

Data sheet

ECL Comfort 210 controller, Remote Control Units ECA 30 / 31 and Application keys

Designed in Denmark

Description

ECL Comfort 210 controller series



The ECL Comfort 210 is an electronic weather compensated temperature controller in the ECL Comfort controller family for use in district heating, central heating and cooling systems. Energy savings can be achieved by correct control of the flow temperature in heating and cooling systems. Up to 3 circuits can be controlled. The weather compensation function in the ECL Comfort controllers measures the outdoor temperature and controls the flow temperature to the heating system accordingly. The weather compensated heating system increases the comfort level and saves energy.

The ECL Comfort 210 controller is configured with a selected application by means of an ECL Application Key.

ECL Comfort 210 is designed for comfortable temperatures, optimum energy consumption, easy installation by means of the ECL Application Key (Plug-and-Play) and user friendly operation. Improved energy savings are facilitated by weather compensation, adjustment of temperature according to schedule, optimization as well as limitation of return temperature, flow and power. Functionalities such as data logging and alarm functions are implemented in the controller.

The ECL Comfort 210 is easily operated by means of a dial (multi-functional knob) or a Remote Control Unit (RCU). The dial and the backlit display guide the user through the text menus in the selected language.

The ECL Comfort 210 controller has electronic output for motorized valve control, relay output for circulation pump / changeover valve control among others, as well as alarm output.

6 Pt 1000 temperature sensors can be connected. In addition, 2 inputs are configured when uploading the application. The configuration can be Pt 1000 temperature sensor input, analog input (0 – 10 V) or digital input.

The enclosure is designed for mounting on wall and DIN rail. A variant ECL Comfort 210B (without display and dial) is available. It can be used for mounting inside a panel and is operated by means of the RCU ECA 30 / 31 which can be placed in front of the panel.

The ECL Comfort 210 is a stand-alone controller which communicates with the RCU and other ECL Comfort 210 / 310 controllers via the ECL 485 communication bus.

Remote Control Unit (RCU):

The RCUs ECA 30 and ECA 31 are used for room temperature control and override of the ECL Comfort 210. The display has backlight. The RCUs are connected to the ECL Comfort controllers by means of 2 × twisted pair cable for communication and power supply (ECL 485 communication bus).

The ECA 30 / 31 has a built-in room temperature sensor. An external room temperature sensor can be connected substituting the built-in temperature sensor. Furthermore, the ECA 31 has a built-in relative humidity sensor and the signal is used in relevant applications. It is possible to connect up to 2 RCUs on the ECL 485 communication bus. One RCU can monitor max. 10 ECL Comfort controllers (master/ slave system).

Description (continued)

ECL Application Key and applications:

Different ECL Application Keys make it easy for the ECL Comfort 210 hardware to run different applications. The ECL Comfort 210 controller is loaded with the desired application by means of the ECL Application Key, which contains information about applications (simple application sketches are shown in the display), languages and factory settings.

The ECL Application Keys for ECL Comfort 210 can also be used in ECL Comfort 310.

The application parameters are stored in the controller and are not affected by power break.

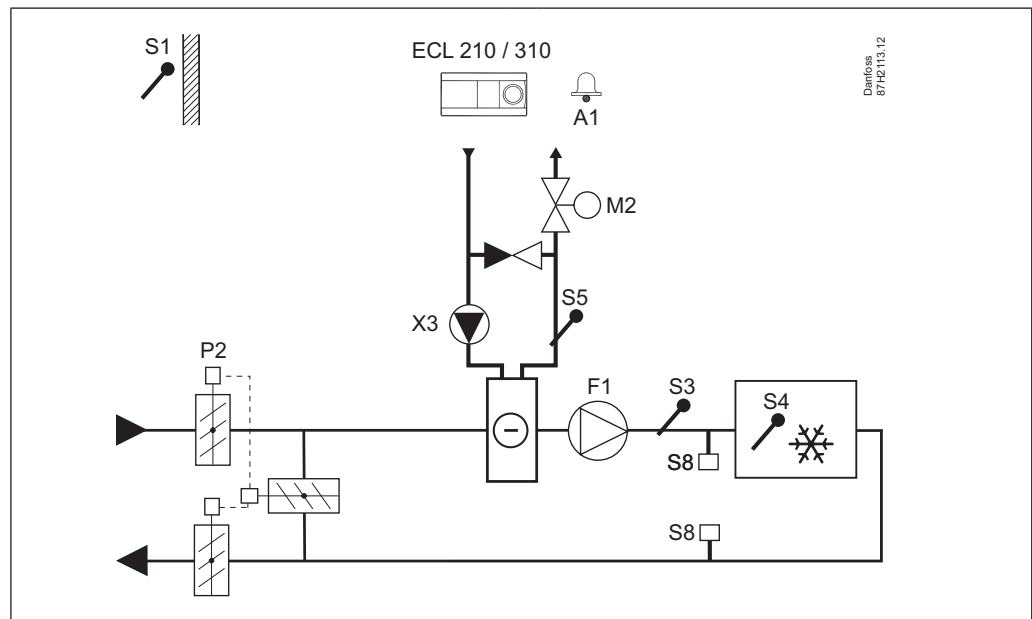
The relevant ECL Application Keys for the ECL Comfort 210 controller can be found in the ordering section.

Application examples

All mentioned components (S = temperature sensor, P = pump, M = Motorized control valve and so on) are wired to the ECL Comfort 210.

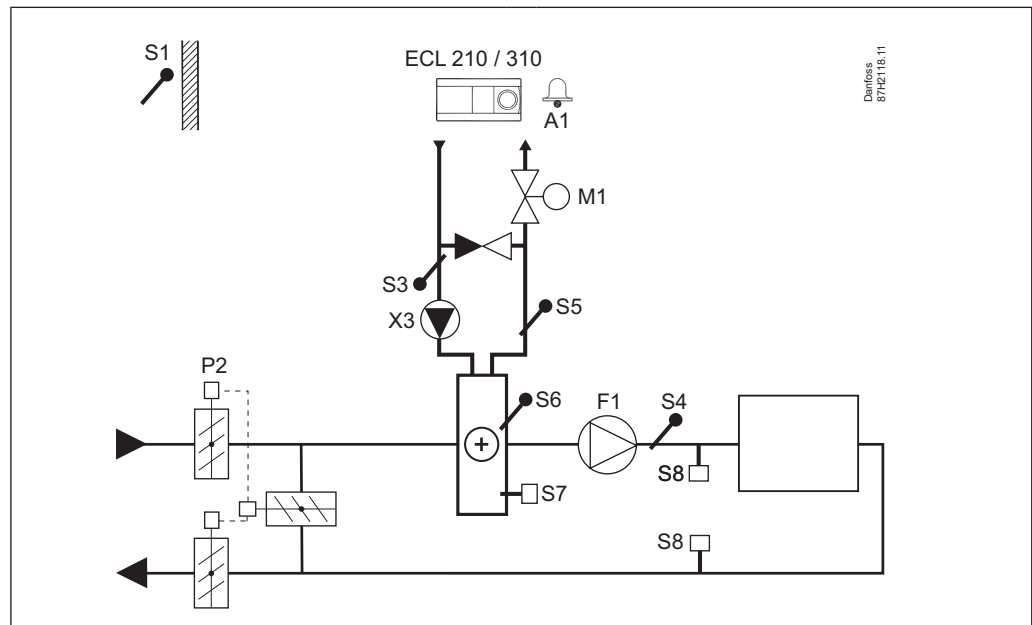
A214.1, ex. a:

Cooling application, duct temperature based on room temperature

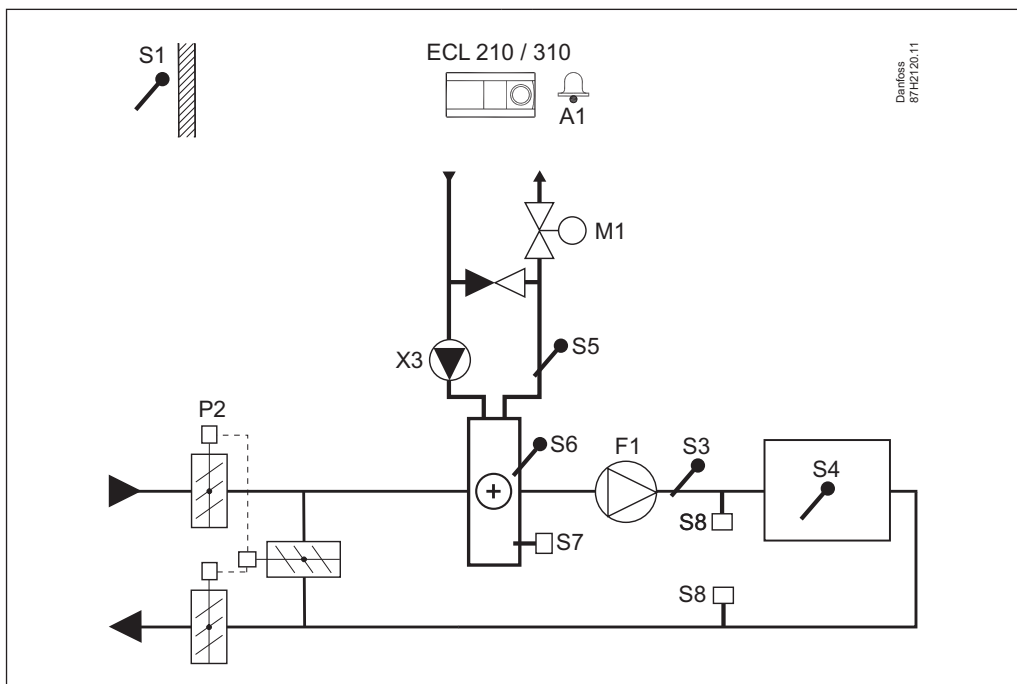


A214.2, ex. a:

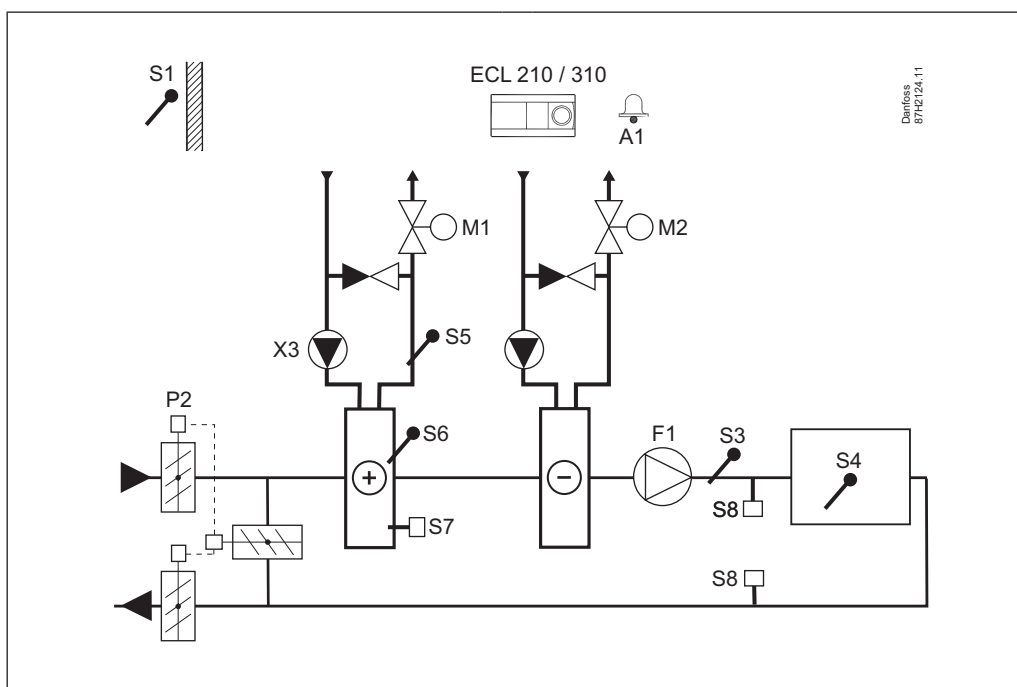
Heating application, heating temperature based on duct temperature



