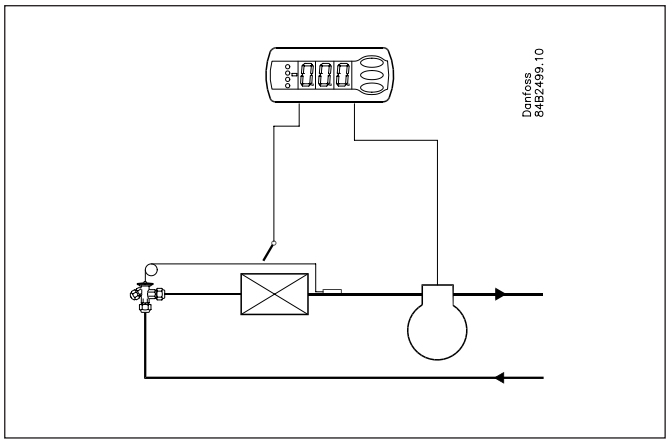
Controller for temperature control
- EKC 102

Manual

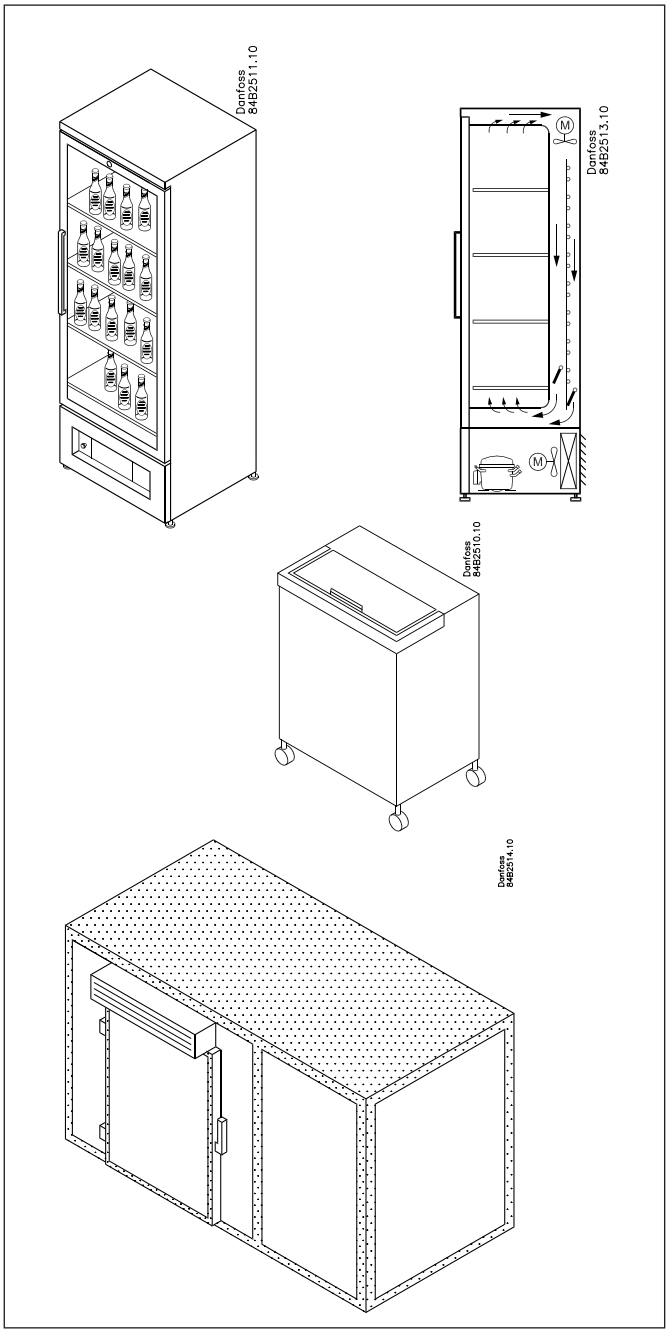
Introduction

Application
- The controller is used for temperature control refrigeration appliances and cold room
- Defrost control
- For front panel mounting



Principle
The controller contains a temperature control where the signal can be received from one temperature sensor.
The sensor is placed in the cold air flow after the evaporator or in the warm air flow just before the evaporator.
The controller controls the defrost with either natural defrost or electric defrost. Renewed cutin after defrost can be accomplished based on time or temperature.
A measurement of the defrost temperature can be obtained directly through the use of an S5 sensor.
One, two or three relays will cut the required functions in and out – the application determines which:
- Refrigeration (compressor or solenoid valve)
- Defrost
- Alarm
- Refrigeration 2 (compressor 2)
- Fan

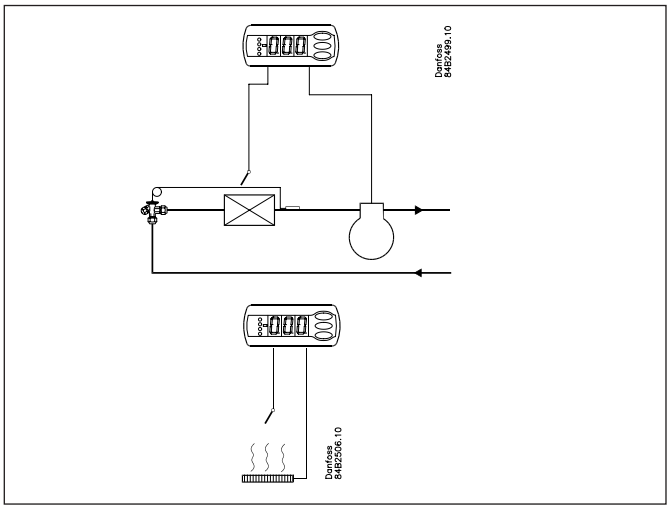
The different applications are described on next page.



Advantages
- Integrated refrigeration-technical functions
- Defrost on demand in 1:1 systems
- Buttons and seal imbedded in the front
- IP65 density from the front panel
- Can control two compressors
- Digital input for either:
  - Door alarm
  - Defrost start
  - Start/stop of regulation
  - Night operation
  - Change-over between two temperature reference
  - Case cleaning function
- Instant programming via programming key
- HACCP
  Factory calibration that will guarantee a better measuring accuracy than stated in the standard EN 441-13 without subsequent calibration (Pt 1000 ohm sensor)

The series
There are four controllers in the series:
A-model for simple regulation
B-model where an alarm function and possibly also a digital input will be required
C-model where the defrost temperature also enjoys top priority
D-model with fan function, change-over between temperature reference and case cleaning function

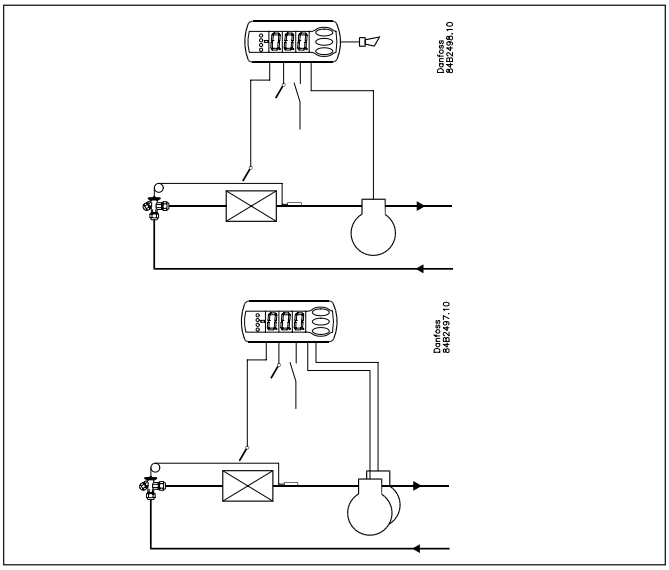
All these four controllers are without data communication.
If data communication or additional functions are required, we refer you to the EKC 202 or AK-CC 210 series.



