P16

ECL Comfort
User's Guide

VI.7B.E6.02
2005.10

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VI7BE602

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Installer's Guide

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P16
DHW controller

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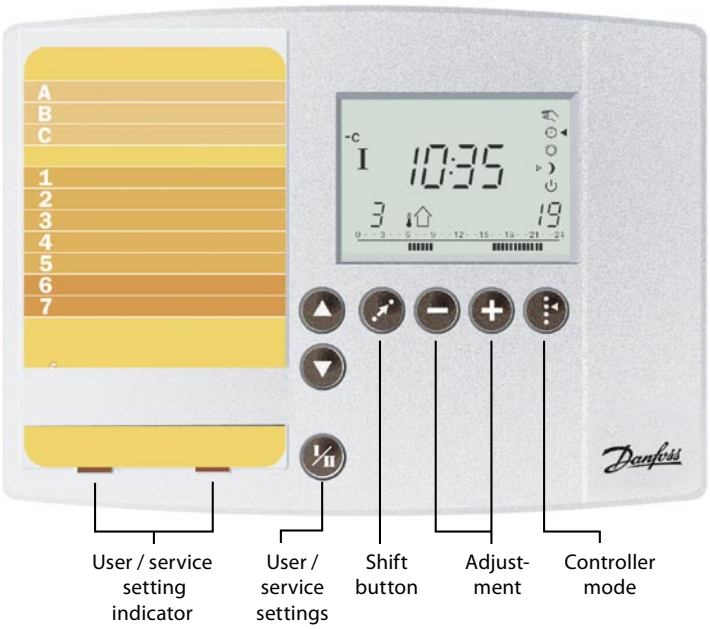


Controller mode

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.

Switch between user settings (yellow card side) and service settings (grey card side).

Safety Note

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

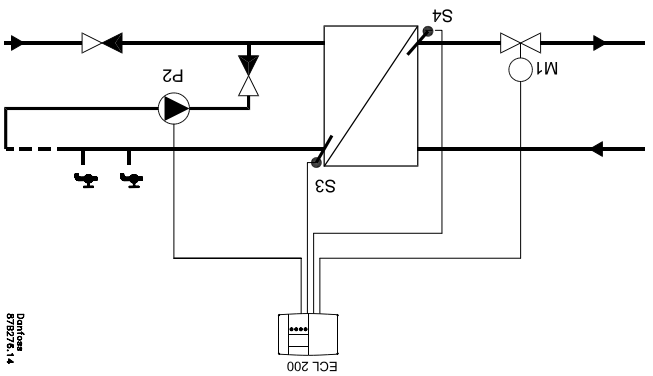
Necessary assembly, start-up, and maintenance work must be performed by qualified and authorized personnel only.

This guide is associated with ECL Card 087B4663

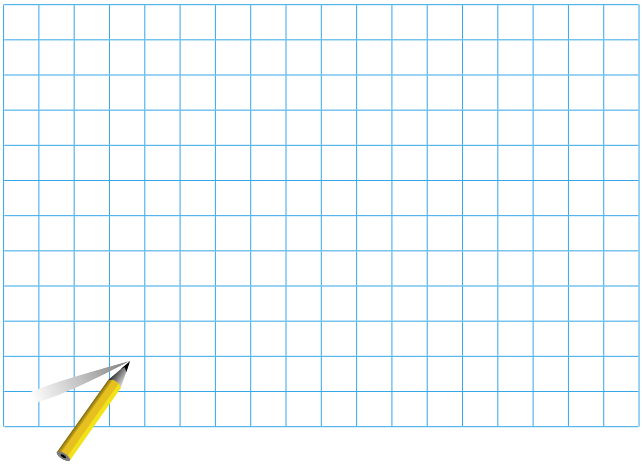
Installer:

By:

Date:



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



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

List of components:

ECL Comfort 200

S3 DHW temperature sensor

S4 Return temperature sensor

P2 Circulation pump, DHW

M1 Motorized control valve

Table of Contents

Sections in the Installer's Guide
The documentation for the ECL Comfort controller is composed of numbered sections. Only sections relevant to your ECL Comfort controller are included here.

Before you start

Sketch your application

The ECL Comfort controller series is designed for a wide range of heating and hot-water 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 **P16** is very flexible. These are the basic principles:

If the measured DHW temperature (S3) is lower than the desired DHW temperature, the motorized control valve (M1) is opened gradually 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).

The circulation pump, P1, is ON when the desired DHW temperature is higher than 20 °C.