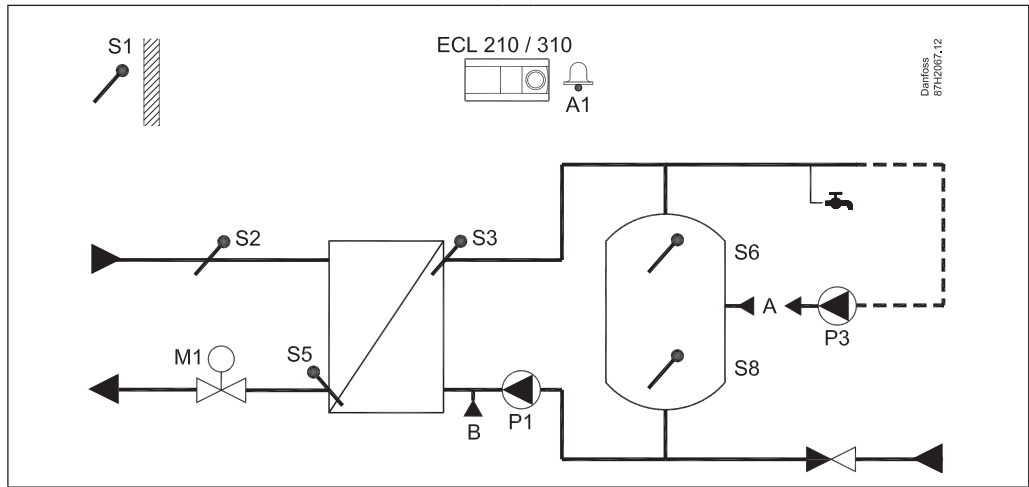
A214.3, ex. a:
Heating application, duct temperature based on room temperature



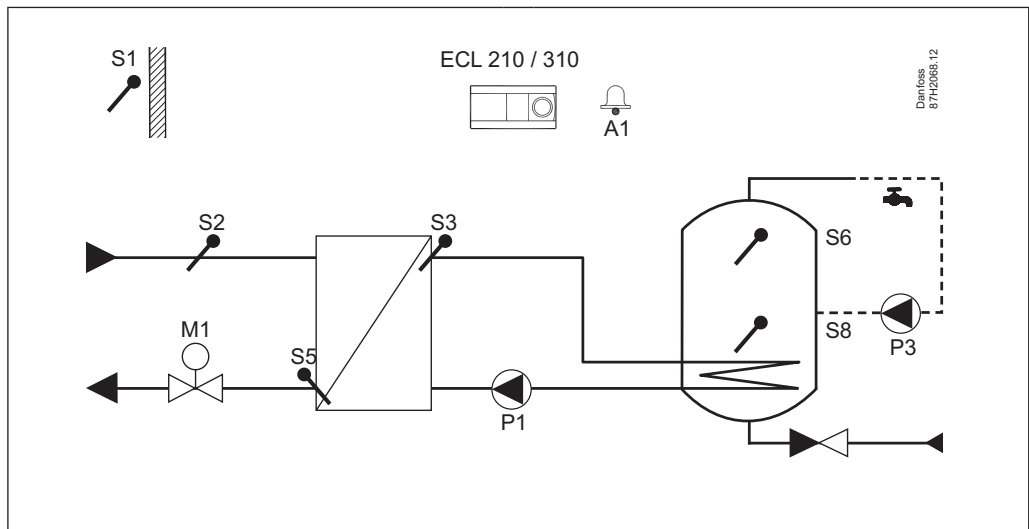
A214.5, ex. a:
Heating / cooling application, duct temperature based on room temperature



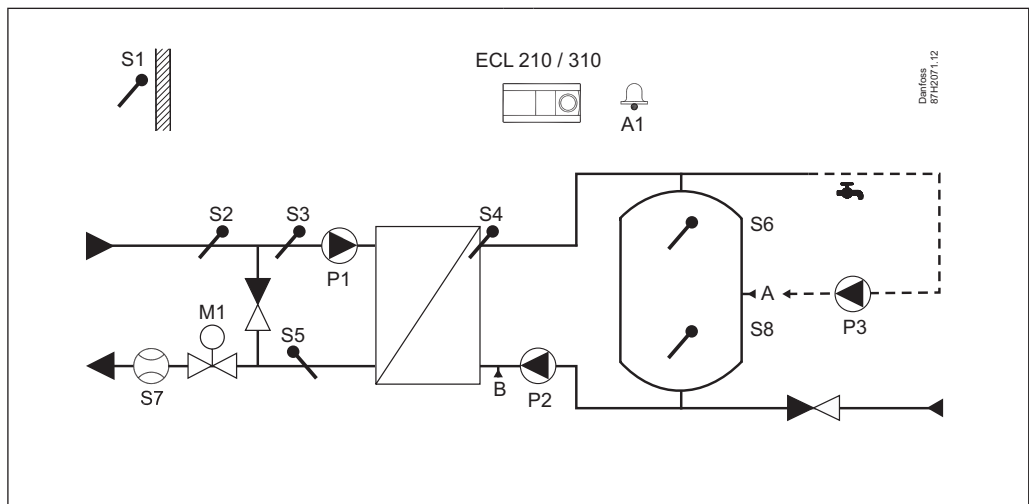
A217.1, ex. a:
DHW tank charging application



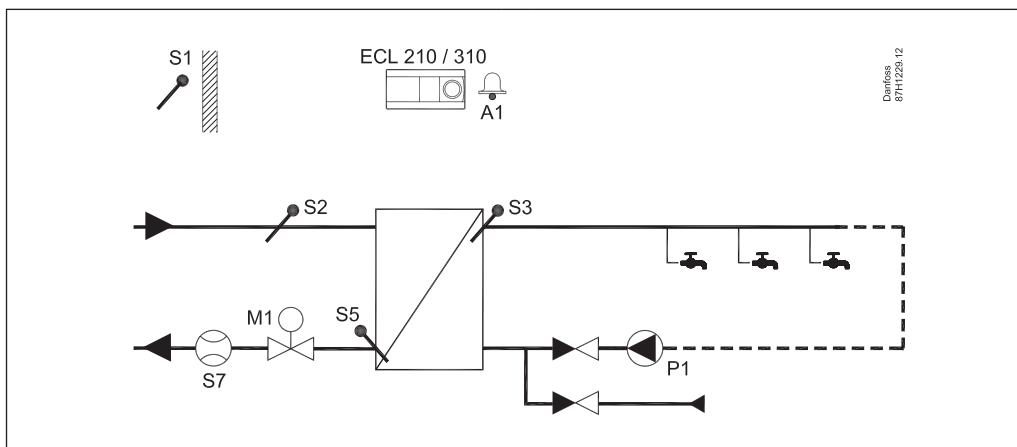
A217.1, ex. b:
DHW tank heating application



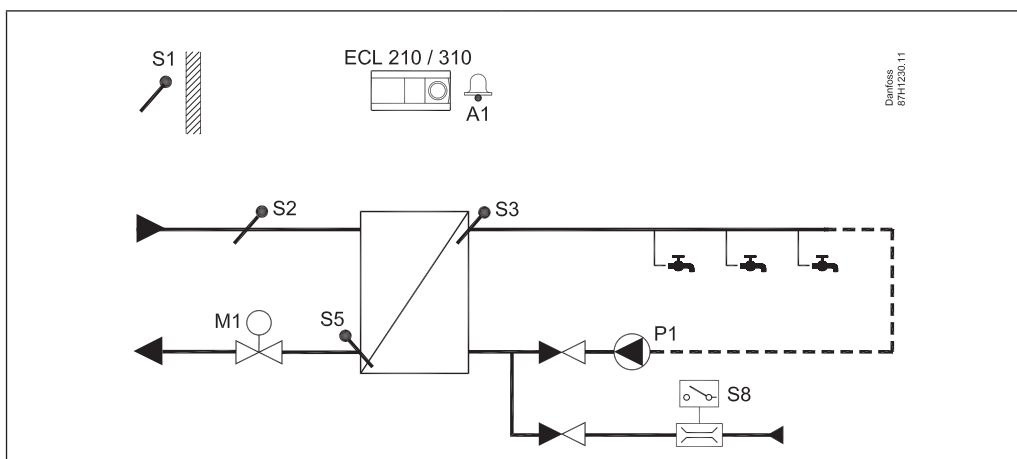
A217.2, ex. a:
DHW tank charging with preheating circuit



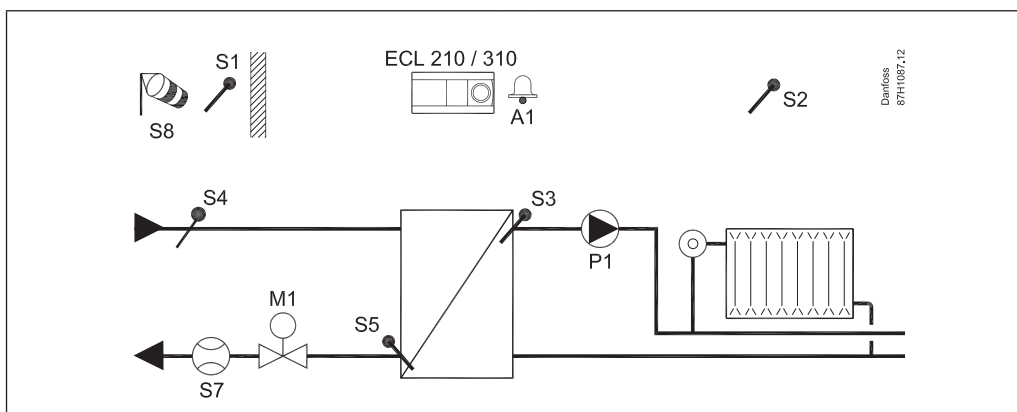
A217.3, ex. a:
DHW heating



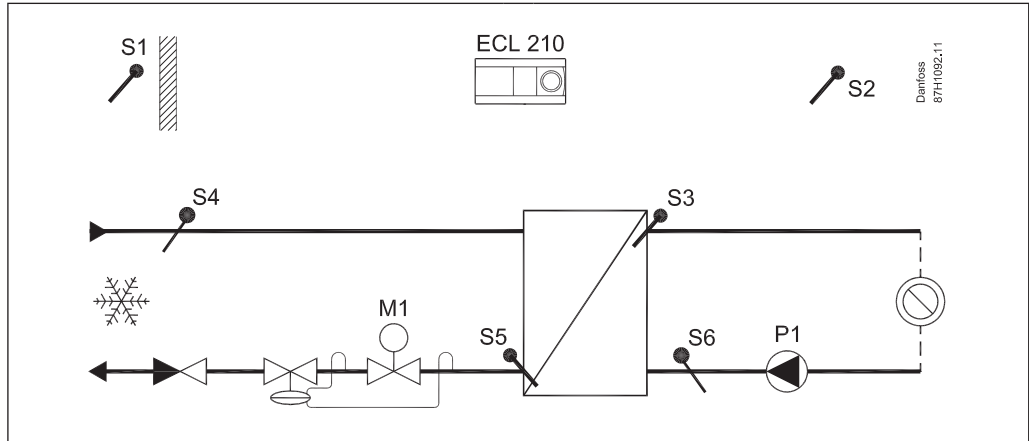
A217.3, ex. c:
DHW heating on demand (flow switch). With or without circulation