EKC 102A
Controller with one relay output and one temperature sensor.

Temperature control at start/stop of compressor.
Natural defrost at stop of compressor.
Instead of the compressor a solenoid valve may of course be connected in the liquid line.

Heating function
The controller can also be used as a simple ON/OFF thermostat for heating applications.

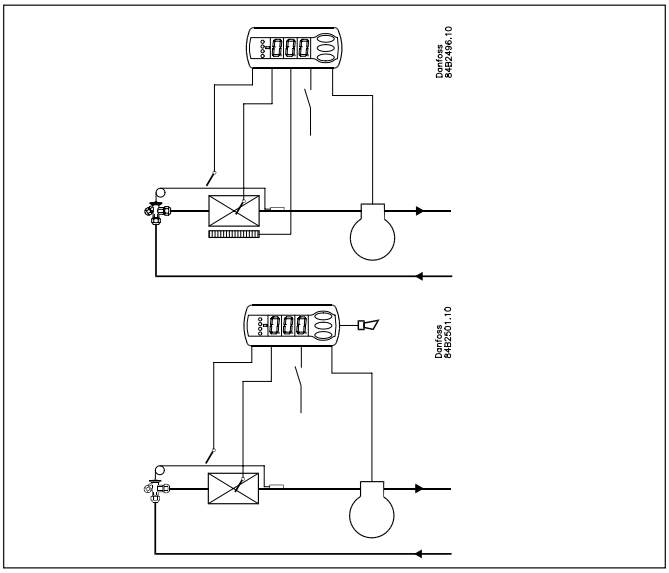


EKC 102B
Controller with two relay outputs, extra temperature sensor and digital input.

Relay output 2 can be used for alarm function or for cutin and cutout of a refrigeration step 2.

The extra temperature signal can be used for product sensor or for condenser sensor with alarm function.

The digital input can be used for door alarm, defrost start, start/ stop of refrigeration or for night signal.

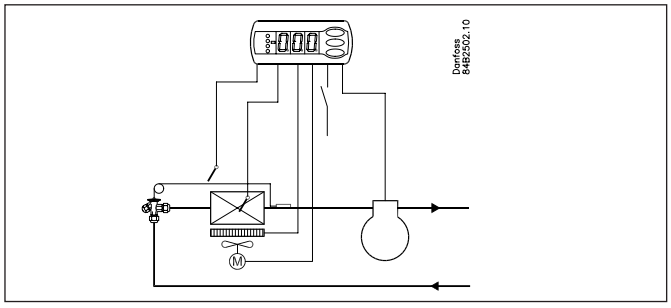


EKC 102C
Controller with two relay outputs, extra temperature sensor and digital input.

Relay output 2 can be used for electric defrost or for an alarm function.

Temperature signal 2 can be used for defrost stop based on temperature or for product sensor.
In a 1:1 system and with the sensor mounted on the evaporator the controller will be able to use the "defrost on demand" function. The function will start a defrost when the evaporator's refrigeration capacity drops due to icing-up.

The digital input can be used for door alarm, defrost start, start/ stop of refrigeration or for night signal.



EKC 102D
Controller with three relay outputs, two temperature sensors and digital input.

Temperature control at start/stop of compressor / solenoid valve
Defrost sensor
Electrical defrost / gas defrost
Relay output 3 is used for control of fan.

Start of defrost

A defrost can be started in different ways

Interval: Defrost is started at fixed time intervals, say, every eighth hour

Refrigeration time: Defrost is started at fixed refrigeration time intervals, in other words, a low need for refrigeration will "postpone" the coming defrost

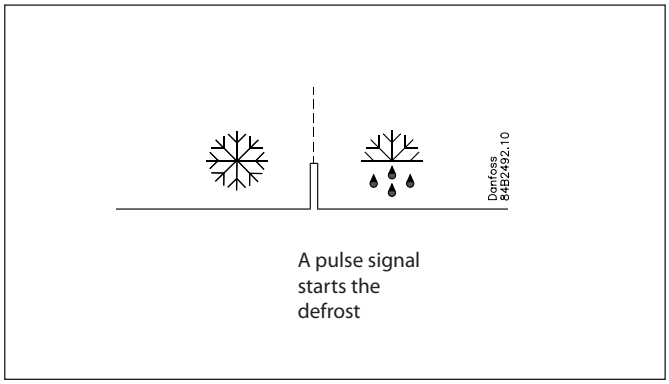
Contact Defrost is started here with a pulse signal on a digital input.

Manual: An extra defrost can be activated from the controller's lower-most button

S5-temp. In 1:1 systems the efficiency of the evaporator can be followed. Icing-up will start a defrost.

Start-up After a power cut the system can be started with a defrost.

All the mentioned methods can be used at random – if just one them is activated a defrost will be started. When the defrost starts the defrost timers are set at zero.



A pulse signal starts the defrost

Refrigeration control with two compressors

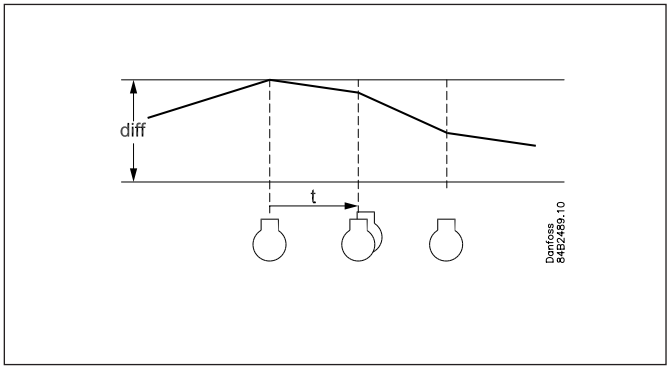
The two compressors must be of the same size.

When the controller demands refrigeration it will first cut in the compressor with the shortest operating time. After the time delay the second compressor will be cut in.

When the temperature has dropped to "the middle of the differential" the compressor with the longest operating time will be cut out.

If the Compressor in operation is unable to lower the temperature to the cutout point, the other compressor will be cut in again. This happens when the temperature reaches the upper part of the differential. If the temperature, on the contrary, remains "stuck" within the differential for two hours there will be a change-over between the two compressors so that the operating time can be equalised.

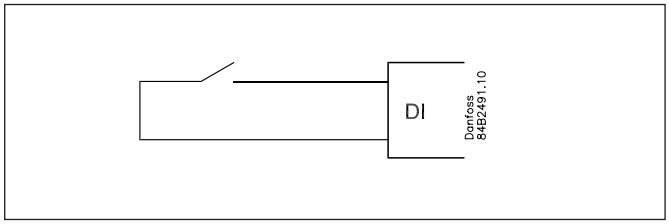
The compressors used must be of a type that is capable of starting up against a high pressure.



