

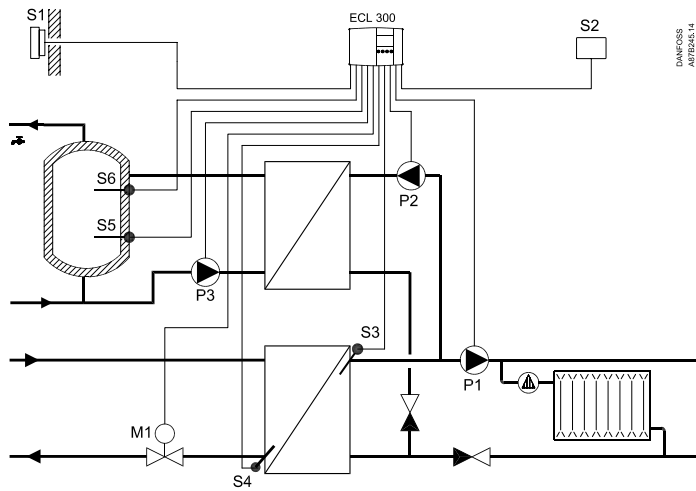
# ECL Comfort User's Guide



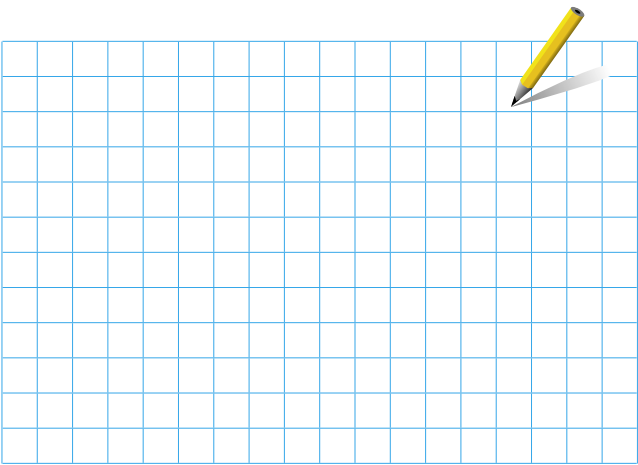
## ECL Comfort Installer's Guide

Mixing controller with ON / OFF  
controlled DHW charging





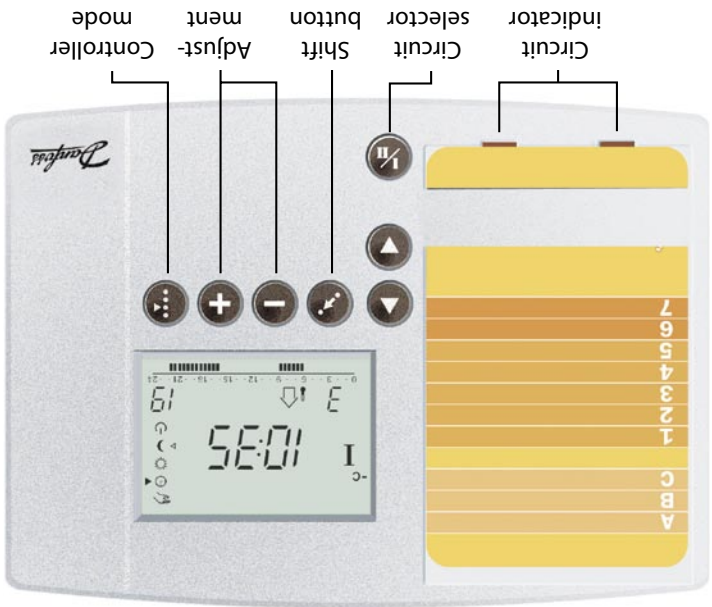
The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.



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 300
- S1 Outdoor temperature sensor
- S2 Room temperature sensor, circuit I
- S3 Flow temperature sensor, circuit I
- S4 Return temperature sensor
- S5 DHW tank temperature sensor, lower
- S6 DHW tank temperature sensor, upper
- P1 Circulation pump, heating, circuit I
- P2 Primary charging pump, DHW, circuit II
- P3 Charging / circulation pump, DHW, circuit II
- M1 Motorized control valve, heating, circuit I



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.



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 087B4758

Installer:

By:

Date:

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## 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.

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- 5** Advantages of the ECL Card
- 6** Hot points
- 7** Definitions



# Before you start

## Sketch your application

The ECL Comfort controller series is designed for a wide range of heating, hot-water 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 **C37** is very flexible. These are the basic principles:

### Heating:

Typically, the flow temperature is always adjusted according to your requirements.

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

The desired flow temperature at S3 is calculated in the ECL controller, based on the outdoor temperature (S1). The lower the outdoor temperature, the higher the desired flow temperature.

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

The return temperature (S4) 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.

### DHW:

If the measured DHW temperature is lower than the desired DHW heating temperature minus the cut-in difference, the desired flow temperature at S3 is increased in order to heat the DHW. DHW heating can have priority, i.e. pump P2 is ON and pump P1 is OFF (or changeover valve is activated and P1 is still ON).

# 10a Identifying the system type

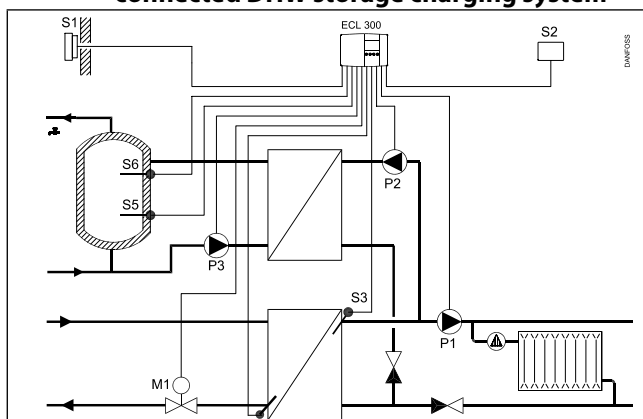
The ECL Comfort controller is a universal controller that can be used for various systems. Based on the shown standard systems, it is possible to configure additional systems.

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 300 and as of controller version 1.08.

## 10.1 Indirectly connected system and secondarily connected DHW storage charging system



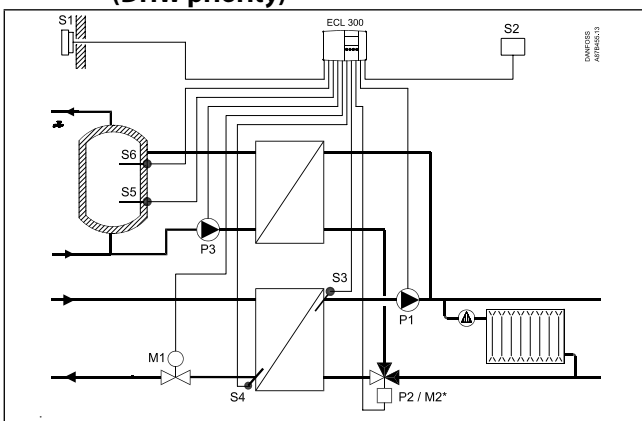
### System settings

Circuit	Line	Description	Recomm. setting
I	51	DHW charging pump / changeover valve	OFF
I	52	Closed valve / normal operation	OFF
I	53	Desired flow temperature at DHW charging	OFF
I	90	P3 = DHW circulation pump	OFF



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

## 10.2 Indirectly connected system and secondarily connected DHW storage charging system (DHW priority)



### System settings

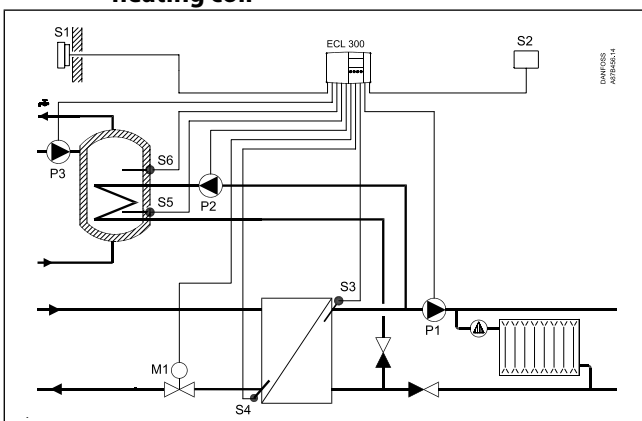
Circuit	Line	Description	Recomm. setting
I	51	DHW charging pump / changeover valve	ON
I	52	Closed valve / normal operation	OFF
I	53	Desired flow temperature at DHW charging	OFF
I	90	P3 = DHW circulation pump	OFF



P2/M2\*

For the control of the actuator use either relay output P2 or triac output M2, see section 12.

## 10.3 Indirectly connected system and secondarily connected DHW storage tank with built-in heating coil

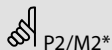


### System settings

Circuit	Line	Description	Recomm. setting
I	51	DHW charging pump / changeover valve	OFF
I	52	Closed valve / normal operation	OFF
I	53	Desired flow temperature at DHW charging	OFF
I	90	P3 = DHW circulation pump	ON

The diagram illustrates a heating system controlled by a Danfoss ECL 300 unit. The system includes a boiler with a pump P3, a mixing valve with actuators S3 and S4, a pump P1, a radiator, and various sensors S1, S2, S5, and S6. The ECL 300 unit is connected to all these components via a multi-core cable.

Circuit	Line	Description	Recomm. setting
I	51	DHW charging pump / changeover valve	ON
I	52	Closed valve / normal operation	OFF
I	53	Desired flow temperature at DHW charging	OFF
I	90	P3 = DHW circulation pump	ON



The diagram illustrates a Danfoss ECL 300 control system for a heating system. The main components and their connections are as follows:

- Boiler:** A central component with a burner at the top and a pump P3 on the left side.
- Sensors:**
  - S1:** A pressure sensor located on the supply line to the boiler.
  - S2:** A pressure sensor located on the return line from the boiler.
  - S3:** A pressure sensor located on the supply line to the radiator.
  - S4:** A pressure sensor located on the return line from the radiator.
  - S5:** A pressure sensor located on the supply line to the pump P2/M2\*.
  - S6:** A pressure sensor located on the return line from the pump P2/M2\*.
- Pumps and Motors:**
  - P3:** A pump located on the left side of the boiler.
  - P2/M2\*:** A pump located on the supply line to the boiler.
  - M1:** A motor located on the return line from the boiler.
  - P1:** A pump located on the supply line to the radiator.
- Control Unit:** The **ECL 300** unit is connected to all sensors (S1, S2, S3, S4, S5, S6) and the pump P2/M2\*.
- Radiator:** A heating radiator located on the right side of the system, connected to the pump P1.

