Danfoss L10 ECL Comfort Controller User Guide

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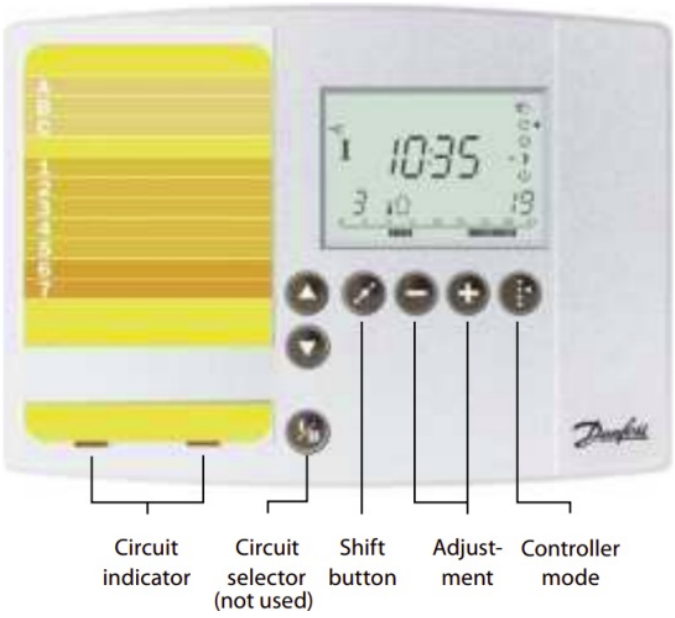
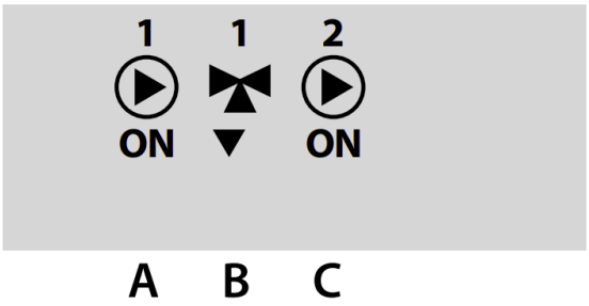
Installation Instruction



	Controller mode	
		Manual operation (used only at maintenance and s ervice)
		Scheduled operation
		Constant comfort temperature
		Constant setback temperature
		Standby mode
		Arrow buttons. Switch between the lines of the EC L Card.
		Shift button. Switches between temperatures, chan geover points etc.
		Adjust temperatures and values etc.
		Circuit selector for switching between the circuits.

Display indications, controlled units, L10



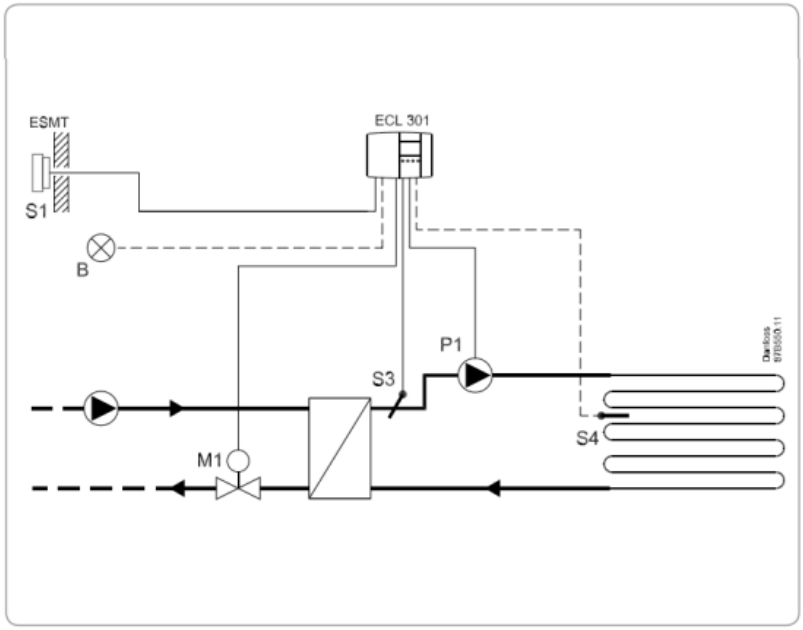
A: P1	Blank = OFF	ON = ON
B: M1	▲= Opens	▼= Closes
C: B	Blank = OFF	ON = ON

⚠ 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.

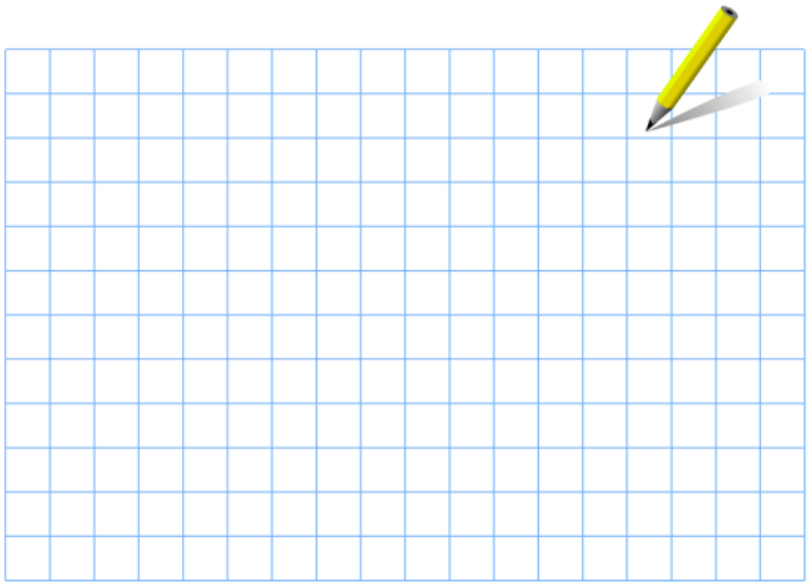
This guide is associated with ECL Card 087B4874

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 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

S3 : Flow temperature sensor

S4 : Slab temperature sensor

P1 : Circulation pump

M1 : Motorized control valve

B : Operation indicator

Sections in the Installer's Guide

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

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 L10 is very flexible. These are the basic principles:

The flow temperature sensor (S3) is the most important sensor.

The desired flow temperature at S3 can indicate three different values:

- When the outdoor temperature (S1) is above the setting in line 160, the desired flow temperature is 10 °C.
- When the outdoor temperature (S1) is below the setting in line 160, the desired flow temperature is the max. value (right side in the display), set in line 2.
- When the outdoor temperature (S1) is below the setting in line 161, the desired flow temperature is the min. value (left side in the display), set in line 2.

The motorized control valve (M1) is opened gradually when the flow temperature is lower than the desired flow temperature and vice versa. The circulation pump is ON when the desired flow temperature is higher than 20 °C.

If the outdoor temperature sensor is not connected, the outdoor temperature is assumed to be 0 (zero) °C.

The return temperature (S6) to the boiler should not be too low or if it is a district heating application, 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 (lines 30–37).

The slab temperature (S4) can be set to a max. limit when the outdoor temperature (S1) is below the setting in line 160. The desired flow temperature will be corrected (typically to a lower value), set in lines 60–63. This function reduces heat consumption, when the slab is dry.

The slab temperature (S4) can be set to a min. limit when the outdoor temperature (S1) is below the setting in line 161. The desired flow temperature will be corrected (typically to a higher value), set in lines 64–67.

A snow / ice detector can be connected. The desired flow temperature at S3 is kept at 10 °C as long as snow / ice is not detected (line 140).

