ENGINEERING
TOMORROW

Danfoss

User Guide

Controller for
temperature control
EKC 202A, B, C

ADAP-KOOL® Refrigeration control systems

Introduction

Application
• The controller is used for temperature control refrigeration appliances and cold room in supermarkets
• Control of defrost, fans, alarm and light

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 a defrost sensor.
Two to four relays will cut the required functions in and out – the application determines which:
• Refrigeration (compressor or solenoid valve)
• Defrost
• Fan
• Alarm
• Light

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 enclosure from the front panel

• Digital input for either:
  - Door contact function with 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 ISO 23953-2 without subsequent calibration (Pt 1000 ohm sensor)
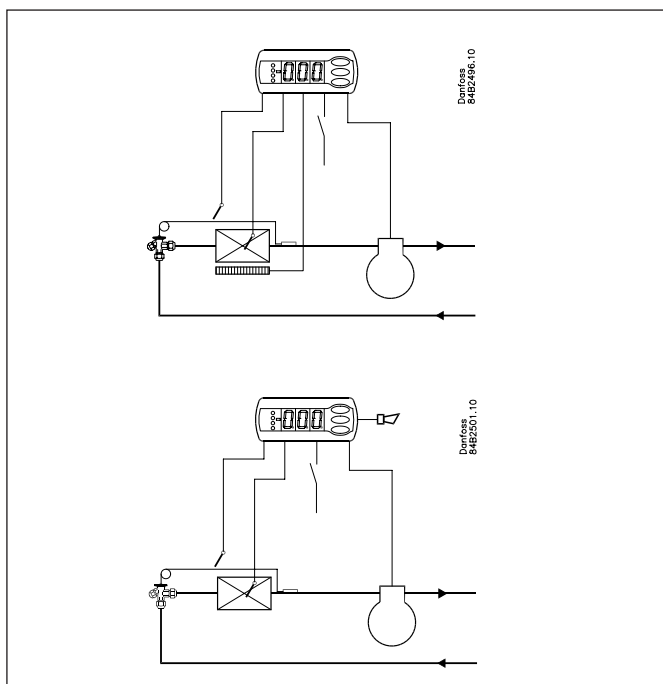
Extra module
• The controller can afterwards be fitted with an insertion module if the application requires it.
  The controller has been prepared with plug, so the module simply has to be pushed in.
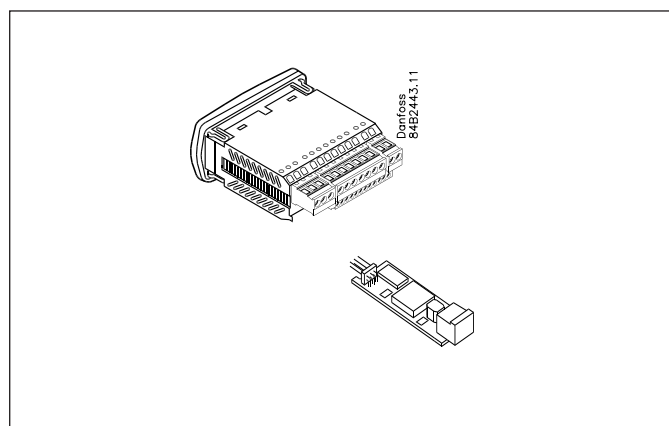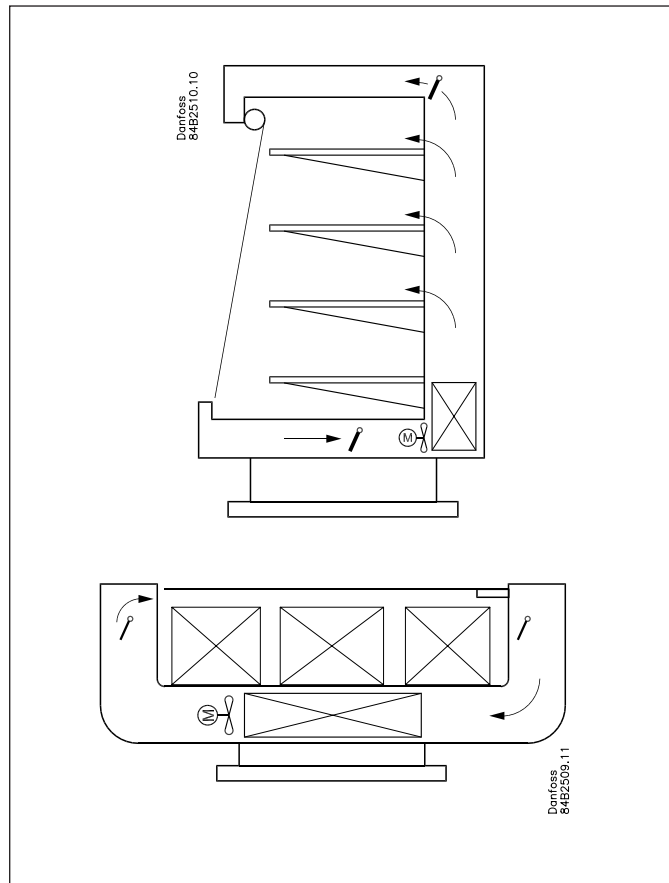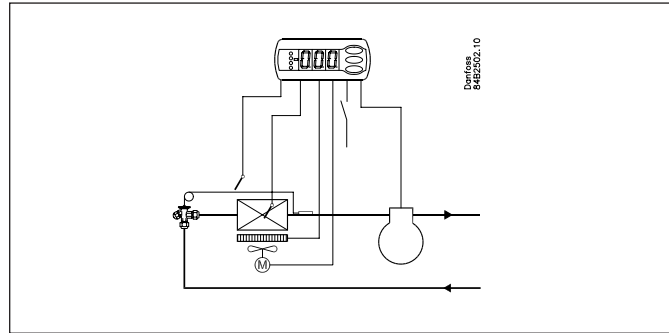
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EKC 202A

