

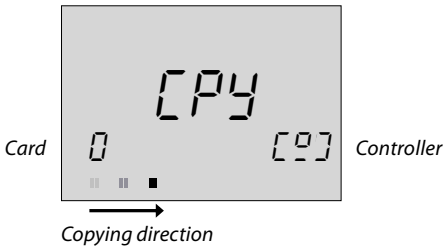
Copy personal settings to additional controller(s) in identical systems

Ensure that the other controller(s) use(s) the same ECL Card type. (If this is not the case, please read section 15).

Insert the ECL Card, which contains the personal settings, with the yellow side facing you.

Go to line 9 (is not displayed), which is the second line below line 7.

Select the copying direction (from the card to the controller).

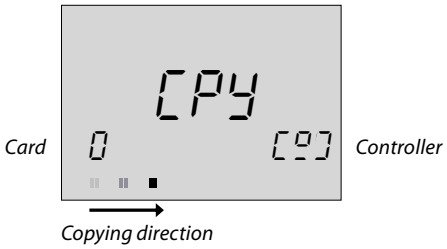


Copy.

Store new ECL Card application in the controller

If you insert an ECL Card with another application type, it is necessary to copy it to your controller.

Insert the ECL Card with the yellow side facing you. The controller will keep showing CPY.



Copy.

Do not remove the ECL Card while copying. The data on the ECL Card can be damaged!

Miscellaneous

The yellow side of the ECL Card

7a Definitions

Air duct temperature
Temperature measured in the air duct where the temperature is to be controlled.

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.

Controller mode indicator
Black arrow to the right of the symbols indicating the present mode.

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.

Factory settings
Settings stored on the ECL Card 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.

Heating circuit
The circuit for heating the room / building.

Heat curve
A curve showing the relationship between actual outdoor temperature and required flow temperature.

DHW circuit
The circuit for heating the domestic hot water (DHW).

7b

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 62 / 63 and is used for the calculation of the dew point temperature.

Limitation temperature
Temperature that influences the desired flow / balance temperature.

Pt 1000 sensor
All sensors used with the ECL Comfort controller are based on the Pt 1000 type. 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.

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, room panel or remote control. 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 setback temperatures. The schedule can be made individually for each week day and may consist of up to 3 comfort periods per day.

Setback temperature
Temperature maintained in the heating / DHW circuit during setback temperature periods.

State / mode indicators
White arrow to the left of the symbols (sun / moon). The white arrow indicates the present state, comfort (sun) or setback (moon), when the controller is in scheduled operation mode. The black arrow symbol indicates the mode of the controller.

Time line / bar
Line with numbers representing the hours. Below the time line, time bars represent scheduled periods with comfort temperature. The bar is divided into half hour sections.

Weather compensation
Flow temperature control based on the outdoor temperature. The control is related to a user-defined heat curve.



The definitions apply to the Comfort 200 as well as ECL Comfort 300 series. Consequently, you might come across expressions that are not mentioned in your guide.

6a Hot points

The time shown in the display is one hour off?
See the summer time changeover in line 198, section 32.

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 12 hours.
Set time and date.
See section 17.

The ECL Card is lost?
Switch the power off and on again to see the system type and the software generation of the controller.
Order a replacement from your Danfoss representative.
Insert the new ECL Card with the yellow side facing you and make sure that you copy your personal settings from the controller to the ECL Card.
See section 34.

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 (section 3). If this does not help, adjust the heat curve / balance temperature (section 20).

The room temperature is too high during setback periods?
Make sure that the min. flow temperature limitation is not too high. See section 22.

The temperature is unstable?
Check that the flow temperature sensor is correctly connected and in the right place. Adjust the control parameters (section 26).
If the controller has a room temperature signal, see section 23.

The controller does not operate and the control valve is closed?
Check that the flow temperature sensor is measuring the correct value, see section 1.
Check the influence from other measured temperatures.

6b

How to make an extra comfort period in the schedule?
You can make an additional comfort period by pushing the shift and + buttons simultaneously for 2 seconds.
See section 4.

How to remove a comfort period in the schedule?
You can remove a comfort period by pushing the shift and - buttons simultaneously for 2 seconds.
See section 4.

How to restore your personal settings?
Insert the ECL Card with the yellow side facing you. Go to line 9 (is not displayed), which is the second line below line 7.
Select copy direction 'card to controller' (left to right) by using the shift button. Push the + button to copy.
See section 5.



This is a collection of frequently asked questions for the ECL Comfort 200 as well as ECL Comfort 300 series. Consequently, you might come across some questions that do not apply to your application.

5a Advantages of the ECL Card

Save your personal settings to the ECL Card

Go to line 9 (is not displayed), which is the second line below line 7.