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Card L10
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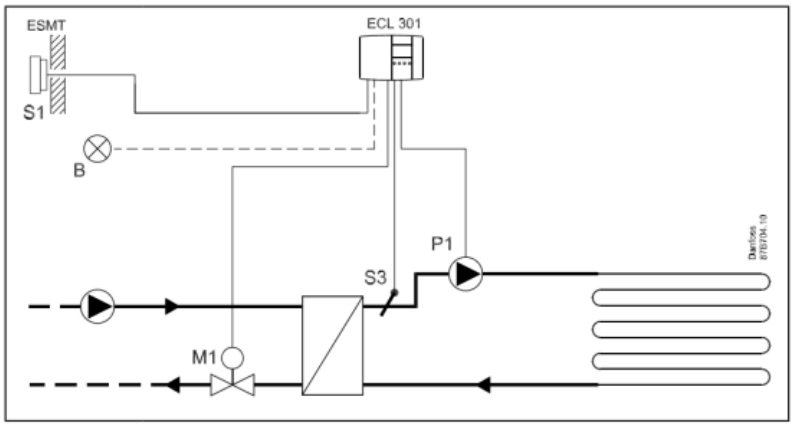
Installation

Identifying the system type

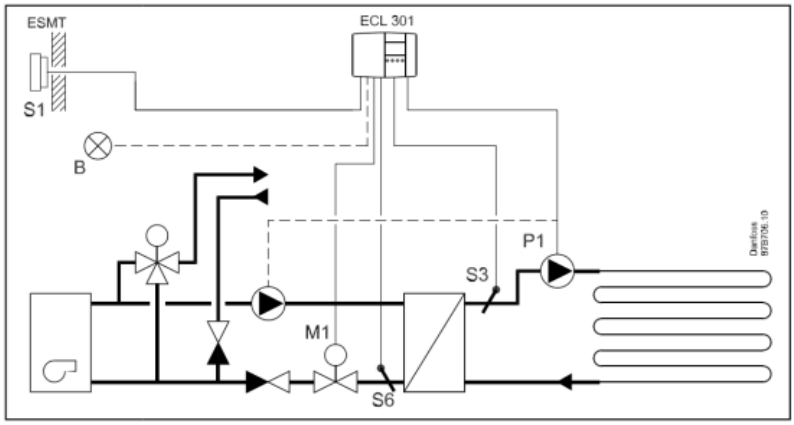
The ECL Comfort controller is a universal controller that can be used for various systems. Based on the shown standard systems, it is possible to configure additional systems.

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 2.03.



For heating cut-in, the controller mode must be scheduled operation, comfort or setback.

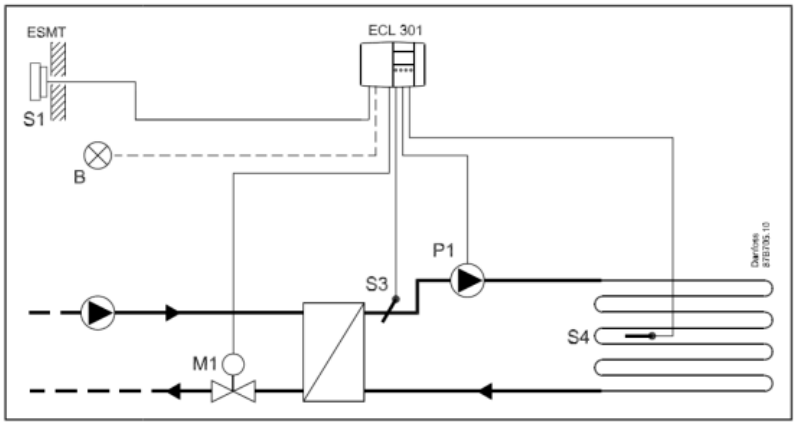
Flow temperature control based on two outdoor temperature ranges and boiler return temperature protection



For heating cut-in, the controller mode must be scheduled operation, comfort or setback.

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

Flow temperature control based on two outdoor temperature ranges and slab temperature control

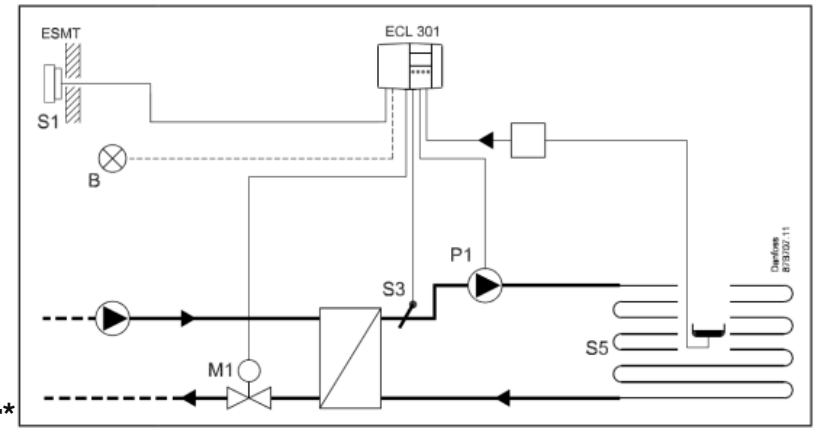


System settings

Circuit	Line	Description	Recomm. settin g
I	161	Min. outdoor temperature (cut-in / cut-out)	-5 oC

For heating cut-in, the controller mode must be scheduled operation, comfort or setback

Flow temperature control based on two outdoor temperature ranges and snow / ice detector*



* Devireg™ 850, product from DEVI A/S (www.devi.com)

For heating cut-in, the controller mode must be scheduled operation, comfort or setback.

Mounting the ECL Comfort controller

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

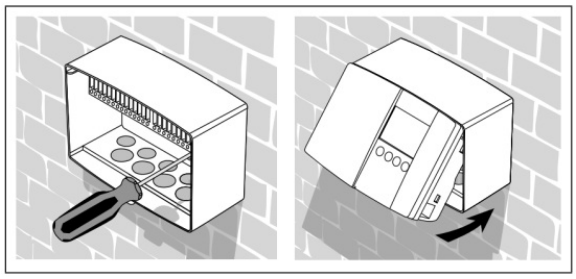
Screws and rawlplugs are not supplied.

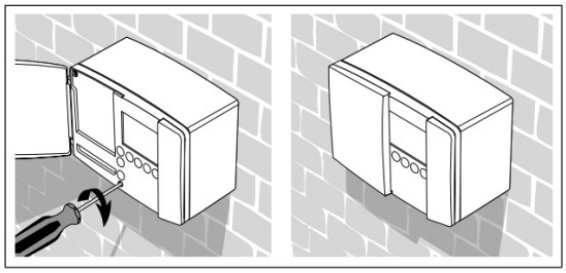
Mounting on a wall

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.

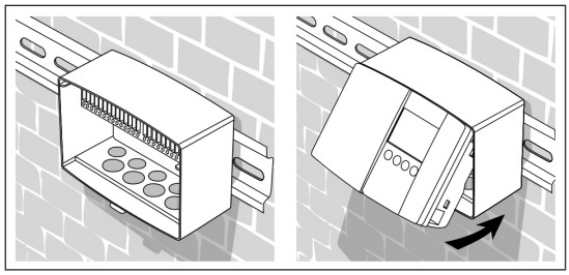


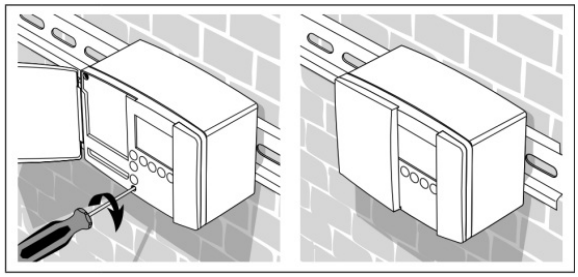


Mounting on a DIN rail

Mounting kit: Order code No. 087B1145.

A mounting kit is necessary to mount the box with the controller on a DIN rail.



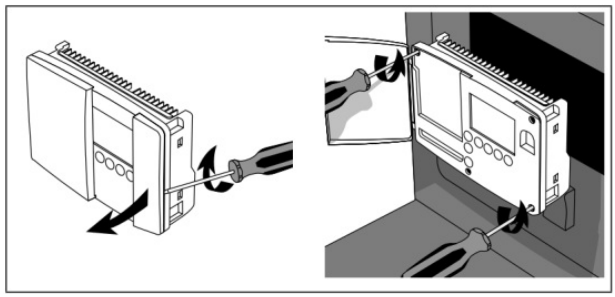


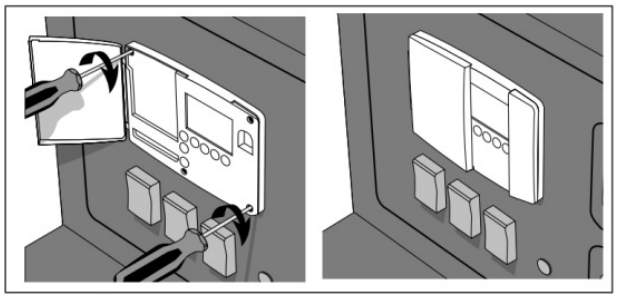
Mounting in a panel

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.