Controller with two relay outputs, two temperature sensors and digital input.

Temperature control at start/stop of compressor / solenoid valve
Defrost sensor
Electrical defrost / gas defrost

Alarm function
If an alarm function is required, relay number two may be used for it.
Defrost is performed here with circulation of the air as the fans are operating continuously.

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EKC 202B

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.

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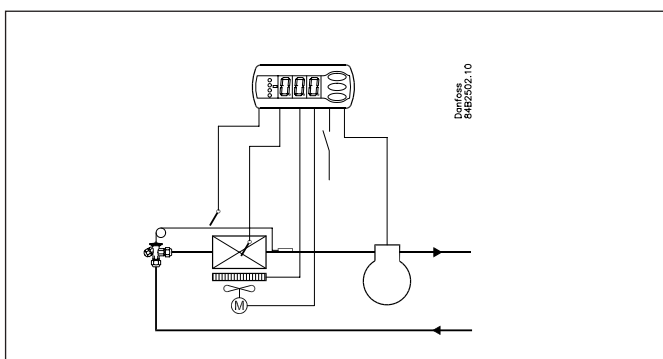84B2503.10

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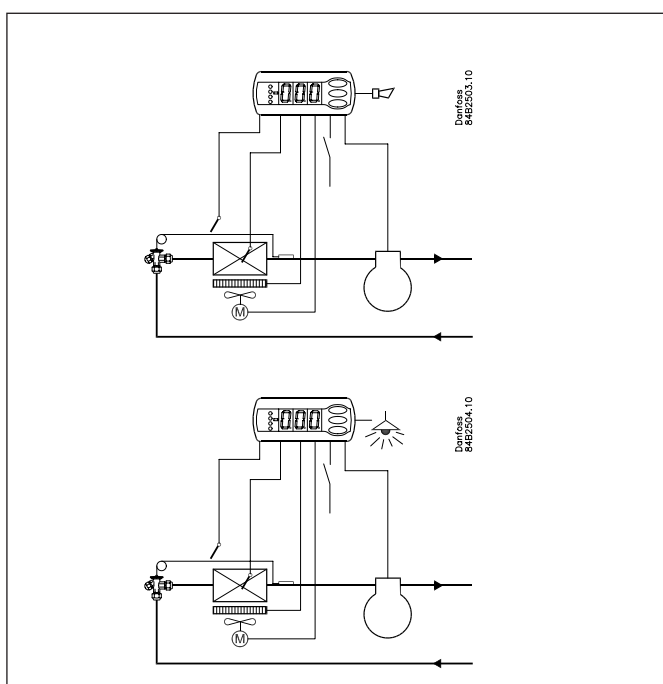
EKC 202C

Controller with four relay outputs, two temperature sensors and digital input.

