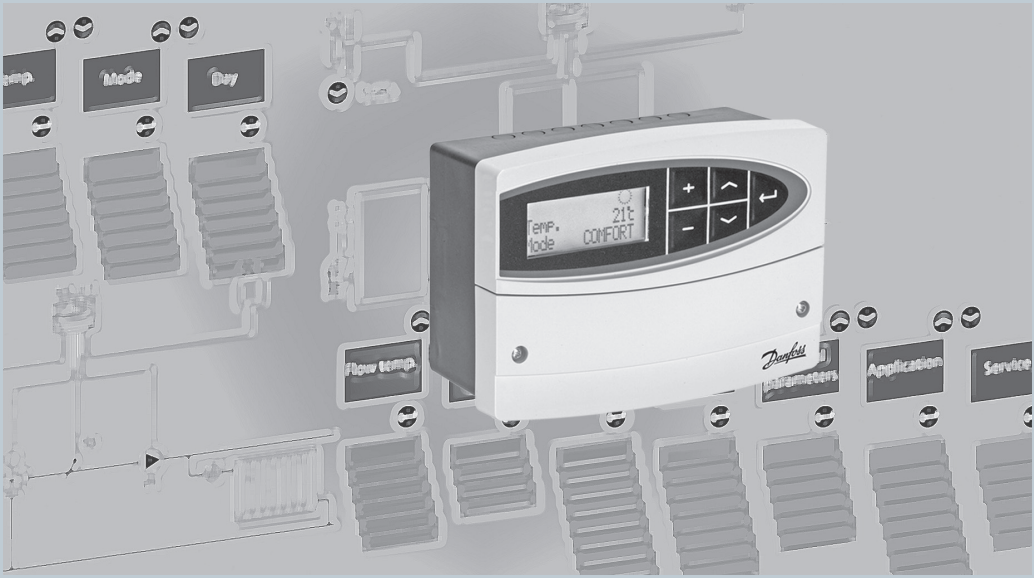
ENGINEERING TOMORROW

Operating Guide

ECL Comfort 110, application 131

(valid as of software version 2.00)

English version



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How to navigate?



Adjust temperatures and values.

Switch between menu lines.

Select / return.

2 sec.
Return to daily user menu.

What do the symbols mean?



The desired flow temperature is influenced by for example return temperature.

The actuator closes the control valve.

The actuator opens the control valve.

The actuator does not activate the valve.

The circulation pump is ON.

The circulation pump is OFF.

The controller is in saving mode.

The controller is in comfort mode.

Safety Note
To avoid injury of persons and damages to the device, it is absolutely necessary to read and observe these instructions carefully. The warning sign is used to emphasize special conditions that should be taken into consideration.

This symbol indicates that this particular piece of information should be read with special attention.

Operating guide for ECL 110 with appl. 131 (Cooling)
Application 131 controls the flow temperature in a cooling circuit.

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How to use this guide

The instructions is divided into six parts:
- Introduction
- Settings overview
- Daily use
- Maintenance
- Installation
- Check

Operation of the ECL Comfort is divided into two menu areas:
- Daily use (end user). Setting the desired flow temperature, mode and schedule
- Maintenance (installer's level). Setting of, for example, control functions.

Access to Maintenance (installer's level) on the ECL Comfort 110:
Press and hold "Arrow-down" button for 3 sec.

Basic principles of application 131 for ECL Comfort 110

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 set in the ECL Comfort controller.

By means of the week schedule, the cooling circuit can be in 'Comfort' or 'Saving' mode (two values for the desired flow temperature).

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

The return temperature S4 to the cooling supply (district cooling or cooling machine) should not be too low. If so, the desired flow temperature can be adjusted (typically to a higher value), thus resulting in a gradual closing of the motorized control valve.

The circulation pump P1 is ON when the desired flow temperature is lower than 40 °C (a selectable value).

The Standby mode maintains a selectable flow temperature, for example 30 °C, provided the circulation pump is in operation.

If the measured room temperature does not equal the desired room temperature, the desired flow temperature can be adjusted.
The week schedule also controls two values ('Comfort T' and 'Saving T') for the desired room temperature. If the measured room temperature does not equal the desired room temperature, the desired flow temperature can be adjusted.

The compensation temperature S1 can be arranged to influence the desired flow temperature. The higher the compensation temperature, the lower the desired flow temperature.
An override input allows shift to constant Comfort or Saving mode.



°C (degrees Celsius) is an absolute temperature whereas K (Kelvin) is a relative temperature.

Settings overview



Setting:	Line:	Page:	Factory setting:	Your setting:
Date – time	1000	11		
Flow temp. – Comfort T	2018	11	8.0 °C	
Flow temp. – Saving T	2019	11	45.0 °C	
Flow temp. – Temp. min.	2177	11	0 °C	
Flow temp. – Temp. max.	2178	11	50 °C	
Room T limit – Comfort T	3180	13	20 °C	
Room T limit – Saving T	3181	13	40 °C	
Room T limit – Gain – max.	3182	13	0.0	
Room T limit – Gain – min.	3183	13	0.0	
Room T limit – Intgr. time	3015	13	OFF	
Compensation 1 – Temp.	4060	16	5 °C	
Compensation 1 – Gain - max.	4062	16	0.0	
Compensation 1 – Gain - min.	4063	16	0.0	
Compensation 1 – Intgr. time	4061	16	OFF	
Compensation 2 – Temp.	5064	17	25 °C	
Compensation 2 – Gain - max.	5066	17	0.0	
Compensation 2 – Gain - min.	5067	17	0.0	
Compensation 2 – Intgr. time	5065	18	OFF	
Return T limit – Limit	6030	20	14 °C	
Return T limit – Gain - max.	6035	20	0.0	
Return T limit – Gain - min.	6036	20	0.0	
Return T limit – Intgr. time	6037	20	OFF	
Control param. – Xp	7184	22	80 K	
Control param. – Tn	7185	22	30 s	
Control param. – M1 run	7186	22	96 s	
Control param. – Nz	7187	23	2 K	
Control param. – Min. on time	7189	23	10	

Settings overview

Setting:	Line:	Page:	Factory setting:	Your setting:
Application – Total stop	8021	25	ON	
Application – P1 exercise	8022	26	ON	
Application – M1 exercise	8023	26	OFF	
Application – P1 start T	8078	27	40 °C	
Application – P1 post-run	8040	27	3 m	
Application – Standby T	8093	27	40 °C	
Application – Ext.	8141	27	COMFORT	
Application – S1 T filter	8081	27	100	
Application – Daylight	8198	28	ON	
Application – ECL address	8199	28	15	
Application – Type	8600	29	131	
Service – Code no.	9300	30	087B1670	
Service – Ver.	9301	30	D200010516	
Service – Backlight	9310	30	16	
Service – Contrast	9311	30	10	
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Service – MOD address	9320	31	5	

Temperatures

Push any button to switch on the backlight.