Accept to copy personal settings from the controller to the ECL Card.

The controller will return to display line C when the copying is completed. This takes approx. 15 seconds.
By saving your personal settings* to the ECL Card, you have ensured that your settings will not be lost if the controller settings are changed by mistake.

* Time and date settings are not stored on the ECL Card.

Prevent unauthorized operation

One of the primary advantages of the controller is the setting security.
If you remove the ECL Card, and the ECL Comfort controller is not operated during the next 25 minutes (approx.):
- the controller returns to display line C (section 1)
- further changes are not possible
- the controller continues its operation

When the ECL Card is inserted with the yellow side facing you, the controller can be operated again.

Do not remove the ECL Card while copying. The data on the ECL Card can be damaged!

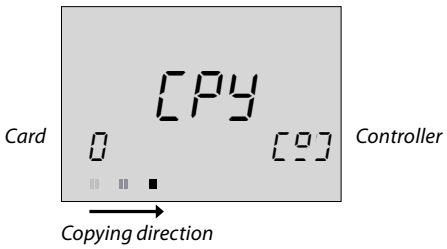
If you have copied your personal settings to the ECL Card, you cannot restore the factory settings!

Restore ECL Card data

After establishing your favorite temperatures, comfort periods etc., and after copying these to the ECL Card, you can set alternative settings.

Insert the ECL Card and make the temporary settings, e.g. for holidays, but do not copy these. To restore your favorite settings, copy these from the ECL Card to the controller. Insert the ECL Card.

Go to line 9 (is not displayed), which is the second line below line 7.



Choose to copy the ECL Card to the controller (from left to right).

Copy

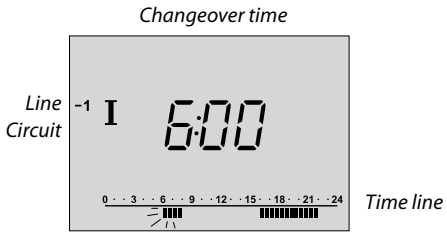
Do not remove the ECL Card while copying. The data on the ECL Card can be damaged!

The yellow side of the ECL Card

4a Set your personal schedule

Monitor the current schedules

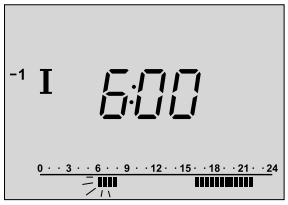
To see your individual schedules for:
Circuit I / II:
Select between lines 1 - 7 (Monday, Tuesday ..... Sunday)
Circuit III:
Choose line C for the daily schedule



Periods with comfort temp. are shown as black bars

Change the schedules

Select appropriate day.



The changeover point blinks

Adjust the first blinking changeover point, if required. The end of the bar moves, extending or reducing the comfort period.

Shift to next changeover point and adjust accordingly.

Change the schedule for circuit II / III

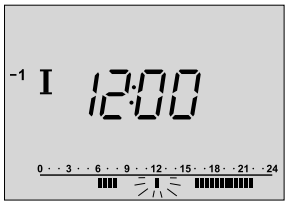
Select circuit II / III to view or change the schedule. Use the same method for changes as for circuit I.

Access circuit III by pushing the button until there is no circuit indication (display / lights). The circuit indicators are apparently switched OFF but the display will still show you circuit III (water tap symbol).

4b

Add an extra comfort period

Push the shift and + button simultaneously for 2 seconds.



The new period appears

Adjust the new period.

Remove a comfort period

Select the period to be removed (blinking changeover point)

Push shift and - buttons simultaneously for 2 seconds.

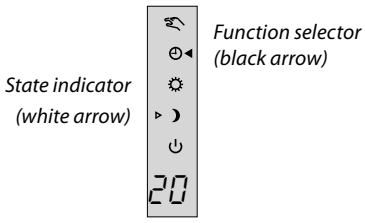
Cancel changes in your personal settings

Push - and + buttons simultaneously for 2 seconds to restore the factory settings of the actual schedule.

2 Select circuit mode

During scheduled operation (clock), the state indicator (a white arrow) will show you the control mode of the selected circuit. The white arrow will blink when this is a heating circuit and it is in the optimizing period.

The mode can be set differently for each circuit by means of the function selector. However, if manual operation (hand) is chosen, this mode will apply to all circuits.



Function selector. Push the button to change the mode of the circuit. The black arrow shows you which of the modes you have chosen.

What do the symbols mean?

Manual operation
Used only at maintenance and service.

Note! The protection against frost is switched off when this mode is selected.