Digital input

2 of the controllers has a digital input which can be used for the following functions:

- Door contact function with alarm if the door has been open for too long.
- Defrost start
- Start/stop of regulation
- Change-over to night operation
- Case cleaning
- Change to another temperature reference
- Inject on/off (relay for refrigeration cut-out)



Case cleaning function

This function makes it easy to steer the refrigeration appliance through a cleaning phase. Via three pushes on a switch you change from one phase to the next phase.

The first push stops the refrigeration – the fans keep working

"Later": The next push stops the fans

"Still later": The next push restarts refrigeration

The different situations can be followed on the display.

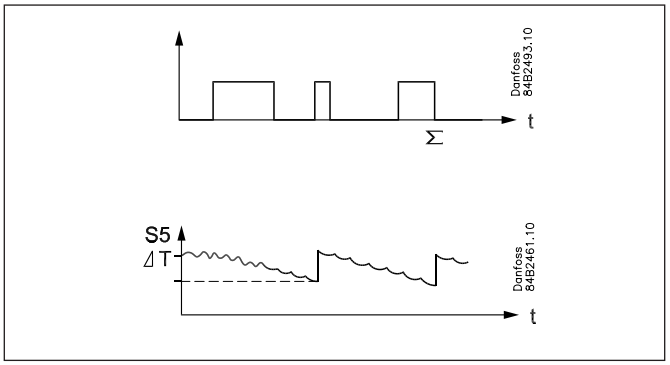
There is no temperature monitoring during case cleaning.

-	+	+	°C
1	÷	+	Fan
2	÷	÷	Off
3	+	+	°C

Defrost on demand

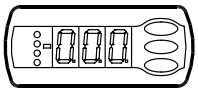
1 Based on refrigeration time
When the aggregate refrigeration time has passed a fixed time, a defrost will be started.

2 Based on temperature
The controller will constantly follow the temperature at S5. Between two defrosts the S5 temperature will become lower the more the evaporator ices up (the compressor operates for a longer time and pulls the S5 temperature further down). When the temperature passes a set allowed variation the defrost will be started.
This function can only be used in 1:1 systems



Operation

Display
The values will be shown with three digits, and with a setting you can determine whether the temperature are to be shown in °C or in °F.



Light-emitting diodes (LED) on front panel
There are LED's on the front panel which will light up when the belonging relay is activated.
= Refrigeration
= Defrost
= Fan

The light-emitting diodes will flash when there is an alarm.
In this situation you can download the error code to the display and cancel/sign for the alarm by giving the top button a brief push.

Defrost
During defrost a –d- is shown in the display. This view will continue up till 15 min. after the cooling has resumed.
However the view of –d- will be discontinued if:
- The temperature is suitable within the 15 minutes
- The regulation is stopped with "Main Switch"
- A high temperature alarm appears

The buttons
When you want to change a setting, the upper and the lower buttons will give you a higher or lower value depending on the button you are pushing. But before you change the value, you must have access to the menu. You obtain this by pushing the upper button for a couple of seconds - you will then enter the column with parameter codes. Find the parameter code you want to change and push the middle buttons until value for the parameter is shown. When you have changed the value save the new value by once more pushing the middle button

Examples

Set menu
1. Push the upper button until a parameter r01 is shown
2. Push the upper or the lower button and find that parameter you want to change
3. Push the middle button until the parameter value is shown
4. Push the upper or the lower button and select the new value
5. Push the middle button again to enter the value.

Cutout alarm relay / receipt alarm/see alarm code
• Push briefly the upper button
If there are several alarm codes they are found in a rolling stack. Push the uppermost or lowermost button to scan the rolling stack.

Set temperature
1. Push the middle button until the temperature value is shown
2. Push the upper or the lower button and select the new value
3. Push the middle button to select the setting

Manual start or stop of a defrost
• Push the lower button for four seconds.

See the temperature at the defrost sensor
• Push briefly the lower button
If no sensor has been mounted, "non" will appear.

100% tight
The buttons and the seal are imbedded in the front.
A special moulding technique unites the hard front plastic, the softer buttons and the seal, so that they become an integral part of the front panel. There are no openings that can receive moisture or dirt.

Menu survey

EKC 102A

SW = 1.2x

Parameters Function	Codes	Min.-value	Max.-value	Factory setting	Actual setting
Normal operation					
Temperature (set point)	---	-50°C	99°C	2°C	
Thermostat					
Differential	r01	0,1 K	20 K	2 K	
Max. limitation of setpoint setting	r02	-49°C	99°C	99°C	
Min. limitation of setpoint setting	r03	-50°C	99°C	-50°C	
Adjustment of temperature indication	r04	-20 K	20 K	0 K	
Temperature unit (°C/°F)	r05	°C	°F	°C	
Correction of the signal from Sair	r09	-10 K	10 K	0 K	
Manual service (-1), stop regulation (0), start regulation (1)	r12	-1	1	1	
Compressor					
Min. ON-time	c01	0 min	30 min	0 min	
Min. OFF-time	c02	0 min	30 min	0 min	
Compressor relay must cutin and out inversely (NC-function)	c30	OFF	On	OFF	
Defrost					
Defrost method (0=none / 1=natural)	d01	0	1	1	
Defrost stop temperature	d02	0°C	25°C	6°C	
Interval between defrost starts	d03	0 hours	48 hours	8 hours	
Max. defrost duration	d04	0 min	180 min	45 min	
Displacement of time on cutin of defrost at start-up	d05	0 min	240 min	0 min	
Defrost sensor (0=time, 1=Sair)	d10	0	1	0	
Defrost at start-up	d13	no	yes	no	
Miscellaneous					
Delay of output signals after start-up	o01	0 s	600 s	5 s	
Access code	o05	0	100	0	
Used sensor type (Pt /PTC/NTC)	o06	Pt	ntc	Pt	
Refrigeration or heat (rE=refrigeration, HE=heat)	o07	rE	HE	rE	
Display step = 0.5 (normal 0.1 at Pt sensor)	o15	no	yes	no	
Save the controllers present settings to the programming key. Select your own number.	o65	0	25	0	
Load a set of settings from the programming key (previously saved via o65 function)	o66	0	25	0	
Replace the controllers factory settings with the present settings	o67	OFF	On	OFF	
Service					
Status on relay Can be controlled manually, but only when r12=-1	u58				

Regulation starts when the voltage is on.