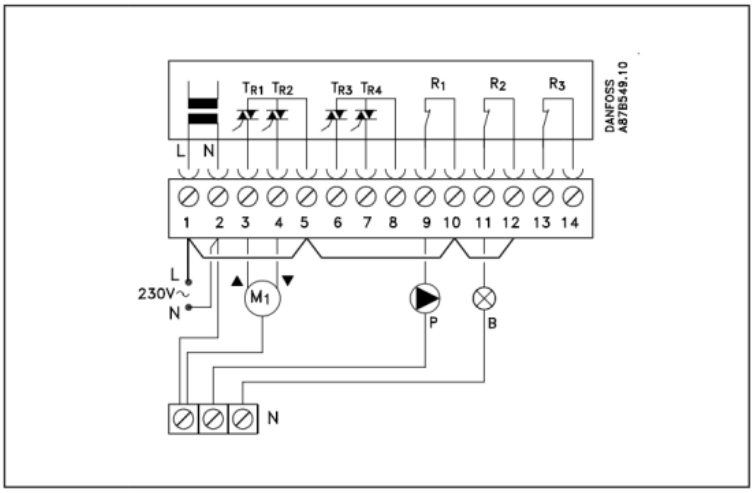




Electrical connections – 230 V a.c. – in general

230 V a.c. connections

Typical circuit diagram



Terminal	Description	Max. load
1 L	Supply voltage 230 V a.c.	
2 N	Supply voltage 230 V a.c.	
3 M1	Actuator – open	0.2 A / 230 V a.c.
4 M1	Actuator – closealt. thermo actuator	0.2 A / 230 V a.c.
5	230 V a.c. supply voltage for M1	
6	Not used	
7	Not used	
8	Not used	

9 P1	Circulation pump	4 (2) A / 230 V a.c.
10	230 V a.c. supply for pump relay R1	
11 B	Signal, operation active	4 (2) A / 230 V a.c.
12	230 V a.c. supply for operation indicator R2	

Wire cross section: 0.75 – 1.5 mm2

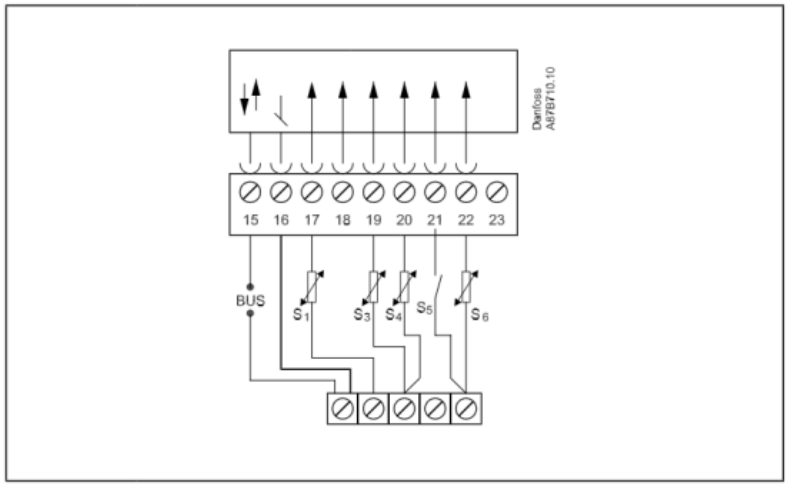
Electrical connections

Max. 2 x 1.5 mm2 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.!

Connecting and placing the temperature sensors

Connecting the temperature sensors and the bus



Terminal	Description		Type (recomm.)
15 and 16	System device bus		
17 and 16	S1	Outdoor temperature sensor	ESMT
19 and 16	S3	Flow temperature sensor	ESM-11 / ESMC / ESMU

20 and 16	S4	Slab temperature sensor	ESMB-12
21 and 16	S5	Snow / ice detector (see section 32g for further information)	Devireg™ 850
22 and 16	S6	Return temperature sensor	ESM-11 / ESMC / ES MU

Establish the jumper from 16 to common terminal.

Wire cross section for sensor connections: Min. 0.4 mm2

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.

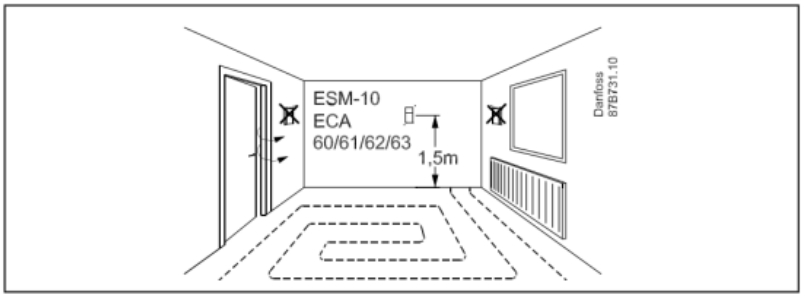
Make sure that the surface of the pipe is clean and even where the sensor is mounted.

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)

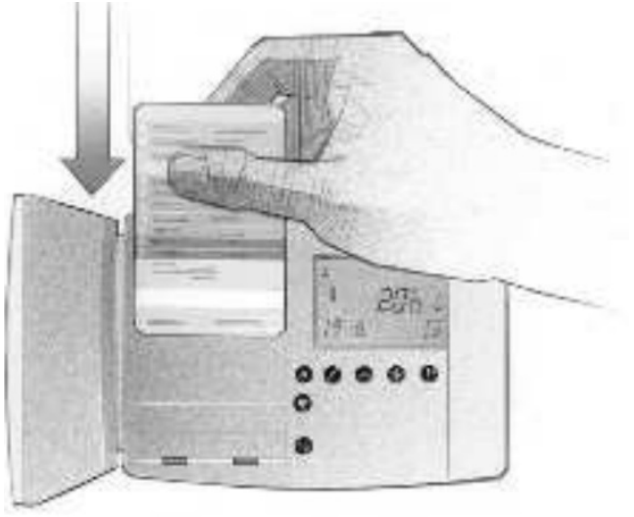
Place the sensor so that it measures a representative temperature.

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.

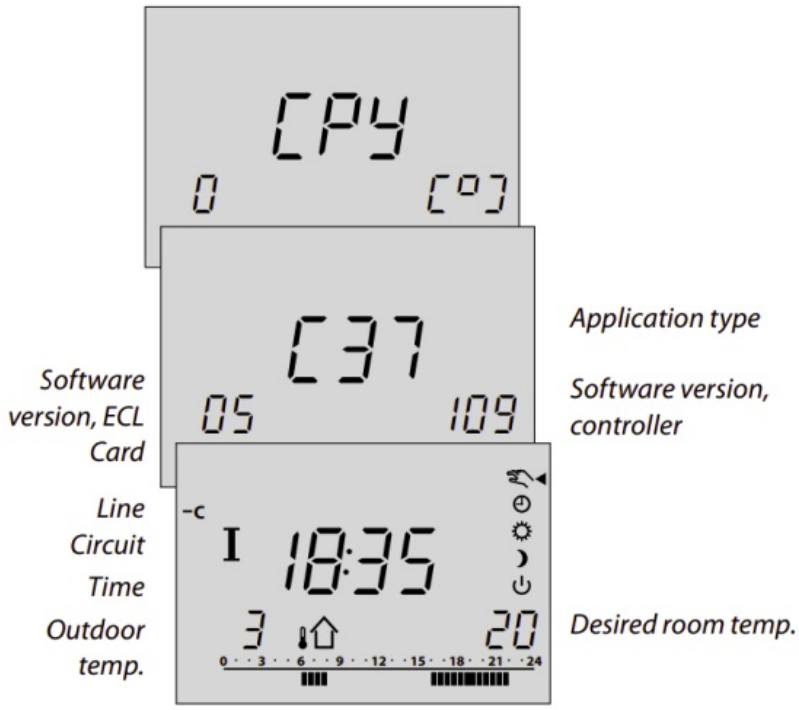
Inserting the ECL Card



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.

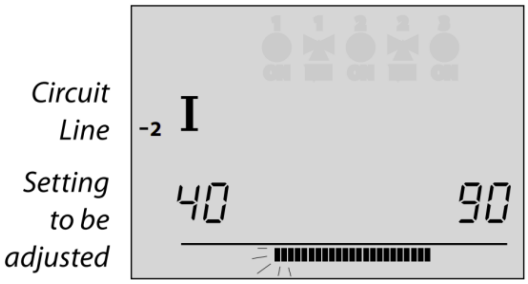
Basic set-up

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:



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.