Scheduled operation
This is the normal mode. The temperature is controlled according to your schedule with automatic changeover to / from comfort and setback temperature periods.

Constant comfort temperature
The schedule is not in operation. Use this mode when a constant comfort temperature is desired.

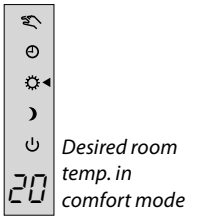
Constant setback temperature
The schedule is not in operation. Use this mode when you are away on holiday, etc.

Standby
The heating circuit is stopped. The system is still protected against frost.
In the DHW circuit, however, the DHW temperature is controlled according to the setback temperature.

Set your room and DHW temperature 3

Go to display A.

Circuit I / II: Setting the desired room temperature



Select the constant comfort mode.

Set the desired room temperature for the comfort mode.

Select the constant setback mode.

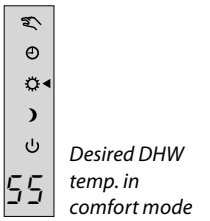
Set the desired room temperature for the setback mode.

Select the desired mode (section 2).

The setting of the desired room temperature is important even if a room temperature sensor / room panel / remote control is not connected.

Is the room temperature 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.

Circuit III: Setting the desired DHW temperature



Select the constant comfort mode.

Set the desired DHW temperature for the comfort mode.

Select the constant setback mode.

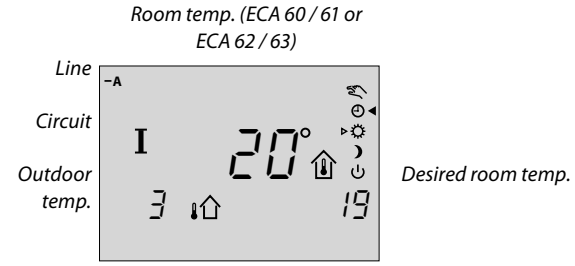
Set the desired DHW temperature for the setback mode.

Select the desired mode (section 2).

1a Choose your favorite display (circuit I)

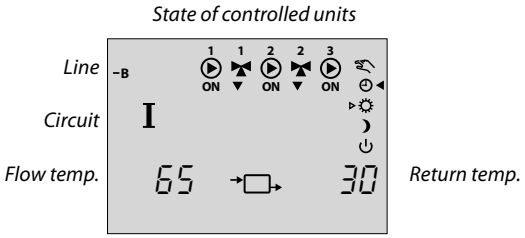
Choose the display - A, B, or C - for daily operations.

Room temperature - display A



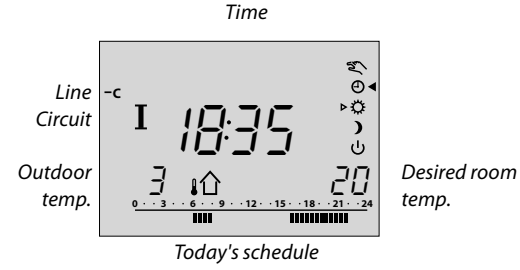
The display will show the room temperature if a room panel or a remote control is installed. If not, two bars will be shown.

System information - display B



Push and hold the shift button to see:
- the calculated flow temperature
- the desired return temperature limitation.

Today's schedule - display C



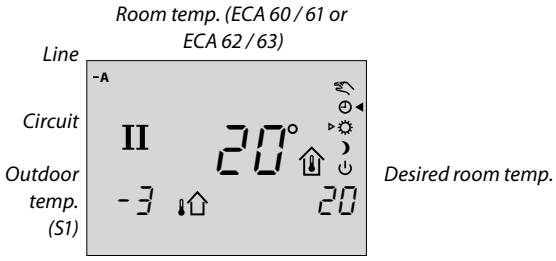
The controller automatically reverts to display C if the card has been reinserted or the power supply has been interrupted.

If the temperature value is displayed as "- -", the sensor in question is not connected. "- - - " means that the sensor is short-circuited.

Choose your favorite display (circuit II) 1b

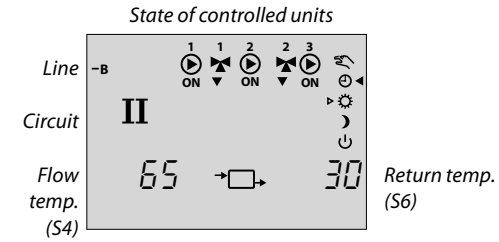
Choose the display - A, B, or C - for daily operations.