Setting the desired flow temperature

Change the desired temperature.

Temperature overview

2 sec.
Push the button to see the sensor (S1-S4) temperatures.

Change between the temperature displays:

S1:
Actual S1 temperature



S2:
Actual room temperature
Desired room temperature



S3:
Actual flow temperature
Desired flow temperature



S4:
Actual return temperature
Desired return temperature limitation



Push to exit 'Temperature overview'.

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

Select control mode

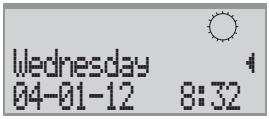
During scheduled operation (AUTO), the symbols will show you the control mode.



Change the mode (AUTO, COMFORT, SAVING, or STANDBY).

Set your personal schedule

It is only possible to set the personal schedules if the ECL Comfort 110 controller has a built-in ECA 110 timer program.



This display will show the current day and time.

Choose the day for which you wish to change the settings.

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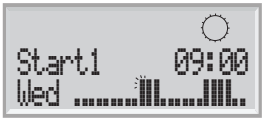
Today's schedule





The first display will show you the start of the first comfort period ('Start1'). See or change the start of this period.

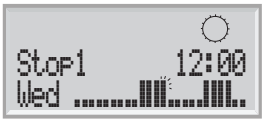
The first bar will blink.





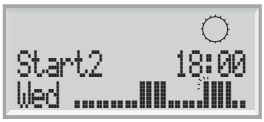
See or change the end ('Stop1') of the first comfort period.

The next bar will blink.



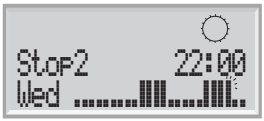


See or change the start ('Start2') of the next comfort period.





See or change the next start / stop periods, if necessary.





The schedule has always two comfort periods a day. The start and stop times can be set in half-hourly intervals (30 min.).

To arrange only one comfort period on a day: Set Start2 and Stop2 times to the same time value.

2 sec.
Enter the maintenance menus.

Date - time 1000

It is only necessary to set the correct date and time in connection with the first use of the ECL Comfort 110 controller or after a power break of more than 36 hours (see the chapter on Adapting the ECL Comfort 110 controller).

Flow temp. (flow temperature control) 2000

Comfort T (desired flow temperature in Comfort mode)	**2018**
Setting range	*-20.0 . . . 50.0 °C*
Setting the desired flow temperature for Comfort mode. *The same value is set in the End user menu as desired flow temperature when in Comfort mode.*	

Saving T (desired flow temperature in Saving mode)	**2019**
Setting range	*-20.0 . . . 50.0 °C*
Setting the desired flow temperature for Saving mode. *The same value is set in the End user menu as desired flow temperature when in Saving mode.*	

Temp. min. (minimum limitation of desired flow temp.)	**2177**
Setting range	*-20 ... 50 °C*
Set the minimum flow temperature for your system. The desired flow temperature will not be lower than this setting. Adjust the factory setting, if required.	

Temp. max. (maximum limitation of desired flow temp.)	**2178**
Setting range	*-20 ... 50 °C*
Set the maximum flow temperature for your system. The desired flow temperature will not be higher than this setting. Adjust the factory setting, if required.	

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

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Room T limit (room temperature limitation) 3000

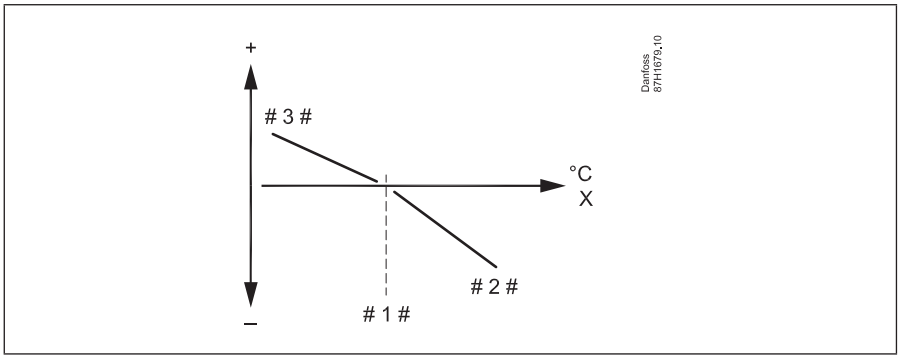
This section is a general description for Room temperature limitation and is only relevant if you have installed a room temperature sensor (S2).

The ECL Comfort 110 adjusts the desired flow temperature to compensate for the difference between the desired and the actual room temperature.

If the room temperature is higher than the desired value, the desired flow temperature can be reduced.
The 'Gain-max.' (Influence, max. room temp.) determines how much the desired flow temperature should be reduced.
Use this influence type to avoid a too high room temperature.

If the room temperature is lower than the desired value, the desired flow temperature can be increased.
The 'Gain-min.´ (Influence, min. room temperature) determines how much the desired flow temperature should be increased.
Use this influence type to avoid a too low room temperature.

A typical setting will be -4.0 for 'Gain-max.' and 4.0 for 'Gain-min.´



X = Room temperature

1 # = Desired room temperature

2 # = Negative influence (3182) when actual room temp. gets higher than desired room temp.

3 # = Positive influence (3183) when actual room temp. gets lower than desired room temp.

Comfort T (desired room temperature in Comfort mode)	3180
Setting range	*5 . . . 40 °C*
Setting the desired room temperature for Comfort mode.	

Saving T (desired room temperature in Saving mode)	3181
Setting range	*5 . . . 40 °C*
Setting the desired room temperature for Saving mode.	

Gain - max. (room temp. limitation, maximum)	3182
Setting range	*-9.0 . . . 0.0*
Determines how much the desired flow temperature will be influenced (decreased) if the actual room temperature gets higher than the desired room temperature (P control).	