In order to cut-in the heating, the controller mode must be scheduled operation, comfort or setback and the outdoor temperature must be lower than the set cut-in value in line 160.

Setting the time and date – line A

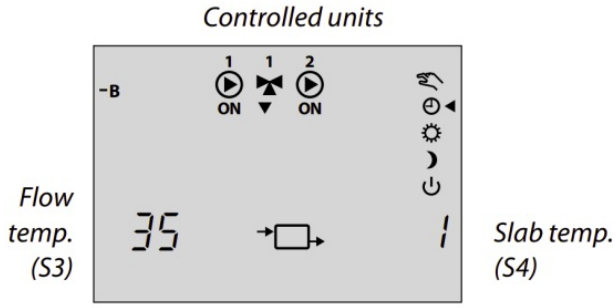
Use the shift button to switch between minutes, hours, years, months and days.

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



Push and hold the shift button to see:

- the calculated flow temperature
- the desired slab temperature limitation.

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.

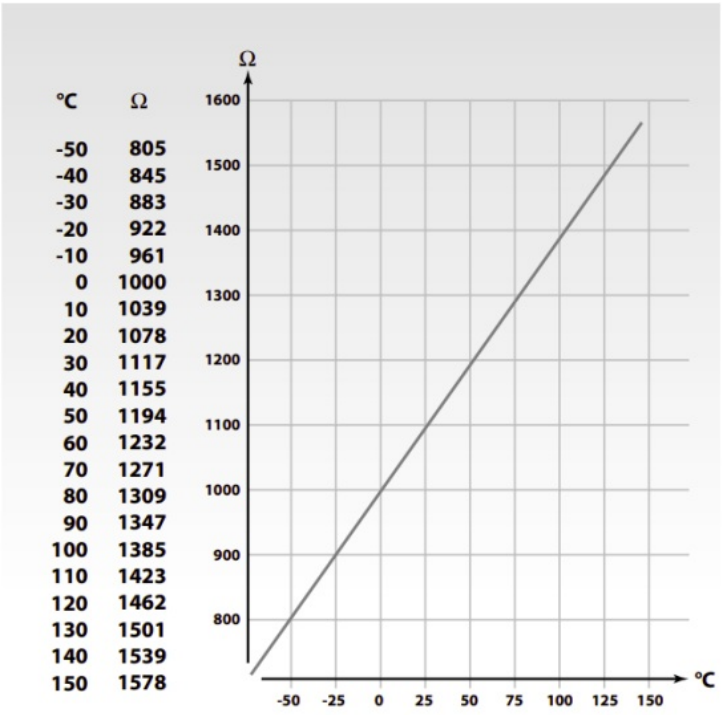
If a sensor is not mounted or is disconnected, the display will indicate it as "- -".

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.

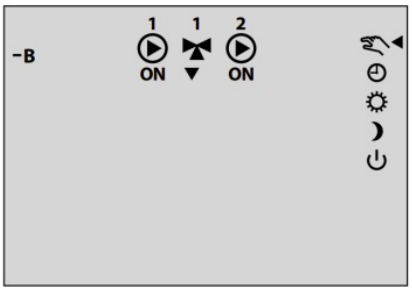
Relationship between temperature and ohmic value



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.

The motorized actuator (gear motor / damper)

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.

The motorized actuator (gear motor / damper)

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.

The thermo actuator

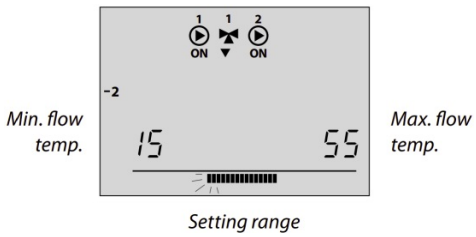
activates the valve as long as the button is pushed. If pushed for more than 3 seconds, the actuator continues to open the valve.

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 both circuits, if available.

During manual operation, all control functions are deactivated.

Flow temperature values – line 2



2 Flow temperature values, min. and max.		
Circuit	*Setting range*	*Factory setting*
I	**10 … 110 °C**	**min. 15 / max. 40 °C**

The min. flow temperature value corresponds to the desired flow temperature when the outdoor temperature falls below the min. outdoor temperature (line 161).

The max. flow temperature value corresponds to the desired flow temperature if the outdoor temperature falls below the max. outdoor temperature (line 160).

If the max. outdoor temperature (line 160) is exceeded, the desired flow temperature is kept at 10 oC. The pump is switched OFF after 3 min.

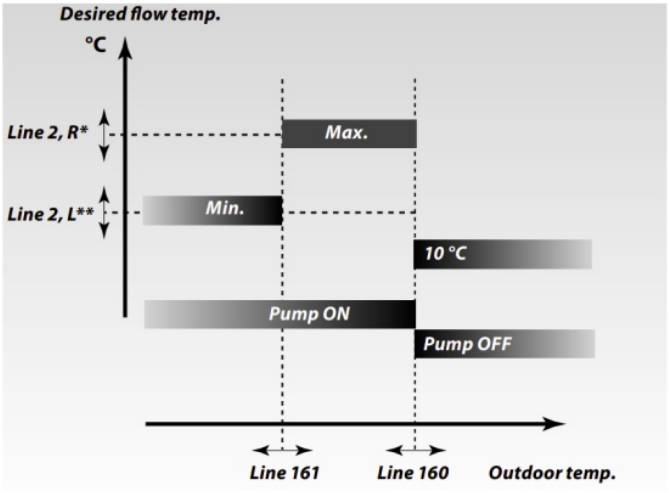
The temperatures between the min. and max. outdoor temperature is the range in which snow and ice typically can be expected.

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

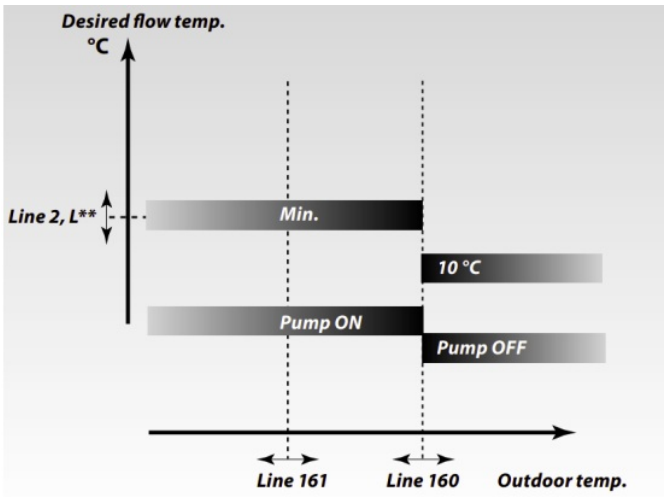
Select the max. value. The right end of the setting range blinks.

Adjust the max. value.

Function in comfort mode



Function in setback mode



* R = to the right in the display

** L = to the left in the display

Control parameters – lines 4-7

4 Proportional band, Xp		
Circuit	*Setting range*	*Factory setting*
I	**1 … 250 K**	**80 K**

Set the proportional band.

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

5 Integration time constant, Tn		
Circuit	*Setting range*	*Factory setting*
I	**5 … 999 sec.**	**30 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*
I	**5 … 250 sec.**	**120 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.

☝

Control parameters (lines 4-7) are overruled if thermo actuator is chosen (OFF in line

24).

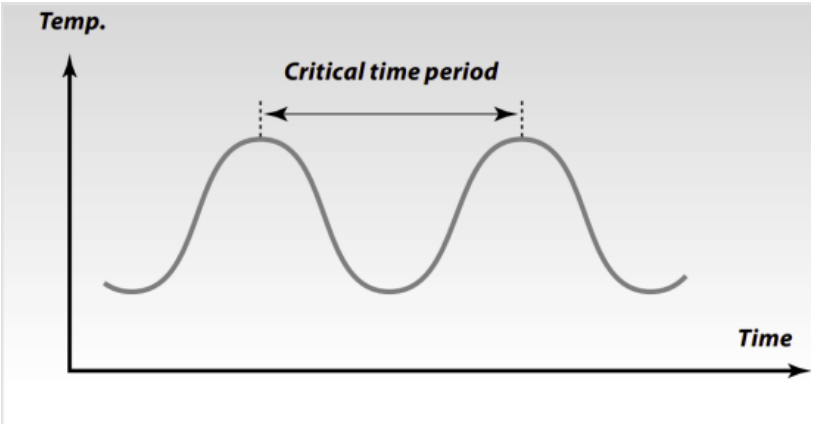
7 Neutral zone, Nz		
Circuit	*Setting range*	*Factory setting*
I	**0 … 9 K**	**3 K**

⊕⊖ 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.