The diagram is labeled "DANFOSS A079456.13" in the bottom right corner.

Circuit	Line	Description	Recomm. setting
I	51	DHW charging pump / changeover valve	ON
I	52	Closed valve / normal operation	OFF
I	53	Desired flow temperature at DHW charging	ON
I	90	P3 = DHW circulation pump	ON



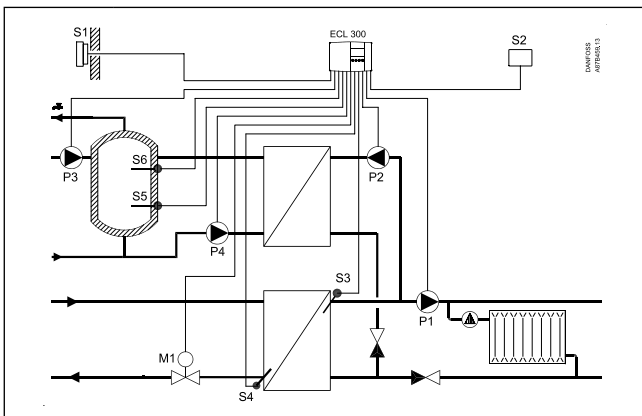
For the control of the actuator use either relay output P2 or triac output M2, see section 12.





The following heating systems are only applicable with relay module ECA 80

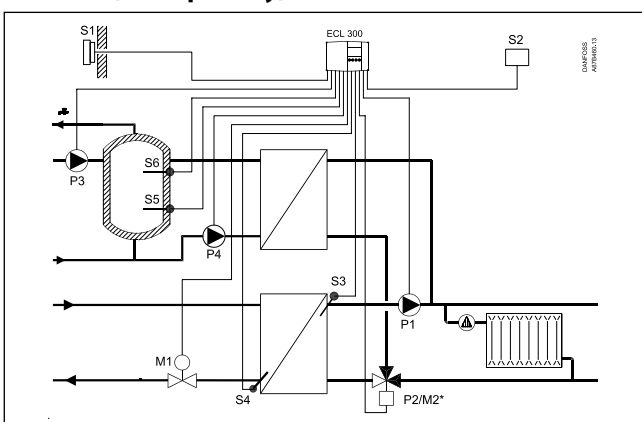
## 10.6 Indirectly connected system and secondarily connected DHW storage charging system



### System settings

Circuit	Line	Description	Recomm. setting
I	51	DHW charging pump / changeover valve	OFF
I	52	Closed valve / normal operation	OFF
I	53	Desired flow temperature at DHW charging	OFF
I	90	P3 = DHW circulation pump	ON

## 10.7 Indirectly connected system and secondarily connected DHW storage charging system (DHW priority)



### System settings

Circuit	Line	Description	Recomm. setting
I	51	DHW charging pump / changeover valve	ON
I	52	Closed valve / normal operation	OFF
I	53	Desired flow temperature at DHW charging	OFF
I	90	P3 = DHW circulation pump	ON



P2/M2\*

For the control of the actuator use either relay output P2 or triac output M2, see section 12.

# 11a Mounting the ECL Comfort controller

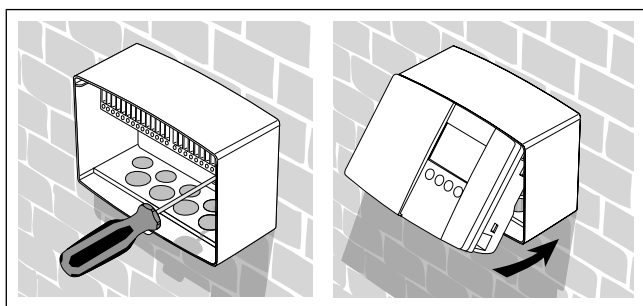
For easy access, you should mount the ECL Comfort controller near the system. Select one of the three following methods:

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

Screws and rawlplugs are not supplied.

## Mounting on a wall

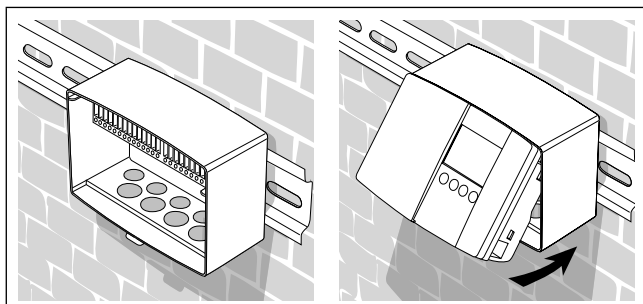
Socket for mounting on wall: Order code No. 087B1149.  
Mount the terminal box on a wall with a smooth surface. Establish the electrical connections and position the controller in the box. Secure the controller with the fixing screw.



## 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.



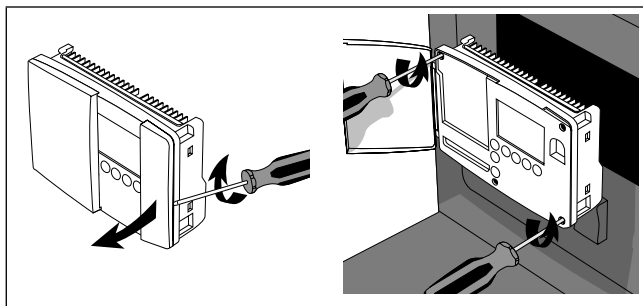
## Mounting in a panel

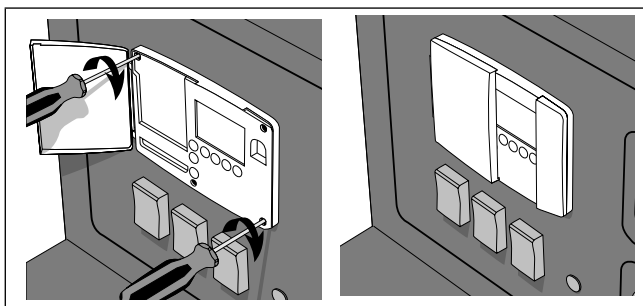
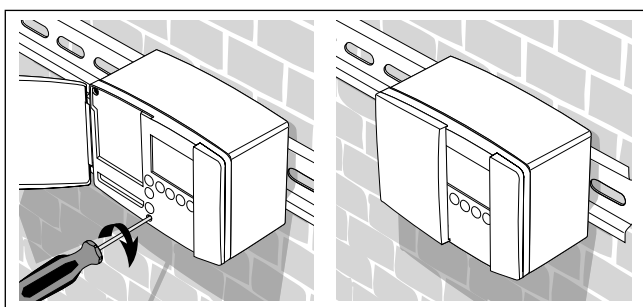
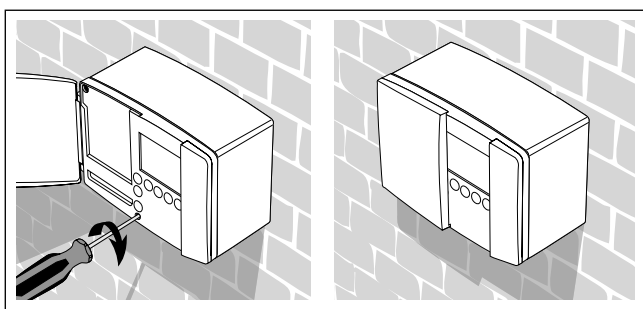
Connector set: Order code No. 087B1148.

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.

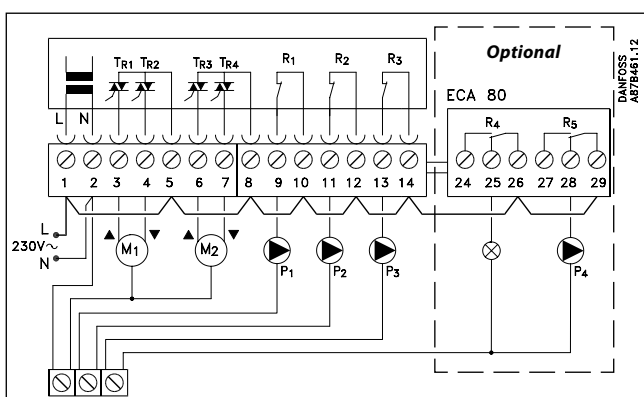
Insert the controller into the panel cut-out and fix it with the two locks which are placed diagonally in two corners of the controller.





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

## 230 V a.c. connections - without safety thermostat



P2 / M2\*

For the heating systems 2, 4, 5 and 7 it must be determined whether the actuator is to be controlled by means of the terminals 6 and 7 (M2) or the terminal 11, cf. section 10.

Terminals 6 and 7: Only control valves with 3-point control

Terminal 11: For change-over valves ON / OFF

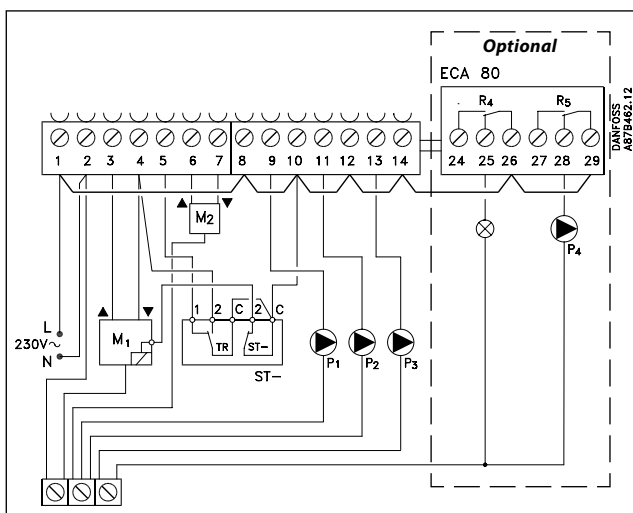
Establish these jumpers:

1-5-8-10-12-14

and jumper 2 to common N-terminal.