Temperature control at start/stop of compressor / solenoid valve
Defrost sensor
Electrical defrost / gas defrost
Control of fan

Relay output 4 can be used for an alarm function or for a light function.

Start of defrost

A defrost can be started in different ways

| Interval:	Defrost is started at fixed time intervals, say, every eight 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.
Schedule	Defrost here can be started at fixed times of the day and night. But max. six defrosts
Network	A defrost can be started via data communication

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
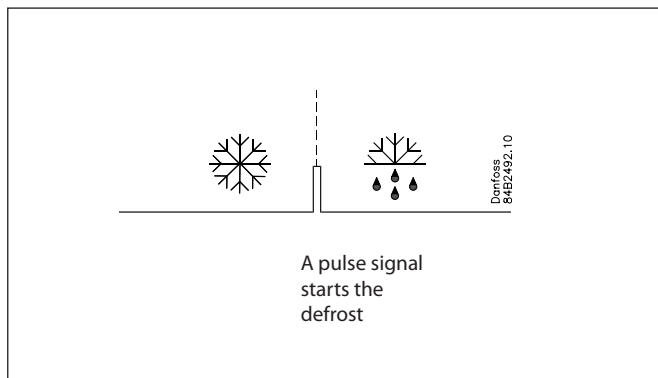
If you need coordinated defrost, this must be done via data communication.

Digital input

The digital input 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

DI
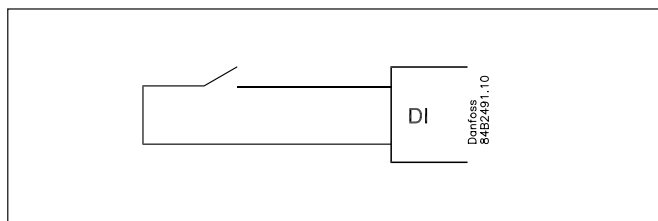
Case cleaning function

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.

On the network a cleaning alarm is transmitted to the system unit. This alarm can be "logged" so that proof of the sequence of events is provided.

E⌐	❄	✿	🖵
-	+	+	°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
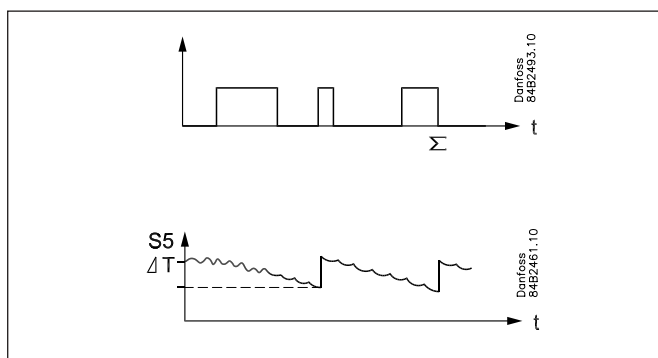
Operation

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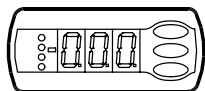
Light-emitting diodes (LED) on front panel
There are LED's on the front panel which will light up when the belonging relay is activated.
❄ = Refrigeration
▒ = Defrost
✛ = Fan