Fault code display	
A45	Standby mode
Alarm code display	
E1	Fault in controller
E29	Sair sensor error
Status code display	
S0	Regulating
S2	ON-time Compressor
S3	OFF-time Compressor
S10	Refrigeration stopped by main switch
S11	Refrigeration stopped by thermostat
S14	Defrost sequence. Defrosting
S20	Emergency cooling
S25	Manual control of outputs
S32	Delay of output at start-up
non	The defrost temperature cannot be displayed. There is no sensor
-d-	Defrost in progress / First cooling after defrost
PS	Password required. Set password

Factory setting
If you need to return to the factory-set values, it can be done in this way:
- Cut out the supply voltage to the controller
- Keep upper and lower button depressed at the same time as you reconnect the supply voltage

EKC 102B and EKC 102C

SW = 1.2X

Parameters		EKC	EKC	Min.-	Max.-	Factory	Actual
Function	**Codes**	**102B**	**102C**	**value**	**value**	**setting**	**setting**
Normal operation							
Temperature (set point)	---			-50°C	50°C	2°C	
Thermostat							
Differential	r01			0,1 K	20 K	2 K	
Max. limitation of setpoint setting	r02			-49°C	50°C	50°C	
Min. limitation of setpoint setting	r03			-50°C	49°C	-50°C	
Adjustment of temperature indication	r04			-20 K	20 K	0 K	
Temperature unit (°C/°F)	r05			°C	°F	°C	
Correction of the signal from Sair	r09			-10 K	10 K	0 K	
Manual service, stop regulation, start regulation (-1, 0, 1)	r12			-1	1	1	
Displacement of reference during night operation	r13			-10 K	10 K	0 K	
Alarm							
Delay for temperature alarm	A03			0 min	240 min	30 min	
Delay for door alarm	A04			0 min	240 min	60 min	
Delay for temperature alarm after defrost	A12			0 min	240 min	90 min	
High alarm limit	A13			-50°C	50°C	8°C	
Low alarm limit	A14			-50°C	50°C	-30°C	
High alarm limit for condenser temperature (o69)	A37			0°C	99°C	50°C	
Compressor							
Min. ON-time	c01			0 min	30 min	0 min	
Min. OFF-time	c02			0 min	30 min	0 min	
Time delay for cutin of comp.2	c05			0 sec	999 sec	5 sec	
Compressor relay must cutin and out inversely (NC-function)	c30			OFF	On	OFF	
Defrost							
Defrost method (0=none / 1=natural, 2=gas)	d01	0/1	0/1*/2	0	2	1	
Defrost stop temperature	d02			0°C	25°C	6°C	
Interval between defrost starts	d03			0 hours	48 hours	8 hours	
Max. defrost duration	d04			0 min	180 min	45 min	
Displacement of time on cutin of defrost at start-up	d05			0 min	240 min	0 min	
Defrost sensor 0=time, (B:1=Sair.) (C: 1=S5, 2=Sair)	d10	1=Sair	1=S5	0	1 (2)	0	
Defrost at start-up	d13			no	yes	no	
Max. aggregate refrigeration time between two defrosts	d18			0 hours	48 hours	8 hours	
Defrost on demand - S5 temperature's permitted variation during frost build-up. On central plant choose 20 K (=off)	d19			0 K	20 k	2 K	
Miscellaneous							
Delay of output signals after start-up	o01			0 s	600 s	5 s	
Input signal on DI1. Function: (0=not used. , 1= door alarm when open. 2=defrost start (pulse-pressure). 3=ext.main switch. 4=night operation	o02			0	4	0	
Access code 1 (all settings)	o05			0	100	0	
Used sensor type (Pt /PTC/NTC)	o06			Pt	ntc	Pt	
Display step = 0.5 (normal 0.1 at Pt sensor)	o15			no	yes	no	
Access code 2 (partly access)	o64			0	100	0	
Save the controllers present settings to the programming key. Select your own number.	o65			0	25	0	
Load a set of settings from the programming key (previously saved via o65 function)	o66			0	25	0	
Replace the controllers factory settings with the present settings	o67			OFF	On	OFF	
Select application for Saux sensor (0=not used, 1=product sensor, 2=condenser sensor)	o69			0	2	0	
Select application for S5 sensor (0=defrost sensor, 1= product sensor)	o70			0	1	0	
Select application for relay 2: 1=compressor-2 / defrost, 2= alarm relay	o71	Comp. / Alarm	Defrost/ Alarm	1	2	1	
Service							
Temperature measured with Saux sensor	u03						
Temperature measured with S5 sensor	u09						
Status on DI1 input. on/1=closed	u10						
Status on relay for cooling Can be controlled manually, but only when r12=-1	u58						
Status on relay 2 Can be controlled manually, but only when r12=-1	u70						

Regulation starts when the voltage is on.

Alarm code display	
A1	High temperature alarm
A2	Low temperature alarm
A4	Door alarm
A45	Standby mode
A61	Condenser alarm
Fault code display	
E1	Fault in controller
E27	S5 sensor error
E29	Sair sensor error
E30	Saux sensor error
Status code display	
S0	Regulating
S2	ON-time Compressor
S3	OFF-time Compressor
S10	Refrigeration stopped by main switch
S11	Refrigeration stopped by thermostat
S14	Defrost sequence. Defrosting
S17	Door open (open DI input)
S20	Emergency cooling
S25	Manual control of outputs
S32	Delay of output at start-up
non	The defrost temperature cannot be displayed. There is no sensor
-d-	Defrost in progress / First cooling after defrost
PS	Password required. Set password

Factory setting
If you need to return to the factory-set values, it can be done in this way:
- Cut out the supply voltage to the controller
- Keep upper and lower button depressed at the same time as you reconnect the supply voltage