If an ECA 80 module is to be applied, the jumpers 14-26-29 must be established additionally.

## 230 V a.c. connections - with safety thermostat



This circuit diagram is only valid if Danfoss actuators are used

Establish these jumpers:

1-8-10-12-14

Safety thermostat:

4, 5 and 10 with ST- (safety thermostat)

and jumper 2 to common N-terminal.

If an ECA 80 module is to be applied, the jumpers 14-26-29 must be established additionally.

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 - close alt. thermo actuator	0.2 A / 230 V a.c.
5 M1	230 V a.c. voltage supply for actuator M1	0.2 A / 230 V a.c.
6 M2	Actuator - open	0.2 A / 230 V a.c.
7 M2	Actuator - close	0.2 A / 230 V a.c.
8 M2	230 V a.c. voltage supply for actuator M2	
9 P1	Circulation pump for heating circuit	4 (2) A / 230 V a.c.
10	Phase for pump relay R1	
11 P2/ M2	DHW pump / changeover valve / ON/OFF valve	4 (2) A / 230 V a.c.
12	Phase for pump / valve output R2	
13 P3	Circulation pump ON/OFF	4 (2) A / 230 V a.c.
14	Phase pump relay R3	

Wire cross section: 0.75 - 1.5 mm<sup>2</sup>

#### Electrical connections

Max. 2 x 1.5 mm<sup>2</sup> 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.!

#### Option:

Relay module ECA 80 (contacts: max. load 4 (2) A / 230 V a.c.)

25 (R4) Alarm relay

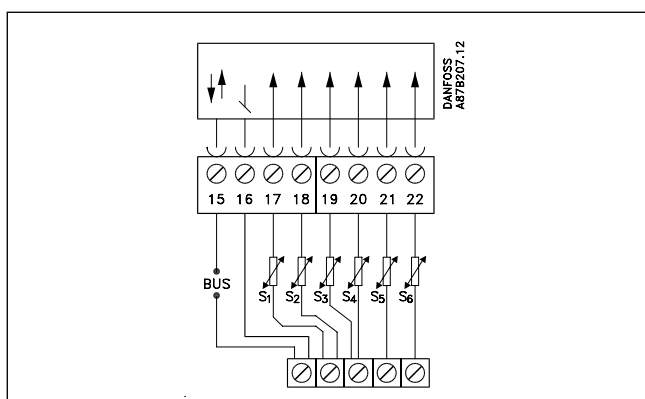
28 (R5) Control of the DHW charging pump in heating systems 6 and 7.



Relay module ECA 80 is only active when the outdoor temperature sensor is connected.

# 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 Room temperature sensor**	ESM-10
19 and 16	S3 Flow temperature sensor	ESM-11 / ESMC / ESMU
20 and 16	S4 Return temperature sensor	ESM-11 / ESMC / ESMU
21 and 16	S5 DHW tank temperature sensor, lower	ESMB / ESMU
22 and 16	S6 DHW tank temperature sensor, upper***	ESMB / ESMU

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

\*\* Either room temperature sensor or room panel / remote control

\*\*\* If only one DHW tank temperature sensor is used, it must be connected to terminal 22

Establish the jumper from 16 to common terminal.

Wire cross section for sensor connections:

Min. 0.4 mm<sup>2</sup>

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.

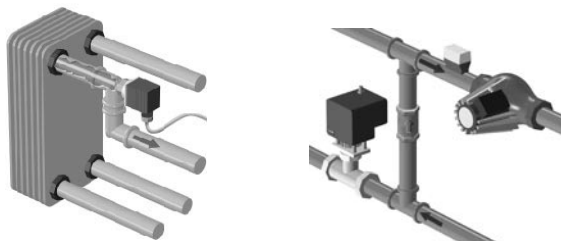
The temperature sensor mentioned below are sensors used for the ECL Comfort 200 and 300 series which not all will be needed for your application!

### 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.



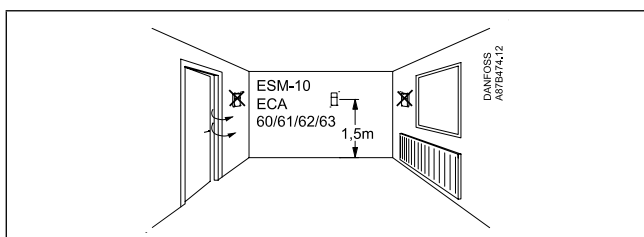
Make sure that the surface of the pipe is clean and even where the sensor is mounted.

### 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.

### Surface temperature sensor (ESMB-12)

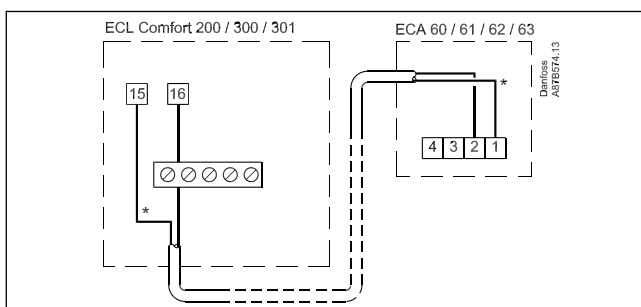
Place the sensor in the surface of the floor.



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

# 14c

## Connecting the room panel / remote control



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

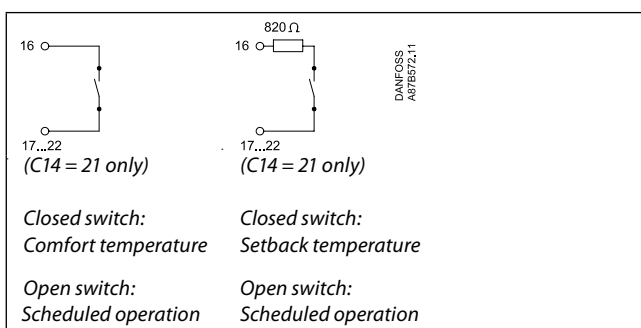
The ECA 60 / 61 / 62 / 63 is powered by the system device bus which means that the bus must be active. The bus is activated by setting the controller address to 15 (section 32, line 199).

## 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).

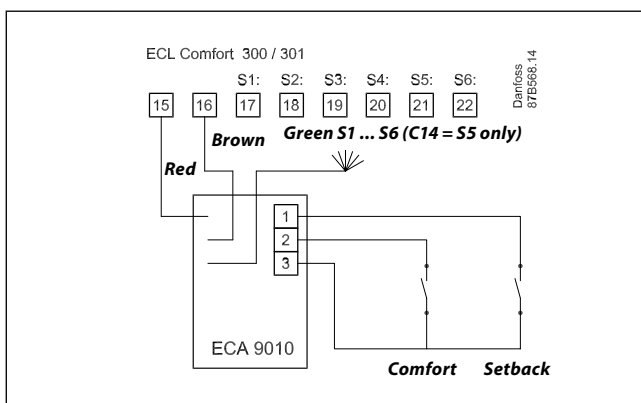
## Connection example without ECA 9010

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



## Connection example with ECA 9010

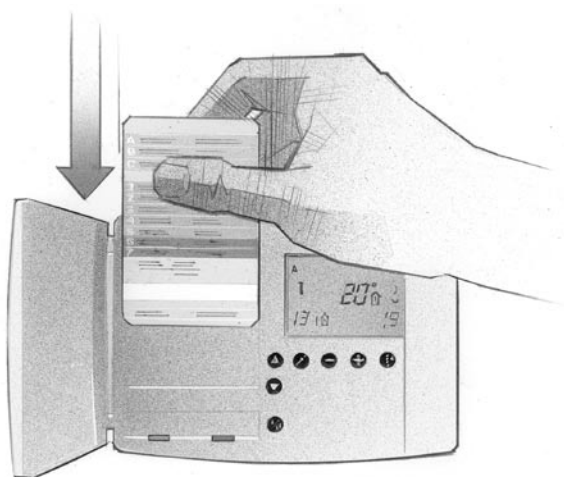
The ECA 9010 module is powered by the system device bus, which means that the bus must be active. The bus is activated by setting the controller address to 15 (line 199). To avoid influence from contact resistance, the use of ECA 9010 is recommended.





# Installation

# 15a Inserting the ECL Card

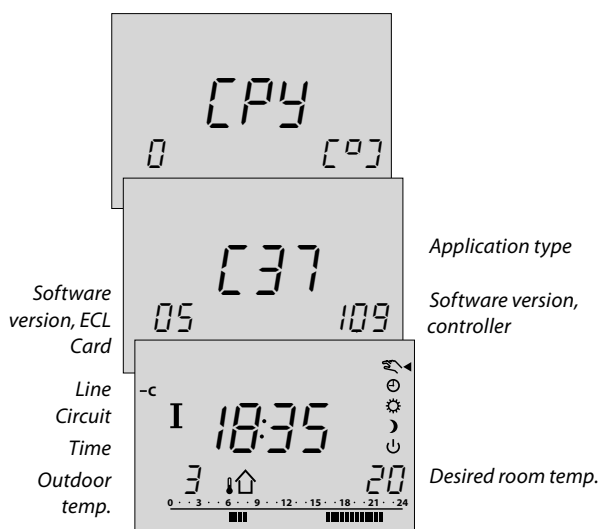


## How to insert your ECL Card the first time

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.

## 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.

# 16

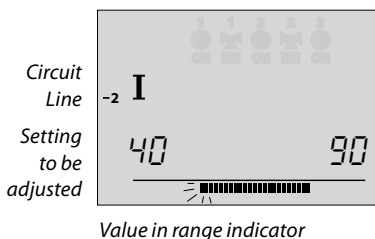
## Adjusting the ECL Card settings

### 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.



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



Set the correct time and date.