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

Manuel 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

Parameters					Min.- value	Max.- value	Factory setting	Actual setting
			Controller					
Function	Codes	EKC 202A	EKC 202B	EKC 202C				
Normal operation								
Temperature (set point)	---				-50°C	50°C	2°C	
Thermostat								
Differential	r01				0,1 K	20 K	2 K	
Max. limitation of set point setting	r02				-49°C	50°C	50°C	
Min. limitation of set point 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 (activation 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 during the whole phase 2: Running during the heating phase only	d09				0	2	1	
Defrost sensor (0=time, 1=S5, 2=Sair)	d10				0	2	0	
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	
Real time clock								
Six start times for defrost. Setting of hours. 0=OFF	t01-t06				0 hours	23 hours	0 hours	
Six start times for defrost. Setting of minutes. 0=OFF	t11-t16				0 min	59 min	0 min	
Clock - Setting of hours	t07				0 hours	23 hours	0 hours	
Clock - Setting of minute	t08				0 min	59 min	0 min	
Clock - Setting of date	t45				1	31	1	
Clock - Setting of month	t46				1	12	1	
Clock - Setting of year	t47				0	99	0	
Miscellaneous								
Delay of output signals after power failure	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-signal). 5=ext.main switch. 6=night operation 7=change reference (r40 will be activated) 8=alarm function when closed. 9=alarm function when open. 10=case cleaning (pulse signal). 11=Inject off when open.	o02				0	11	0	
Network address	o03				0	240	0	
On/Off switch (Service Pin message)	o04				OFF	ON	OFF	
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	
Max hold time after coordinated defrost	o16				0 min	60 min	20	
Configuration of light function (relay 4) 1=ON during day operation. 2=ON / OFF via data communication. 3=ON follows the DI-function, when DI is selected to door function or to door alarm	o38				1	3	1	
Activation of light relay (only if o38=2)	o39				OFF	ON	OFF	
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
Re alternative application for the S5 sensor (maintain the setting at 0 if it is used as defrost sensor, otherwise 1 = product sensor and 2 = condenser sensor with alarm)	o70				0	2	0
Select application for relay 4: 1=defrost/light, 2= alarm	o72	defrost / Alarm		Light / Alarm	1	2	2
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						
Status on relay 4 (alarm, defrost, light). (Can be controlled manually, but only when r12=-1)	u71						

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

Fault code display		Alarm code display		Status code display	
E1	Fault in controller	A 1	High temperature alarm	S0	Regulating
E6	Change battery + check clock	A 2	Low temperature alarm	S1	Waiting for end of the coordinated defrost
E 27	S5 sensor error	A 4	Door alarm	S2	ON-time Compressor
E 29	Sair sensor error	A 5	Max. Hold time	S3	OFF-time Compressor
		A 15	DI 1 alarm	S4	Drip-off time
		A 45	Standby mode	S10	Refrigeration stopped by main switch
		A 59	Case cleaning	S11	Refrigeration stopped by thermostat
		A 61	Condenser alarm	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

Start-up:

Regulation starts when the voltage is on.

1 Go through the survey of factory settings. Make any necessary changes
   in the respective parameters.
2 For network. Set the address in o03 and then transmit it to the gateway/
   system unit with setting o04.

Functions

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

Function	Para-meter	Parameter by operation via data com-munication
Normal display		
Normally the temperature value from thermostat sensor Sair is displayed.		Display air (u69)
Thermostat		**Thermostat control**
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 r03. The reference at any time can be seen in "u28 Temp. ref"		Cutout °C
Differential When the temperature 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. Ref. Dif.	r01	Differential
Set point limitation The controller's setting range for the set point 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 set point, the max. allowable reference value must be lowered.	r02	Max cutout °C
To avoid a too low setting of the set point, the min. allowable reference value must be increased.	r03	Min cutout °C
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	Disp. Adj. K
Temperature unit Set here if the controller is to show temperature values in °C or in °F.	r05	Temp. unit °C=0. / °F=1 (Only °C on AKM, whatever the setting)
Correction of signal from Sair Compensation possibility through long sensor cable	r09	Adjust Sair
Start / stop of refrigeration With this setting refrigeration can be started, stopped or a manual override of the outputs can be allowed. Start / stop of refrigeration can also be accomplished with the external switch function connected to the DI input. Stopped refrigeration will give a "Standby alarm".	r12	Main Switch 1: Start 0: Stop -1: Manual control of outputs allowed
Night setback value The thermostat's reference will be the set point plus this value when the controller changes over to night operation. (Select a negative value if there is to be cold accumulation.)	r13	Night offset
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). r40 Diff	r39	Th. offset
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	Th. offset K
		Night setbck (start of night signal)