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.

Control & overviews

Check list in general

✓ 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 I/II, 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 I/II, 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.

ECL Card settings

A Time and date Section 17

B System information Sections 18 & 19

Setting ranges Factory settings Your setting

A	Time and dateSection 17	
	System information	Sections 18 & 19
Setting ranges	Factory settings	Your settings
1		
2	Flow temperature, min. / max. values	
10 … 110 °C		min. 15, max. 40 °C
See section 22		
3		
4	Proportional band, Xp	
1 … 250 K		80 K
See section 26		
5	Integration time constant, Tn	
5 … 999 sec.		30 sec
See section 26		

6	Running time of the motorized control valve	
5 … 250 sec.		120 sec
See section 26		
7	Neutral zone, Nz	
0 … 9 K		3 K
See section 26		

Service parameters (10-199)

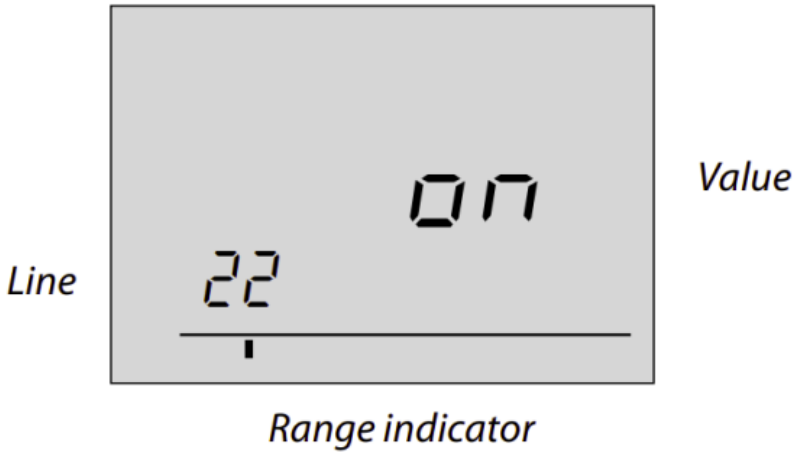
Lines	**Setting ranges**	**Factory settings**	**Your settings**
22	Pump exercise		
	ON / **OFF**	**ON**	
23	Valve exercise		
	ON / **OFF**	**ON**	
24	Gear motor / thermo actuator		
	ON / **OFF**	**ON**	
30	Return temperature limitation		
	10 … 110 °C	**40 °C**	**°C**
35	Return temperature influence- max. limitation**-9.9 … 0 … 9.9**	**0.0**	
36	Return temperature influence- min. limitation**-9.9 … 0 … 9.9**	**0.0**	

37	Time constant for return temperature limitation**OFF** / **1 … 50** **25**	
60	Max. slab temperature limitation	
	-30 … 15 °C **3 °C**	**°C**
62	Influence at max. slab temperature	
	-9.9 … 0 **-2.0**	
63	Adaptive function of max. slab temperature limitation	
	OFF / **1 … 50** **OFF**	
64	Min. slab temperature limitation	
	-30 … 15 °C **-3 °C**	**°C**
65	Influence at min. slab temperature	
	0 … 9.9 **2.0**	
67	Adaptive function of min. slab	
	OFF / **1 … 50** **OFF**	
78	Anti-freeze function	
	1 … 30 °C **5 °C**	**°C**
140	Snow / ice detector	
	OFF / **ON** **OFF**	
160	Max. outdoor temperature (cut-in / cut-out value)	
	-30 … 15 °C **5 °C**	**°C**
161	Min. outdoor temperature (cut-in / cut-out value)	

	-30 … 15 °C	**-15 °C**	**°C**
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**	

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 22 and onwards.



▲
▼ Now you can move to any line of your choice.

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.

Service parameter(s) 22-24

22 Pump exercise		
Circuit	*Setting range*	*Factory setting*
I	**ON** / **OFF**	**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**	**ON**
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.

Control parameters (lines 4-7) are overruled if thermo actuator is chosen (OFF).

24 Gear motor / **thermo actuator**		
Circuit	*Setting range*	*Factory setting*
I	**ON** / **OFF**	**ON**

Choose the actuator type for your valve.

⊕⊖ **ON:** Gear motor

OFF: Thermo actuator (ABV type)

☝

Control parameters (lines 4-7) are overruled if thermo actuator is chosen (OFF).

Service parameter(s) 30-35

30 Return temperature limitation		
Circuit	*Setting range*	*Factory setting*
I	**10 … 110 °C**	**40 °C**
Set the return temperature you accept for the circuit.		

⊕⊖ Set the acceptable return temperature limit.

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 lines 35 and 36.

35 Return temperature influence – max. limitation		
Circuit	*Setting range*	*Factory setting*
I	**-9.9 … 0 … 9.9**	**0.0**
Set the influence from the return temperature on the desired flow temperature.		

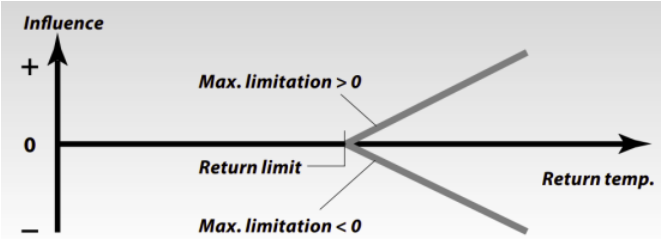
⊕⊖ Set the influence of the max. return temperature limitation (set in line 30 or lines 31-34).

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).

Service parameter(s) 36-37

36 Return temperature influence – min. limitation		
Circuit	*Setting range*	*Factory setting*
I	**-9.9 … 0 … 9.9**	**0.0**
Set the influence from the return temperature on the desired flow temperature.		

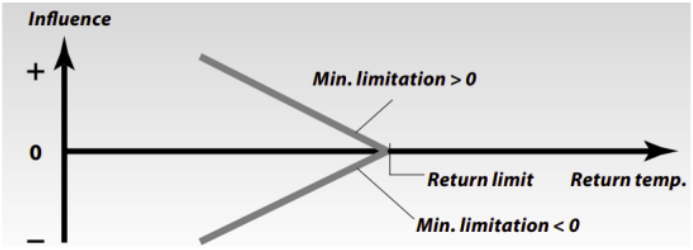
⊕⊖ Set the influence of the min. return temperature limitation (set in line 30 or lines 31-34).

Influence higher than 0:

The desired flow temperature is increased, when the return temperature gets below the set limit.

Influence lower than 0:

The desired flow temperature is decreased, when the return temperature gets below the set limit.



Example

The return limit is active up to 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, the setting in line 36 is 0 in district heating systems because a lower return temperature is acceptable.

Typically, the setting in line 36 is higher than 0 in boiler systems to avoid a too low return temperature (see also line 35).

37 Time constant for return temperature limitation		
Circuit	*Setting range*	*Factory setting*
I	**OFF / 1 … 50**	**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.

Service parameter(s) 60-62
By using a slab temperature sensor, an improved control can be achieved.

If the slab temperature gets higher than the set value in line 60, the flow temperature will be reduced (typically when the slab is dry).

If the surface temperature gets below the set value in line 64, the flow temperature is increased (typically in connection with a surface covered by snow / ice).

60 Max. slab temperature limitation		
Circuit	*Setting range*	*Factory setting*
I	**-30 … 15 °C**	**3 °C**
If the slab temperature gets higher than the set value, the flow temperature is reduced . The influence is set in line 62.		

⊕⊖ Set the limit.

62 Influence at max. slab temperature		
Circuit	*Setting range*	*Factory setting*
I	**-9.9 … 0**	**–2.0**
If the slab temperature gets higher than the set limit (line 60), the flow temperature is r educed. Set the desired influence of the flow temperature.		