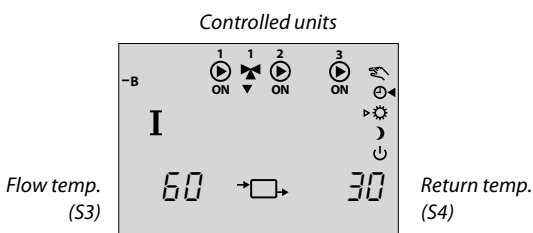
In case of a power break, which lasts longer than 12 hours, the time and the date have to be set again. All other settings are stored as programmed.

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

See *User's Guide*, section 4.



# 18 Monitoring temperatures and system units - line B



Push and hold the shift button to see:

- the calculated flow temperature
- the desired return temperature limitations.



This display can also show the actual and desired flow and return temperatures during DHW charging.

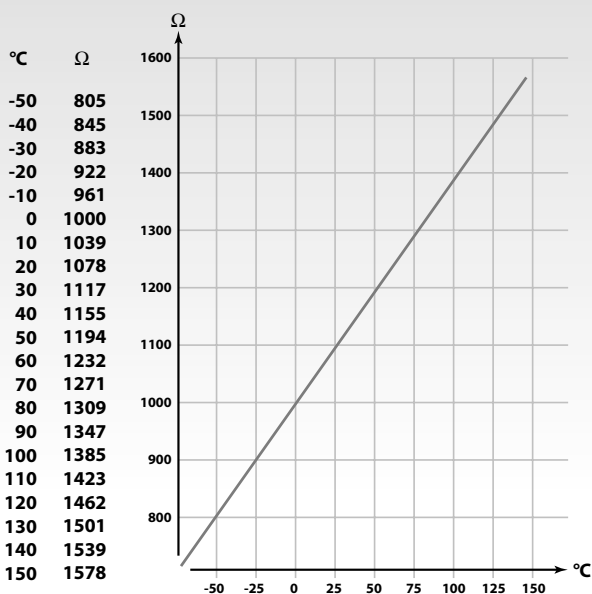
The activity of the motorized control valve is shown as arrows below the valve symbol. When the circulation pump is operating, it is indicated as ON below the pump symbol.

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

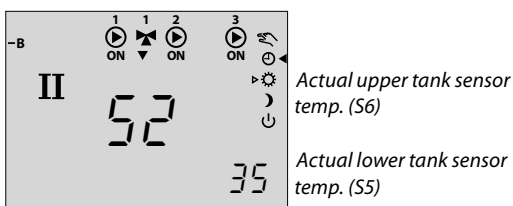
If the sensor is short-circuited, the display will indicate it as "---".

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

## Relationship between temperature and ohmic value

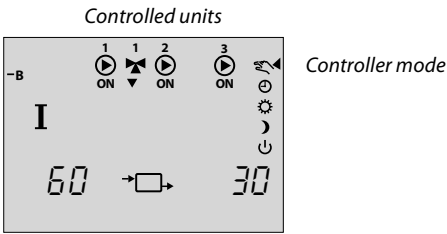


Choose circuit II to see the actual temperatures of the upper and lower tank sensors.






Shift to manual 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 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.

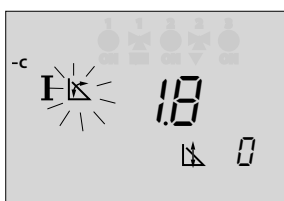


This operation applies to both circuits, if available.



During manual operation, all control functions are deactivated.

## 20a Setting the heat curve - line C



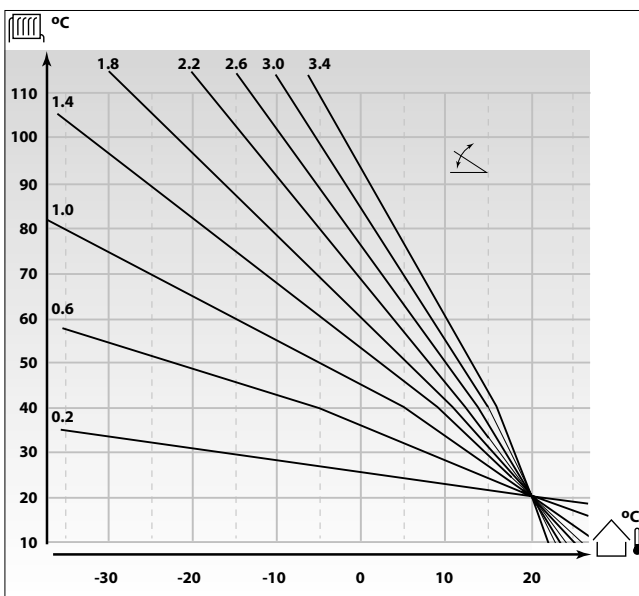
Slope

Displacement

Slope		
Circuit	Setting range	Factory setting
I / (II)	0.2 ... 3.4	1.8 / (1.8)



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	1.0 / (1.0)



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.

The grey side of the ECL Card



Parallel displacement		
<i>Circuit</i>	<i>Setting range</i>	<i>Factory setting</i>
I / (II)	-9 ... 9 K	0 / (0) K



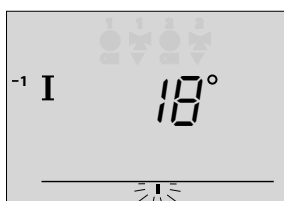
If you want to adjust the parallel displacement of the heat curve, push the shift button. The symbol for the parallel displacement will blink.



Make your adjustments.



## 21 Heating cut-out - line 1

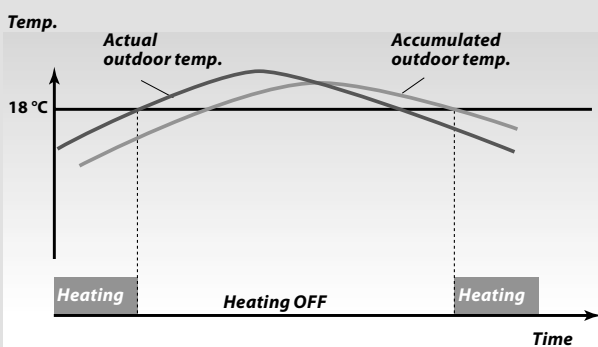


1 Limit for heating cut-out		
Circuit	Setting range	Factory setting
I	10 ... 30 °C	20 °C

**+** **-** 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.

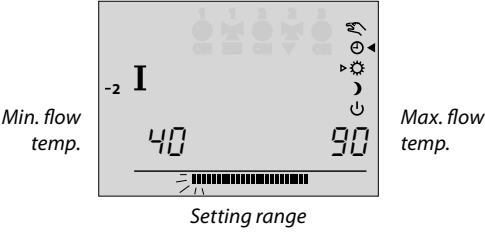
The min. limitation set in line 2 will be ignored.



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.



2 Flow temperature limits, min. and max.		
Circuit	Setting range	Factory setting
I / (II)	10 ... 150 °C	min. 10 / (10), max. 90 / (90) °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.



## 23a Room temperature influence - line 3



This section is only relevant if you have installed a room 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 / (0) max. -40 / (-40)

**+** **-** The bar below the min. value blinks. Adjust the min. influence.

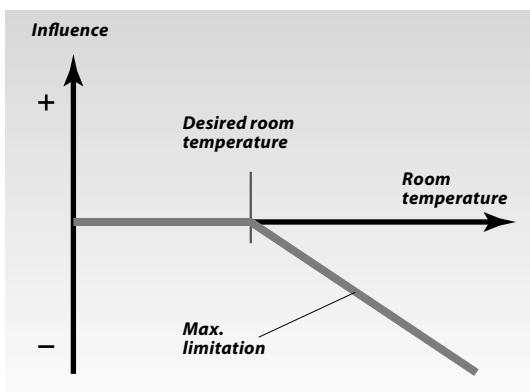
**↗** Select the max. influence.  
The bar below the max. value blinks.

**+** **-** 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 heating system is fully equipped with radiator 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

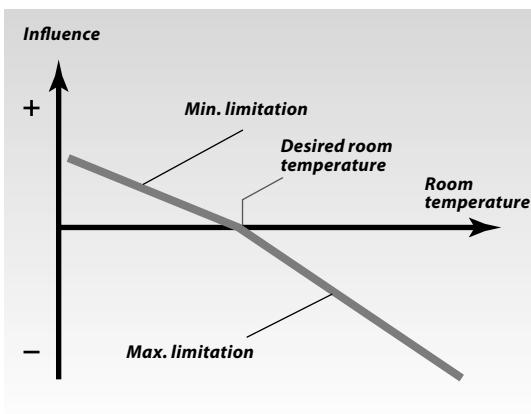
$2 \times -40 \times 1.8 \times 0.1 = -14.4$  degrees.

## B: Reference room temperature control

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

(However, should you have a few radiator thermostats installed, make sure that they are fully open).

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



The room 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  
 $2 \times 20 \times 1.8 \times 0.1 = 7.2$  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  
 $2 \times (-35) \times 1.8 \times 0.1 = -12.6$  degrees.

## 26a Control parameters - lines 4-7

4 Proportional band, Xp		
<i>Circuit</i>	<i>Setting range</i>	<i>Factory setting</i>
I / (II)	1 ... 250 K	80 / (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		
<i>Circuit</i>	<i>Setting range</i>	<i>Factory setting</i>
I / (II)	5 ... 999 sec.	30 / (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		
<i>Circuit</i>	<i>Setting range</i>	<i>Factory setting</i>
I / (II)	5 ... 250 sec.	35 / (35) 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:  $5.0 \text{ mm} \times 15 \text{ sec. / mm} = 75 \text{ sec.}$

#### Rotating valves

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

Example:  $90 \text{ degrees} \times 2 = 180 \text{ sec.}$

7 Neutral zone, Nz		
Circuit	Setting range	Factory setting
I / (II)	0 ... 9 K	3 / (3) K



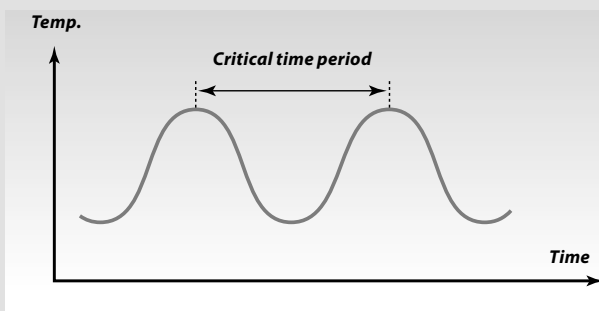
Set the neutral zone to a high value if you can accept a high variation in flow temperature. When the actual flow temperature is within the neutral zone, the controller does not activate the motorized valve.