0.0: No influence
-2.0: Minor influence
-5.0: Medium influence
-9.9: Maximum influence

Gain - min. (room temp. limitation, minimum)	3183
Setting range	*0.0 . . . 9.9*
Determines how much the desired flow temperature will be influenced (increased) if the actual room temperature gets lower than the desired room temperature (P control).	

9.9: Maximum influence
5.0: Medium influence
2.0: Minor influence
0.0: No influence

Intgr. time (Integration time)	3015
Setting range	*OFF / 1 . . . 50 s*
Controls how fast the actual room temperature adapts to the desired room temperature (I control). The "Intgr. time" function can correct the desired flow temperature with max. 8 degrees.	

OFF: The control function is not influenced by the 'Intgr. time'.
Minor value: The desired room temperature is adapted quickly.
Major value: The desired room temperature is adapted slowly.

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Example 1
The actual room temperature is 2 degrees too low.
The 'Gain - max.' is set to -3.5.
The 'Gain - min.' is set to 2.0.
Result:
The desired flow temperature is changed by 2 x 2.0 = 4.0 degrees.

Example 2
The actual room temperature is 2 degrees too high.
The 'Gain - max.' is set to -3.5.
The 'Gain - min.' is set to 2.0.
Result:
The desired flow temperature is changed by 2 x (-3.5) = -7.0 degrees.

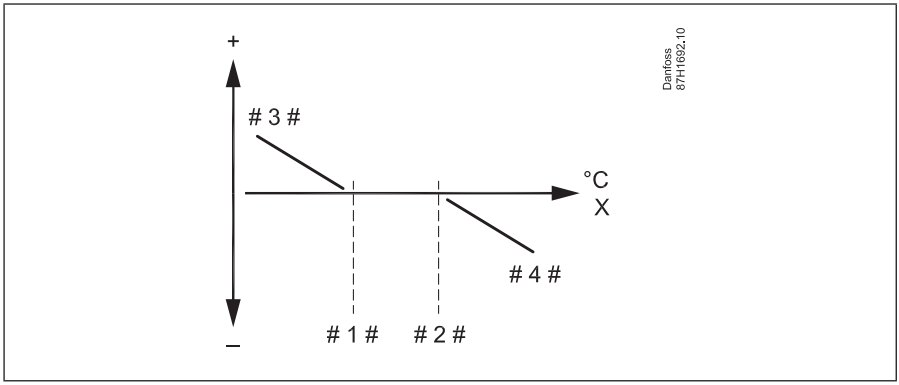
Compensation 1 and 2 4000

This section is a general description for Compensation.

Compensation is only relevant if you have installed a compensation temperature sensor (S1).

The desired flow temperature can be increased or decreased by the compensation temperature, measured by S1. The compensation temperature is often the outdoor temperature, but could for example be a room temperature.

This application contains 2 compensation temperature points: Compensation 1 (Comp. 1) and Compensation 2 (Comp. 2).
An example: Compensation 1 can be set to 18 °C and Compensation 2 can be set to 24 °C.
When the compensation temperature gets lower than 18 °C, the desired flow temperature can be increased (less demand for cooling).
When the compensation temperature gets higher than 24 °C, the desired flow temperature can be decreased (more demand for cooling).



X	=	Compensation temperature
# 1 #	=	Compensation temperature value 1
# 2 #	=	Compensation temperature value 2
# 3 #	=	Positive influence (4063) when actual compensation temp. gets lower than "Compensation temperature value 1"
# 4 #	=	Negative influence (5066) when actual compensation temp. gets higher than "Compensation temperature value 2"

The example shows that the desired flow temperature can be influenced when the compensation temperature gets below "Compensation temperature value 1".
Also, the desired flow temperature can be influenced when the compensation temperature gets above "Compensation temperature value 2".

Temp. (Compensation temperature)	**4060**
Setting range	*-20 . . . 50 °C*
Setting the compensation temperature value 1. *When the temperature, measured by S1, falls below or gets higher than the set compensation value, the ECL Comfort 110 changes the desired flow temperature. The influence is set in 'Gain - max.' and 'Gain - min.'.*	

Gain - max. (Compensation temp., limitation, maximum)	**4062**
Setting range	*-9.9 . . . 9.9*
Determines how much the desired flow temperature will be influenced (increased or decreased) if the compensation temperature gets higher than the set compensation temperature value (P control).	

9.9: Maximum increase of desired flow temperature
5.0: Medium influence
2.0: Minor influence
0.0: No influence
-2.0: Minor influence
-5.0: Medium influence
-9.9: Maximum decrease of desired flow temperature

Gain - min. (Compensation temp., limitation, minimum)	**4063**
Setting range	*-9.9 . . . 9.9*
Determines how much the desired flow temperature will be influenced (increased or decreased) if the compensation temperature gets lower than the set compensation temperature value (P control).	

9.9: Maximum increase of desired flow temperature
5.0: Medium influence
2.0: Minor influence
0.0: No influence
-2.0: Minor influence
-5.0: Medium influence
-9.9: Maximum decrease of desired flow temperature

Intgr. time (Integration time)	**4061**
Setting range	*OFF / 1 . . . 50 s*
Controls how fast the compensation temperature changes the desired flow temperature (I control). *The "Intgr. time" function can correct the desired flow temperature with max. 8 degrees.*	

OFF: The control function is not influenced by the 'Intgr. time'.
Minor value: The desired flow temperature is changed quickly.
Major value: The desired flow temperature is changed slowly.

Compensation 2 5000

Temp. (Compensation temperature)	5064
Setting range	*-20 . . . 50 °C*
Setting the compensation temperature value 2. *When the temperature, measured by S1, falls below or gets higher than the set compensation value, the ECL Comfort 110 changes the desired flow temperature. The influence is set in 'Gain - max.' and 'Gain - min.'.*	

Gain - max. (Compensation temp., limitation, maximum)	5066
Setting range	*-9.9 . . . 9.9*
Determines how much the desired flow temperature will be influenced (increased or decreased) if the compensation temperature gets higher than the set compensation temperature value (P control).	

9.9: Maximum increase of desired flow temperature
5.0: Medium influence
2.0: Minor influence
0.0: No influence
-2.0: Minor influence
-5.0: Medium influence
-9.9: Maximum decrease of desired flow temperature

Gain - min. (Compensation temp., limitation, minimum)	5067
Setting range	*-9.9 . . . 9.9*
Determines how much the desired flow temperature will be influenced (increased or decreased) if the compensation temperature gets lower than the set compensation temperature value (P control).	