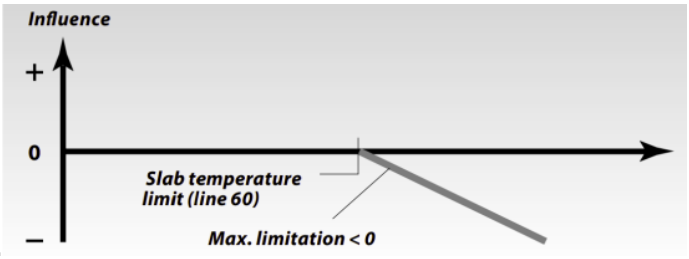
⊕⊖ Set the desired influence.

Influence = 0:

The desired flow temperature is not influenced when the slab temperature gets higher than the set value (line 60).

Influence lower than 0:

The desired flow temperature is influenced when the slab temperature gets higher than the set value (line 60).



Example:

The limitation value is set to 3 °C.

The influence is set to -2.0.

The actual slab temperature is 5 °C.

Result:

The flow temperature is changed by 2 x -2 = -4 degrees.

Service parameter(s) 63-65

63 Adaptive function of max. slab temperature limitation		
Circuit	*Setting range*	*Factory setting*
I	**OFF / 1 … 50**	**OFF**
Controls how fast the flow temperature adapts to the desired flow temperature when t he slab temperature gets higher than the limit (line 60).		

⊕⊖ **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

64 Min. slab temperature limitation		
Circuit	*Setting range*	*Factory setting*
I	**-30 … 15 °C**	**-3 °C**
If the slab temperature gets below the set limit, the flow temperature is increased. The influence is set in line 65.		

⊕⊖ Set the limit.

65 Influence at min. slab temperature		
Circuit	*Setting range*	*Factory setting*
I	**0 … 9.9**	**2.0**
If the slab temperature gets below the set limit (line 64), the flow temperature is increa sed. Set the desired influence of the flow temperature.		

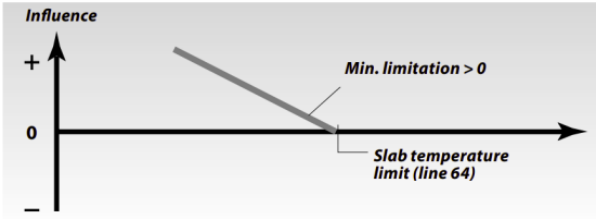
⊕⊖ Set the desired influence.

Influence = 0:

The desired flow temperature is not influenced when the slab temperature gets below the set value (line 64) .

Influence higher than 0:

The desired flow temperature is influenced when the slab temperature gets below the set value (line 64) .



Example:

The limitation value is set to -3 °C.

The influence is set to 2.0.

The actual slab temperature is -5 °C.

Result:

The flow temperature is changed by 2 x 2 = 4 degrees

Service parameter(s) 67

67 Adaptive function of min. slab temperature limitation		
Circuit	*Setting range*	*Factory setting*
I	**OFF / 1 … 50**	**OFF**
Controls how fast the flow temperature adapts to the desired flow temperature when t he slab temperature gets below the limit (line 64).		

⊕⊖ **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.

☝

The limitation function of the slab temperature is not active if

- the connected snow / ice detector registers snow / ice (line 140) and
- the outdoor temperature is higher than the max. outdoor temperature (line 160).

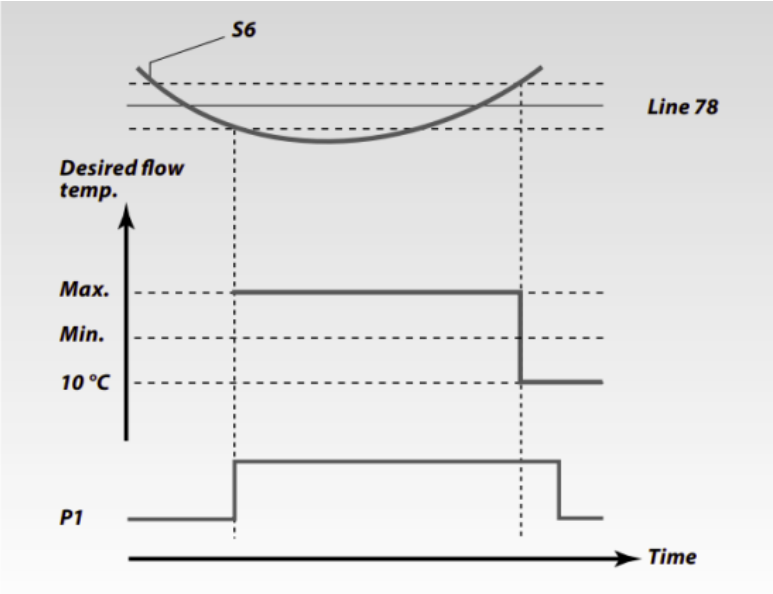
78 Anti-freeze function		
Circuit	*Setting range*	*Factory setting*
I	**1 … 30 °C**	**5 °C**
Prevents the liquid in the ground coil from freezing. This is typically used when the liq uid does not contain antifreeze.		

⊕⊖ Set the temperature at which the anti-freeze function should be active.

☝

The anti-freeze function is active, if line 140 is set to ON and if

- the outdoor temperature is between the set values in lines 160 and 161 or
- schedule II is in comfort mode



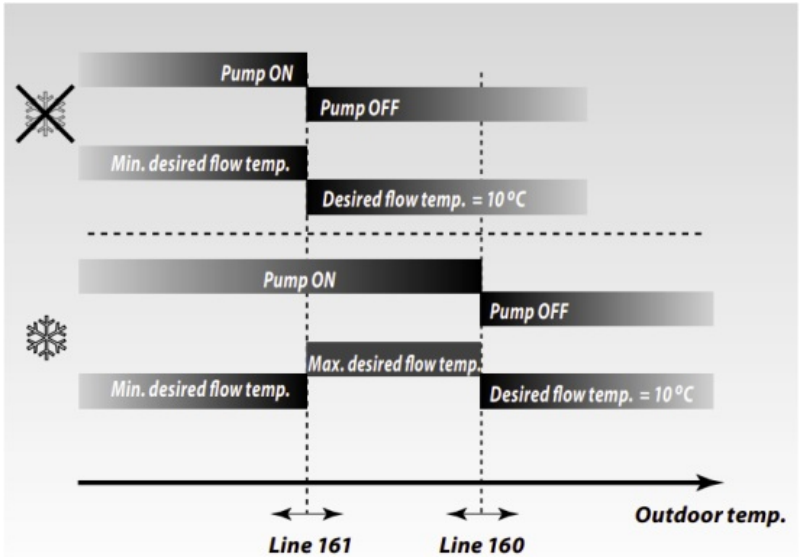
Service parameter(s) 140

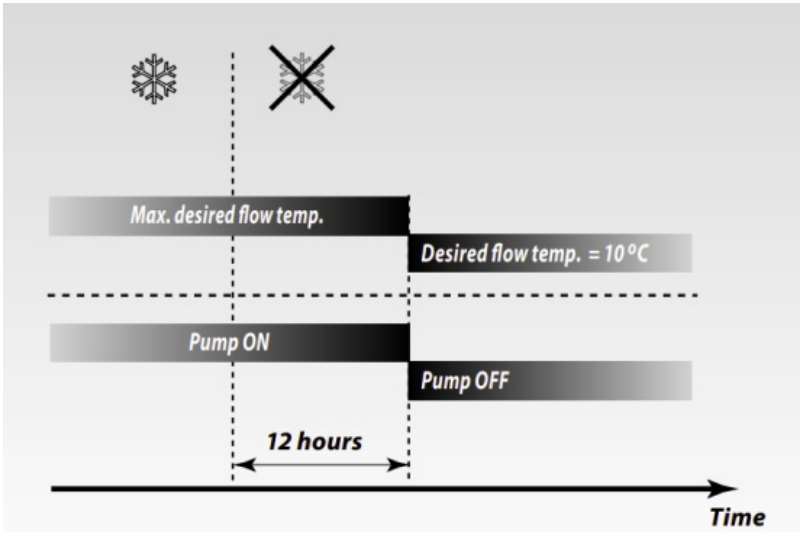
78 Anti-freeze function		
Circuit	*Setting range*	*Factory setting*
I	**1 … 30 °C**	**5 °C**
Prevents the liquid in the ground coil from freezing. This is typically used when the liq uid does not contain antifreeze.		