Alarm		Alarm settings
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, and the alarm relay will cut in.		With data communication the importance of the individual alarms can be defined. Setting is carried out in the "Alarm destinations" menu.
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	Alarm delay
Time delay for door alarm The time delay is set in minutes. The function is defined in o02.	A04	DoorOpen del
Time delay for cooling (long alarm delay) This time delay is used during start-up, during defrost, immediately 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	Pulldown del
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	HighLim Air
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	LowLim Air
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	AI.Delay DI
High alarm limit for condenser temperature If the 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. The definition of S5 as condenser sensor is accomplished in o70. The alarm is zeroset again 10 K below the set temperature.	A37	Condtemp Al.
		Reset alarm

Compressor		Compressor control
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. On time
Min. OFF-time (in minutes)	c02	Min. Off time
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).	c30	Cmp relay NC

Defrost		Defrost control
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. If there is power failure the timer value will be saved and continue from here when the power returns. 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. The controller also contains a real-time clock. By means of settings of this clock and times for the required defrost times, defrost can be started at fixed times of the day. If there is a risk of power failure for periods longer than four hours, a battery module should be mounted in the controller. Defrost start can also be accomplished via data communication, 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, hot gas or brine. 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 or "non". During defrost the defrost relay will be cut in. When gas defrosting the compressor relay will be cut in during defrost.	d01	Def. method
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	Def. Stop Temp
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. If master/slave defrost without clock function or without data communication is used, the interval time will be used as max. time between defrosts. If a defrost start via data communication does not take place, the interval time will be used as max. time between defrosts. When there is defrost with clock function or data communication, 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. In connection with power failure the interval time will be maintained, and when the power returns the interval time will continue from the maintained value. The interval time is not active when set to 0.	d03	Def Interval (0=off)
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 or via coordinated defrost. (The setting will be the defrost time if d10 is selected to be 0)	d04	Max Def. time
Time staggering for defrost cut ins 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	Time Stagg.
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	DripOff time
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	FanStartDel
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 a lower value than the one set here.	d08	FanStartTemp
Fan cut in during defrost Here you can set whether fan is to operate during defrost. 0: Stopped (Runs during pump down) 1: Running during the whole phase 2: Running during the heating phase only. After that stopped	d09	FanDuringDef
Defrost sensor Here you define the defrost sensor. 0: None, defrost is based on time 1: S5 2: Sair	d10	DefStopSens.

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	MaxTherRunT
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	CutoutS5Dif.
If you wish to see the temperature at the S5 sensor, push the controller's lowermost button.		Defrost temp.
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		Def Start Here you can start a manual defrost.
		Hold After Def Shows ON when the controller is operating with coordinated defrost.
		Defrost State Status on defrost 1= pump down / defrost
Fan		**Fan control**
Fan stopped at cut-out compressor Here you can select whether the fan is to be stopped when the compressor is cut out	F01	Fan stop CO (Yes = Fan stopped)
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 del. CO
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	FanStopTemp.
Internal defrosting schedule/clock function		
(Not used if an external defrosting schedule is used via data communication.) Up to six individual times can be set for the defrost start throughout the day.		
Defrost start, hour setting	t01-t06	
Defrost start, minute setting (1 and 11 belong together, etc.) When all t01 to t16 equal 0 the clock will not start defrosts.	t11-t16	
Real-time clock Setting the clock is only necessary when there is no data communication. In the event of a power failure of less than four hours, the clock function will be saved. When mounting a battery module the clock function can preserved longer. (EKC 202 only)		
Clock: Hour setting	t07	
Clock: Minute setting	t08	
Clock: Date setting	t45	
Clock: Month setting	t46	
Clock: Year setting	t47	