9.9: Maximum increase of desired flow temperature
5.0: Medium influence
2.0: Minor influence
0.0: No influence
-2.0: Minor influence
-5.0: Medium influence
-9.9: Maximum decrease of desired flow temperature

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Intgr. time (Integration time)	**5065**
Setting range	*OFF / 1 . . . 50 s*
Controls how fast the compensation temperature changes the desired flow temperature (I control). The "Intgr. time" function can correct the desired flow temperature with max. 8 degrees.	

OFF: The control function is not influenced by the 'Intgr. time'.
Minor value: The desired flow temperature is changed quickly.
Major value: The desired flow temperature is changed slowly.

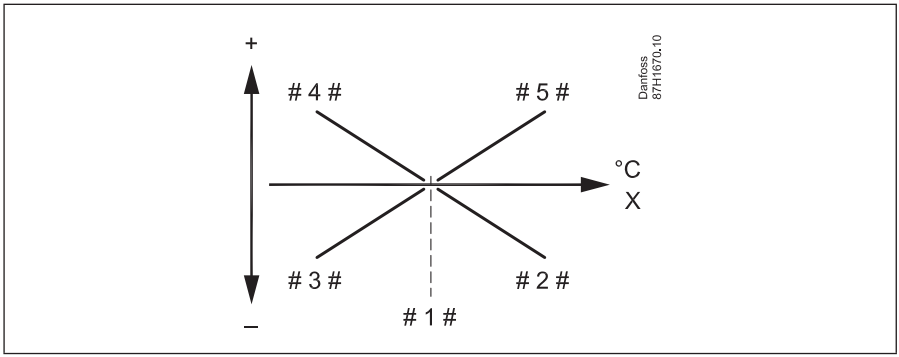
Example:
The compensation temp. value is set to 5 °C.
'Gain. min.' (4063) is set to 2.5.
The actual compensation temperature is 2°C (3 degrees below the limit value).
Result:
The desired flow temperature is changed by 2.5 x 3 = 7.5 degrees.

Return T limit (return temp. limitation) 6000

This section is a general description for Return temperature limitation and is only relevant if you have installed a return temperature sensor (S4).

The ECL Comfort 110 adjusts the desired flow temperature to compensate for the difference between the limitation temperature and the actual return temperature.

Cooling application:
If the return temperature gets lower than the limitation value, the desired flow temperature can be increased.
The 'Gain. -min.' (Influence, min. return temperature) determines how much the desired flow temperature should be increased. By this, the control valve gradually closes, resulting in a higher return temperature.
Use this influence type to avoid a too low return temperature.



X	=	Return temperature
# 1 #	=	Limitation temperature
# 2 #	=	Negative influence (6035) when return temp. gets higher than limit. temp.
# 3 #	=	Negative influence (6036) when return temp. gets lower than limit. temp.
# 4 #	=	Positive influence (6036) when return temp. gets lower than limit. temp.
# 5 #	=	Positive influence (6035) when return temp. gets higher than limit. temp.

Limit (return temperature limitation value)	**6030**
Setting range	*-20 . . . 50 °C*
Setting the limitation value for the return temperature.	

Gain - max. (return temp. limitation, maximum)	**6035**
Setting range	*-9.0 . . . 9.9*
Determines how much the desired flow temperature will be influenced (increased or decreased) if the actual return temperature gets higher than the set return temperature limitation value (P control).	

9.9: Maximum increase of desired flow temperature
5.0: Medium influence
2.0: Minor influence
0.0: No influence
-2.0: Minor influence
-5.0: Medium influence
-9.9: Maximum decrease of desired flow temperature

Gain - min. (return temp. limitation, minimum)	**6036**
Setting range	*-9.0 . . . 9.9*
Determines how much the desired flow temperature will be influenced (increased or decreased) if the actual return temperature gets lower than the set return temperature limitation value (P control).	

9.9: Maximum increase of desired flow temperature
5.0: Medium influence
2.0: Minor influence
0.0: No influence
-2.0: Minor influence
-5.0: Medium influence
-9.9: Maximum decrease of desired flow temperature

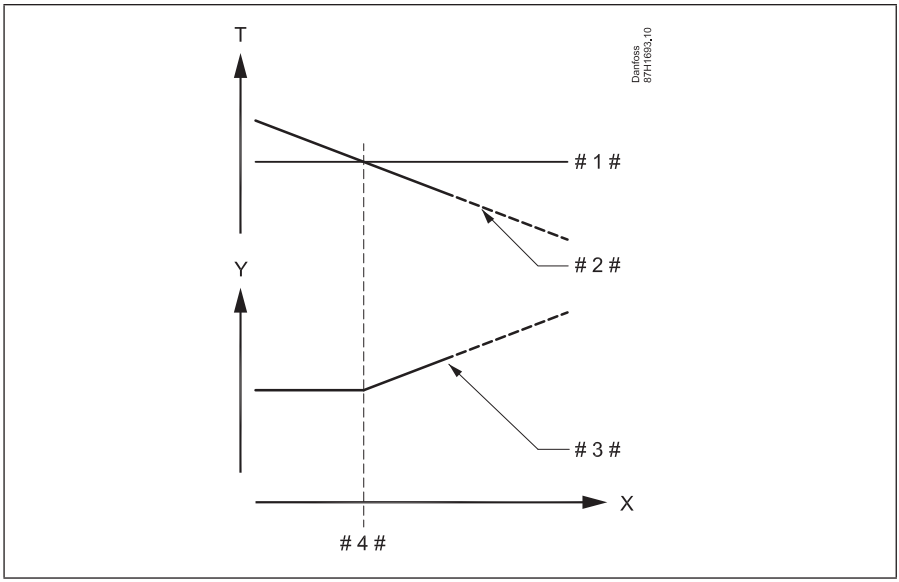
Intgr. time (Integration time)	**6037**
Setting range	*OFF / 1 . . . 50 s*
Controls how fast the return temperature limitation changes the desired flow temperature (I control). The "Intgr. time" function can correct the desired flow temperature with max. 8 degrees.	

OFF: The control function is not influenced by the 'Intgr. time'.
Minor value: The desired flow temperature is changed quickly.
Major value: The desired flow temperature is changed slowly.



If the 'Gain' is too high and / or the 'Intgr. time' too low, there is a risk of unstable control.