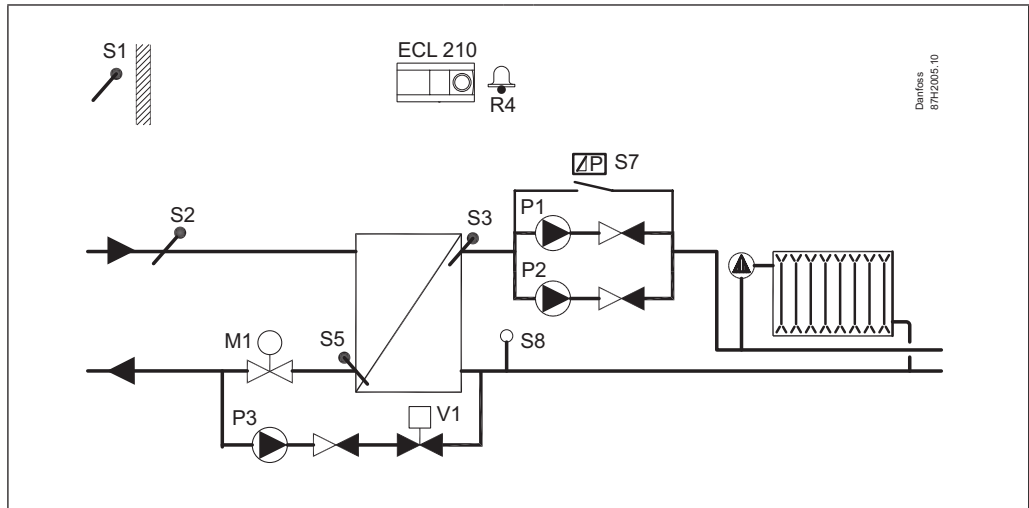
A230.1, ex. a:
Indirectly connected heating system. Wind compensation as option



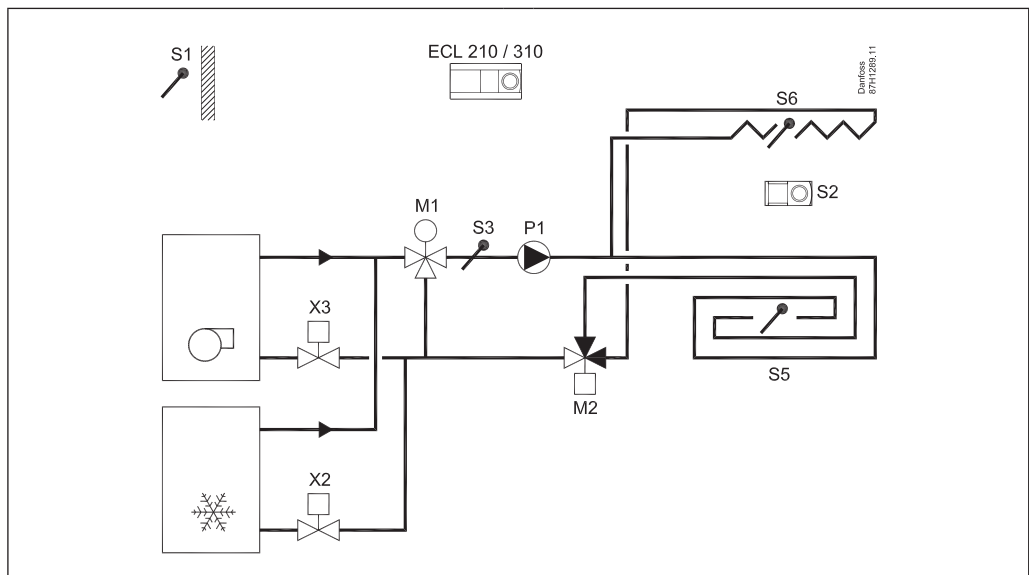
A230.2, ex. a:
Indirectly connected cooling system (district cooling)



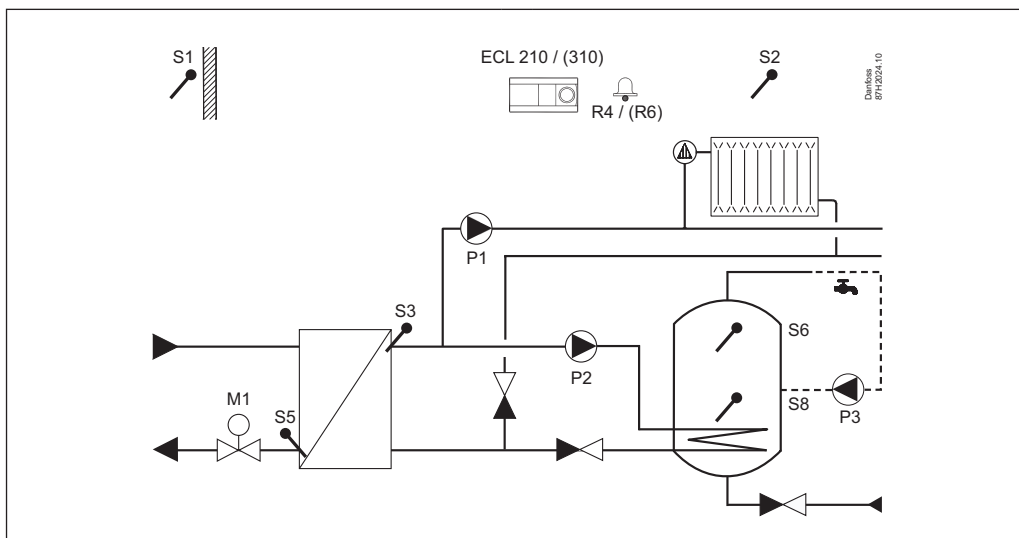
A231.2:
Indirectly connected heating system with 2-pump control and refill water function



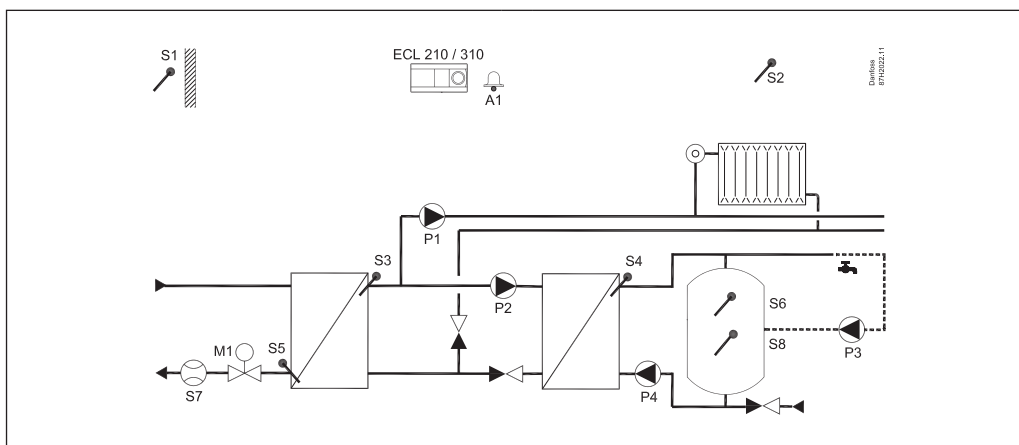
A232.1, ex. a:
Control of flow temperature (heating in floor /cooling in ceiling) in relation to outdoor, room and dew point temperature



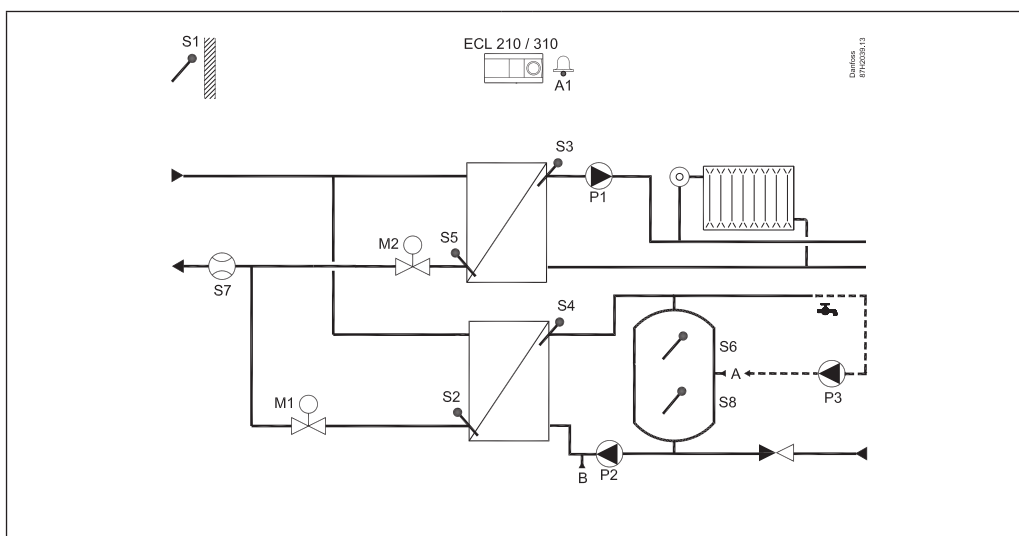
A237.1, ex. a:
Indirectly connected heating and DHW system