Miscellaneous		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	DelayOfOutp.
Digital input signal - DI 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 signal. 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 signal. Cf. also description on page 4. 11) Inject on/off. Off when DI is open.	o02	DI 1 Config. Definition takes place with the numerical value shown to the left. (0 = off) DI state (Measurement) The DI input's present status is shown here. ON or OFF.
Address If the controller is built into a network with data communication, it must have an address, and the master gateway of the data communication must then know this address. The installation of the data communication cable has been mentioned in a separate document "RC8AC".		After installation of data communication the controller can be operated on an equal footing with the other controllers in ADAP-KOOL® refrigeration controls.
The address is set between 1 and 240, gateway determined	o03	
The address is sent to the system manager when the menu o04 is set to 'ON', or when the system manager's scanning function is activated. (o04 is only to be used if the data communication is LON.)	o04	
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 1000 sensor or an NTC sensor (5000 Ohm at 25°C). All the mounted sensors must be of the same type.	o06	SensorConfig Pt = 0 PTC = 1 NTC = 2
Display step Yes: Gives steps of 0.5° No: Gives steps of 0.1°	o15	Disp. Step = 0.5
Max. standby time after coordinated defrost When a controller has completed a defrost it will wait for a signal which tells that the refrigeration may be resumed. If this signal fails to appear for one reason or another, the controller will itself start the refrigeration when this standby time has elapsed.	o16	Max HoldTime
Configuration of light function 1) The relay cuts in during day operation 2) The relay to be controlled via data communication 3) The relay to be controlled by the door switch defined in either o02 where the setting is selected to either 2 or 3. When the door is opened the relay will cut in. When the door is closed again there will be a time delay of two minutes before the light is switched off.	o38	Light config
Activation of light relay The light relay can be activated here (if 038=2)	o39	Light remote
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	Case clean
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. All settings except for Address (o03) will be copied. 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. All settings except for Address (o03) will be copied. When copying has started the display returns to o66. After two seconds you can move back 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.	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	-	
Other application for S5 sensor 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	S5 Config	
Relay 4 Here you define the application for relay 4: 1: Defrost (EKC 202A) or Light (EKC 202C) 2: Alarm	o72	DO4 Config	
		- - - Night Setback 0=Day 1=Night	

Service			Service
Temperature measured with S5 sensor		u09	S5 temp.
Status on DI input. on/1=closed		u10	DI1 status
Status on night operation (on or off) 1=night operation		u13	Night Cond.
Read the present regulation reference		u28	Temp. ref.
* Status on relay for cooling		u58	Comp1/LLSV
* Status on relay for fan		u59	Fan relay
* Status on relay for defrost		u60	Def. relay
* Temperature measured with Sair sensor		u69	Sair temp
* Status on relay 4 (alarm, defrost or light function)		u71	DO4 status
*) Not all items will be shown. Only the function belonging to the selected application can be seen.			

Fault message		Alarms
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 further push again 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:		1 = alarm
A1: High temperature alarm		High t. alarm
A2: Low temperature alarm		Low t. alarm
A4: Door alarm		Door Alarm
A5: Information. Parameter o16 is expired		Max Hold Time
A15: Alarm. Signal from DI input		DI1 alarm
A45: Standby position (stopped refrigeration via r12 or DI input)		Standby mode
A59: Case cleaning. Signal from DI input		Case cleaning
A61: Condenser alarm		Cond. alarm
E1: Faults in the controller		EKC error
E6: Fault in real-time clock. Check the battery / reset the clock.		-
E27: Sensor error on S5		S5 error
E29: Sensor error on Sair		Sair error
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).		
		Alarm destinations
		The importance of the individual alarms can be defined with a setting (0, 1, 2 or 3)

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)

Override

The controller contains a number of functions that can be used together with the override function in the master gateway / System Manager.

| Function via data communication	Functions to be used in the gateway's override function	Used parameter in EKC 202
Start of defrosting	Defrost control Time schedule	- - - Def.start
Coordinated defrost	Defrost control	- - - HoldAfterDef u60 Def.relay
Night setback	Day/night control Time schedule	- - - Night setbck
Light control	Day/night control Time schedule	o39 Light Remote