Example:
The return temperature limit is set to 12 °C.
'Gain. min.' (6036) is set to 2.5.
The actual return temperature is 9 °C (3 degrees below the limit value).
Result:
The desired flow temperature is changed by 2.5 x 3 = 7.5 degrees.



T	=	Temperature
Y	=	Temperature
X	=	Time
# 1 #	=	Return temperature limit
# 2 #	=	Return temperature
# 3 #	=	Desired flow temperature
# 4 #	=	Action point

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Control param. (control parameters) 7000

Xp (proportional band)	7184
Setting range	*1 ... 250 K*

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

Tn (integration time constant)	7185
Setting range	*5 ... 999 s*

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

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

M1 run (running time of the motorized control valve)	7186
Setting range	*5 ... 250 s*

'M1 run' is the time it takes the controlled unit to move from fully closed to fully open position. Set the 'M1 run' according to the example.

How to calculate the running time of a motorized control valve

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

Seated valves

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

Rotating valves

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

Nz (neutral zone)	**7187**
Setting range	*1 ... 9 K*

Set the acceptable flow temperature deviation.

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



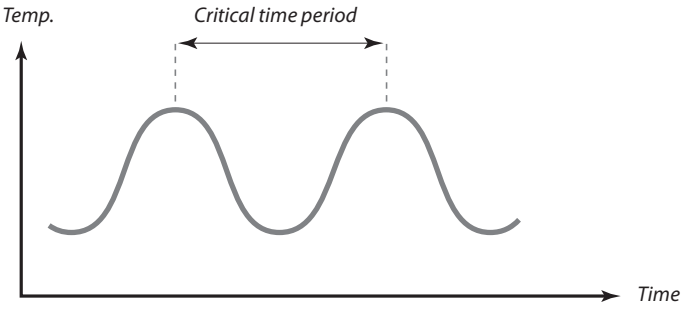
The neutral zone is symmetrical around the desired flow temperature value, i.e. half the value is above and half the value is below this temperature.

Min. on time (minimum activation time of valve actuator	**7189**
Setting range	*2 . . . 50*
The set value is multiplied by 20 ms (milliseconds). The time is the minimum pulse period for activation of the valve actuator (gear motor). *The setting should be kept as high as acceptable to increase the lifetime of the valve actuator.*	

Setting examples	**Set value x 20 ms**
2	40 ms (= 0.04 sec)
10	200 ms (= 0.2 sec)
50	1000 ms (= 1 sec)

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

- Set the 'Tn' (integration time constant line 6185) to its max. value (999 sec.).
- Decrease the value for the 'Xp' (proportional band line 6184) 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.

'Tn' = 0.85 x critical time period
'Xp' = 2.2 x proportional band value in the critical time period.

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

Application 8000

Total stop	8021
Setting range	*OFF / ON*
Decide whether you want a total stop during the Saving period	

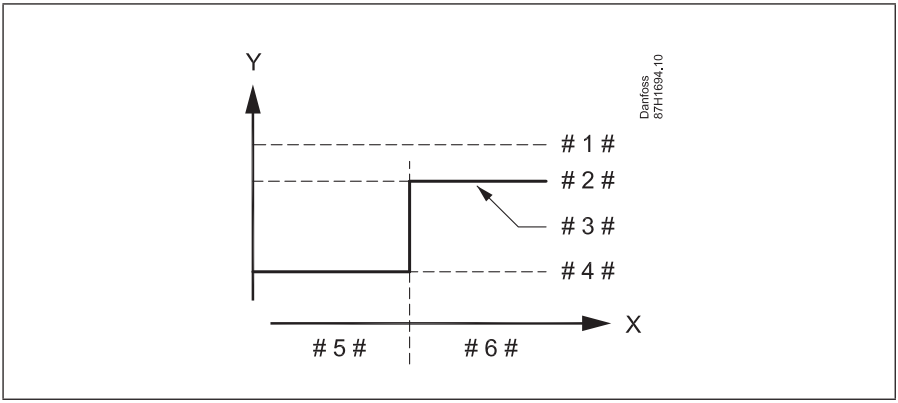
OFF: No total stop. The desired flow temperature is the value, set as "**Saving T**" (2019). Typically a high value in order to have less or no cooling.

"Temp. max." (2178) limitation is active.

ON: The desired flow temperature is the value, set in **Standby** mode.

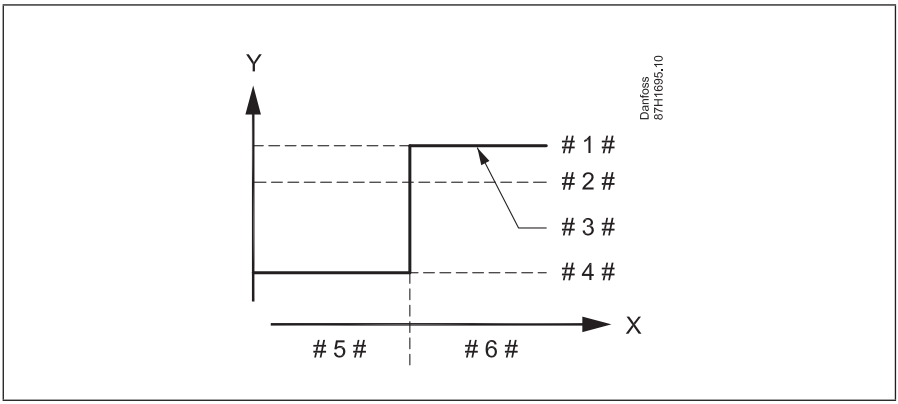
"Temp. max." (2178) limitation is not active.

Total stop = OFF



X = Time
Y = Desired flow temperature
# 1 # = Standby temperature
# 2 # = Saving temperature
# 3 # = Desired saving temperature
# 4 # = Comfort temperature
# 5 # = Comfort period
# 6 # = Saving period

Total stop = ON



X	=	Time
Y	=	Desired flow temperature
# 1 #	=	Standby temperature
# 2 #	=	Saving temperature
# 3 #	=	Desired saving temperature
# 4 #	=	Comfort temperature
# 5 #	=	Comfort period
# 6 #	=	Saving period

P1 exercise	**8022**
Setting range	*OFF / ON*
Exercises the circulation pump to avoid blocking in periods without cooling demand.	

OFF The pump exercise is not active.

ON: The pump is switched ON daily for 15 minutes as from 12.30.