A237.2, ex. a:
Indirectly connected heating and DHW charging system

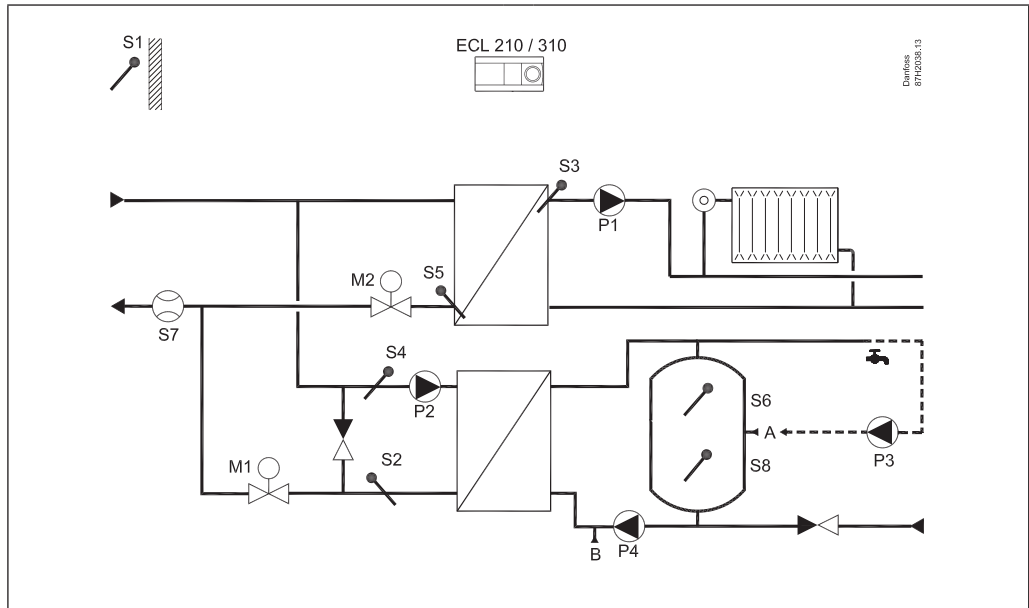


A247.1, ex. a:
Indirectly connected heating and DHW tank charging system. Parallel mode or DHW priority



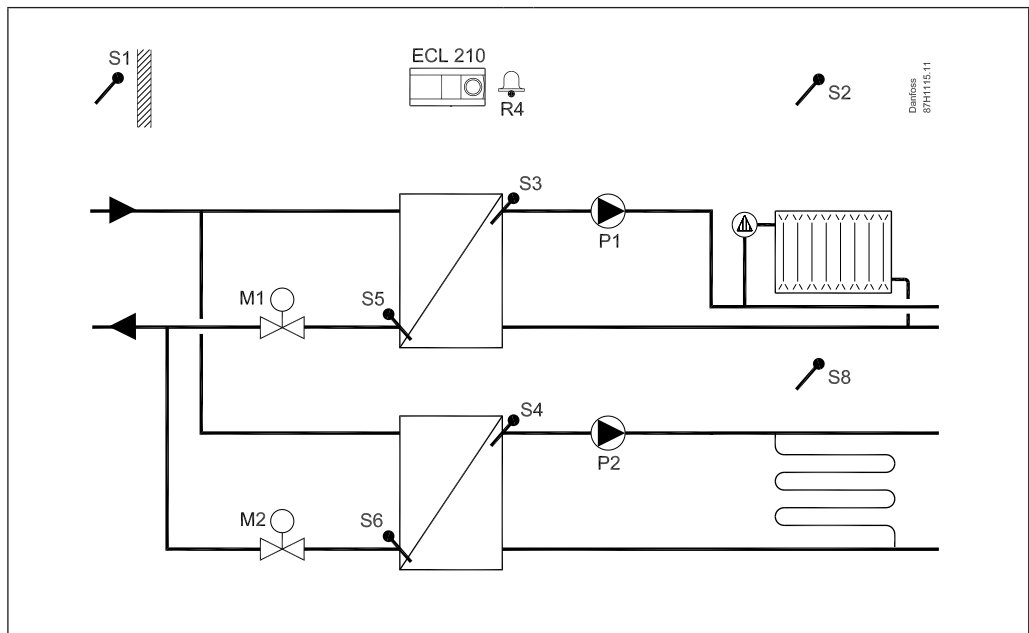
(S7*) = optional in ECL Comfort 310

A247.2, ex. a:
Indirectly connected heating and DHW tank charging system with preheating circuit.
Parallel mode or DHW priority

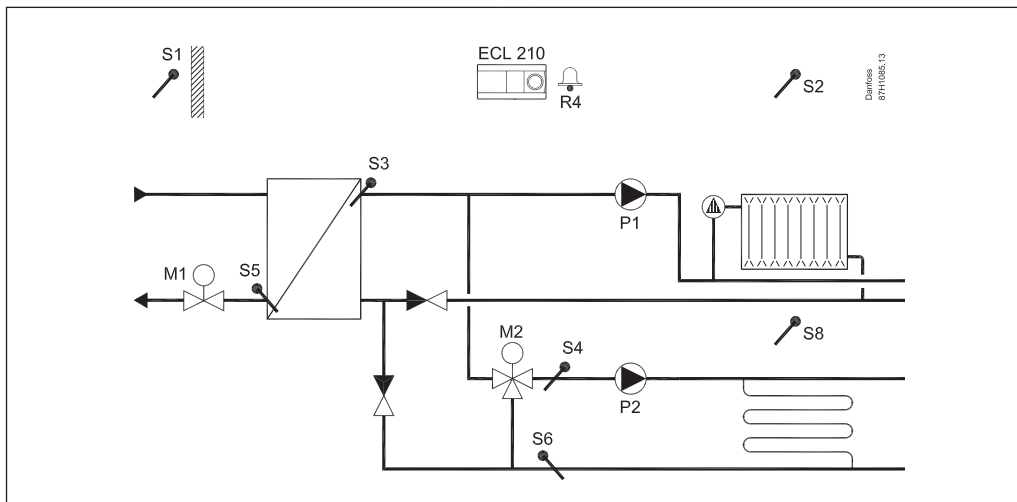


(S7*) = optional in ECL Comfort 310

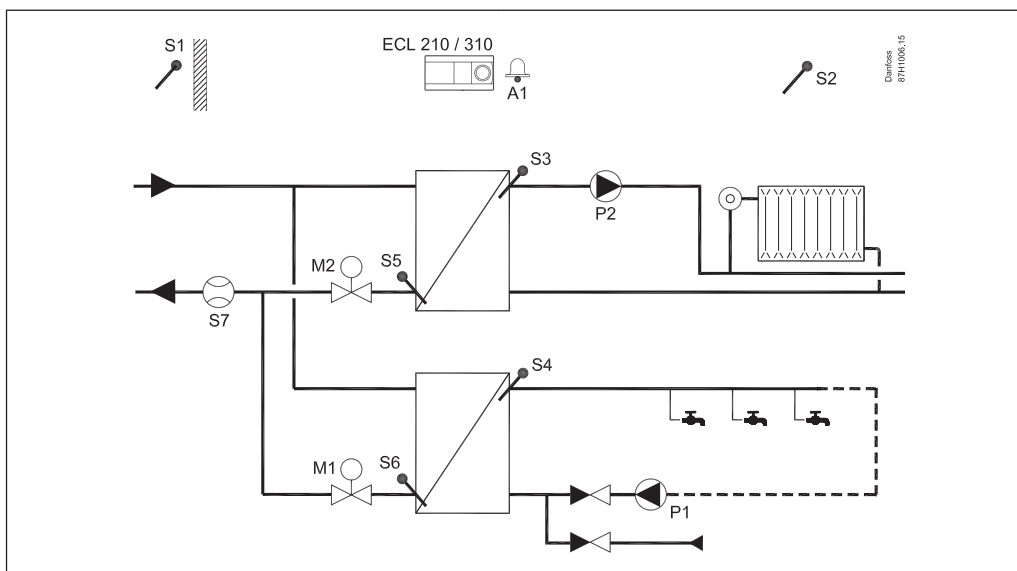
A260.1, ex. a:
Two heating systems



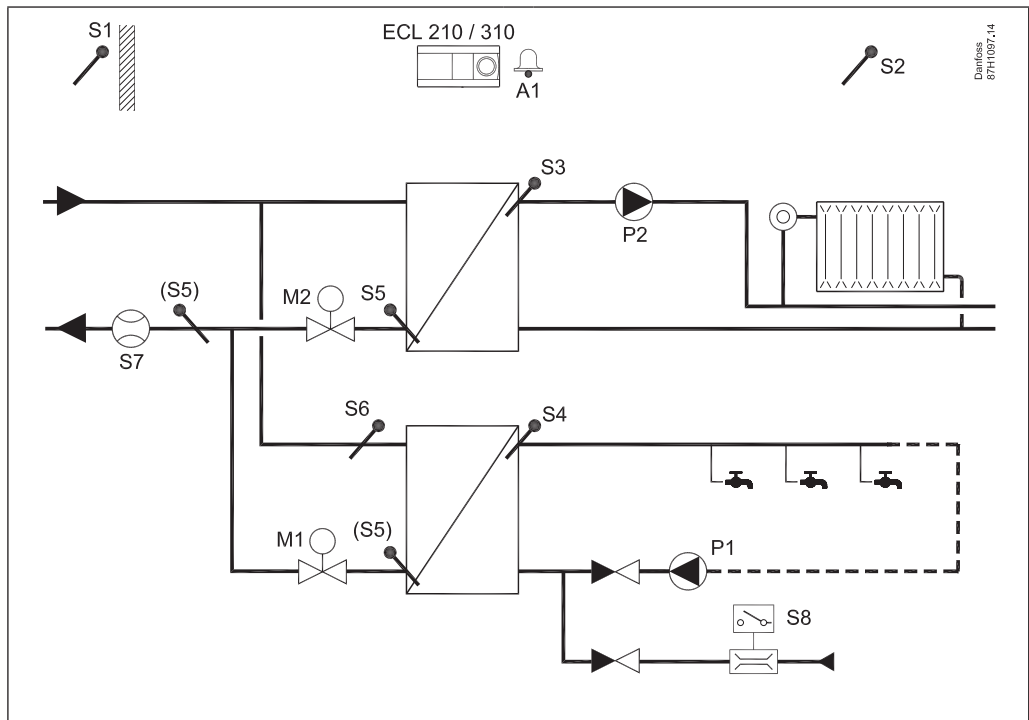
A260.1, ex. d:
Two heating systems. Circuit 2 is a sub-circuit of circuit 1.