Connections

EKC 202A
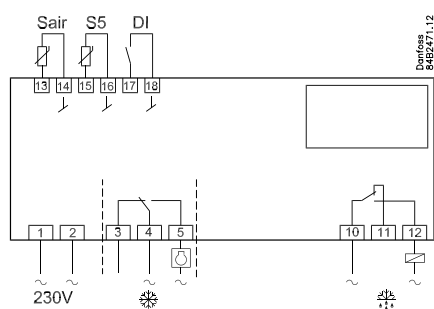
EKC 202B
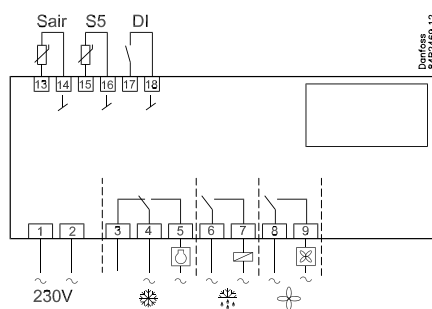
EKC 202C
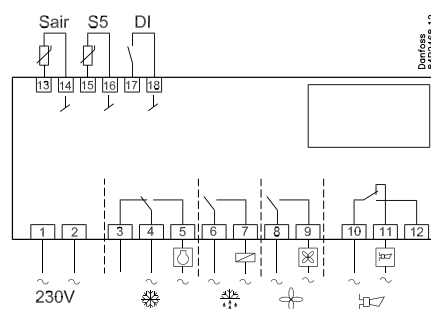
or
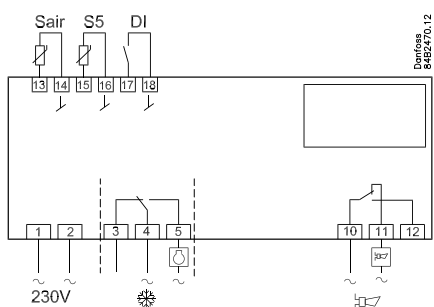
or
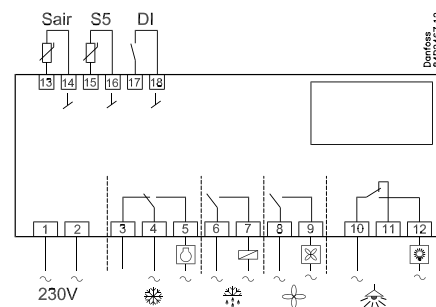
Power supply
230 V a.c.

Sensors
Sair is thermostat sensors.
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 signal
A cut-in input will activate a function. The possible functions are described in menu o02.

Relays
The general connections are:
Refrigeration. The contact will cut in when the controller demands refrigeration
Defrost.
Fan.
Alarm. The relay is cut out during normal operation and cuts in in alarm situations and when the controller is dead (de-energised)
Light. The contact will cut in when the controller demands light.

Electric noise
Cables for sensors, DI inputs and data communication 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

Data communication

If data communication is used, it is important that the installation of the data communication cable is performed correctly.

See separate literature No. RC8AC..

Gateway/
System manager

Data communication

O3   DO4
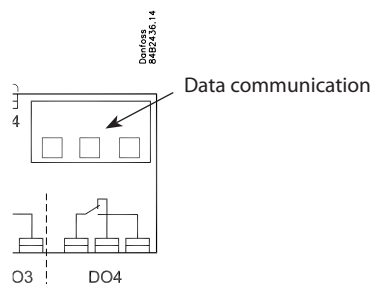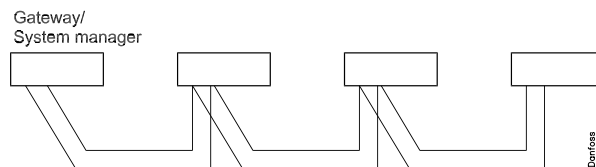
MODBUS or LON-RS485 via insert cards.