M1 exercise	**8023**
Setting range	*OFF / ON*
Exercises the control valve to avoid blocking in periods without cooling demand.	

OFF The valve exercise is not active.

ON: The valve is opened daily for 15 minutes as from 12.00.
The valve is closed as from 12.15.

P1 start T (cooling demand)	8078
Setting range	*5 . . . 40 °C*
When the desired flow temperature is below the set temperature in 'P1 start T', the ECL Comfort 110 automatically switches ON the circulation pump. *NOTE: The control valve is fully closed as long as the circulation pump is not switched on.*	

P1 post-run	8040
Setting range	*0 . . . 10 minutes*
The circulation pump in the cooling circuit can be ON for a number of minutes (m) after cooling stop. Cooling stop is when the desired flow temperature gets higher than the setting in 'P1 start T' (8078). This P1 post-run function can utilize the remaining energy in for example a heat exchanger.	

0: The circulation pump stops immediately after cooling stop.

Value: The circulation pump is ON for the set time after cooling stop.

Standby T (standby temperature)	8093
Setting range	*5 . . . 40 °C*
Setting the desired flow temperature for the ECL Comfort 110 when it is in Standby mode. The same value is set in the End user menu as desired flow temperature when in Standby mode.	

Ext. (external override mode)	8141
Setting range	*OFF / Comfort / Saving*
By means of a switch or a relay contact the ECL Comfort 110 can be overridden to 'Comfort' or 'Saving' mode. *The override switch or relay contact is connected to the input terminals 11 and 12. When closing the switch / relay contacts, the override is activated. The override remains active until the switch / relay contact opens.* *The override mode can be activated only when the ECL Comfort 110 is in scheduled (AUTO) mode.*	

OFF: Override is not possible.

Comfort: The cooling circuit is in Comfort mode when the override switch is closed.

Saving: The cooling circuit is in Saving mode when the override switch is closed.

S1 T filter (filtering of the S1 temperature)	8081
Setting range	*1 . . . 200*
The measured S1 temperature is filtered (dampened) by means of the set factor. If the S1 temperature has unacceptable fluctuations a high value is recommended.	

Low value: Low filtering (minor dampening)

High value: High filtering (major dampening)

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Daylight (daylight saving time changeover)	8198
Setting range	*OFF / ON*
Choose whether you want the change to summer / winter time to be automatic or manual.	

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

ON: The ECL Comfort 110's built-in clock automatically changes + / - one hour on the standardized days for daylight saving time changeover for Central Europe.

ECL address (master / slave address)	8199
Setting range	*0 . . . 15*
This setting is relevant if more ECL Comfort 110 are connected in the same ECL Comfort system (connected via the ECL BUS). *The ECL Comfort 110, which is physically connected with the S1 temperature sensor, must be the master of the entire system and must have the address 15.* *However, more slaves can have the address 0 if they only have to receive information about S1 temperature and system time.* *NOTES:* *The total cable length of max. 125 m (all temperature sensor connections and the ECL BUS) should not be exceeded.* *Cable lengths of more than 125 m may cause noise sensibility (EMC).* *In a system with master / slave controllers, only one master controller with address 15 is allowed.* *If by mistake more master controllers are present in an ECL BUS system, decide which controller is to be master.* *Change the address in the remaining controllers. However, the system will operate, but not be stable with more than one master controller.*	

0: The ECL Comfort 110 works as slave. The slave receives information about the S1 temperature and system time and date.
Several slaves can have address 0.

1 . . . 9: The ECL Comfort 110 works as slave. The slave receives information about the S1 temperature and system time and date.
Each slave must be configured with its own address (1 ... 9).

10 . . . 14: Not used.

15: The ECL Comfort 110 is master. The master sends information about the S1 temperature and system time and date.

Type (application type)	8600
Setting range	*??? / 131*
Use this setting to restore the factory settings, if necessary.	

To restore the factory settings:

Press and hold for 5 sec.

Hereafter the ECL Comfort 110 resets.

An ECL Comfort 110, new from factory, will show "???" at start-up.
Select application 131 by means of the + button.
Press and hold the "arrow-down" button for 5 sec.

Factory settings are restored. All personal settings will be deleted. It is recommended to make a note of your personal settings in the 'Settings overview' for future use.

Service 9000

Code no.	9300
Information about the ECL Comfort 110's code number. *Example: 087B1670*	

Ver. (version no.)	9301
Info	*ABBBCCWWYY*
Information about the ECL Comfort 110's version. *A = Hardware version* *BBB = Software version* *CC = Application version* *WW = Production week* *YY = Production year* *Example: D200010516* *Please state the version in connection with questions about the product, if any.*	

Backlight (display brightness)	9310
Setting range	*OFF, 1 . . . 30*
The brightness of the display can be adjusted.	

OFF: No backlight
1: Weak backlight
30: Strong backlight

Contrast (display contrast)	9311
Setting range	*0 . . . 20*
The contrast of the display can be adjusted.	

0: High contrast
20: Low contrast

Language	9315
Setting range	*ENGLISH / DANSK*
Choose the preferred language.	

MOD address (MODBUS address)	9320
Setting range	*0 . . . 250*
The MODBUS related functionality is used for production test only.	

Mounting the ECL Comfort controller

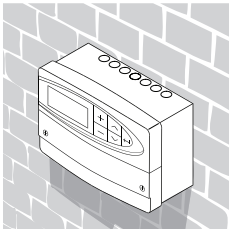
For easy access, you should mount the ECL Comfort controller near the system. Select one of the three following methods:

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

Screws and rawlplugs are not supplied.

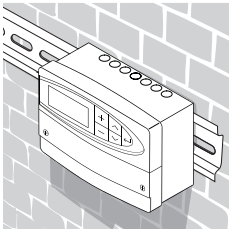
Mounting on a wall

Mount the controller on a wall with a smooth surface and establish the electrical connections.



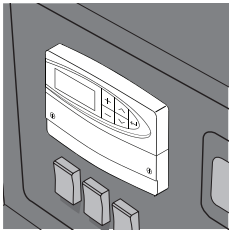
Mounting on a DIN rail

Mount the controller on the DIN rail and establish the electrical connections.