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.

# 27a Cut-in and cut-out temperature at DHW charging - lines 1-2, circuit II

The controller can control the DHW temperature with either one or two tank temperature sensor(s). The controller will automatically register the number of sensors.

1 Cut-out temperature difference - (lower sensor)*		
Circuit	Setting range	Factory setting
II	1 ... 99 K	15 K
Set the difference between the desired charging temperature and cut-out temperature (charging stop) .		

  Set the difference.



**Example:**

Desired charging temperature (section 3): 60 °C

Cut-out difference: 15 K

Calculated cut-out temperature (60-15) = 45 °C

2 Cut-in temperature difference - (upper sensor)*		
Circuit	Setting range	Factory setting
II	1 ... 99 K	20 K
Set the difference between the desired charging temperature and cut-in temperature (charging start).		

  Set the difference.

**Example:**

Desired charging temperature (section 3): 60 °C

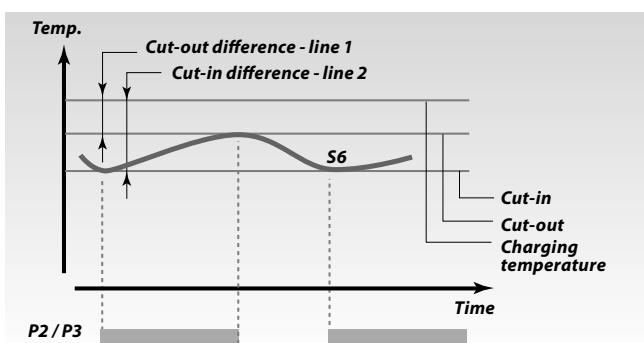
Cut-in difference: 20 K

Calculated cut-in temperature (60-20) = 40 °C

\* In case of two sensors.

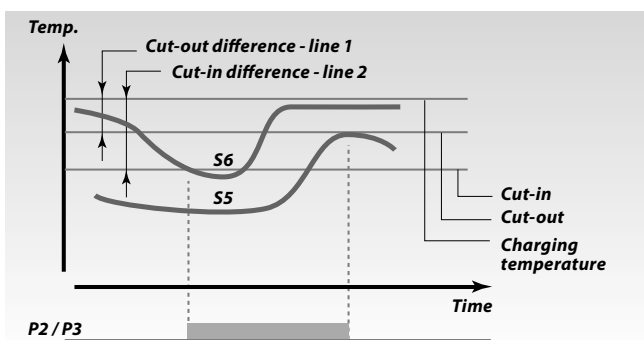


## One sensor (S6)



If you only have one sensor installed (S6), this sensor will measure the cut-out temperature as well as the cut-in temperature.

## Two sensors (S5 + S6)



The DHW temperature will vary between the cut-in and the cut-out temperatures.

### Example:

Cut-in difference: 15 K

Cut-out difference: 20 K

Variation: 5 K

## 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  $\frac{1}{n}$ , 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  $\frac{1}{2}$ , 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.

# 30a ECL Card settings (circuit I)

## A Time and date Section 17

## B System information Sections 18 & 19

## C Heat curve Section 20

<i>Setting ranges</i>	<i>Factory settings</i>	<i>Your settings</i>
<b>Slope</b>		
0.2 ... 3.4	1.8	
See section 20		
<b>Parallel displacement</b>		
-9 ... 9 K	0 K	
See section 20		
<b>1</b>		
<b>Limit for heating cut-out</b>		
10 ... 30 °C	20 °C	
See section 21		
<b>2</b>		
<b>Flow temperature, min. / max. limits</b>		
10 ... 150 °C	min. 10, max. 90 °C	
See section 22		
<b>3</b>		
<b>Room temperature influence</b>		
0 ... 99 / -99 ... 0	min. 0, max. -40	
See section 23		
<b>4</b>		
<b>Proportional band, Xp</b>		
1 ... 250 K	80 K	
See section 26		
<b>5</b>		
<b>Integration time constant, Tn</b>		
5 ... 999 sec.	30 sec.	
See section 26		
<b>6</b>		
<b>Running time of the motorized control valve</b>		
5 ... 250 sec.	35 sec.	
See section 26		
<b>7</b>		
<b>Neutral zone, Nz</b>		
0 ... 9 K	3 K	
See section 26		

A

Time and date

Section 17

B

System information

Sections 18 & 19

C		
Setting ranges	Factory settings	Your settings
1		
Cut-out temperature difference		
1 ... 90 K	15 K	
See section 27		
2		
Cut-in temperature difference		
1 ... 90 K	20 K	
See section 27		

# 31a Service parameters (10-199)

Circuit I (Heating)			
Lines	Setting ranges	Factory settings	Your settings
10	Choice of room panel / remote control 0 ... 5	0	
11	Setback temperature dependent on outdoor temperature OFF / -29 ... 10 °C	-15 °C	°C
12	Boost 0 ... 99%	0%	%
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
20	Optimization based on room / outdoor temperature ON / OFF	OFF	
21	Total stop ON / OFF	OFF	
22	Pump exercise ON / OFF	ON	
23	Valve exercise ON / OFF	OFF	
24	Gear motor / thermo actuator ON / OFF	ON	
31	Return temperature limitation - upper limit (X-axis) -60 ... 20 °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) -60 ... 20 °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	
36	Return temperature influence - min. limitation -9.9 ... 0 ... 9.9	0.0	
37	Time constant for return temperature limitation OFF / 1 ... 50	25	
43	Priority or parallel operation OFF / 1 ... 99 K	OFF	K
52	Closed valve / normal operation ON / OFF	OFF	
141	Override input selection OFF / 1 ... 6	OFF	

Circuit I (Heating)			
Lines	Setting ranges	Factory settings	Your settings
147	Acceptable temperature deviation below desired flow temperature ( $\Delta T1_{ALARM}$ ) <b>OFF / 1 ... 30 K</b>	<b>OFF</b>	<b>K</b>
148	Acceptable temperature deviation above the desired flow temperature ( $\Delta T2_{ALARM}$ ) <b>1 ... 30 K</b>	<b>5 K</b>	<b>K</b>
149	Time interval $\Delta t_{ALARM}$ before activation of alarm function <b>1 ... 99 min.</b>	<b>10 min.</b>	<b>min.</b>
174	Motor protection <b>OFF / 10 ... 59 min.</b>	<b>OFF</b>	<b>min.</b>
196	Service pin LON <b>ON / OFF</b>	<b>OFF</b>	
197	LON reset <b>ON / OFF</b>	<b>ON</b>	
198	Daylight saving time changeover <b>ON / OFF</b>	<b>ON</b>	
199	Master / slave address <b>0 ... 9, 15</b>	<b>15</b>	

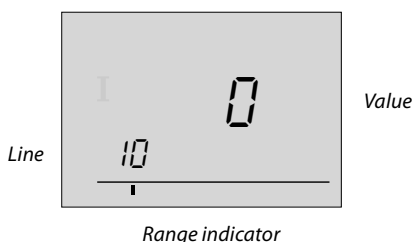
Circuit II (DHW)			
Lines	Setting ranges	Factory settings	Your settings
16	Frost protection by DHW circulation pump <b>ON / OFF</b>	<b>OFF</b>	
30	Return temperature limitation <b>10 ... 110 °C</b>	<b>60 °C</b>	<b>°C</b>
40	DHW pump post-run <b>0 ... 9 min.</b>	<b>0 min.</b>	<b>min.</b>
41	DHW charging pump post-run (P3) <b>0 ... 9 min.</b>	<b>0 min.</b>	<b>min.</b>
44	Max. DHW charging time <b>OFF / 1 ... 100 min.</b>	<b>OFF</b>	<b>min.</b>
45	DHW charging deactivation time <b>OFF / 1 ... 250 min.</b>	<b>0 min.</b>	<b>min.</b>
51	DHW charging pump / changeover valve <b>ON / OFF</b>	<b>OFF</b>	
53	Desired flow temperature, DHW charging <b>ON / OFF</b>	<b>OFF</b>	
55	Activation / deactivation of DHW circulation during DHW charging <b>ON / OFF</b>	<b>OFF</b>	
78	Desired temperature for anti-bacteria function <b>OFF / 1 ... 100 °C</b>	<b>OFF</b>	<b>°C</b>
80	Anti-bacteria function period <b>5 ... 250 min.</b>	<b>120 min.</b>	<b>min.</b>
90	P3 = DHW circulation pump or DHW charging pump <b>ON / OFF</b>	<b>OFF</b>	
141	Override input selection <b>OFF / 1 ... 6</b>	<b>OFF</b>	

## 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)	0 ... 5	(0) / (0)
<i>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.</i>		

- +

−

Choose between
- 0:

No room panel / remote control
- 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 ... 5:

Not used



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

11 Setback temperature dependent on outdoor temperature		
Circuit	Setting range	Factory setting
(I) / (II)	OFF / -29 ... 10 °C	(-15) / (-15) °C
<i>Below this outdoor temperature, the setback temperature setting has no influence.</i>		

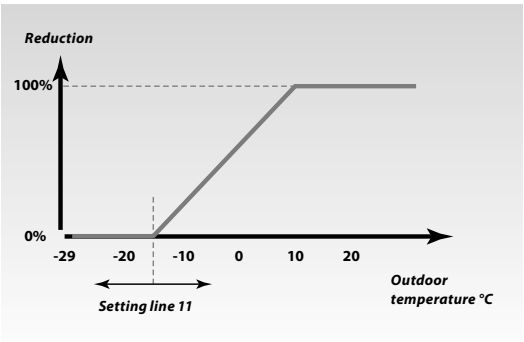
- +

−

-29 ... 10:



The setback temperature depends on the outdoor temperature, when the outdoor temperature is above the set limit. The lower the outdoor temperature, the less the temperature reduction. When the outdoor temperature is below the set limit, there is no temperature reduction.
- OFF:

The setback temperature does not depend on the outdoor temperature.