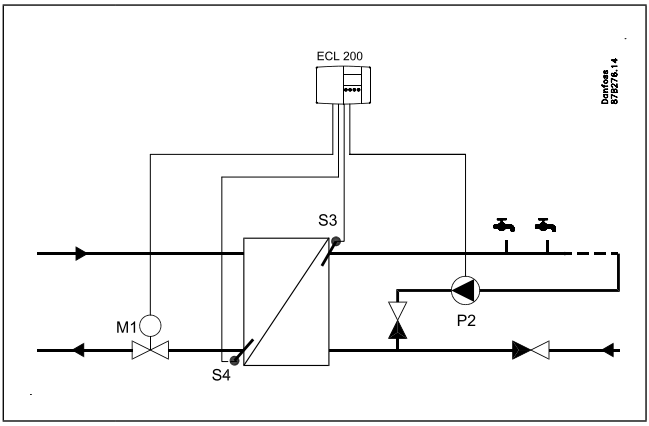
VI.7B.E6.02
Card P16
2005.10

10a Identifying the system type

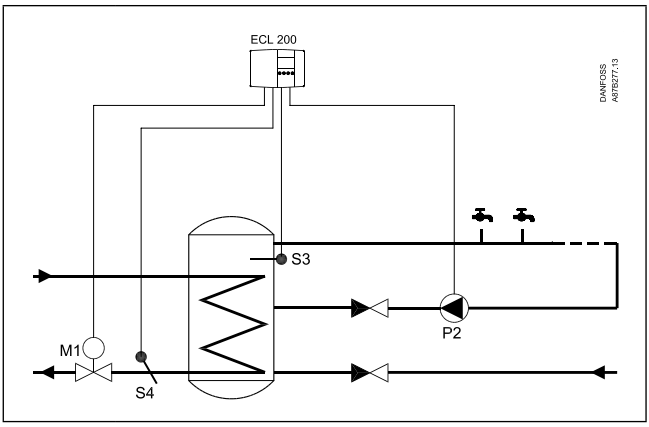
The ECL Comfort controller is a universal controller that can be used for various systems. Based on the shown standard systems, it is possible to configure additional systems.

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.

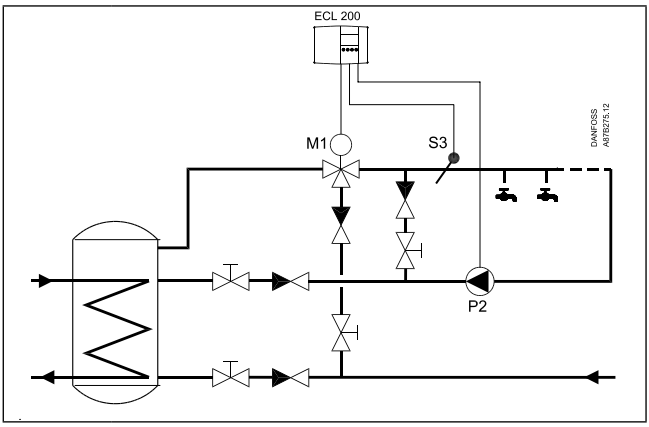
10.1 Constant temperature control of the DHW circuit with flow system



10.2 Constant temperature control of the DHW circuit with storage tank with built-in heating coil



10.3 Constant temperature control of the DHW circuit in the secondary side with storage tank with built-in heating coil



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

11a Mounting the ECL Comfort controller

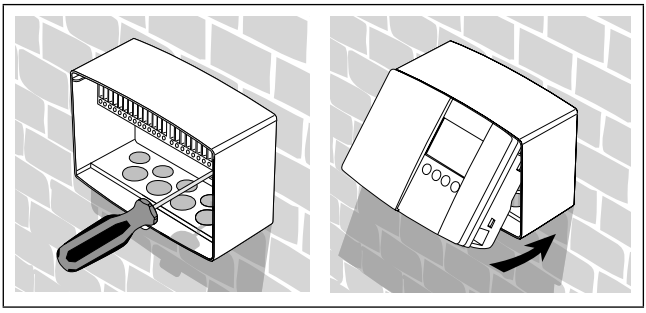
For easy access, you should mount the ECL Comfort controller near the system. Select one of the three following methods:

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

Screws and rawlplugs are not supplied.

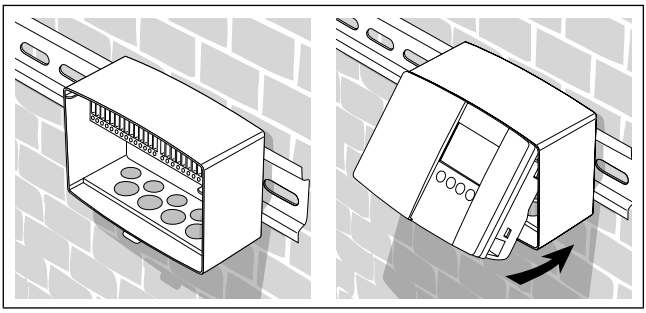
Mounting on a wall

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.