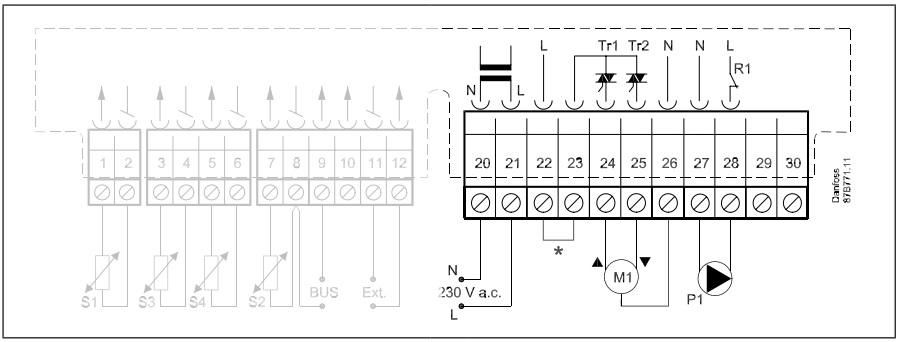
Mounting in a panel

Mounting kit: Order code no. 087B1249.
The panel plate thickness must not exceed 5 mm. Prepare a cut-out with the dimensions 93 x 139 mm. Insert the controller into the panel cut-out and fix it with the clamp which is placed horisontally on the controller. Establish the electrical connections.



For further details on mounting, see the mounting guide.

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



** Optional connections for safety thermostat*

Terminal		Description	Max. load
20		Supply voltage 230 V a.c. - neutral (N)	
21		Supply voltage 230 V a.c. - live (L)	
22		Optional connections for safety thermostat	
23		Optional connections for safety thermostat	
24	M1	Actuator - open	15 VA
25	M1	Actuator - close	15 VA
26	M1	Actuator - neutral	
27	P1	Circulation pump - neutral	
28	P1	Circulation pump - live (relay R1)	4 (2) A *
29		Not to be used	
30		Not to be used	

*: Ohmic load: 4 Amp.; Inductive load: 2 Amp.

Wire cross section: 0.5 - 1.5 mm^2

Incorrect connection can damage the TRIAC outputs (terminals 23, 24 and 25).

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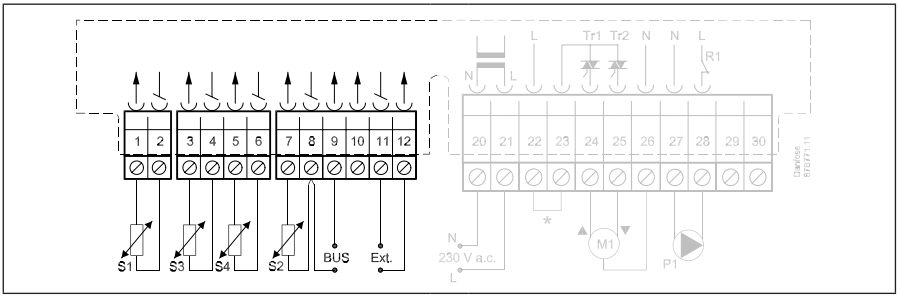
Connecting the temperature sensors and the ECL BUS



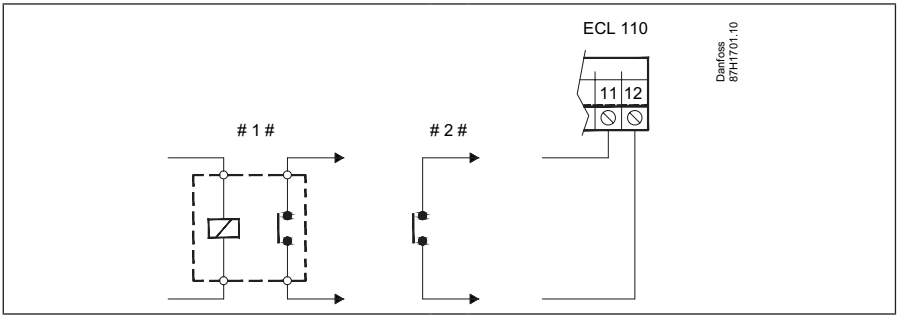
Terminal	Description		Type (recomm.)
1 and 2	S1	Compensation temperature sensor	ESMT (Outdoor) ESM-10 (Room)
3 and 4	S3	Flow temperature sensor*	ESMC
5 and 6	S4	Return temperature sensor	ESMC
7 and 8	S2	Room temperature sensor	ESM-10
8 and 9		ECL BUS	
10		Not to be used	
11 and 12		External override	

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

Wire cross section for sensor connections: 0.4 - 0.75 mm^2
Total cable length: Max. 125 m (all sensors incl. the ECL BUS)

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

External override

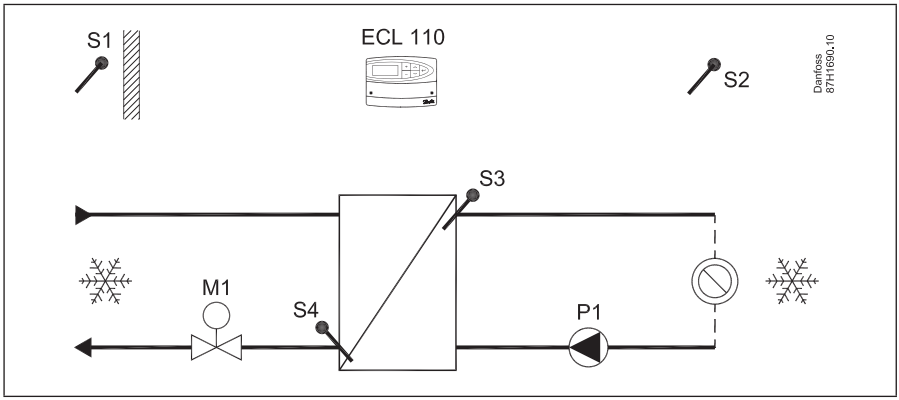


Override by means of a relay (# 1 #) or a switch (# 2 #).