## 32b Service parameter(s) 12-13

12 Boost		
Circuit	Setting range	Factory setting
(I) / (II)	0 ... 99%	(0) / (0)%
Shortens the heating-up period by increasing the desired flow temperature by the percentage you set.		

  Set the percentage at which you want the desired flow temperature increased temporarily.

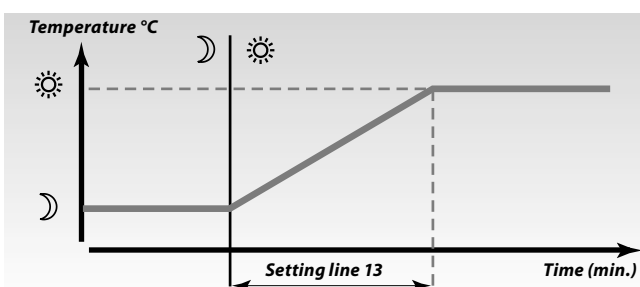
In order to shorten the heating-up period after a setback temperature period, the desired flow temperature can be increased temporarily (max. 1 hour). At optimizing the boost is active in the optimization period (line 14).

If a room temperature sensor or an ECA 60 / 61 / 62 / 63 is connected, the boost stops when the room temperature has been reached.

The boost also stops at the end of an optimizing period.

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.

## 32d Service parameter(s) 16-17

16 Frost protection by DHW circulation pump		
Circuit	Setting range	Factory setting
II	ON / OFF	OFF
When the outdoor temperature is lower than 2 °C (frost risk), the controller automatically switches ON the circulation pump to protect the system.		

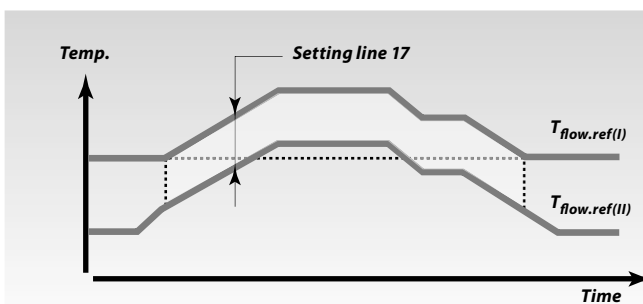
- ⊕ **ON:** When the outdoor temperature is lower than 2 °C, the circulation pump is switched ON.
- ⊖ **OFF:** The circulation pump is switched ON and OFF according to schedule.

17 Influence on desired flow temperature ( $T_{\text{flow.ref(I)}}$ )		
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 ( $T_{\text{flow.ref(I)}}$ ), the temperature of the master will be increased accordingly ( $T_{\text{flow.ref(II)}} + \text{the setting (line 17)}$ ).



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

20 Optimization based on room / outdoor temperature		
Circuit	Setting range	Factory setting
(I) / (II)	ON / OFF	(OFF) / (OFF)
The optimized start and stop time can be based on either room or outdoor temperature.		

- +

−

ON:

Optimization based on room temperature, if measured.
- OFF:

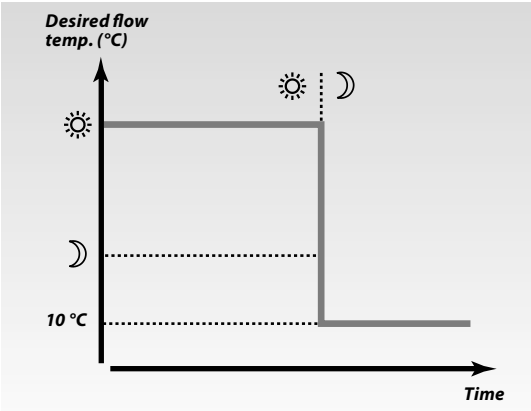
Optimization based on outdoor temperature. Use this setting if the room temperature is not measured.

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:

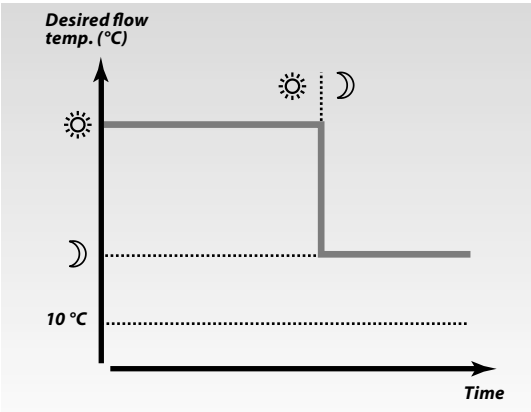
The desired flow temperature is lowered to 10 °C. The min. setting of the flow temperature (line 2, section 22) is overruled.



- −

OFF:



No total stop



Extended service



## 32f Service parameter(s) 22-24

22 Pump exercise		
<i>Circuit</i>	<i>Setting range</i>	<i>Factory setting</i>
<b>I / (II)</b>	<b>ON / OFF</b>	<b>ON / (ON)</b>
<i>Exercises the pump to avoid blocking in periods without heat demand.</i>		

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

**OFF:** The pump exercise is not active.

23 Valve exercise		
<i>Circuit</i>	<i>Setting range</i>	<i>Factory setting</i>
<b>I / (II)</b>	<b>ON / OFF</b>	<b>OFF / (OFF)</b>
<i>Exercises the valve to avoid blocking in periods without heat demand.</i>		

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

**OFF:** The valve exercise is not active.

24 Gear motor / thermo actuator		
<i>Circuit</i>	<i>Setting range</i>	<i>Factory setting</i>
<b>(I) / (II)</b>	<b>ON / OFF</b>	<b>(ON) / (ON)</b>
<i>Choose the actuator type for your valve.</i>		


  **ON:** Gear motor

**OFF:** Thermo actuator (ABV type)



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

30 Return temperature limitation		
Circuit	Setting range	Factory setting
II	10 ... 110 °C	60 °C
Set the return temperature you accept for the heating / DHW 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.

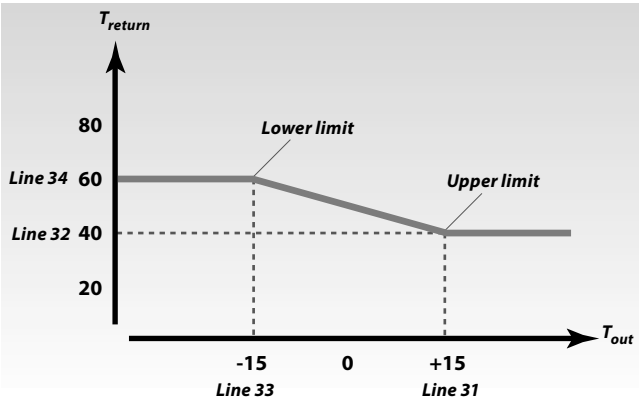


For some applications the return temperature limitation for heating circuits is set in lines 31-34 (outdoor temperature dependent limitation).

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.



## 32h Service parameter(s) 31-34

31 Return temperature limitation - upper limit (X-axis)		
<i>Circuit</i>	<i>Setting range</i>	<i>Factory setting</i>
(I) / (II)	<b>-60 ... 20 °C</b>	<b>(15) / (15) °C</b>
<i>Set the outdoor temperature value (see drawing).</i>		

- ⊕ ⊖ 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)		
<i>Circuit</i>	<i>Setting range</i>	<i>Factory setting</i>
(I) / (II)	<b>10 ... 110 °C</b>	<b>(40) / (40) °C</b>
<i>Set the return temperature limitation referring to the outdoor temperature value set in line 31 (see drawing).</i>		

- ⊕ ⊖ 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)		
<i>Circuit</i>	<i>Setting range</i>	<i>Factory setting</i>
(I) / (II)	<b>-60 ... 20 °C</b>	<b>(15) / (15) °C</b>
<i>Set the outdoor temperature value (see drawing).</i>		

- ⊕ ⊖ 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)		
<i>Circuit</i>	<i>Setting range</i>	<i>Factory setting</i>
(I) / (II)	<b>10 ... 110 °C</b>	<b>(60) / (60) °C</b>
<i>Set the return temperature limitation (see drawing).</i>		

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

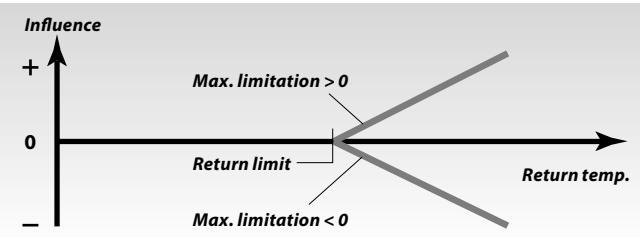


35 Return temperature influence - max. limitation		
Circuit	Setting range	Factory setting
(I) / (II)	-9.9 ... 0 ... 9.9	(-2.0) / (-2.0)
Set the influence from the return temperature on the desired flow temperature.		


**⊕ ⊖** 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  $-2.0 \times 2 = -4$  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).

## 32j Service parameter(s) 36

36 Return temperature influence - min. limitation		
Circuit	Setting range	Factory setting
(I) / (II)	-9.9 ... 0 ... 9.9	(0.0) / (0.0)
Set the influence from the return temperature on the desired flow temperature.		

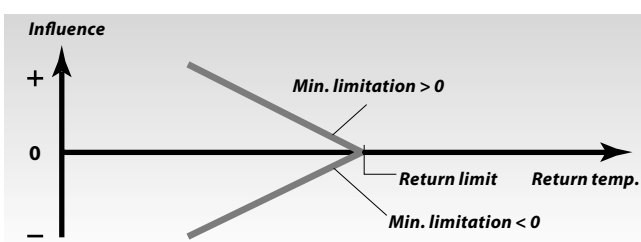
⊕ ⊖ Set the influence of the min. return temperature limitation (set in line 30 or lines 31-34).