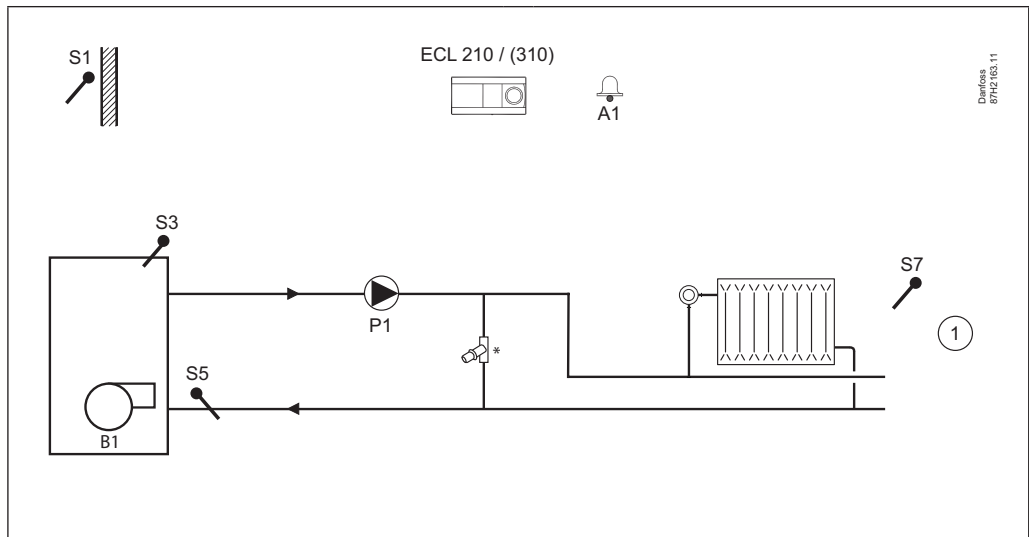
A266.1, ex. a:
Heating and direct DHW heating system. Parallel mode or DHW priority.



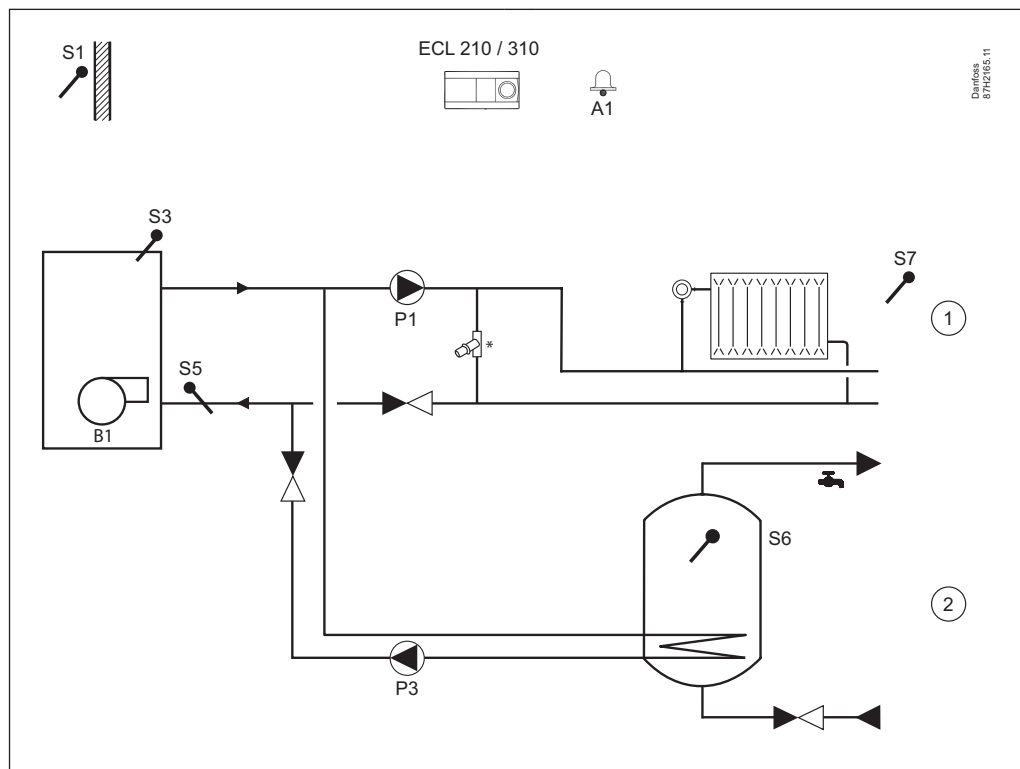
A266.2:
 Heating and direct DHW heating system. Parallel mode or DHW priority. DHW heating on demand (flow switch)



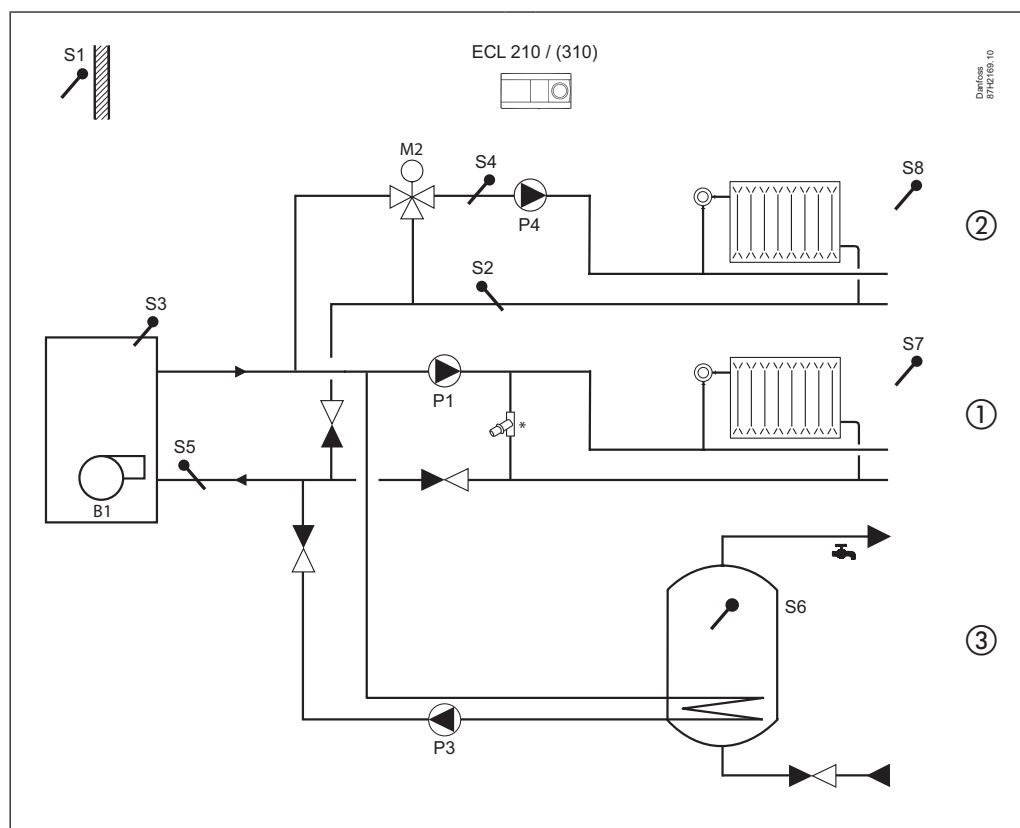
A275.1, ex. a:
 Heating system with 1-stage boiler



A275.2, ex. a:
Heating system with 1-stage boiler and DHW tank



A275.3, ex. a:
Heating system with 1-stage boiler, mixing circuit and DHW tank



Ordering

Controller, base parts and accessories:

Type	Designation	Code no.
ECL Comfort 210	Universal hardware - 230 V a.c. Base part is not included. Mounting guide (no text) is included.	087H3020
ECL Comfort 210	Universal hardware - 24 V a.c. Base part is not included. Mounting guide (no text) is included.	087H3024
ECL Comfort 210B	Universal hardware - 230 V a.c. Without display and dial. Requires a Remote Control Unit. Base part is not included. Mounting guide (no text) is included.	087H3030
ECL Comfort 210 base part	For mounting on wall or DIN rail (35 mm). Mounting guide (no text) and cable inlet accessories is included.	087H3220
ECL Comfort 310 base part	For mounting on wall or DIN rail (35 mm). ECL Comfort 210 can be mounted in an ECL Comfort 310 base part (for future upgrade). Mounting guide (no text) and cable inlet accessories is included.	087H3230

Remote Control Units and accessories

Type	Designation	Code no.
ECA 30	Remote Control Unit with an integrated room temperature sensor and possibility for connecting an external Pt 1000 room temperature sensor. Base part for mounting on wall included. Mounting guide (no text) is included.	087H3200
ECA 31	Remote Control Unit with an integrated room temperature sensor and a humidity sensor. Possibility for connecting an external Pt 1000 room temperature sensor. Used for dedicated applications. Base part for mounting on wall included. Mounting guide (no text) is included.	087H3201
ECA 30 / 31 frame kit for mounting in panel front	For mounting in a panel cut-out. Format 144 × 96 mm, actual cut-out 139 × 93 mm. Mounting guide (no text) is included.	087H3236

Accessories:

Type	Designation	Code no.
ECA 99	230 V a.c. to 24 V a.c. transformer (35 VA)	087B1156

ECL Application Keys

Type	Application type description	Controller output signals	Code no.
A214	<ul style="list-style-type: none"> Temperature control (heating / cooling) of ventilation systems. Duct / room temperature control. Return temperature limitation. Flow / power limitation. Fire and frost protection as well as alarm function. The A214 application key contains applications related to ECL Comfort 310 for increased functionalities (control of rotating heat-exchanger). 	2 x 3-point, 2 x 2-point	087H3811
A217	<ul style="list-style-type: none"> Advanced temperature control of DHW (Domestic Hot Water) circuit with/without storage charging system. Circulation pump control. Return temperature limitation. Frost protection and alarm function. The A217 application key contains applications related to ECL Comfort 310 for increased functionalities (M-bus). 	1 x 3-point, 3 x 2-point	087H3807
A230	<ul style="list-style-type: none"> (A230.1) Weather compensated flow temperature control of heating systems. Circulation pump control. Room temperature control and sliding return temperature limitation. Flow / power limitation. Wind compensation, frost protection and alarm function. (A230.2) Flow temperature control of cooling systems. Compensation for outdoor and room temperatures. Return temperature limitation. The A230 application key works in ECL Comfort 310 for increased functionalities (M-bus). 	1 x 3-point, 2 x 2-point	087H3802
A231	<ul style="list-style-type: none"> Weather compensated flow temperature control of heating systems. 2-pump control for circulation and refill water function. Sliding return temperature limitation. Frost protection and alarm function. The A231 application key contains applications related to ECL Comfort 310 for increased functionalities (2 pumps for refill water and M-bus). 	1 x 3-point, 3 x 2-point	087H3805
A232	<ul style="list-style-type: none"> Weather compensated flow temperature control of heating / cooling circuit(s). Automatic change-over between heating and cooling. Circulation pump control. Dew point (cooling mode only) and surface temperature compensation. The A232 application key contains applications related to ECL Comfort 310 for increased functionalities (return temperature limitation and separated control of heating and cooling circuits). 	1 x 3-point, 3 x 2-point	087H3812

ECL Application Keys (continued):