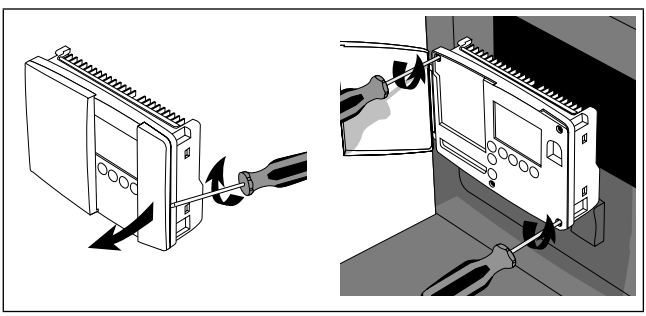
Mounting on a DIN rail

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

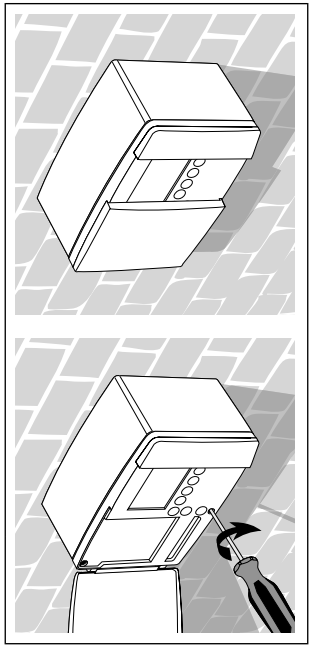


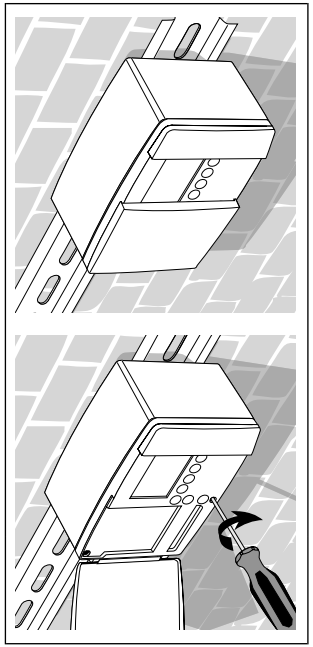
Mounting in a panel

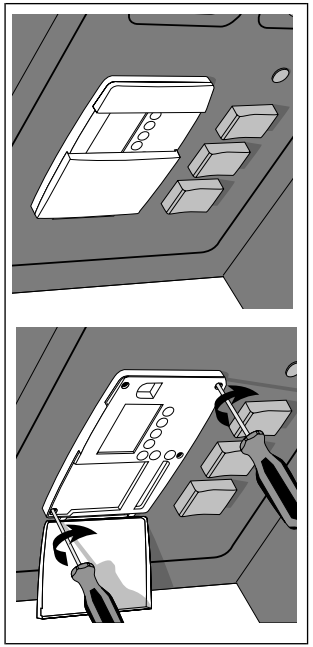
Connector set: Order code No. 087B1148.
The panel plate thickness must not exceed 3 mm.
Prepare a cut-out with the dimensions 93 x 139 mm. Pull off the right side of the lid by means of a screwdriver.
Insert the controller into the panel cut-out and fix it with the two locks which are placed diagonally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



11b

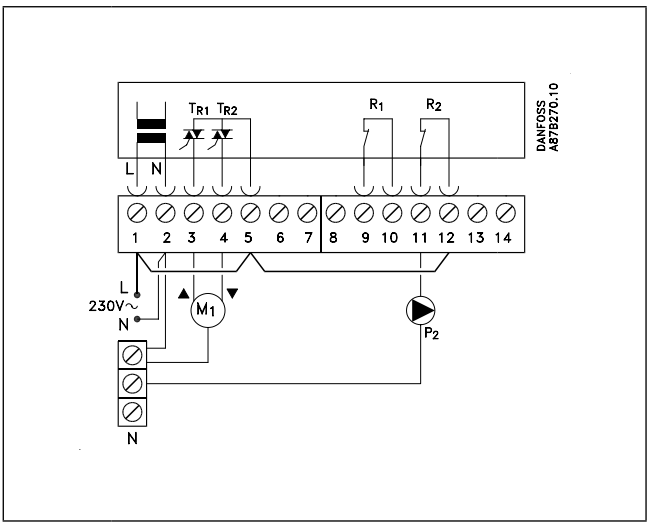






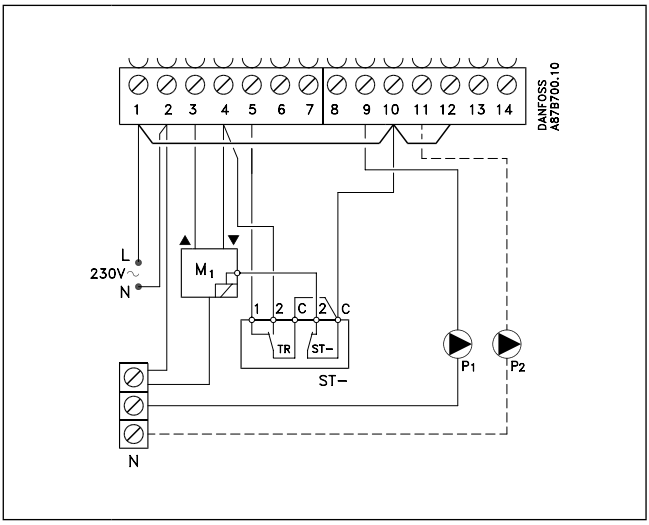
12a Electrical connections - 230 V a.c. - in general

230 V a.c. connections - without safety thermostat



Establish these jumpers:
1-5-12
and 2 to common N-terminal.