*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  $-3.0 \times 2 = -6$  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) / (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.

40 DHW pump post-run		
Circuit	Setting range	Factory setting
(I) / (II)	0 ... 9 min.	(0) / (0) min.
The DHW pump can continue to run after charging to utilize the remaining heat in the heat exchanger / boiler.		

- +

−

0:

The DHW pump stops immediately after charging.
- 1 ... 9:

The time the DHW pump runs after the charging has ended.

This function also prevents that too DHW is circulated in the heating circuit.

41 DHW charging pump post-run (P3)		
Circuit	Setting range	Factory setting
II	0 ... 9 min.	0 min.
Set the post-run time of the DHW charging pump in the secondary circuit.		

- +

−

0:

The pump stops immediately after charging.
- 1 ... 9:

The time the pump runs after the charging has ended.

When the DHW charging pump runs after the charging of the DHW tank has stopped, the heat in the exchanger can be utilized to a better extent.



The post-run of the DHW charging pump (line 41) should not be set to a shorter time than that of the DHW pump (line 40). During the post-run of the two pumps, the heating pump is inactive.



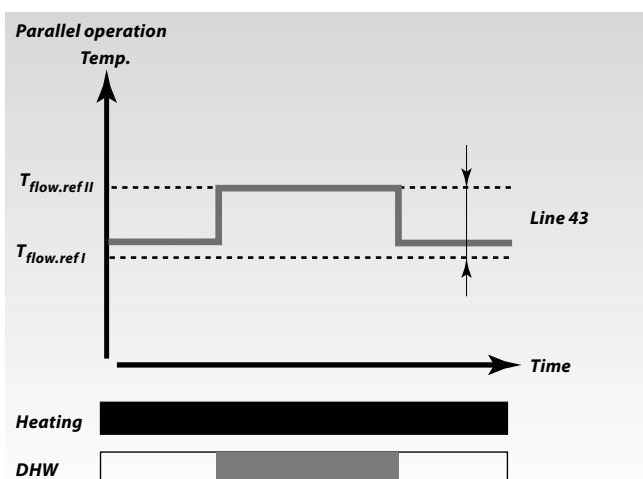
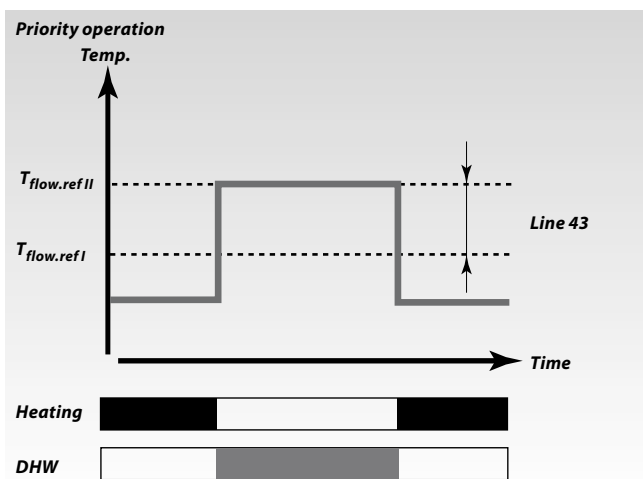
# 321 Service parameter(s) 43

43 Priority or parallel operation		
Circuit	Setting range	Factory setting
I	OFF / 1 ... 99 K	OFF
Choose whether the DHW should have priority or the heating operation should be limited at DHW charging if the circuits are operated in parallel.		

⊕ ⊖ **OFF:** Priority operation for the DHW circuit.

**1 ... 99:**

Parallel operation of DHW and heating circuits. Set the limit for parallel operation. Parallel operation is obtained as long as the difference between  $T_{\text{flow.ref I}}$  and  $T_{\text{flow.ref II}}$  is less than the set value.



When the parallel operation is active, and the charging temperature (at S3) cannot be kept at the set level (circuit II, line C, section 3 in the yellow part), the controller changes into priority operation.

If the DHW charging time exceeds 35 minutes and the DHW temperature is above the cut-in level (circuit II, line 2), the controller changes into heating operation.

If the controller has changed to priority operation and the DHW temperature remains below the cut-in level, the controller does not change into heating operation. This situation can be avoided by setting a lower value for the DHW charging temperature.

The grey side of the ECL Card

44 Max. DHW charging time		
Circuit	Setting range	Factory setting
II	OFF / 1 ... 100 min.	OFF
When the set max. DHW charging time expires, the charging is deactivated.		

**+** **−** **OFF:** If the DHW temperature is lower than the DHW charging cut-in temperature, the DHW charging remains active for unlimited time. If the DHW temperature is higher than the DHW charging cut-in temperature, the charging is deactivated after 35 min.

**1 ... 100:**  
The charging is deactivated when the set time expires.

45 DHW charging deactivation time		
Circuit	Setting range	Factory setting
II	0 ... 250 min.	0 min.
If the charging time has reached its maximum (line 44), the charging is deactivated for the set time.		

**+** **−** **0:** No deactivation time.

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

51 DHW charging pump / changeover valve		
Circuit	Setting range	Factory setting
II	ON / OFF	OFF
Determine whether you have a DHW charging pump or a changeover valve.		

**+** **−** **ON:** Changeover valve P2. The circulation pump P1 is running during DHW charging

**OFF:** DHW charging pump P2. The heating circulation pump P1 is stopped during DHW charging\*.

\*) See line 43 for parallel operation



## 32n Service parameter(s) 52-55

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



**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.

53 Desired flow temperature, DHW charging		
Circuit	Setting range	Factory setting
(I) / (II)	ON / OFF	(OFF) / (OFF)
<i>Choose temperature condition at the flow temperature sensor during DHW charging.</i>		



**ON:** The desired flow temperature is controlled according to heating circuit demands.

**OFF:** The desired flow temperature is set to the desired DHW charging temperature during DHW charging.



55 Activation / deactivation of DHW circulation pump during DHW charging		
Circuit	Setting range	Factory setting
II	ON / OFF	OFF
<i>At DHW charging, the pump can be deactivated independently of the schedule.</i>		



**ON:** The pump always operates according to schedule.



**OFF:** The pump is deactivated at DHW charging, independently of the schedule.

78 Desired temperature for anti-bacteria function		
Circuit	Setting range	Factory setting
II	OFF / 1 ... 100 °C	OFF
Set the desired temperature for the anti-bacteria function. The DHW will be charged once a week at the set temperature to protect against bacteria. The function is always active on Mondays from 00:00 and the DHW is charged according to the period set in line 80.		

  **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
(I) / (II)	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.

90 P3 = DHW circulation pump or DHW charging pump		
Circuit	Setting range	Factory setting
II	ON / OFF	OFF
State whether the pump relay (R3) for P3 is to control a circulation pump or a charging pump according to the heating system types 1-7 (section 10). In heating system types 6 and 7, the DHW charging pump (P4) is controlled via the additional module ECA 80, pump relay (R5)!		

  **ON:** Circulation pump.

**OFF:** Charging pump.



# 32p Service parameter(s) 141

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'!

- +

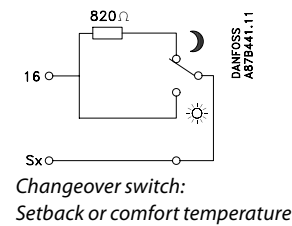
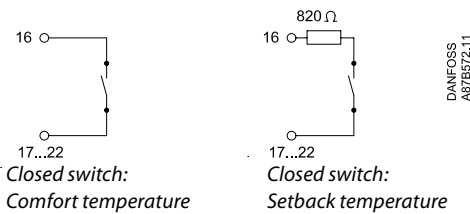
−

**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.

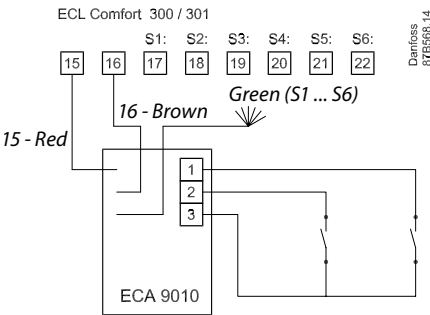
## Connection example

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



## 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)
<p>The alarm is activated if the actual flow temperature drops too much below the desired flow temperature. The max. deviation <math>\Delta T1_{ALARM}</math> is set here.</p> <p>This condition must last longer than the time interval <math>\Delta t_{ALARM}</math> (line 149).</p> <p>See also line 148.</p>		

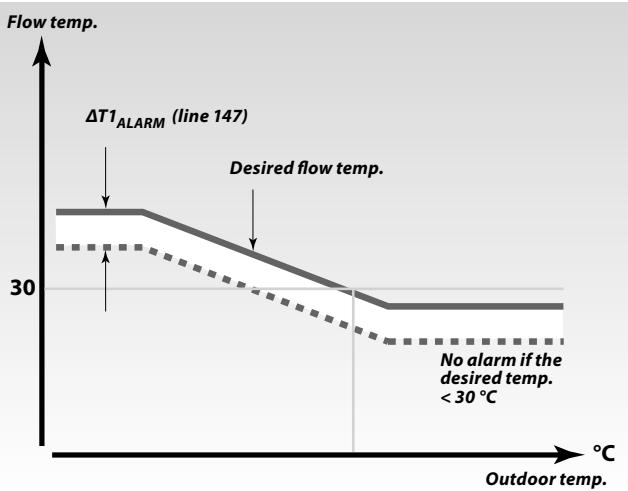
+

−

**OFF:** The alarm function and the alarm relay of the additional module ECA 80 are not active.

**1 ... 30:**

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

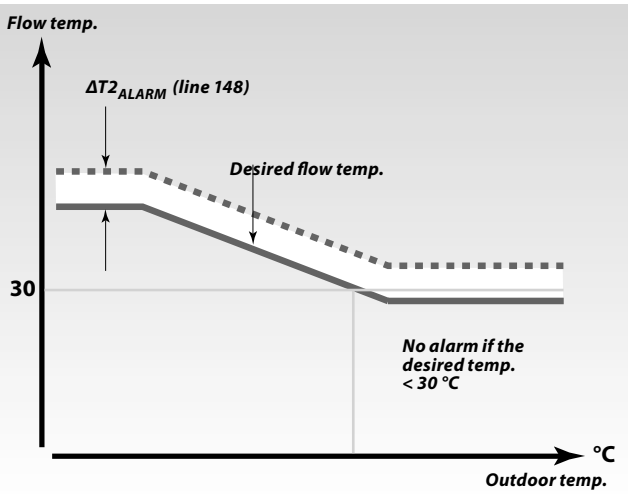


The alarm signal can only be sent via the module ECA 80.