Type	Application type description	Controller output signals	Code no.
A237	<ul style="list-style-type: none"> Weather compensated flow temperature control of heating systems. Circulation pump control. Room temperature control and sliding return temperature limitation. Flow / power limitation. Temperature control of secondarily connected DHW circuit with storage tank charging system or storage tank with internal heat exchanger. Optional ON / OFF control of the DHW circuit in connection with primarily connected storage tank with internal heat exchanger. DHW circulation pump control. Frost protection and alarm function. The A237 application key contains applications related to ECL Comfort 310 for increased functionalities (M-bus). 	1 x 3-point, 3 x 2-point	087H3806
A247	<ul style="list-style-type: none"> Weather compensated flow temperature control of heating systems. Circulation pump control. Sliding return temperature limitation. Flow / power limitation. Temperature control of DHW circuit with storage tank charging system. DHW circulation pump control through the storage tank or the heat-exchanger. Frost protection and alarm function. The A247 application key contains applications related to ECL Comfort 310 for increased functionalities (room temperature sensor and M-bus). 	2 x 3-point, 3 x 2-point	087H3808
A260	<ul style="list-style-type: none"> Weather compensated flow temperature control of heating systems. Circulation pump control, room temperature control and sliding return temperature limitation for two independent heating circuits. Flow / power limitation, frost protection and alarm function. The A260 application key works in ECL Comfort 310 for increased functionalities (M-bus). 	2 x 3-point, 2 x 2-point	087H3801
A266	<ul style="list-style-type: none"> Weather compensated flow temperature control of heating systems. Circulation pump control, room temperature control and sliding return temperature limitation. Temperature control of DHW circuit with DHW circulation. Return temperature limitation, sliding DHW priority, frost protection and alarm function. Optional control of DHW heating based on DHW demand. The A266 application key works in ECL Comfort 310 for increased functionalities (M-bus). 	2 x 3-point, 2 x 2-point	087H3800
A275	<ul style="list-style-type: none"> Weather compensated flow temperature control of 1-stage boiler based heating systems. One direct heating circuit and one mixing circuit. Circulation pumps control, room temperature control and sliding return temperature limitation. Temperature control of DHW storage tank with internal heat exchanger. Frost protection and alarm function. The A275 application key contains applications related to ECL Comfort 310 for increased functionalities (multiple boiler stages). 	1 x 3-point, 4 x 2-point	087H3814

Each of the abovementioned code nos. comprises 1 ECL Application Key, 1 mounting guide and 1 set of multi-lingual user guides.

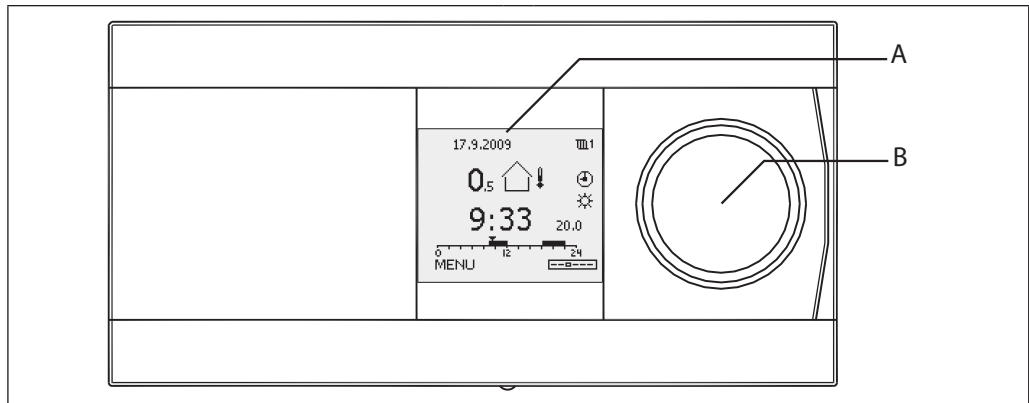
Pt 1000 temperature sensors (IEC 751B, 1000 Ω / 0 °C):

Type	Designation	Code No.
ESMT	Outdoor temperature sensor	084N1012
ESM-10	Room temperature sensor	087B1164
ESM-11	Pipe surface temperature sensor	087B1165
ESMB-12	Universal temperature sensor	087B1184
ESMC	Pipe surface temperature sensor incl. 2 m cable	087N0011
ESMU-100	Immersion sensor, 100 mm, copper	087B1180
ESMU-250	Immersion sensor, 250 mm, copper	087B1181
ESMU-100	Immersion sensor, 100 mm, stainless steel	087B1182
ESMU-250	Immersion sensor, 250 mm, stainless steel	087B1183
Accessories and spare parts:		
Pocket	Immersion, stainless steel 100 mm, for ESMU-100, Cu (087B1180)	087B1190
Pocket	Immersion, stainless steel 250 mm, for ESMU-250, Cu (087B1181)	087B1191
Pocket	Immersion, stainless steel 100 mm, for ESMB-12, (087B1184)	087B1192
Pocket	Immersion, stainless steel 250 mm, for ESMB-12, (087B1184)	087B1193

Typical ordering, types:

ECL Comfort Controller	Base part	Appl. key	Remote Control Unit	Temperature sensors	Actuators / valves
ECL 210, 230 V a.c. ECL 210 B, 230 V a.c. ECL 210, 24 V a.c.	for ECL 210 for ECL 310	A2xx	ECA 30 ECA 31	ESMT (outdoor) ESM-11 (pipe surface) ESMC (pipe surface) ESMU (immersion) ESM-10 (room) ESMB-12 (universal)	see dedicated literature

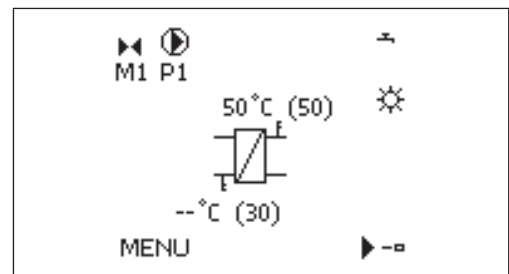
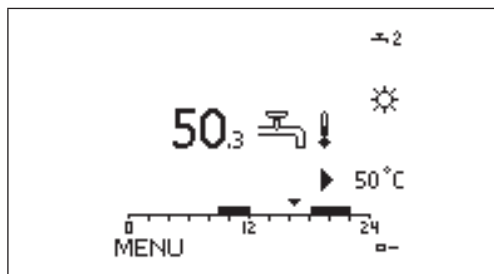
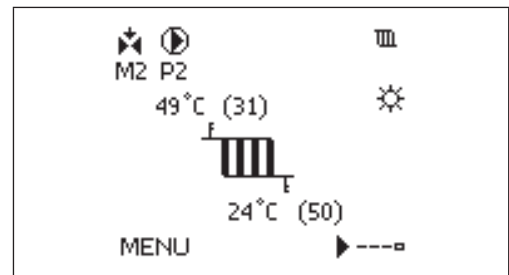
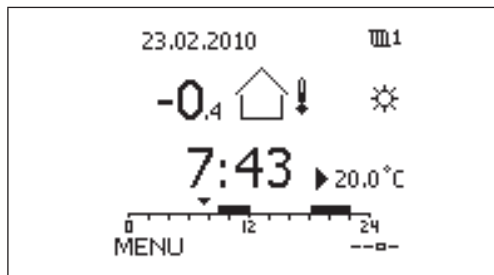
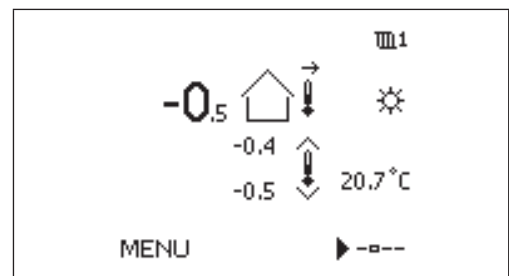
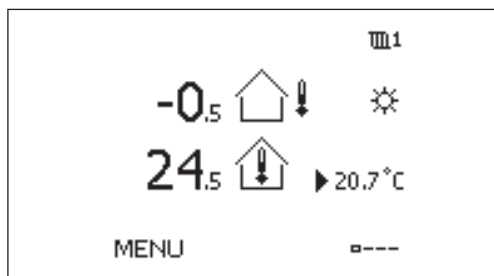
Operation



The graphical monochrome display (A) shows all temperature values as well as status information and is used for the setting of control parameters. The display has backlight. Different favorite displays can be selected. Navigation, browsing and selecting the current item in the menus is done by means of the dial (multi-functional knob (B)).

The RCUs ECA 30 / 31 are used for remote setting and override of ECL Comfort controller. By means of the built-in room temperature sensor, the flow temperature can be corrected to keep a constant room temperature at comfort or saving temperature. The ECA 30 / 31 is operated as an ECL Comfort 210 with dial and backlit display.

Examples of favorite displays:



Functions

General functions:

- The ECL Comfort 210 has all the required functions of a modern electronic temperature controller for heating and DHW applications.
- The controller can be used as master or slave in systems with master / slave ECL Comfort 210 / 310 controllers.
- The ECL Application Key contains the application software for flexible configuration. Furthermore, an update of the controller software is done automatically, if required.
- The ECL Comfort 210 contains, besides the standard functions, log and alarm functions.
- The built-in Real Time Clock gives automatic summer / winter time changeover, week and holiday schedule.
- Motor protection, which ensures stable control and a long life of the motorized control valve, is available for most of the applications. In periods without heat demand, the motorized control valve is exercised to avoid blocking.
- Scheduled control (Comfort and Saving mode) is based on a week program. A holiday program gives the possibility to select days with comfort or saving mode.
- The ECL Comfort 210 can receive pulses from a heat or flow meter to limit the power or the flow.
- In many applications analog input (0 – 10 V) is configured for pressure measuring among others. The scaling is set in the controller.
- Some applications are configured to handle digital input. This function can be used to have an external switch to run comfort or saving mode or react on a flow switch signal.
- The control parameters, proportional band (Xp), integration time (Tn), running time of the motorized control valve and neutral zone (Nz) can be set individually for each output (3-point control).

Heating functions:

- The heat curve (relationship between outdoor temperature and desired flow temperature) is set by means of 6 coordinate points or a slope value. Max. / min. limitation of the desired flow temperature can be set.
- The return temperature limitation can work in relation to the outdoor temperature or be a fixed value.
- The heating cut-out function can switch OFF the heating and stop the circulation pump at high outdoor temperatures.
- Based on the room temperature the ECL Comfort 210 can correct the desired flow temperature in order to increase the comfort level.
- The optimizer function ensures heating in the desired periods (the lower outdoor temperature, the earlier cut-in of the heating).
- The ramping function makes a smooth cut-in of the heating valuable (district heating installations).
- The boost function makes a powerful cut-in of the heating (boiler based installations).
- The circulation pump is controlled in relation to heat demand and frost protection. In periods without heat demand, the circulation pump is exercised to avoid blocking.
- The saving function gives two possibilities:
 - reduced flow temperature with fixed reduction or reduction in relation to outdoor temperature (the lower the outdoor temperature, the less the reduction),
 - heating off, still with active frost protection

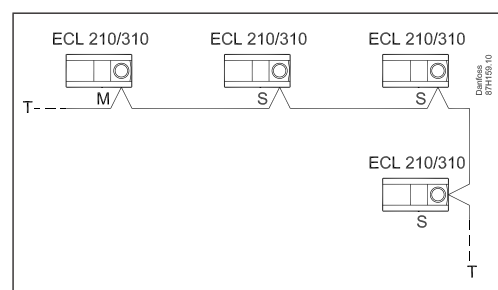
DHW functions:

- The Auto Tuning function with automatic setting of control parameters for constant DHW temperature is integrated in the application A217 and A266. However, Auto Tuning is only applicable 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 and VFS.
- The anti-bacteria function can follow a schedule program.
- The heating circuit can have sliding DHW priority.