230 V a.c. connections - with safety thermostat



This circuit diagram is only valid if Danfoss actuators are used

Establish these jumpers:
1-10-12

Safety thermostat:
4, 5 and 10 with ST- (safety thermostat)
and 2 to common N-terminal.

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	0.2 A / 230 V a.c.
5	Phase for motor output	
11 P2	Circulation pump	4 (2) A / 230 V a.c.
12	Phase for pump relay R2	

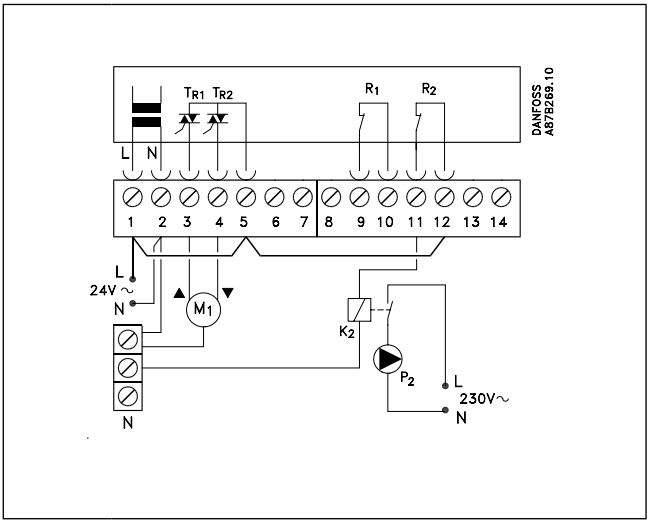
Wire cross section: 0.75 - 1.5 mm^2

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

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

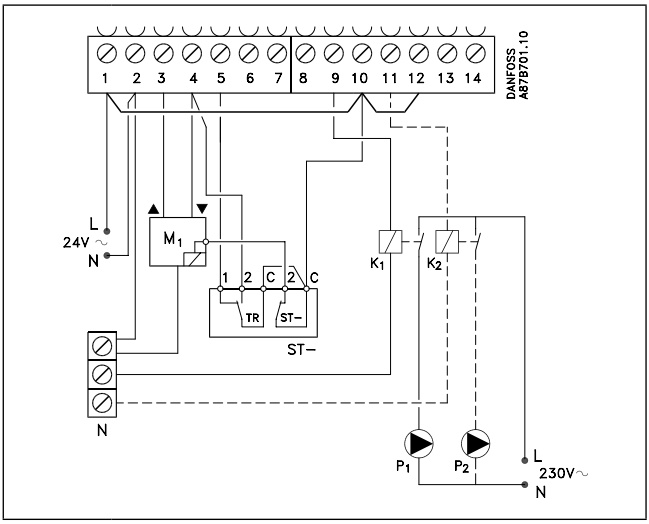
13a Electrical connections - 24 V a.c. - in general

24 V a.c. connections - without safety thermostat



Establish these jumpers:
1-5-12
and 2 to common N-terminal.

24 V a.c. connections - with safety thermostat



This circuit diagram is only valid if Danfoss actuators are used

Establish these jumpers:
5-10-12

Safety thermostat:
4, 5 and 10 with ST- (safety thermostat)
and 2 to common N-terminal.

Terminal		Description	Max. load
1	(L)	Supply voltage 24 V a.c.	
2	(N)	Supply voltage 24 V a.c.	
3	M1	Actuator - open	1.0 A / 24 V a.c.
4	M1	Actuator - close alt. thermo actuator	1.0 A / 24 V a.c.
5		24 V a.c. supply voltage for motor output	
11	K2*	Relay for circulation pump	4 (2) A / 24 V a.c.
12		24 V a.c. supply voltage for relay K2	

* *K2 auxilliary relay coil 24 V a.c.*

Wire cross section: 0.75 - 1.5 mm^2

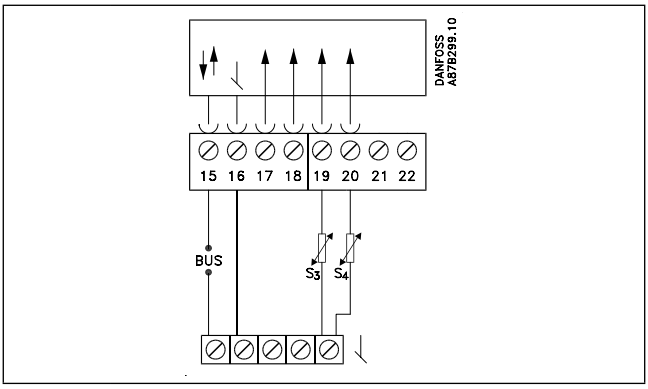
Electrical connections

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

Incorrect connection can damage the TRIAC outputs. Max. load (terminals 3 and 4) 1.0 A / 24 V a.c.!