# 32r    Service parameter(s) 148

148 Acceptable temperature deviation above the desired flow temperature ( $\Delta T_{ALARM}$ )		
Circuit	Setting range	Factory setting
(I) / (II)	1 ... 30 K	(5) / (5) K
<p>The alarm is activated if the actual flow temperature rises too much above the desired flow temperature. The max. deviation <math>\Delta T_{ALARM}</math> is set here.</p> <p>This condition must last longer than the time interval <math>\Delta t_{ALARM}</math> (line 149).</p> <p>This alarm can only be activated if the value in line 147 is set to 1 ... 30 K.</p>		

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



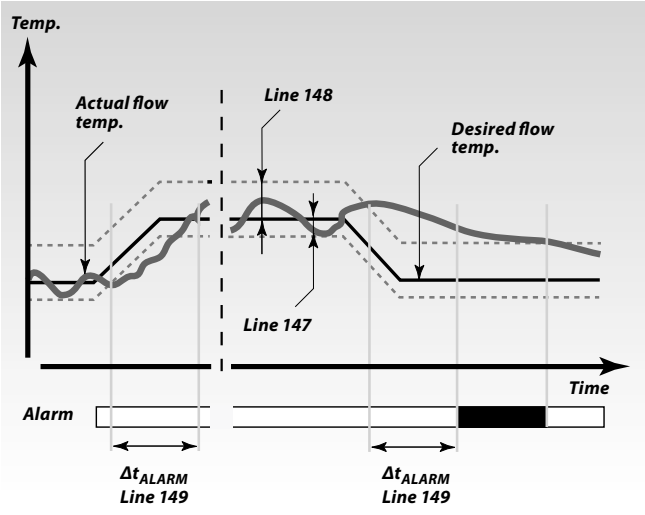
The alarm signal can only be sent via the module ECA 80.

149 Time interval $\Delta t_{\text{ALARM}}$ before activation of alarm function		
Circuit	Setting range	Factory setting
(I) / (II)	1 ... 99 min.	(10) / (10) min.
If an alarm condition from either line 147 or 148 is present for a longer time than the time interval $\Delta t_{\text{ALARM}}$ , the alarm function is activated.		

+

−

1 ... 99: Time interval  $\Delta t_{\text{ALARM}}$ .



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 80.

## 32t Service parameter(s) 174-198

174 Motor protection		
Circuit	Setting range	Factory setting
(I) / (II)	OFF / 10 ... 59 min.	(OFF) / (OFF)
Prevents the controller from unstable temperature control (and resulting actuator oscillations). This can occur when there is no DHW tapping, i.e. when the load is only due to the DHW circulation, or when the heating demand in the heating circuit is very low. The motor protection increases the lifetime of all involved components.		

**+** **−** **OFF:** Motor protection is not activated.

### 10 ... 59:

Motor protection is activated after the set activation delay.

A high value should be used for DHW installations with many consumers.

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).

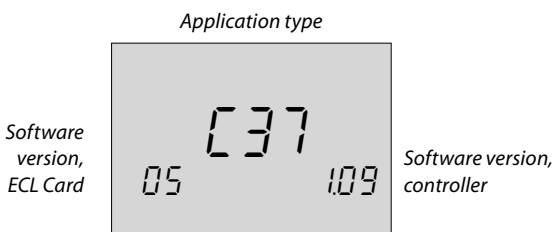
However, more slaves can have the address 0 if they only have to receive information about outdoor temperature, system time, and signal for DHW demand in the master.

## 34a 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!

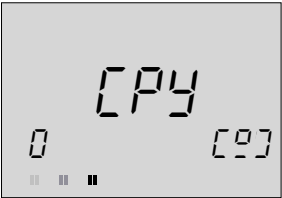


**Copy personal settings to additional controller(s) in identical systems**

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).



Copying direction

-  Copy.



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



# 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).



**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.

**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!



The yellow side of the ECL Card

## 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!

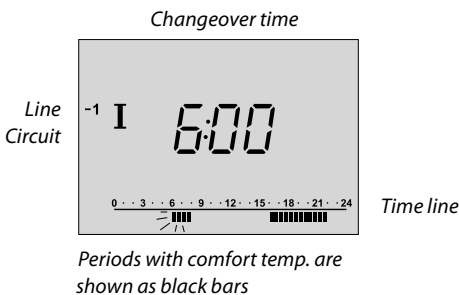


## 4a Set your personal schedule

### Monitor the current schedules



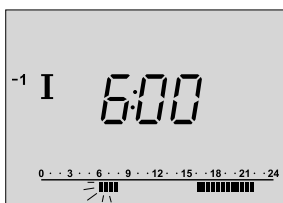
Select between lines 1-7 (Monday, Tuesday ..... Sunday) to see your individual schedules.



### 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



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



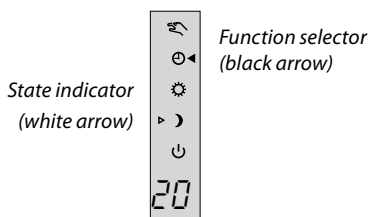
Push - and + buttons simultaneously for 2 seconds to restore the factory settings of the actual schedule.



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



The yellow  
side of the  
ECL Card



# Set your room and DHW charging temperature



Go to display C.

## Circuit I:

### Setting the desired room temperature



*Desired room  
temp. in  
comfort mode*



*Desired room  
temp. in  
setback mode*



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 II:

### Setting the desired DHW charging temperature



*Desired DHW  
charging temp. in  
comfort mode*



*Desired DHW  
charging temp. in  
setback mode*



Select the constant comfort mode.



Set the desired DHW charging temperature for the comfort mode.



Select the constant setback mode.



Set the desired DHW charging temperature for the setback mode.



Select the desired mode (section 2).



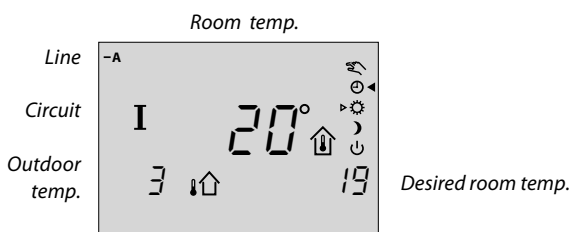
# 1a Choose your favorite display (circuit I)



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

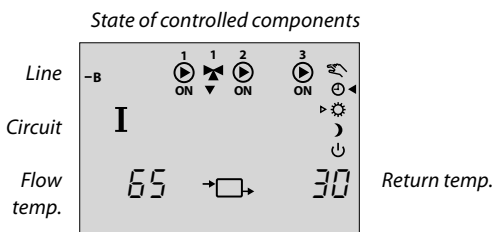


## Room temperature - display A

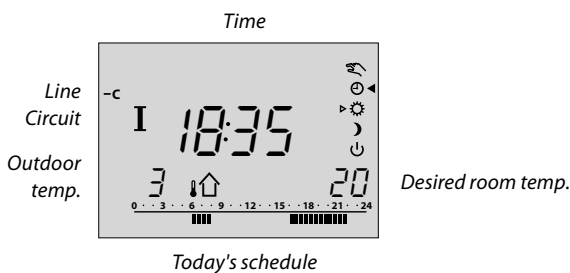


The display will show the room temperature if a room temperature sensor, a room panel or a remote control is installed. If not, two bars will be shown.

## System information - display B



## 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.



The yellow side of the ECL Card

# Choose your favorite display (circuit II)

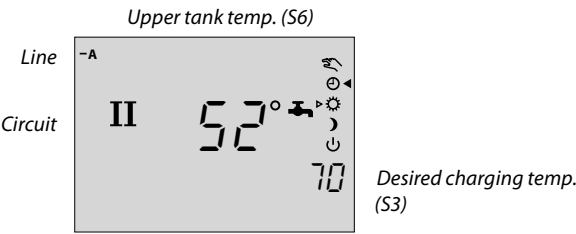
1b



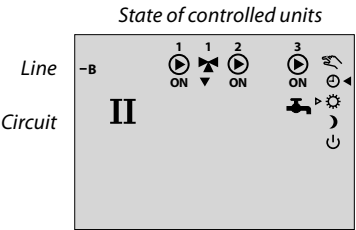
Choose the display - A, B, or C - for daily operations.



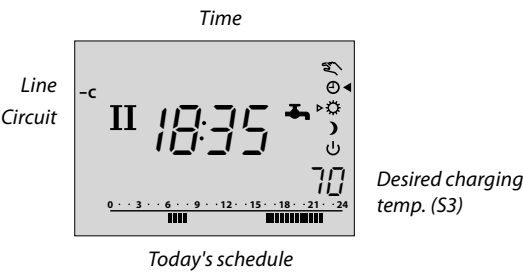
## DHW temperature - display A



## System information - display B



## 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.



# 1c Schedule, DHW circulation pump (P3)



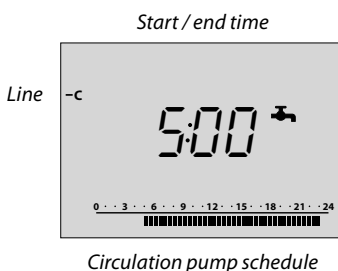
Choose the schedule of the circulation pump by pushing the button until there is no circuit indication (display / lights).



Go to display C.



## Schedule of the circulation pump (P3) - display C



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



The pump P3 is selected as circulation pump by the setting ON in line 90 (circuit II).



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, hot-water, 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.