Communication

The ECL Comfort 210 has an ECL 485 communication bus, which is used for closed communication between master, slave and RCUs.

Additionally, the ECL Comfort 210 has a non-galvanically separated RS 485 bus for limited Modbus communication. A USB connection (type B) can be used for an ECL Tool.



Master / slave connections

Languages

Menu languages are selectable among approx. 20 languages. See "Language list".

Furthermore, English is always uploaded in parallel to the selected language.

General data

ECL Comfort controller and RCU data:

	ECL Comfort 210 / 210B	ECA 30 / 31
Ambient temperature	0 - 55 °C	
Storage and transportation temperature	-40 - 70 °C	
Mounting	Vertically, on wall or DIN rail (35 mm)	Vertically, on wall or in panel cut-out
Connections	Terminals in base part	Terminals in base part
Number of inputs	8 in total: 6 temperature sensors 2*) Pt 1000 sensor, digital, analog or pulse	-
Temperature sensor type	Pt 1000 (1000 ohm at 0 °C), IEC 751B Range: -60 – 150 °C	Alternative to built-in room temperature sensor: Pt 1000 (1000 ohm at 0 °C), IEC 751B
Digital input	12 V pull-up possible	-
Analog input	0 - 10 V, resolution 9 bits	-
Pulse input, frequency range (selected applications)	For monitoring: 0.01 - 200 Hz For limitation: Minimum 1 Hz (recommended) and regular pulses for having a stable control.	-
Weight	0.46 / 0.42 kg	0.14 kg
Display (ECL Comfort 210 and ECA 30 / 31 only)	Graphical monochrome with backlight 128 × 96 dots Display mode: Black background, white text	
Setting (ECL Comfort 210 and ECA 30 / 31 only)	Dial with intuitive push and turn function	
Setting (ECL Comfort 210 B)	ECA 30 / 31	
Min. backup time for time and date	72 hours	-
Backup of settings and data	Storage in EEPROM (timeless)	-
Grade of enclosure	IP 41	IP 20
-marking in accordance with the standards	EMC directive 2004/108/EC Immunity: EN 61000-6-1:2007 Emission: EN 61000-6-3:2007 LVD directive 2006/95/EC EN 60730	

*) Configured at application upload.

ECL application key:

Storage type	EEPROM
Segmentation	Part 1: Application data, not changeable Part 2: Factory settings, not changeable Part 3: Updating SW for the ECL Comfort controller, not changeable Part 4: User settings, changeable
Applications	A2xx keys work in ECL Comfort 210 and ECL Comfort 310 A3xx keys work in ECL Comfort 310 only
Lock function	If not inserted in the ECL Comfort controller, all settings can be seen, but not changed

ECL 485 communication bus data:

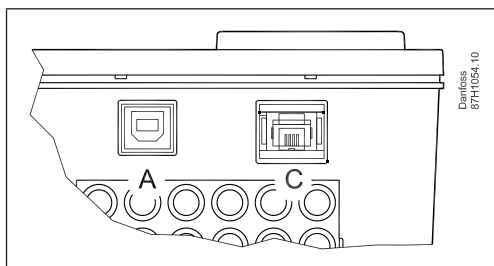
Purpose	For internal ECL Comfort 210 / 310 and ECA 30 / 31 use only (Danfoss proprietary bus)
Connection	Terminals in base part Non-galvanically isolated
Cable type	2 × twisted pair
Max. total cable length (bus cable + sensor cables)	200 m in total (inclusive sensor cables)
Max. number of ECL slaves connected	Units with unique address (1 - 9): 9 Units with address "0": 5
Max. number of Remote Control Units connected	2
Data sent from master	Date Time Outdoor temperature Desired room temperature DHW-priority signal
Data sent from addressed slave controller	Desired flow temperature from each circuit
Data sent from ECA 30 / 31	<ul style="list-style-type: none"> • Actual and desired room temperature • Function selector mode • (ECA 31) Relative humidity

Modbus communication data:

Modbus RS 485	For service purposes
Connection	Terminals in base part Non-galvanically isolated
Cable type	2 × twisted pair
Max. bus cable length	20 m

USB communication data:

USB CDC (Communication Device Class)	For service purposes (Windows driver is needed, to enable that Windows recognize the ECL as a virtual COM port)
Modbus over USB	Similar to the serial Modbus, but with relaxed timing
Connection, cable type	Standard USB cable (USB A ----- USB B)



A port: USB (type B female plug)
C port: ECL Application Key

**Languages
(alphabetic order)**

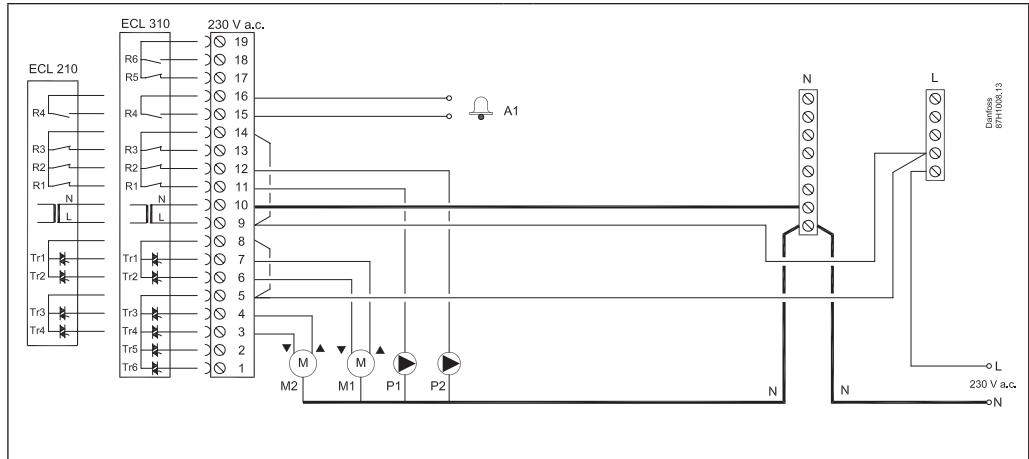
Bulgarian	Estonian	Italian	Russian
Croatian	Finnish	Latvian	Serbian
Czech	French	Lithuanian	Slovak
Danish	German	Polish	Slovenian
English	Hungarian	Romanian	Swedish

The selected language + English is uploaded at application upload.

References

M-bus communication	ECL Comfort 310
Modbus connection (galvanic isolated)	ECL Comfort 310
Ethernet	ECL Comfort 310 has Ethernet connection, RJ45, Modbus / TCP. For SCADA solutions
Extension of input / outputs	ECL Comfort 310 (2 extra inputs, 1 extra output for actuator, 2 extra relays) ECL Comfort 310 + ECA 32 (6 inputs, 2 pulse inputs, 3 analog outputs (0 - 10 V) and 4 relays)

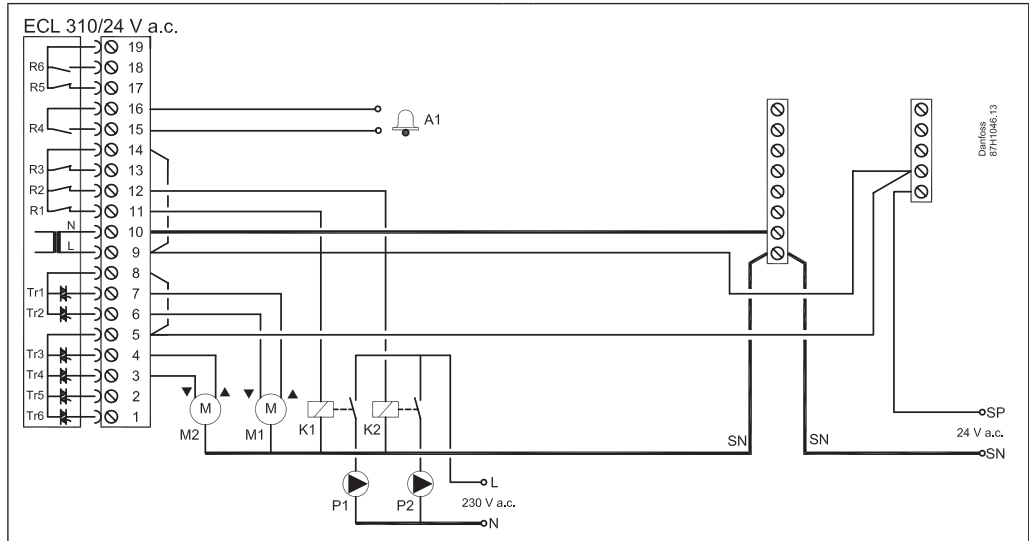
Wiring - 230 V a.c.



ECL Comfort 210 wiring example: Application A266.1

Supply voltage	230 V a.c. - 50 Hz
Voltage range	207 to 244 V a.c. (IEC 60038)
Power consumption	5 VA
Max. load on relay outputs	4(2) A - 230 V a.c. (4 A for ohmic load, 2 A for inductive load)
Max. load on actuator outputs	0.2 A - 230 V a.c.

Wiring - 24 V a.c.