* 1=>EL if o71 = 1

EKC 102D

SW = 1.3X

Parameters		Min.-value	Max.-value	Factory setting	Actual setting
Function	**Codes**				
Normal operation					
Temperature (set point)	---	-50°C	50°C	2°C	
Thermostat					
Differential	r01	0,1 K	20 K	2 K	
Max. limitation of setpoint setting	r02	-49°C	50°C	50°C	
Min. limitation of setpoint setting	r03	-50°C	49°C	-50°C	
Adjustment of temperature indication	r04	-20 K	20 K	0.0 K	
Temperature unit (°C/°F)	r05	°C	°F	°C	
Correction of the signal from Sair	r09	-10 K	10 K	0 K	
Manual service(-1), stop regulation(0), start regulation (1)	r12	-1	1	1	
Displacement of reference during night operation	r13	-10 K	10 K	0 K	
Activation of reference displacement r40	r39	OFF	on	OFF	
Value of reference displacement (can be activated by r39 or DI)	r40	-50 K	50 K	0 K	
Alarm					
Delay for temperature alarm	A03	0 min	240 min	30 min	
Delay for door alarm	A04	0 min	240 min	60 min	
Delay for temperature alarm after defrost	A12	0 min	240 min	90 min	
High alarm limit	A13	-50°C	50°C	8°C	
Low alarm limit	A14	-50°C	50°C	-30°C	
Alarm delay DI1	A27	0 min	240 min	30 min	
High alarm limit for condenser temperature (o70)	A37	0°C	99°C	50°C	
Compressor					
Min. ON-time	c01	0 min	30 min	0 min	
Min. OFF-time	c02	0 min	30 min	0 min	
Compressor relay must cutin and out inversely (NC-function)	c30	0 / OFF	1 / on	0 / OFF	
Defrost					
Defrost method (none/EL/gas)	d01	no	gas	EL	
Defrost stop temperature	d02	0°C	25°C	6°C	
Interval between defrost starts	d03	0 hours	48 hours	8 hours	
Max. defrost duration	d04	0 min	180 min	45 min	
Displacement of time on cutin of defrost at start-up	d05	0 min	240 min	0 min	
Drip off time	d06	0 min	60 min	0 min	
Delay for fan start after defrost	d07	0 min	60 min	0 min	
Fan start temperature	d08	-15°C	0°C	-5°C	
Fan cutin during defrost. 0=stopped, 1=running, 2=running during pump down and defrost	d09	0	2	1	
Defrost sensor (0=time, 1=S5, 2=Sair)	d10	0	2	0	
Defrost at start-up	d13	no	yes	no	
Max. aggregate refrigeration time between two defrosts	d18	0 hours	48 hours	0 hours	
Defrost on demand - S5 temperature's permitted variation during frost build-up. On central plant choose 20 K (=off)	d19	0 K	20 K	20 K	
Fans					
Fan stop at cutout compressor	F01	no	yes	no	
Delay of fan stop	F02	0 min	30 min	0 min	
Fan stop temperature (S5)	F04	-50°C	50°C	50°C	
Miscellaneous					
Delay of output signals after start-up	o01	0 s	600 s	5 s	
Input signal on DI1. Function: 0=not used. 1=status on DI1. 2=door function with alarm when open. 3=door alarm when open. 4=defrost start (pulse-pressure). 5=ext.main switch. 6=night operation 7=change reference (activate r40). 8=alarm function when closed. 9=alarm function when open. 10=case cleaning (pulse pressure). 11=Inject off when open.	o02	0	11	0	
Access code 1 (all settings)	o05	0	100	0	
Used sensor type (Pt /PTC/NTC)	o06	Pt	ntc	Pt	
Display step = 0.5 (normal 0.1 at Pt sensor)	o15	no	yes	no	
Case cleaning. 0=no case cleaning. 1=Fans only. 2=All output Off.	o46	0	2	0	
Access code 2 (partly access)	o64	0	100	0	
Save the controllers present settings to the programming key. Select your own number.	o65	0	25	0	
Load a set of settings from the programming key (previously saved via o65 function)	o66	0	25	0	
Replace the controllers factory settings with the present settings	o67	OFF	On	OFF	
Select application for S5 sensor (0=defrost sensor, 1= product sensor, 2=condenser sensor with alarm)	o70	0	2	0	
Service					
Temperature measured with S5 sensor	u09				
Status on DI1 input. on/1=closed	u10				
Status on night operation (on or off) 1=closed	u13				
Read the present regulation reference	u28				
Status on relay for cooling (Can be controlled manually, but only when r12=-1)	u58				
Status on relay for fans (Can be controlled manually, but only when r12=-1)	u59				
Status on relay for defrost. (Can be controlled manually, but only when r12=-1)	u60				
Temperature measured with Sair sensor	u69				

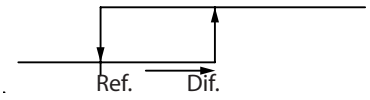
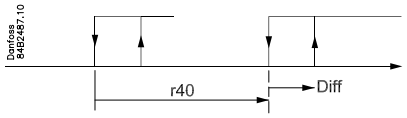
Regulation starts when the voltage is on.

Alarm code display	
A1	High temperature alarm
A2	Low temperature alarm
A4	Door alarm
A15	DI 1 alarm
A45	Standby mode
A59	Case cleasning
A61	Condenser alarm
Fault code display	
E1	Fault in controller
E27	S5 sensor error
E29	Sair sensor error
Status code display	
S0	Regulating
S2	ON-time Compressor
S3	OFF-time Compressor
S4	Drip-off time
S10	Refrigeration stopped by main switch
S11	Refrigeration stopped by thermostat
S14	Defrost sequence. Defrosting
S15	Defrost sequence. Fan delay
S16	Refrigeration stopped because of open DI input
S17	Door open (open DI input)
S20	Emergency cooling
S25	Manual control of outputs
S29	Case cleaning
S32	Delay of output at start-up
non	The defrost temperature cannot be displayed. There is stop based on time
-d-	Defrost in progress / First cooling after defrost
PS	Password required. Set password

Factory setting
If you need to return to the factory-set values, it can be done in this way:
- Cut out the supply voltage to the controller
- Keep upper and lower button depressed at the same time as you reconnect the supply voltage

Functions

Here is a description of the individual functions.
A controller only contains this part of the functions. Cf. the menu survey.

Function	No.
Normal display	
Normal display shows the temperature value from the thermostat sensor Sair.	
Thermostat	
Set point Regulation is based on the set value plus a displacement, if applicable. The value is set via a push on the centre button. The set value can be locked or limited to a range with the settings in r02 and r 03. The reference at any time can be seen in "u28 Temp. ref"	
Differential When the temperaure is higher than the reference + the set differential, the compressor relay will be cut in. It will cut out again when the temperature comes down to the set reference.  	r01
Setpoint limitation The controller's setting range for the setpoint may be narrowed down, so that much too high or much too low values are not set accidentally - with resulting damages.	
To avoid a too high setting of the setpoint, the max. allowable reference value must be lowered.	r02
To avoid a too low setting of the setpoint, the min. allowable reference value must be increased.	r03
Correction of the display's temperature showing If the temperature at the products and the temperature received by the controller are not identical, an offset adjustment of the shown display temperature can be carried out.	r04
Temperature unit Set here if the controller is to show temperature values in °C or in °F.	r05
Correction of signal from Sair Compensation possibility through long sensor cable.	r09
Start / stop of refrigeration With this setting refrigeration can be started, stopped or a manual override of the outputs can be allowed. 1 = regulation 0 = regulation is stopped -1 = regulation is stopped - override allowed. Stopped regulation will give a "Standby alarm".	r12
Night setback value The thermostat's reference will be the setpoint plus this value when the controller changes over to night operation. (Select a negative value if the function is used for "quick cooling".)	r13
Activation of reference displacement When the function is changed to ON the thermostat differential will be increased by the value in r40. Activation can also take place via input DI(defined in o02).  	r39
Value of reference displacement The thermostat reference and the alarm values are shifted the following number of degrees when the displacement is activated. Activation can take place via r39 or input DI	r40
Alarm	
The controller can give alarm in different situations. When there is an alarm all the light-emitting diodes (LED) will flash on the controller front panel	
Alarm delay (short alarm delay) If one of the two limit values is exceeded, a timer function will commence. The alarm will not become active until the set time delay has been passed. The time delay is set in minutes.	A03
Time delay for door alarm The time delay is set in minutes. The function is defined in o02.	A04
Time delay for cooling (long alarm delay) This time delay is used during start-up (recovery time), during defrost, in the cooling phase after a defrost. There will be change-over to the normal time delay (A03) when the temperature has dropped below the set upper alarm limit. The time delay is set in minutes.	A12
Upper alarm limit Here you set when the alarm for high temperature is to start. The limit value is set in °C (absolute value). The limit value will be raised during night operation. The value is the same as the one set for night setback, but will only be raised if the value is positive. The limit value will also be raised in connection with reference displacement r39.	A13
Lower alarm limit Here you set when the alarm for low temperature is to start. The limit value is set in °C (absolute value). The limit value will also be raised in connection with reference displacement r39.	A14
Delay of a DI alarm A cut-out/cut-in input will result in alarm when the time delay is passed. The function is defined in o02.	A27
High alarm limit for condenser temperature If the Saux (S5) sensor is used for monitoring the condenser's temperature you must set the value at which the alarm is to become activated. The value is set in °C. There is no alarm delay. The alarm disappears again when the temperature has dropped 10 degrees. Definition of Saux (S5) takes place in o69/o70.	A37
Compressor	
The compressor relay works in conjunction with the thermostat. When the thermostat calls for refrigeration will the compressor relay be operated.	
Running times To prevent irregular operation, values can be set for the time the compressor is to run once it has been started. And for how long it at least has to be stopped. The running times are not observed when defrosts start.	
Min. ON-time (in minutes)	c01
Min. OFF-time (in minutes)	c02
Time delay for couplings of two compressors Settings indicate the time that has to elapse from the first relay cuts in and until the next relay has to cut in.	c05