14a Connecting and placing the temperature sensors

Connecting the temperature sensors and the bus



Terminal	Description	**Type** (recomm.)
15 and 16	System device bus	
19 and 16	S3 DHW temperature sensor	ESMB / ESMU
20 and 16	S4 Return temperature sensor	ESM-11 / ESMC / ESMU

Establish the jumper from 16 to common terminal.

Wire cross section for sensor connections: Min. 0.4 mm^2

Total cable length: Max. 125 m (all sensors incl. system device bus)

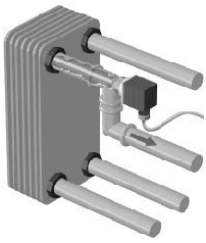
Cable lengths of more than 125 m may cause noise sensibility (EMC).

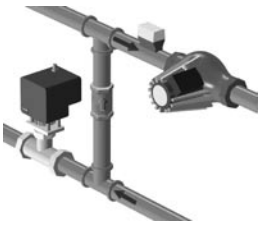
It is important that the sensors are mounted in the correct position in your system.

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

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

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

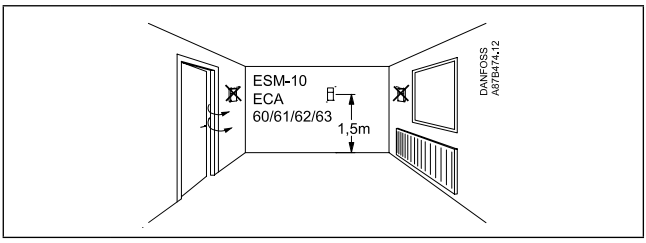




Make sure that the surface of the pipe is clean and even where the sensor is mounted.

Return temperature sensor (ESMU, ESM-11 or ESMC)
The return sensor should always be placed in / on a pipe with return water flow.

Room temperature sensor (ESM-10, ECA 60 / 62 room panel or ECA 61 / 63 remote control)
Place the room sensor in the room where the temperature is to be controlled. Do not place it on outside walls or close to radiators, windows or doors.



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

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

Flow / air duct temperature sensor (ESM-11, ESMB-12, ESMC or ESMU types)
Place the sensor so that it measures a representative temperature.

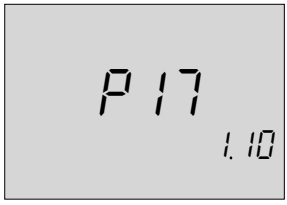
Surface temperature sensor (ESMB-12)
Place the sensor in the surface of the floor.

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

15 Adapting the ECL Comfort controller

Open the lid and switch on the controller. The display will show you the system type (P16, P17, P20 or P30).

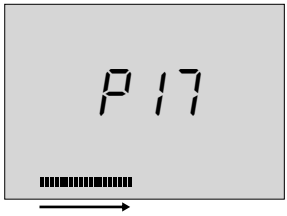
Display examples:



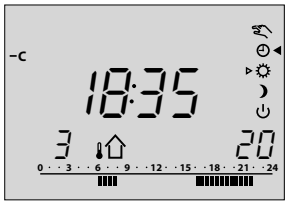
Choose the system type printed on your ECL Card.

Accept to set up the chosen system type.

While the setup is in operation, the data transfer display will appear.



After initializing, the display will return to the standard display C on the yellow side of the ECL Card.



The controller is now ready to control the chosen system. You can make your own adjustments / settings in daily use and in the basic set-up and change the extended service settings.

Insert the ECL Card with the grey side facing you.

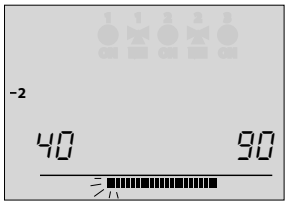
Select the grey side of the ECL Card for the basic set-up and extended service parameters.

See section 16 for general principles of operation and section 17 for setting the time and date.

Adjusting the ECL Card settings

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

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

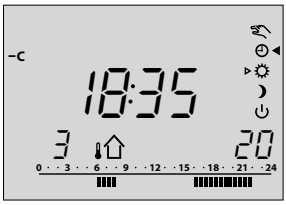


Value in range indicator

Use the plus / minus buttons to adjust the settings.

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

Changing from one side of the ECL Card to the other
When changing from the grey side of the ECL Card to the yellow side, you will always enter line **C** and the standard display.



If you change from the yellow side to the grey side, you will always enter line **A - Time and date.**

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

17 Setting the time and date - line A

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

Set the correct time and date.

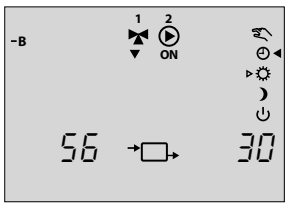
In case of a power break, which lasts longer than 12 hours, the time and the date have to be set again. All other settings are stored as programmed.

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

See User's Guide, section 4.

Monitoring temperatures and system units - line B

Controlled units



Flow temp.

Return temp.