Ordering

Type		Function	Supply voltage	Code no.
EKC 202A		Refrigeration controller		**084B8521**
EKC 202B		Refrigeration controller with fan function	**230 V**	**084B8522**
EKC 202C		Refrigeration controller for electric defrost		**084B8523**
EKA 178A		Data communication module. MOD-bus		**084B8564**
EKA 179A		Data communication module. RS 485- LON		**084B8565**
EKA 181C		Battery module that will protect the clock in case of lengthy power failure		**084B8577**
EKA 182A		Copy key EKC - EKC		**084B8567**

Temperature sensors: please refer to lit.no. RK0YG

Type		Funcion	Code no.
EKA 183A		Programming key	**084B8582**
Copy tool for setting of EKC. For further details refer to Technical Brochure DKRCC.PD.R1.0			

Technical data

Supply voltage	230 V a.c. +10/-15 %. 2.5 VA, 50/60 Hz		
Sensors 3 pcs off either	Pt 1000 or PTC 1000 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 Max. 1 mm² on sensors and DI inputs		
Relays*			IEC60730
	EKC 202	DO1	8 (6) A & (5 FLA, 30 LRA)
		DO2	8 (6) A & (5 FLA, 30 LRA)
		DO3	6 (3) A & (3 FLA, 18 LRA)
		DO4**	4 (1) A, Min. 100 mA**
Data communication	Via insert card		
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.		
Escapement reserve for the clock	4 hours		
Approvals	EU Low Voltage Directive and EMC demands re CE-marking complied with EKC 202: UL approval acc. UL 60730 LVD tested acc. EN 60730-1 and EN 60730-2-9, A1, A2 EMC tested acc. EN 61000-6-3 and EN 61000-6-2		

Weight = 200 g
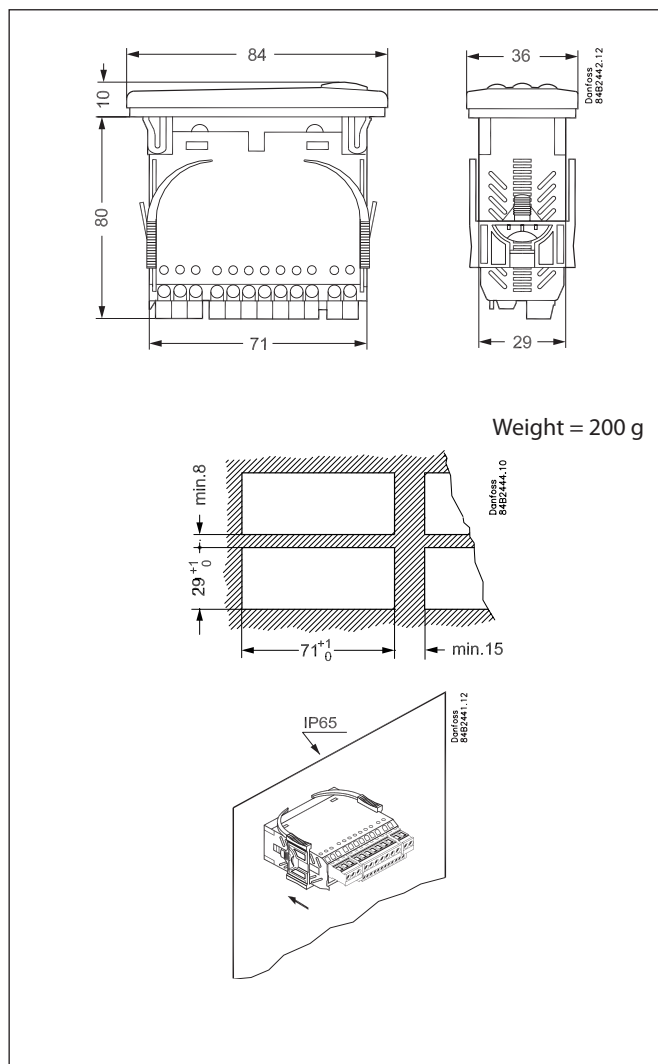
* DO1 and DO2 are 16 A relays. The mentioned 8 A can be increased up to 10 A, when the abient temperature is kept below 50°C. DO3 and DO4 are 8 A relays. Above max. load must be kept.
** Gold plating ensures make function with small contact loads