Reversed relay function for compressor relay 0: Normal function where the relay cuts in when refrigeration is demanded 1: Reversed function where the relay cuts out when refrigeration is demanded (this wiring produces the result that there will be refrigeration if the supply voltage to the controller fails). (When two compressors are cut in and out the two relays will operate in opposite directions).	c30
Defrost	
The controller contains a timer function that is zeroset after each defrost start. The timer function will start a defrost if/when the interval time is passed. The timer function starts when voltage is connected to the controller, but it is displaced the first time by the setting in d05. This timer function can be used as a simple way of starting defrosts, but it will always act as safety defrost if one of the subsequent defrost starts is not received. Defrost start can also be accomplished via contact signals or manual start-up. All starting methods will function in the controller. The different functions have to be set, so that defrosts do not "come tumbling" one after the other. Defrost can be accomplished with electricity or natural defrost. The actual defrost will be stopped based on time or temperature with a signal from a temperature sensor.	
Defrost method Here you set whether defrost is to be accomplished with electricity, natural or "non". A and B: "natural" = 1, "non" = 0 C: "natural" = 1+o71 = 2, "non" = 0, "el" = 1+o71=1, "Gas"=2+o71=1 D: "non" = No, "el" = EL, "Gas" =GAS During defrost the defrost relay will be cut in. When gas defrosting the compressor relay will be cut in during defrost.	d01
Defrost stop temperature The defrost is stopped at a given temperature which is measured with a sensor (the sensor is defined in d10). The temperature value is set.	d02
Interval between defrost starts The function is zeroset and will start the timer function at each defrost start. When the time has expired the function will start a defrost. The function is used as a simple defrost start, or it may be used as a safeguard if the normal signal fails to appear. When there is defrost with clock function on the DI input the interval time must be set for a somewhat longer period of time than the planned one, as the interval time will otherwise start a defrost which a little later will be followed by the planned one. The interval time is not active when set to 0.	d03
Max. defrost duration This setting is a safety time so that the defrost will be stopped if there has not already been a stop based on temperature. (The setting will be the defrost time if d10 is selected to be 0)	d04

Time staggering for defrost cutins during start-up The function is only relevant if you have several refrigeration appliances or groups where you want the defrost to be staggered in relation to one another. The function is furthermore only relevant if you have chosen defrost with interval start (d03). The function delays the interval time d03 by the set number of minutes, but it only does it once, and this at the very first defrost taking place when voltage is connected to the controller. The function will be active after each and every power failure.	d05
Drip-off time Here you set the time that is to elapse from a defrost and until the compressor is to start again. (The time when water drips off the evaporator).	d06
Delay of fan start after defrost Here you set the time that is to elapse from compressor start after a defrost and until the fan may start again. (The time when water is "tied" to the evaporator).	d07
Fan start temperature The fan may also be started a little earlier than mentioned under "Delay of fan start after defrost", if the defrost sensor S5 registers another allowable value than the one set here.	d08
Fan cut in during defrost Here you can set whether fan is to operate during defrost. 0=stopped, 1=running, 2=running during pump down and defrosting	d09
Defrost sensor Here you define the defrost sensor. 0: None, defrost is based on time EKC 102A: 1=Sair EKC 102B: 1=Sair. EKC 102C, EKC 102D: 1=S5. 2=Sair	d10
Defrost during start-up (follow after d05 function) Here you can set if the controller is to start with a defrost if the power has been cut.	d13
Defrost on demand – aggregate refrigeration time Set here is the refrigeration time allowed without defrosts. If the time is passed, a defrost will be started. With setting = 0 the function is cut out.	d18
Defrost on demand – S5 temperature The controller will follow the effectivity of the evaporator, and via internal calculations and measurements of the S5 temperature it will be able to start a defrost when the variation of the S5 temperature becomes larger than required. Here you set how large a slide of the S5 temperature can be allowed. When the value is passed, a defrost will start. The function can only be used in 1:1 systems when the evaporating temperature will become lower to ensure that the air temperature will be maintained. In central systems the function must be cut out. With setting = 20 the function is cut out	d19
If you wish to see the temperature at the S5 sensor, push the controller's lowermost button.	
If you wish to start an extra defrost, push the controller's lowermost button for four seconds. You can stop an ongoing defrost in the same way	
The LED on the controller's front will indicate whether a defrost is going on.	
Fan	
Fan stopped at cut-out compressor Here you can select whether the fan is to be stopped when the compressor is cut out	F01
Delay of fan stop when compressor is cut out If you have chosen to stop the fan when the compressor is cut out, you can delay the fan stop when the compressor has stopped. Here you can set the time delay.	F02

Fan stop temperature The function stops the fans in an error situation, so that they will not provide power to the appliance. If the defrost sensor registers a higher temperature than the one set here, the fans will be stopped. There will be re-start at 2 K below the setting. The function is not active during a defrost or start-up after a defrost. With setting +50°C the function is interrupted.	F04
Miscellaneous	
Delay of output signal after start-up After start-up or a power failure the controller's functions can be delayed so that overloading of the electricity supply network is avoided. Here you can set the time delay.	o01
Digital input signal - DI (EKC 102A, B, C) The controller has a digital input which can be used for one of the following functions: Off: The input is not used 1) Door function. When the input is open it signals that the door is open. When the time setting in "A04" is passed, an alarm will be given 2) Defrost. The function is started with a pulse pressure of at least two seconds' duration. The controller will register when the input is reopened. The controller will then start a defrost cycle. If the signal is to be received by several controllers it is important that ALL connections are mounted the same way (DI to DI and GND to GND). 3) Main switch. Regulation is carried out when the input is short-circuited, and regulation is stopped when the input is put in pos. OFF. 4) Night operation. When the input is short-circuited, there will be regulation for night operation.	o02
Digital input signal - DI (EKC 201D) The controller has a digital input which can be used for one of the following functions: Off: The input is not used 1) Status display of a contact function 2) Door function. When the input is open it signals that the door is open. The refrigeration and the fans are stopped. When the time setting in "A04" is passed, an alarm will be given and refrigeration will be resumed. 3) Door alarm. When the input is open it signals that the door is open. When the time setting in "A04" is passed, there will be alarm. 4) Defrost. The function is started with a pulse pressure. The controller will register when the DI input is activated. The controller will then start a defrost cycle. If the signal is to be received by several controllers it is important that ALL connections are mounted the same way (DI to DI and GND to GND). 5) Main switch. Regulation is carried out when the input is short-circuited, and regulation is stopped when the input is put in pos. OFF. 6) Night operation. When the input is short-circuited, there will be regulation for night operation. 7) Reference displacement when DI1 is short-circuited. Displacement with "r40". 8) Separate alarm function. Alarm will be given when the input is short-circuited. 9) Separate alarm function. Alarm will be given when the input is opened. (For 8 and 9 the time delay is set in A27) 10) Case cleaning. The function is started with a pulse pressure. Cf. also description on page 4. 11) Inject on/off. Off when DI is open. Refrigeration stopped, fan continues or stops as defined in F01.	o02
Access code 1 (Access to all settings) If the settings in the controller are to be protected with an access code you can set a numerical value between 0 and 100. If not, you can cancel the function with setting 0. (99 will always give you access).	o05