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

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

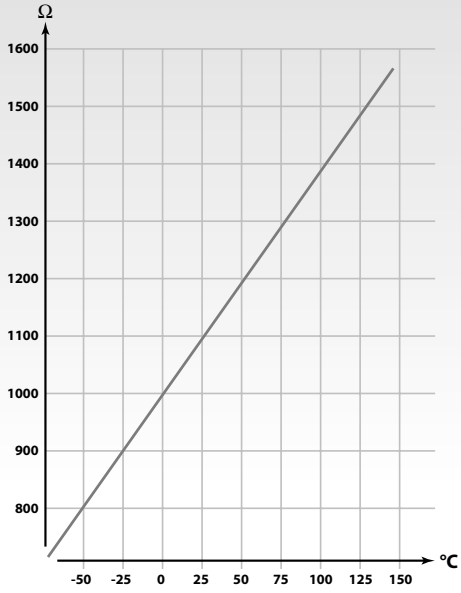
If a sensor is not mounted or is disconnected, the display will indicate it as "- -".

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

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

Relationship between temperature and ohmic value

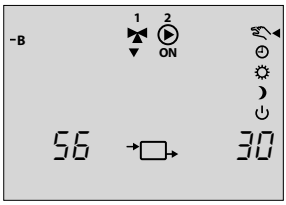
°C	Ω
-50	805
-40	845
-30	883
-20	922
-10	961
0	1000
10	1039
20	1078
30	1117
40	1155
50	1194
60	1232
70	1271
80	1309
90	1347
100	1385
110	1423
120	1462
130	1501
140	1539
150	1578



Manual control - line B

Shift to manual mode.

Controlled units



Controller mode

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

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

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.

26a Control parameters - lines 4-7

4 Proportional band, Xp	
Setting range	*Factory setting*
1 ... 250 K	**80 K**

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

5 Integration time constant, Tn	
Setting range	*Factory setting*
5 ... 999 sec.	**20 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	
Setting range	*Factory setting*
5 ... 250 sec.	**15 sec.**

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

How to calculate the running time of a motorized control valve

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

Seated valves
Running time = Valve stroke (mm) x actuator speed (sec. / mm)
Example: *5.0 mm x 15 sec. / mm = 75 sec.*

Rotating valves
Running time = Turning degrees x actuator speed (sec. / degr.)
Example: *90 degrees x 2 = 180 sec.*

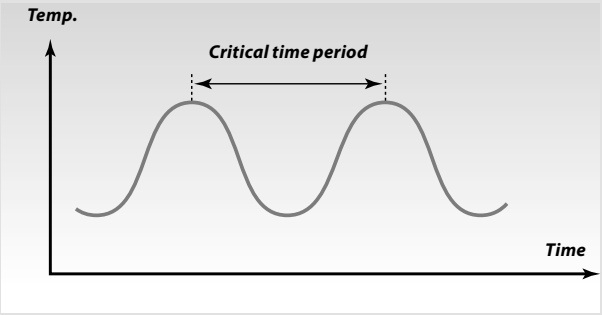
7 Neutral zone, Nz	
Setting range	*Factory setting*
0 ... 9 K	**3 K**

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

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

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

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



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

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

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

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

Control parameters - lines 4-7 (DHW)

Auto tuning
The auto tuning function automatically determines the control parameters for DHW control. Thus you do not need to set the parameter lines 4, 5, 6, and 7 in circuit II, as they are automatically set to the auto tuning function.

Auto tuning is typically used in connection with the installation of the controller, but it can be activated when needed, e.g. for an extra check of the control parameters.

Before starting the auto tuning, the tapping flow should be adjusted to the relevant value (see table below).

Recommended tapping load

No. of apartments	Heat transfer (kW)	Constant tapping load (l / min)
1-2	30-49	3 (or 1 tap 25% open)
3-9	50-79	6 (or 1 tap 50% open)
10-49	80-14	12 (or 1 tap 100% open)
50-129	50-249	18 (or 1 tap 100% + 1 tap 50% open)
130-210	250-350	24 (or 2 taps 100% open)

If possible, any additional DHW consumption should be avoided during the auto tuning process. Should the tapping load vary too much, the auto tuning and controller will return to the default settings.

Auto tuning is set to ON / OFF by using the service parameter line 173, push ⊕ (ON) and ⊖ (OFF). When the auto tuning is ended, the service parameter is automatically set to OFF (default setting). This will be indicated in the display.

The auto tuning process takes up to 25 minutes.

Important!
In order to meet the summer- / winter variations, the ECL clock must be set to the correct date for an successful auto tuning. The motor protection function (line 174) has to be deactivated during auto tuning.

During auto tuning the circulation pump for tap water must be switched off. This is done automatically if the pump is controlled by the ECL controller.

Auto tuning is only applicable in connection with valves that are approved for auto tuning, i.e. the Danfoss types VB 2 and VM 2 with split characteristic as well as logarithmic valves such as VF.

29a Check list

Is the ECL Comfort controller ready for use?

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

Adapting the ECL Comfort controller to the system

- ☐ Turn the ECL Card so that the grey side faces you and push ⓫, 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.