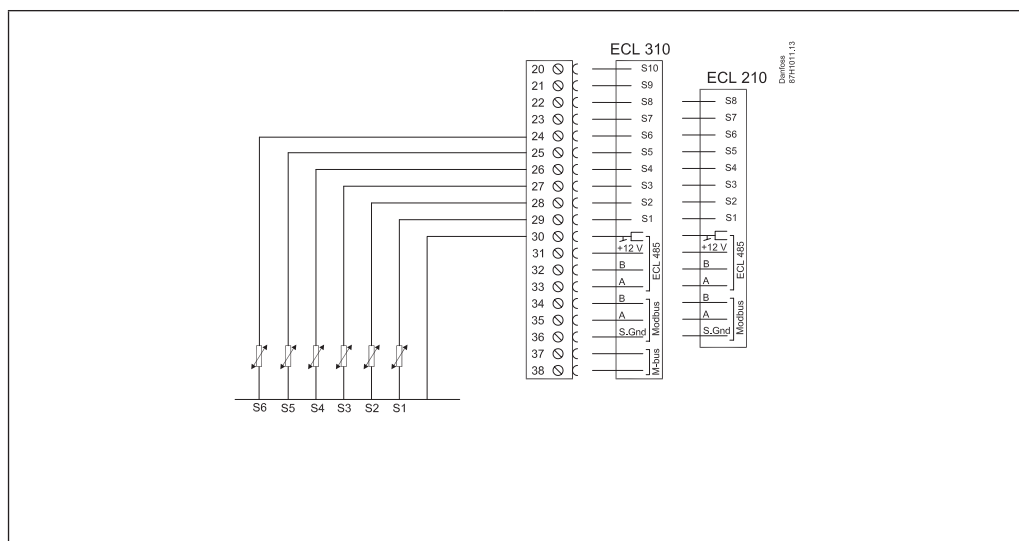


ECL Comfort 210 wiring example: Application A266.1

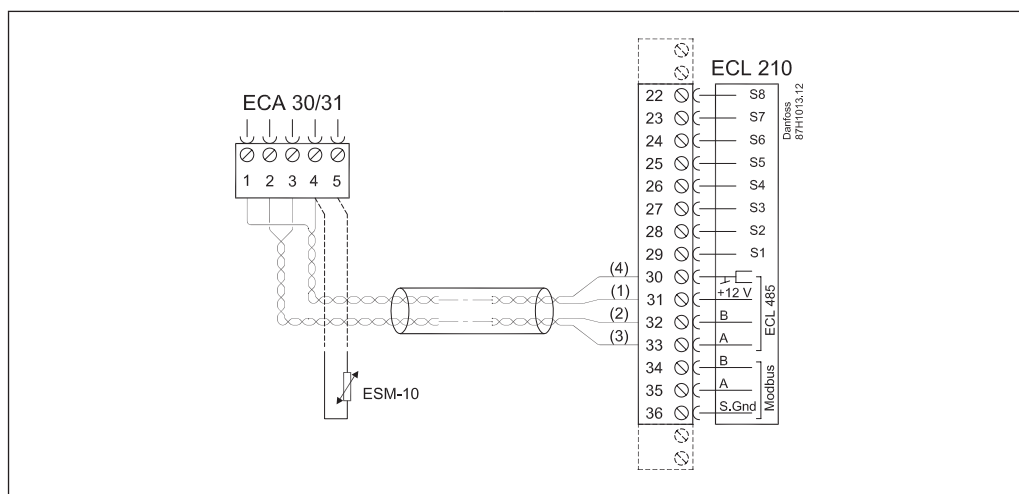
Auxiliary relays (K) must be used in order to separate the 230 V a.c. supply from the 24 V a.c. supply of the controller.

Supply voltage	24 V a.c. - 50 Hz
Voltage range	21.6 to 26.4 V a.c. (IEC 60038)
Power consumption	5 VA
Max. load on relay output	4(2) A - 24 V a.c. (4 A for ohmic load, 2 A for inductive load)
Max. load on actuator output	1 A - 24 V a.c.

Wiring - input



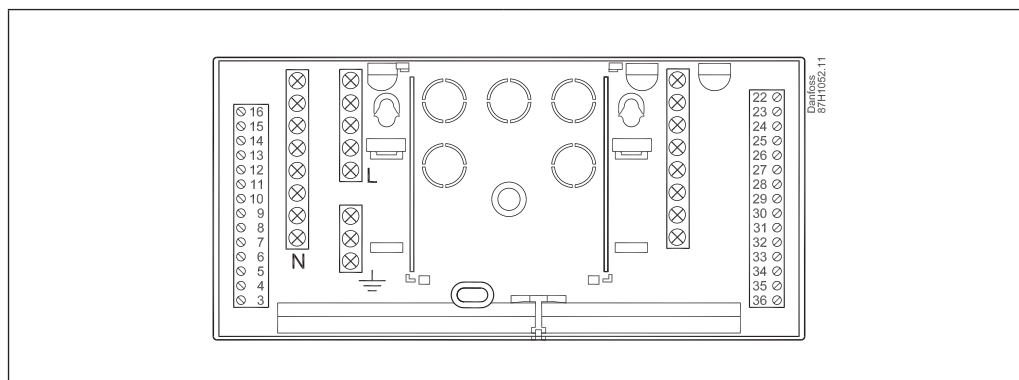
Wiring - ECA 30 / 31 Remote Control Unit



Wiring of ECL Comfort 210 and ECA 30 / 31, 230 V a.c.

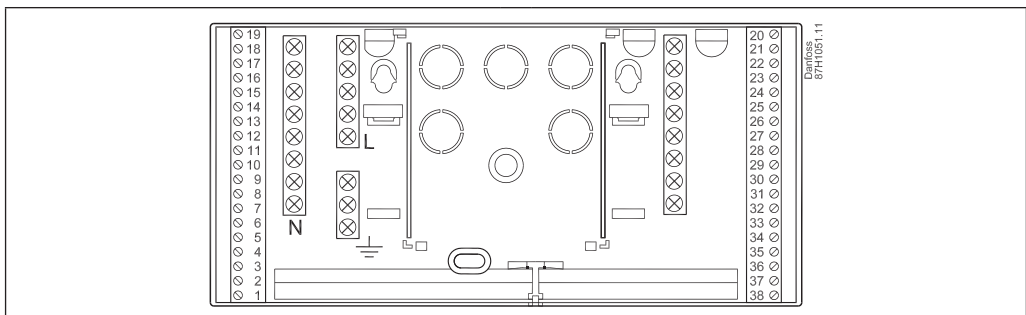
Supply voltage	From ECL 485 communication bus
Power consumption	1 VA
External room temperature sensor	Pt 1000 (ESM-10), substitutes the built-in room temperature sensor
ECA 31 only	Contains humidity sensor, used for special applications

Base part



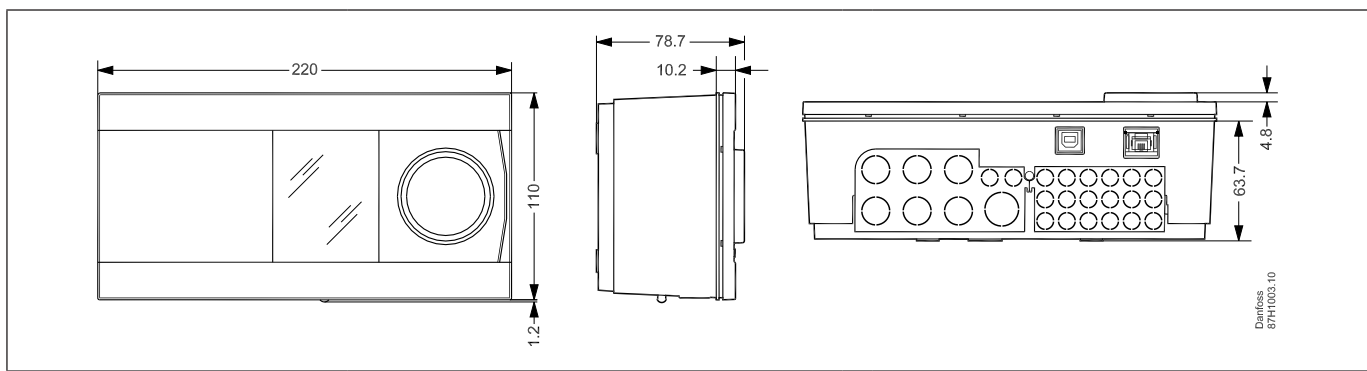
ECL Comfort 210 base part

Base part, continued

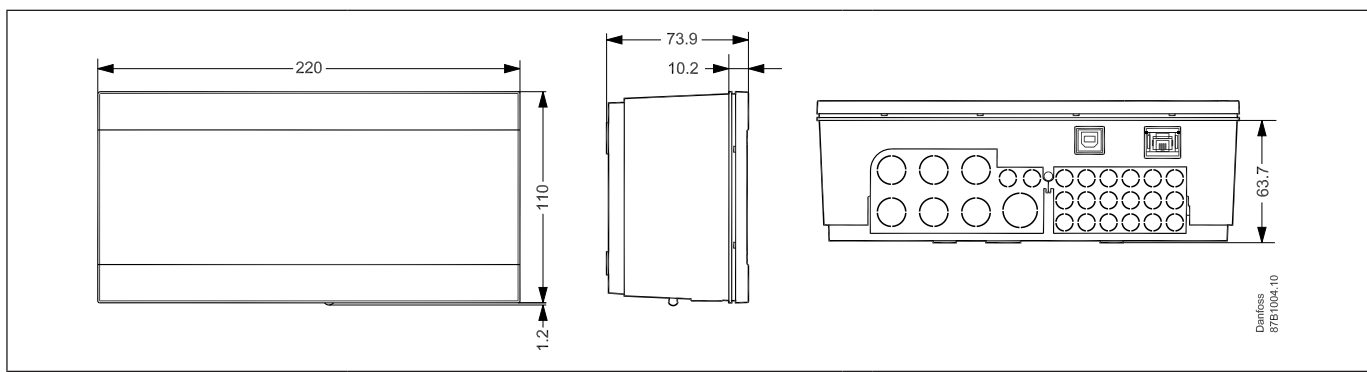


ECL Comfort 310 base part (can be used for ECL Comfort 210 too).

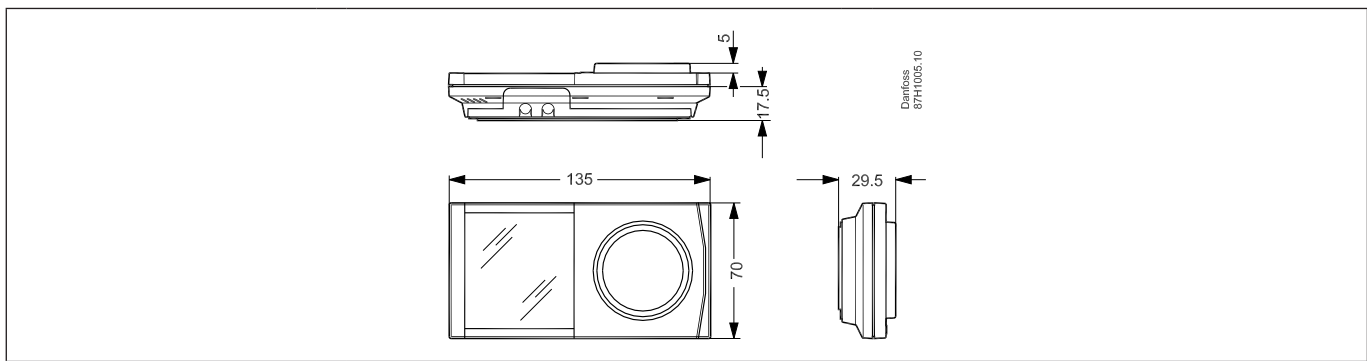
Dimensions



ECL Comfort 210

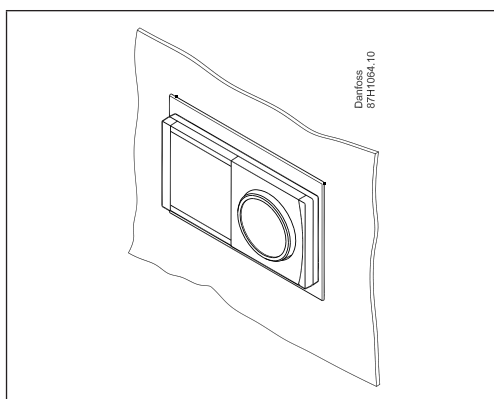


ECL Comfort 210B



ECA 30 / 31

ECA 30 / 31 cut-out for mounting in panel front



A frame (code no. 087H3236) is placed in the cut-out (139 × 93 mm) in which the ECA 30 / 31 is placed.

Additional documentation for ECL Comfort 210, modules and accessories is available on <http://den.danfoss.com/>