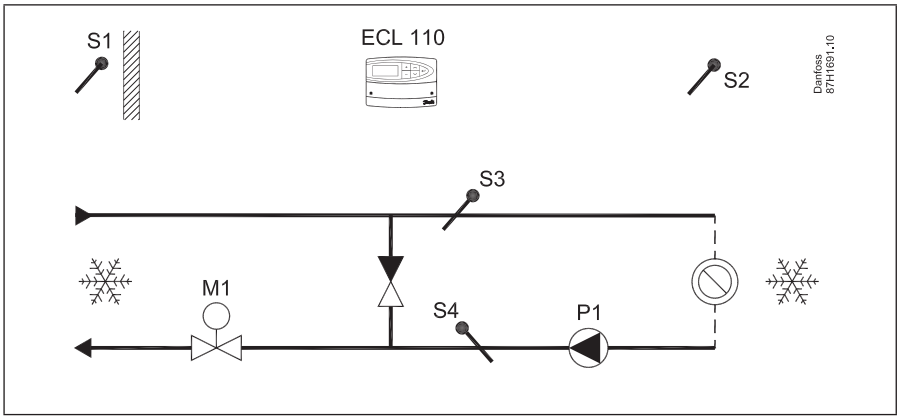
How to identify your system type

The ECL Comfort 110 is a universal controller that can be used for various systems. Based on the shown standard systems, it is possible to configure additional systems.

Cooling system with heat exchanger



Cooling system circuit with direct connection



Sensors:			
S1	Compensation temperature	ECL 110	ECL Comfort 110 with cooling application 131
S2	Room temperature	M1	Circulation pump
S3	Flow temperature	P1	Motorized control valve
S4	Return temperature		Circulation pump

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Adapting the ECL Comfort 110 controller

When you switch on the controller the first time, it will ask you to choose language (default language is English).



Choose your language. Options:
English and Dansk (Danish).

Accept and go to the next menu.

When the language is chosen, the controller will ask for date and time setting.



Set day (dd), month (mm), year (yy), hour (hh), and minuts (mm).

Change values.

Accept the chosen time and date.

When the language has been chosen, and date and time have been set, the controller can ask for application type.



Choose application type 131.

2 sec.
Start the chosen application.

If the application 131 has already been chosen, the display shows:



Go to the 'Maintenance' part for further setup of your controller.

Manual control

Select control mode.



5 sec.
Go to manual mode.

Actuator M1 is opening ( )

Actuator M1 is closing ( )



Pump P1 is ON ( )

Pump P1 is OFF ( )



Select control mode.



> Manual mode should only be used for maintenance purposes. In manual mode all control and safety functions are deactivated!

Placing the temperature sensors

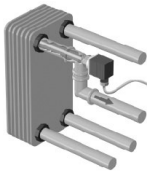
It is important that the sensors are mounted in the correct position in your system.
The temperature sensor mentioned below are sensors used for the ECL Comfort series which not all will be needed for your application!

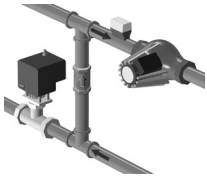
Outdoor temperature sensor (ESMT)

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 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 or ESMC)

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

Room temperature sensor (ESM-10)

Place the room sensor in the room where the temperature is to be controlled. Do not place it on outer walls or close to windows or doors.

Checklist, electrical connections

Is the ECL Comfort controller ready for use?

- ☐ Make sure that the correct power supply is connected to terminals 21 (Live) and 20 (Neutral).
- ☐ Check that the required controlled units (actuator, pump etc.) are connected to the correct terminals.
- ☐ Check that all sensors are connected to the correct terminals.
- ☐ Switch on the power.
- ☐ Choose manual operation as controller mode.
- ☐ Check that valves open and close, and that required controlled units (pump etc.) start and stop when operated manually.
- ☐ Check that the temperatures shown in the display match the actual sensors.

The time shown in the display is one hour off?
See the daylight saving time changeover in line 7198.

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 36 hours. Set time and date. See line 1000.

What does the symbol ⫩ mean?
The flow temperature is under influence of room temperature limitation or return temperature limitation.

The temperature is unstable?
- Check that the flow temperature sensor is correctly connected and in the right place.
- Adjust the control parameters (line 7000).

The controller does not operate and the control valve is closed?
- Check that the flow temperature sensor is measuring the correct value, see 'Daily use'.
- Check the influence from other measured temperatures (⫩).

How to restore the factory settings?
See line 8600.

What does P and PI control mean?
P control: Proportional control.
By using a P control, the controller will change the flow temperature proportional to the difference between a desired and an actual temperature, e.g. a room temperature.
A P control will always have an offset which not will disappear over time.

PI control: Proportional and Integrating control.
A PI control does the same as a P control, but the offset will disappear over time.
A long 'Intgr. time' will give a slow but stable control, and a short 'Intgr. time' will result in a fast control but with a higher risk of oscillations.

Definitions in relation to cooling application

Comfort operation
Normal temperature in the cooling system controlled by the schedule. During cooling the flow temperature in the system is lower in order to have an acceptable room temperature.

Comfort temperature
Temperature maintained in the cooling circuit during comfort periods.

Cooling circuit
The circuit for cooling the room / building.

Desired flow temperature
Temperature set in the ECL Comfort 110 and influences from the room and / or return temperatures. This temperature is used as a reference for the control.

Desired room temperature
Temperature which is set as the desired room temperature. The temperature can only be controlled by the ECL Comfort controller if a room temperature sensor is installed.
If a sensor is not installed, the set desired room temperature has no influence on the desired flow temperature.

Desired temperature
Temperature based on a setting or a controller calculation.

Factory settings
Settings stored in the controller to simplify the setup of your controller the first time.

Flow temperature
Temperature measured in the flow at any time.

Limitation temperature
Temperature that influences the desired flow temperature.

Definitions in relation to cooling application

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 approx. 3.9 ohm / degree.

Return temperature
The temperature measured in the return can influence the desired flow temperature. Typically, the return temperature to the cooling supply should not be too low. If so, the desired flow temperature can be increased.

Room temperature
Temperature measured by the room temperature sensor. The room temperature can only be controlled directly if a room temperature is measured. The room temperature can influence the desired flow temperature.

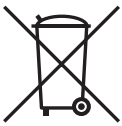
Room temperature sensor
Temperature sensor placed in the room (reference room, typically the living room) where the temperature is to be controlled.

Saving operation
Increased temperature in the cooling system controlled by the schedule. During less cooling the flow temperature in the system is higher in order to save cooling energy.

Saving temperature
Temperature maintained in the cooling circuit during saving temperature periods.

Schedule
Schedule for periods with comfort and saving temperatures. The schedule can be made individually for each week day and it consists of 2 comfort periods per day.

Time bar
The time bars illustrate scheduled periods with comfort temperature.



Disposal instruction:

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

Always follow the local disposal regulations.

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