A Time and date — Section 17

B System information — Sections 18 & 19

C

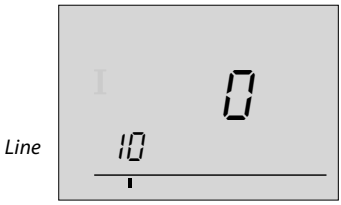
Setting ranges	*Factory settings*	*Your settings*
1		
2		
3		
4		
Proportional band, Xp		
1 ... 250 K	80 K	
See section 26		
5		
Integration time constant, Tn		
5 ... 999 sec.	20 sec.	
See section 26		
6		
Running time of the motorized control valve		
5 ... 250 sec.	15 sec.	
See section 26		
7		
Neutral zone, Nz		
0 ... 9 K	3 K	
See section 26		

Circuit I			
Lines	*Setting ranges*	*Factory settings*	*Your settings*
30	Return temperature limitation **10 ... 110 °C**	**50 °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**	
141	Override input selection **OFF / 1 ... 4**	**OFF**	
173	Auto tuning **ON / OFF**	**OFF**	
174	Motor protection **OFF / 10 ... 59 min.**	**OFF**	**min.**
196	Service pin LON **ON / OFF**	**OFF**	
197	LON reset **ON / OFF**	**ON**	
198	Daylight saving time changeover **ON / OFF**	**ON**	
199	Master / slave address **0 ... 9**	**0**	

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.



Range indicator

Now you can move to any line of your choice.

Set the parameter value.

Check that you have entered all the required settings.

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.

30 Return temperature limitation	
Setting range	*Factory setting*
10 ... 110 °C	**50 °C**
Set the return temperature you accept for the system.	

Set the acceptable return temperature limit.

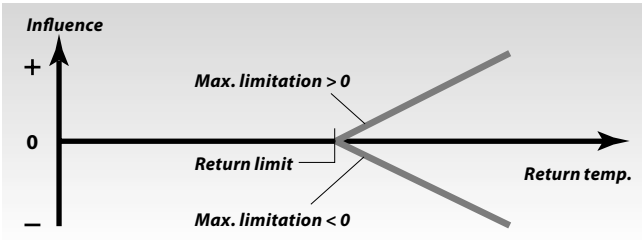
When the return temperature falls below or gets higher than the set value, the controller automatically changes the desired flow temperature to obtain an acceptable return temperature. The influence is set in lines 35 and 36.

35 Return temperature influence - max. limitation	
Setting range	*Factory setting*
-9.9 ... 0 ... 9.9	**-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).

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

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



Example
The return limit is active from 50 °C.
The influence is set to -2.0.
The actual return temperature is 2 degrees too high.
Result:
The desired flow temperature is changed by -2.0 x 2 = -4 degrees.

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

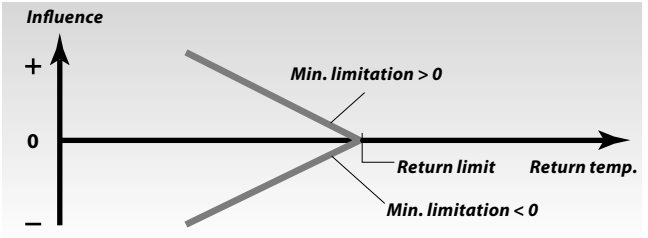
32b Service parameter(s) 36-37

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

Set the influence of the min. return temperature limitation (set in line 30).

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

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



Example
The return limit is active up to 50 °C.
The influence is set to -3.0.
The actual return temperature is 2 degrees too low.
Result:
The desired flow temperature is changed by -3.0 x 2 = -6 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	
Setting range	*Factory setting*
OFF / 1 ... 50	**25**
Controls how fast the actual return temperature adapts to the desired return temperature limitation.	

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

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

1: The desired flow temperature will be adjusted quickly.

50: The desired flow temperature will be adjusted slowly.

141 Override input selection	
Setting range	*Factory setting*
OFF / 1 ... 4	**OFF**
Choose an unused temperature sensor input for overriding the schedule.	

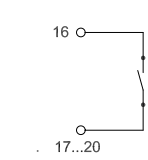
The override can be activated for comfort or setback mode. For override the controller's mode must be in 'scheduled operation'!

OFF: The controller's schedule is not overridden.

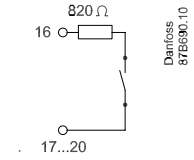
1 ... 4: Select an unused sensor input S1... S4 for the override.

Connection example

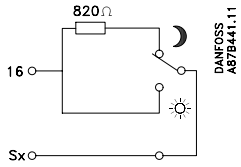
If the override switch has gold-plated contacts, you can choose one of the following solutions:



Closed switch:
Comfort temperature



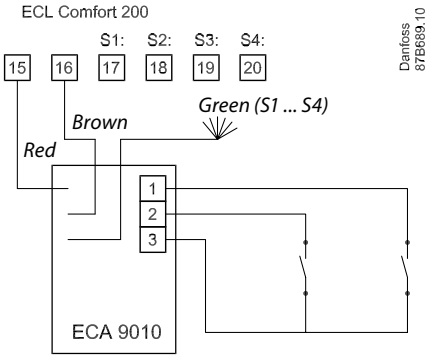
Closed switch:
Setback temperature



Changeover switch:
Setback or comfort temperature

Connection example with ECA 9010

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



The ECA 9010 module is powered by the system device bus, which means that the bus must be active. The bus is activated by an ECL Comfort controller being master (line 199).