Room temperature - display A



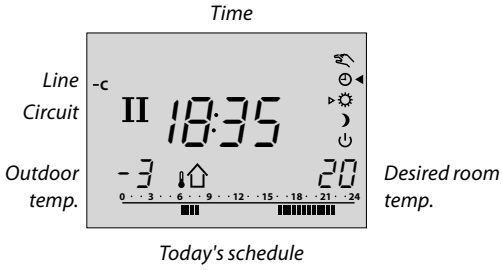
The display will only show a value if an ECA 60 / 61 or ECA 62 / 63 is connected. If not, two bars will be shown.

System information - display B



Push and hold the shift button to see:
- the calculated flow temperature
- the desired return temperature limitation.

Today's schedule - display C



The controller automatically reverts to display C if the card has been reinserted or the power supply has been interrupted.

If the temperature value is displayed as "- -", the sensor in question is not connected. "- - -" means that the sensor is short-circuited.

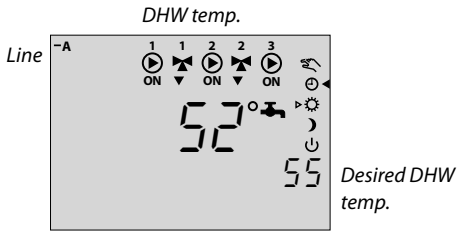
Choose your favorite display (DHW)

1c

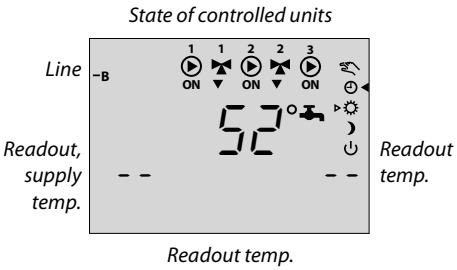
Choose the DHW settings by pushing the button until there is no circuit indication (display / lights).

Choose the display - A, B, or C - for daily operations.

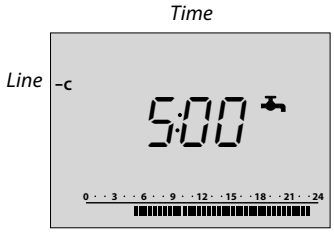
DHW temperature - display A



DHW temperature - display B



DHW schedule - display C



There is one common schedule for all days of the week.
See section 4 for the setting procedure.

The controller automatically reverts to display C if the card has been reinserted or the power supply has been interrupted.

If the temperature value is displayed as "- -", the sensor in question is not connected. "- - - " means that the sensor is short-circuited.

The yellow side of the ECL Card

Save energy - save money - improve your comfort temperature

The ECL Comfort controller is designed by Danfoss for the automatic temperature control of heating, domestic hot-water (DHW), ventilation and cooling systems.

Some of the advantages of the ECL Comfort controller system are:

- Secure control and the optimum use of energy resources.
- Control of system temperatures according to seasonal changes and variations in outdoor temperatures.
- Setback temperature periods and low energy consumption while you are out or asleep save heating costs.

Operating the ECL Comfort controller in general

When operating the controller it is advisable to keep the lid open in order to view the entire display.
During operation the ECL Card must be inserted with the yellow side facing you.
The ECL Card, which is equipped with a memory chip, is simple and easy to handle.
The ECL Card is divided vertically into two columns each representing a circuit.
Horizontally the ECL Card is divided into lines that represent the different control and programming options for the two circuits. Each line is shown in the display of the controller, which gives you an instant overview of the operation, settings etc.

How to use the ECL Comfort User's Guide

This guide provides you with an easy instruction for the ECL Comfort controller.
The Installer's Guide, the grey section (turn the guide over), contains the complete list of factory settings and various detailed adjustments that ensure an efficient and continuous operation of your system.

Table of Contents

Daily use

Section

1 Choose your favorite display

2 Select circuit mode

3 Set your room and DHW temperature

4 Set your personal schedule

5 Advantages of the ECL Card

6 Hot points

7 Definitions

The documentation for the ECL Comfort controller is composed of numbered sections. Only sections that are relevant to your ECL Comfort controller are included here.

Installer's Guide:
Grey sections 10 and onwards. Turn the guide over.

Your personal schedule:



Heating I	0	3	6	9	12	15	18	21	24
			6-8				*16-22*		
1 Monday									
2 Tuesday									
3 Wednesday									
4 Thursday									
5 Friday									
6 Saturday									
7 Sunday									
				8-23					

Heating II	0	3	6	9	12	15	18	21	24
			5-8				*18-22*		
1 Monday									
2 Tuesday									
3 Wednesday									
4 Thursday									
5 Friday									
6 Saturday									
7 Sunday									
				8-23					

DHW (🚰 III)	0	3	6	9	12	15	18	21	24
Monday - Sunday									

Factory settings are grey.

The functions can only be realized with ECL Comfort 301 and as of controller version 2.04.