⊕⊖ **OFF:** A snow / ice detector is not connected.

ON: A snow / ice detector is connected.

Snow / ice detection will be shown in Display A.





= snow / ice detected

= no snow / ice detected

After active snow / ice melting:

Even though the outdoor temperature is in the range between the max. and min. outdoor temperature (lines 160-161) and the snow detection is not active,

- the pump is switched ON for 12 additional hours
- the desired flow temperature will be at the maximum value (line 2)

See also the anti-freeze function in line 78.

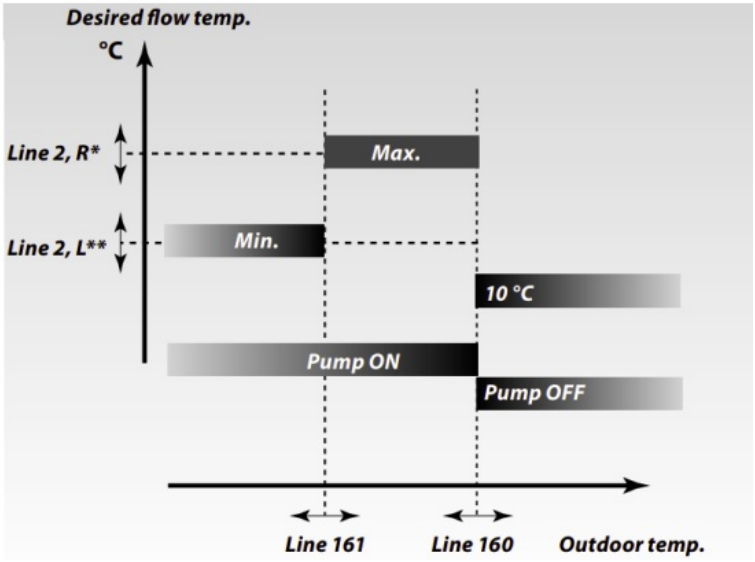
Service parameter(s) 160-197

160 Max. outdoor temperature (cut-in / cut-out value)		
Circuit	*Setting range*	*Factory setting*
I	**-30 … 15 oC**	**5 oC**
If the outdoor temperature gets higher than the max. value, the heating is cut-out. The desired flow temperature is 10 oC.If the outdoor temperature gets below the max. valu e, the heating is cut-in. The desired flow temperature now equals the max. flow temperature in line 2.		

⊕⊖ Set the desired value.

161 Min. outdoor temperature (cut-in / cut-out value)		
Circuit	*Setting range*	*Factory setting*
I	**-30 … 15 oC**	**-15 oC**
If the outdoor temperature gets below the min value, the heating is reduced. The desir ed flow temperature now equals the min. flow temperature.		

⊕⊖ Set the desired value.



* R = to the right in the display

** L = to the left in the display

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).		

Service parameter(s) 198-199

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) and system time in the master.
1 … 9: The slave receives information about the outdoor temperature (S1) and system time 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) and system time.
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).

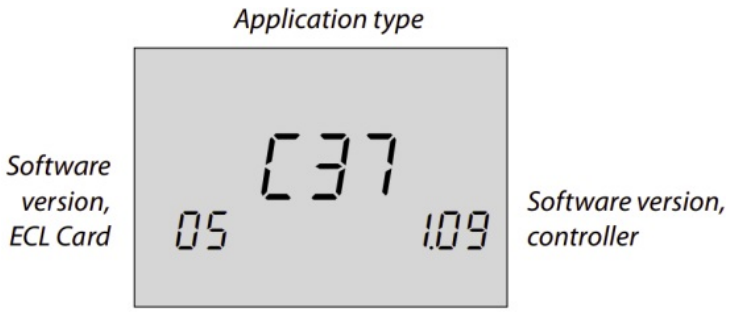
However, more slaves can have the address 0 if they only have to receive information about outdoor temperature and system time.

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.

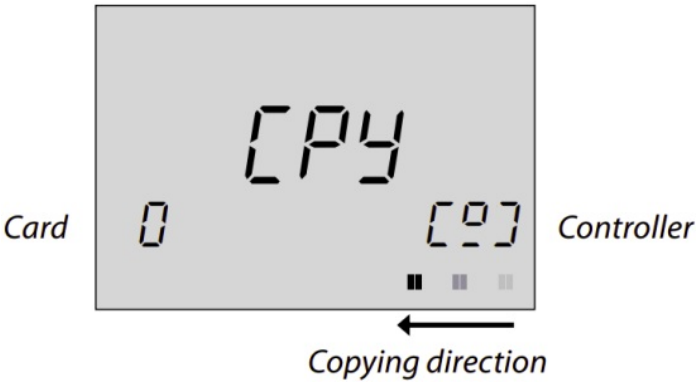
 Go to line 8 (is not displayed), which is the first line below line 7.



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.

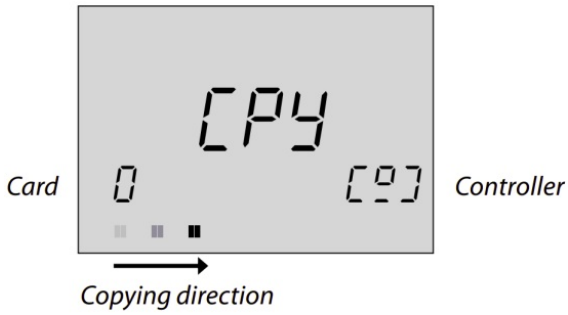
Select the copying direction (from the card to the controller).

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!

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).

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.

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.

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?

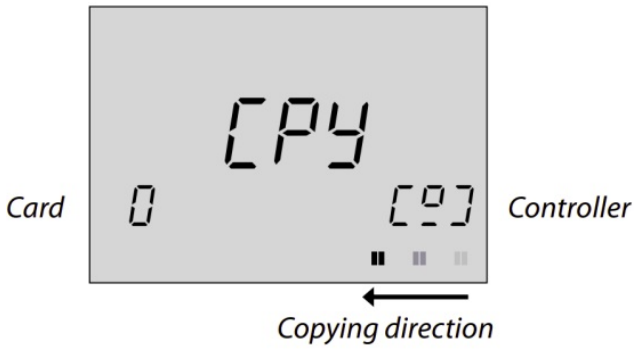
Insert the ECL Card with the yellow side facing you. Go to line 9 (is not displayed), which is the second line below line 7.
Select copy direction ‘card to controller’ (left to right) by using the shift button. Push the + button to copy. See section 5.

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.

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

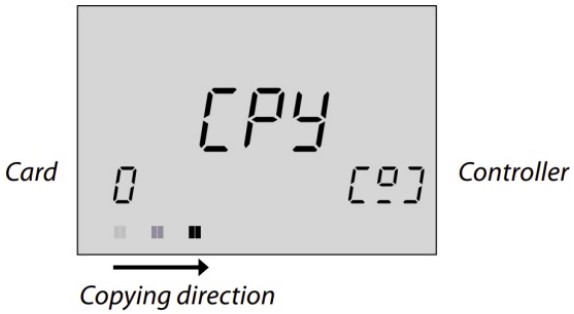
When the ECL Card is inserted with the yellow side facing you, the controller can be operated again.

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

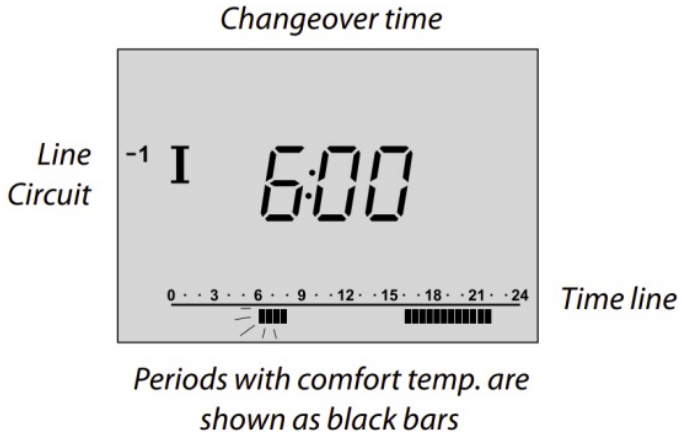
Do not remove the ECL Card while copying. The data on the ECL Card can be damaged!