Sensor type Normally a Pt 1000 sensor with great signal accuracy is used. But you can also use a sensor with another signal accuracy. That may either be a PTC sensor (1000 ohm at 25°C) or an NTC sensor (5000 Ohm at 25°C). **All** the mounted sensors must be of the same type.	o06
Function options The thermostat's function is defined, as follows: rE: Refrigeration. The relay cuts in when lower temperatures are required. HE: Heating. The relay cuts in when higher temperatures are required (remember to cancel defrost functions and compressor functions). With this function the thermostat's differential will lie below the setpoint (the relay will cut in at setpoint minus differential).	o07
Display step Yes: Gives steps of 0.5° No: Gives steps of 0.1°	o15
Case cleaning The status of the function can be followed here or the function can be started manually. **0** = Normal operation (no cleaning) **1** = Cleaning with fans operating. All other outputs are Off. **2** = Cleaning with stopped fans. All outputs are Off. If the function is controlled by a signal at the DI input, the relevant status can be seen here in the menu.	o46
Access code 2 (Access to adjustments) There is access to adjustments of values, but not to configuration settings. If the settings in the controller are to be protected with an access code you can set a numerical value between 0 and 100. If not, you can cancel the function with setting 0. If the function is used, access code 1 (o05) **must also** be used.	o64
Copy the controller's present settings With this function the controller's settings can be transferred to a programming key. The key can contain up to 25 different sets. Select a number. When copying has started the display returns to o65. After two seconds you can move into the menu again and check whether the copying was satisfactory. Showing of a negative figure spells problems. See the significance in the Fault Message section.	o65
Copy from the programming key This function downloads a set of settings earlier saved in the controller. Select the relevant number. When copying has started the display returns to o66. After two seconds you can move back into the mennu again and check whether the copying was satisfactory. Showing of a negative figure spells problems. See the significance in the Fault Message section.	o66
Save as factory setting With this setting you save the controller's actual settings as a new basic setting (the earlier factory settings are overwritten).	o67
Extra sensor Here you define the application for the Saux sensor. 0: None, no sensor is connected 1: Product sensor 2: Condenser temperature sensor with alarm function	o69
S5 sensor EKC 102A, B, C Here you define the application for the S5 sensor. 0: Defrost sensor 1: Product sensor	o70

Other application for S5 sensor EKC 102D Maintain the setting at 0 if the sensor has been defined as defrost sensor in D10. If D10 has been set at 0 or 2 the S5 input can be used as product sensor or condenser sensor. Here you define which: 0: Defrost sensor 1: Product sensor 2: Condenser sensor with alarm	o70
Relay 2 Here you define the application for relay 2 EKC 102B: 1=compressor. 2=alarm EKC 102C: 1=defrost. 2=alarm	o71
Service	
Temperature measured with Saux sensor	u03
Temperature measured with S5 sensor	u09
Status on DI1 input. on/1=closed	u10
Status on night operation (on or off) 1=closed	u13
Read the present regulation reference	u28
* Status on relay for refrigeration	u58
* Status on relay for fan	u59
* Status on relay for defrost	u60
* Temperature measured with Sair sensor	u69
* Status on relay 2 (refrigeration, alarm or defrost)	u70
*) Not all items will be shown. Only the function belonging to the selected application can be seen.	

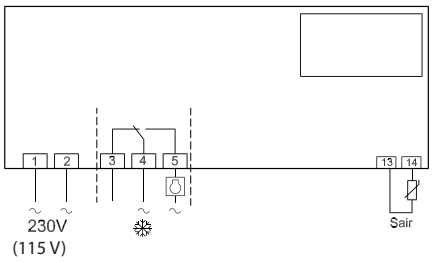
Operating status
The controller goes through some regulating situations where it is just waiting for the next point of the regulation. To make these "why is nothing happening" situations visible, you can see an operating status on the display. Push briefly (1s) the upper button. If there is a status code, it will be shown on the display. The individual status codes have the following meanings:
S0: Regulating
S2: When the compressor is operating it must run for at least x minutes.
S3: When the compressor is stopped, it must remain stopped for at least x minutes.
S10: Refrigeration stopped by main switch. Either with r12 or a DI-input
S11: Refrigeration stopped by thermostat
S14: Defrost sequence. Defrost in progress
S15: Defrost sequence. Fan delay
S16: Refrigeration stopped because of open DI input
S17: Door is open. DI input is open
S20: Emergency cooling
S25: Manual control of outputs
S29: Case cleaning
S32: Delay on outputs during start-up
Other displays:
non: The defrost temperature cannot be displayed. There is no sensor
-d-: Defrost in progress. /First cooling after defrost
PS: Password required. Set password

Fault message
In an error situation the LED's on the front will flash and the alarm relay will be activated. If you push the top button in this situation you can see the alarm report in the display. If there are several, you can continue pushing to see them. There are two kinds of error reports - it can either be an alarm occurring during the daily operation, or there may be a defect in the installation. A-alarms will not become visible until the set time delay has expired. E-alarms, on the other hand, will become visible the moment the error occurs. (An A alarm will not be visible as long as there is an active E alarm). Here are the messages that may appear:
A1: High temperature alarm
A2: Low temperature alarm
A4: Door alarm
A15: Alarm. Signal from DI input
A45: Standby position (stopped refrigeration via r12 or DI input)
A59: Case cleaning. Signal from DI input
A61: Condenser temperature alarm
E1: Faults in the controller
E27: Sensor error on S5
E29: Sensor error on Sair
E30: Sensor error on Saux
When copying settings to or from a copying key with functions o65 or o66, the following information may appear: 0: Copying concluded and OK 4: Copying key not correctly mounted 5: Copying was not correct. Repeat copying 6: Copying to EKC incorrect. Repeat copying 7: Copying to copying key incorrect. Repeat copying 8: Copying not possible. Order number or SW version do not match 9: Communication error and timeout 10: Copying still going on (The information can be found in o65 or o66 a couple of seconds after copying has been started).