32d Service parameter(s) 173-174

173 Auto tuning	
Setting range	*Factory setting*
ON / OFF	**OFF**
Automatically determines the control parameters for the DHW control. Lines 4, 5, 6 and 7 do not need to be set, when using auto tuning. See section 27 for further information.	

ON: Auto tuning is activated.

OFF: Auto tuning is deactivated.

174 Motor protection	
Setting range	*Factory setting*
OFF / 10 ... 59 min.	**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	
Setting range	*Factory setting*
ON / OFF	**OFF**
This setting is only used in connection with LON communication (see the documentation for the used communication unit).	

197 LON reset	
Setting range	*Factory setting*
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	
Setting range	*Factory setting*
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	
Setting range	*Factory setting*
0 ... 9	**0**
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 system time.

1 ... 9: The slave receives information about the system time.

The slave sends information about the desired flow temperature to the master

The ECL Comfort controllers can be connected via the bus to perform a larger system.

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

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

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.

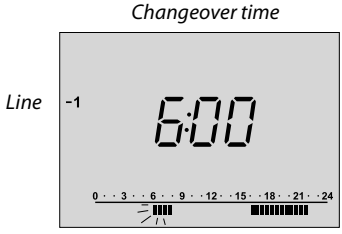
How to restore your personal settings?
Insert the ECL Card with the yellow side facing you. Go to line 9 (is not displayed), which is the second line below line 7. Select copy direction 'card to controller' (left to right) by using the shift button. Push the + button to copy.
See section 5.

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.

4a Set your personal schedule

Monitor the current schedules

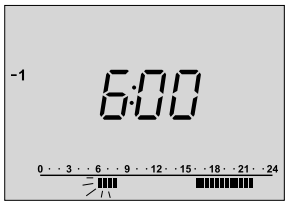
Select between lines 1-7 (Monday, Tuesday ..... Sunday) to see your individual schedules.



Periods with comfort temp. are shown as black bars

Change the schedules

Select appropriate day.



The changeover point blinks

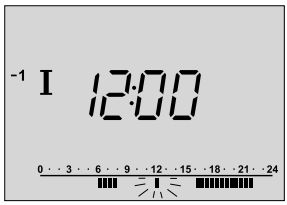
Adjust the first blinking changeover point, if required. The end of the bar moves, extending or reducing the comfort period.

Shift to next changeover point and adjust accordingly.

The yellow side of the ECL Card

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)

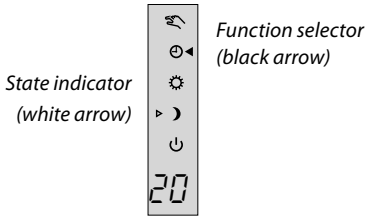
Push shift and - buttons simultaneously for 2 seconds.

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.



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 DHW temperature 3

Go to display C.

Setting the desired DHW temperature

Desired DHW temp. in comfort mode

Desired DHW temp. in setback mode

Select the constant comfort mode.

Set the desired DHW temperature for the comfort mode.

Select the constant setback mode.

Set the desired DHW temperature for the setback mode.

Select the desired mode (section 2).

If an anti-bacteria function is needed, the schedule can be used alternatively:

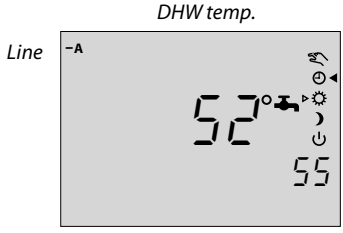
When the controller is in setback mode, increase the temperature (for example to 80 °C for a short period once a week) or other periods.

If the setback mode is used for the anti-bacteria function, it cannot be used for reduction of the DHW temperature.

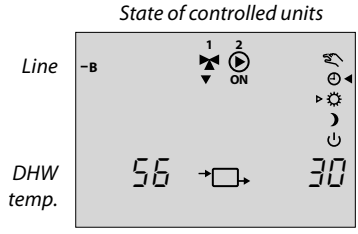
1 Choose your favorite display

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

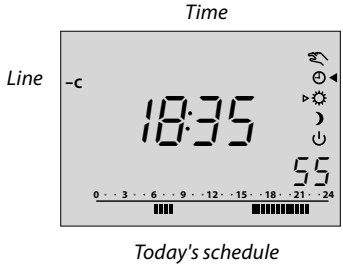
DHW temperature - display A



System information - display B



Today's schedule - display C



The controller automatically reverts to display C if the 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.

Save energy - save money - improve your comfort temperature

The ECL Comfort controller is designed by Danfoss for the automatic temperature control of heating and hot-water 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.
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.
Each line is shown in the display of the controller, which gives you an instant overview of the operation, settings etc.

How to use the ECL Comfort User's Guide

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

Table of Contents

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

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

Your personal schedule:

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

Factory settings are grey.