Set your personal schedule

Monitor the current schedules

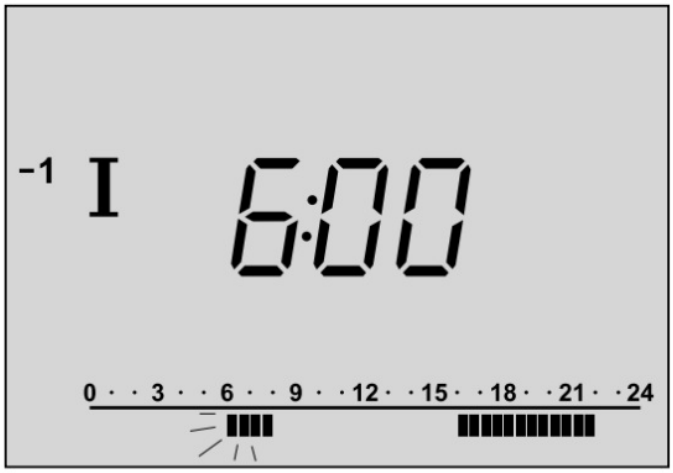
Select between lines 1-7 (Monday, Tuesday ……

Sunday) to see your individual schedules.



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.

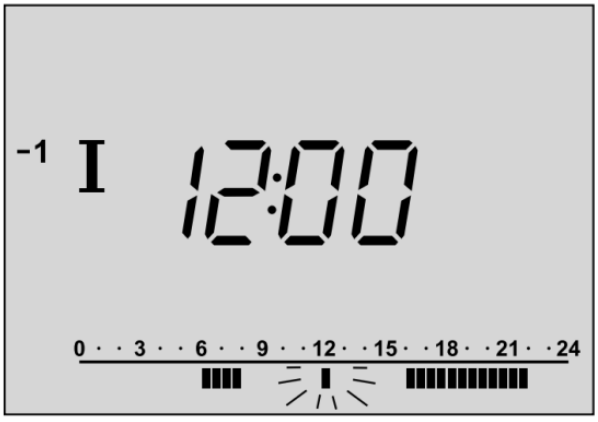
Change the schedule for circuit II

I/II Select circuit II to view or change the schedule.

Use the same method for changes as for circuit I.

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.

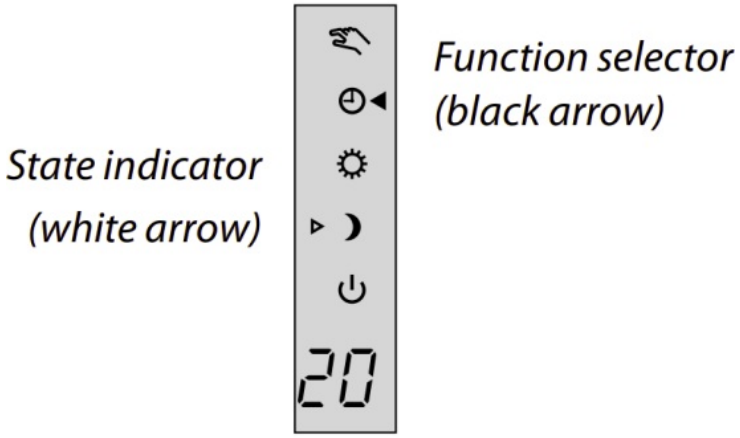
Cancel changes in your personal settings

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

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.

The frost protection is activated by S4 / S6.

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 circuit is stopped. The system is still protected against frost.

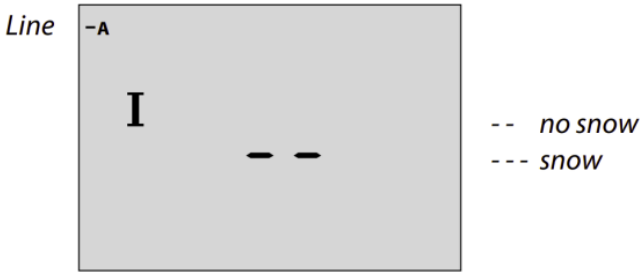
For heating cut-in the controller mode must be scheduled operation, comfort or setback.

The outdoor temperature must be lower than the value set in line 160.

Choose your favorite display (circuit I / schedule II)

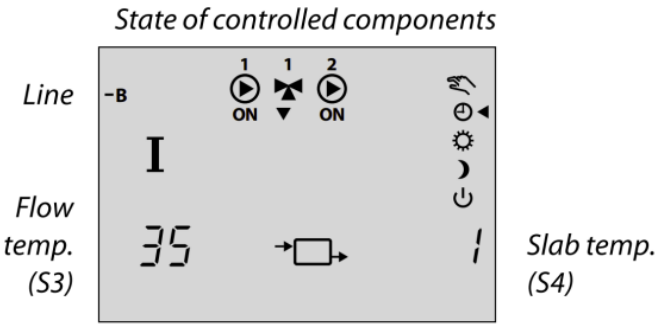
Choose the display – A, B, or C – for daily operations.

Snow / ice detector – display A



Choose this display to check the status of the snow / ice detector.

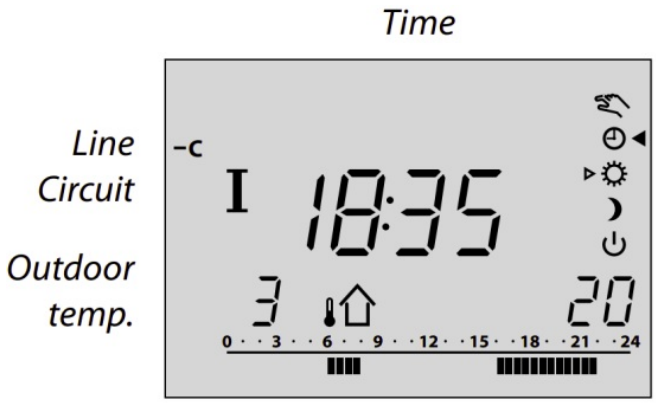
System information – display B



Push and hold the shift button to see:

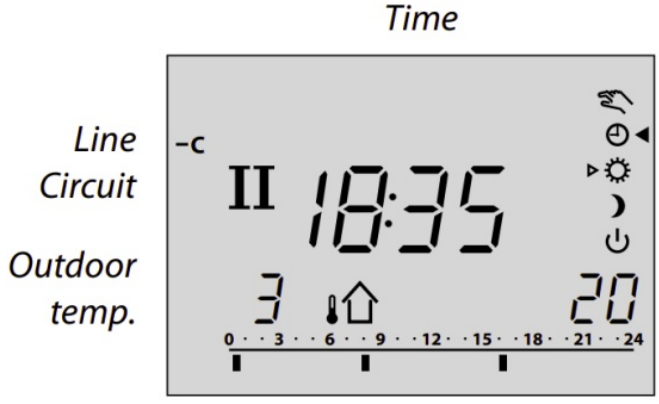
- the calculated flow temperature
- the desired slab temperature limitation.

Today's schedule – display C



Periods in comfort mode are shown as black bars

Choose this display if you prefer a permanent overview of the schedule for today's comfort periods.



Periods in comfort mode are shown as black bars

Choose this display if you prefer a permanent overview of the schedule of the anti-freeze periods.

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

Save energy – save money – improve your comfort temperature

The ECL Comfort controller is designed by Danfoss for the automatic temperature control of heating, domestic hotwater (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

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 understand.
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.

Daily use

Section

1. Choose your favorite display
2. Select circuit mode
3. Set your personal schedule
4. Advantages of the ECL Card
5. Hot points
6. 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	0	3	6	9	12	15	18	21	24
1 Monday									
2 Tuesday									
3 Wednesday									
4 Thursday									
5 Friday									
6 Saturday									
7 Sunday									

0.00 - 24.00

Schedule II	0	3	6	9	12	15	18	21	24
1 Monday									
2 Tuesday									
3 Wednesday									
4 Thursday									
5 Friday									
6 Saturday									
7 Sunday									

0.00 - 0.30 *8.00-8.30* *16.00-16.30*

Factory settings are grey.

The functions can only be realized with ECL Comfort 301 and as of controller version 2.03.

Documents / Resources

	Danfoss L10 ECL Comfort Controller [pdf] User Guide L10 ECL Comfort Controller, L10, ECL Comfort Controller, Comfort Controller, Controller

References

- User Manual

Danfoss

Comfort Controller, controller, Danfoss, ECL Comfort Controller, L10, L10 ECL Comfort Controller

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