Warning ! Direct start of compressors *
To prevent compressor breakdown parameter c01 and c02 should be set according to suppliers requirements or in general :
Hermetic Compressors c02 min. 5 minutes
Semihermetic Compressors c02 min. 8 minutes and c01 min. 2 to 5 minutes (Motor from 5 to 15 KW)
*) Direct activating of solenoid valves does not require settings different from factory (0)

Connections

EKC 102A



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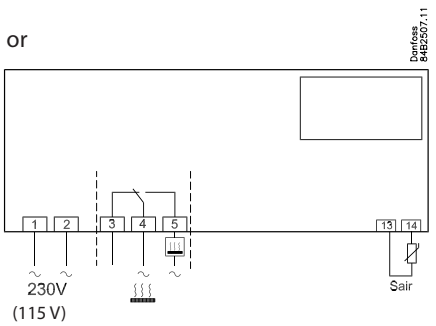
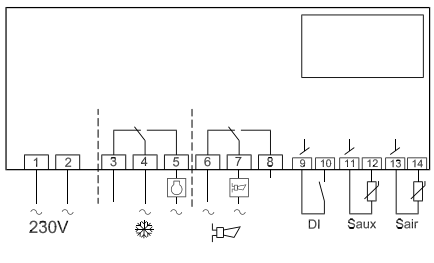


EKC 102B



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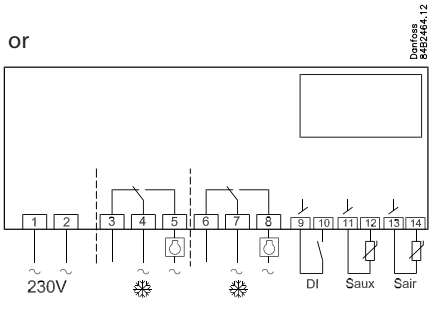
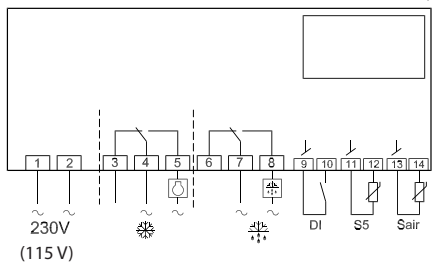


EKC 102C



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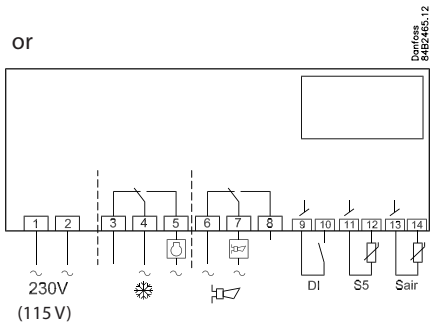
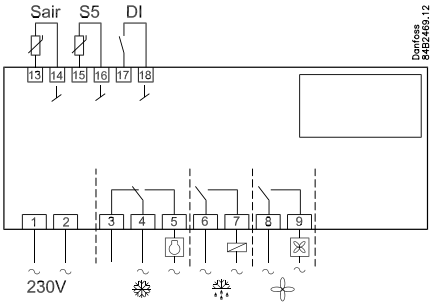


EKC 102D



Power supply
230 V a.c. or 115 V a.c. See controller.

Sensors
Sair is thermostat sensors.
Saux is an extra sensor for measuring fx. the condenser temperature.
S5 is a defrost sensor and is used if defrost has to be stopped based on temperature.
It may however also be used as product sensor or condenser sensor.

Digital On/Off signals
A cut-in input will activate a function. The possible functions are described in menu o02.

Relays
The general connections are:

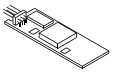
Relay 1
Refrigeration. The contact will cut in when the controller demands refrigeration

Relay 2
Alarm. The relay is cut out during normal operation and cuts in in alarm situations and when the controller is dead (de-energised)
Refrigeration 2. The contact will cut in when refrigeration step 2 has to be cut in
Defrost. The contact will cut in when defrost is in progress

Relay 3
Fan

Electric noise
Cables for sensors and DI inputs must be kept separate from other electric cables:
- Use separate cable trays
- Keep a distance between cables of at least 10 cm
- Long cables at the DI input should be avoided

Ordering

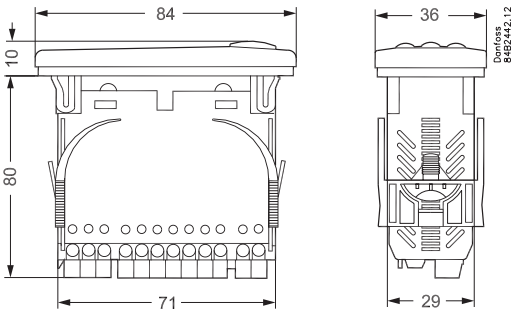
Type		Function	Supply	Code no.
EKC 102A		Temperature controller	230 V a.c.	**084B8500**
			115 V a.c.	**084B8503**
EKC 102B		Temperature controller with alarm function	230 V a.c.	**084B8501**
EKC 102C		Temperature controller for electric defrost	230 V a.c.	**084B8502**
			115 V a.c.	**084B8505**
EKC 102D		Controller for refrigeration with fan function	230 V a.c.	**084B8506**
EKA 182A		Copy key EKC - EKC		**084B8567**

Temperature sensors: Please refer to literature no. RK0YG

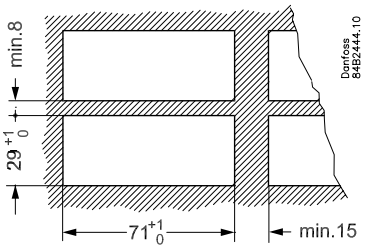
Data

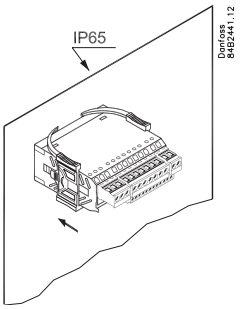
Supply voltage	230 V a.c.(115 V) +10/-15 %. 1.5 VA, 50/60 Hz		
Sensors	Pt 1000 or PTC (1000 ohm / 25°C) or NTC-M2020 (5000 ohm / 25°C)		
Accuracy	Measuring range	-60 to +99°C	
	Controller	±1 K below -35°C ±0,5 K between -35 to +25°C ±1 K above +25°C	
	Pt 1000 sensor	±0.3 K at 0°C ±0.005 K per grad	
Display	LED, 3 digits		
Digital inputs	Signal from contact functions Requirements to contacts: Gold plating Cable length must be max. 15 m Use auxiliary relays when the cable is longer		
Electrical connection cable	Max.1,5 mm² multi-core cable on supply and relays. Max. 1 mm² on sensors - and DI inputs. Terminals are mounted on the circuit board		
Relays*		CE (250 V a.c.)	UL ** (240 V a.c.)
	DO1. Refrigeration	10 (6) A	10 A Resistive 5FLA, 30LRA
	DO2. Alarm/ Defrost/ Refrigeration	10 (6) A	10 A Resistive 5FLA, 30LRA
	DO3. Fan	6 (3) A	6 A Resistive 3FLA, 18LRA 131 VA Pilot duty
Environments	0 to +55°C, During operations -40 to +70°C, During transport		
	20 - 80% Rh, not condensed		
	No shock influence / vibrations		
Enclosure	IP 65 from front. Buttons and packing are imbedded in the front.		
Approvals	EU Low Voltage Directive and EMC demands re CE-marking complied with LVD tested acc. EN 60730-1 and EN 60730-2-9, A1, A2 EMC tested acc. EN50082-1 and EN 60730-2-9, A2		

* DO1 and DO2 are 16 A relays. DO3 is a 8 A relay. Max. load must be kept.
** UL-approval based on 30000 couplings



Weight = 170 g





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