

# **Preface to EKC 531A and EKC 531B**

**Code number:**

**084B8003**

**084B8004**

This controller is only made on customers demand and cannot be ordered generally.

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Manual

**Capacity controller**  
- EKC 531A and 531B  
084B8003 / 084B8004



ADAP-KOOL®  
Refrigeration control systems

# Introduction

## Application

The controller is used for capacity regulation of compressors or condensers in small refrigerating systems.

There are two controllers in the series one of which has relay outputs to both compressor steps and condenser steps while the other controller uses all relay outputs for compressor steps.

## Advantages

- Patented neutral zone regulation
- Many possible combinations for compressor constellations
- Sequential or cyclic operation
- Possibility of suction pressure optimisation via the data communication

## Regulation

Regulation is based on signals from one pressure transmitter for the compressor regulation and one pressure transmitter for the condenser regulation plus one temperature sensor for the air temperature before the condenser.

## Functions

- Relays for capacity regulation
- Voltage output for capacity regulation
- Status inputs. An interrupted signal indicates that the safety circuit has been activated and the respective circuit stopped
- Contact inputs for indication of alarms
- Contact inputs for displacement of references or for indication of alarms
- Alarm relay
- External start/stop of regulation
- Possibility of data communication

## Operation

All operation takes place either via data communication or via connection of a display type EKA 162. The display can be disconnected after the installation.

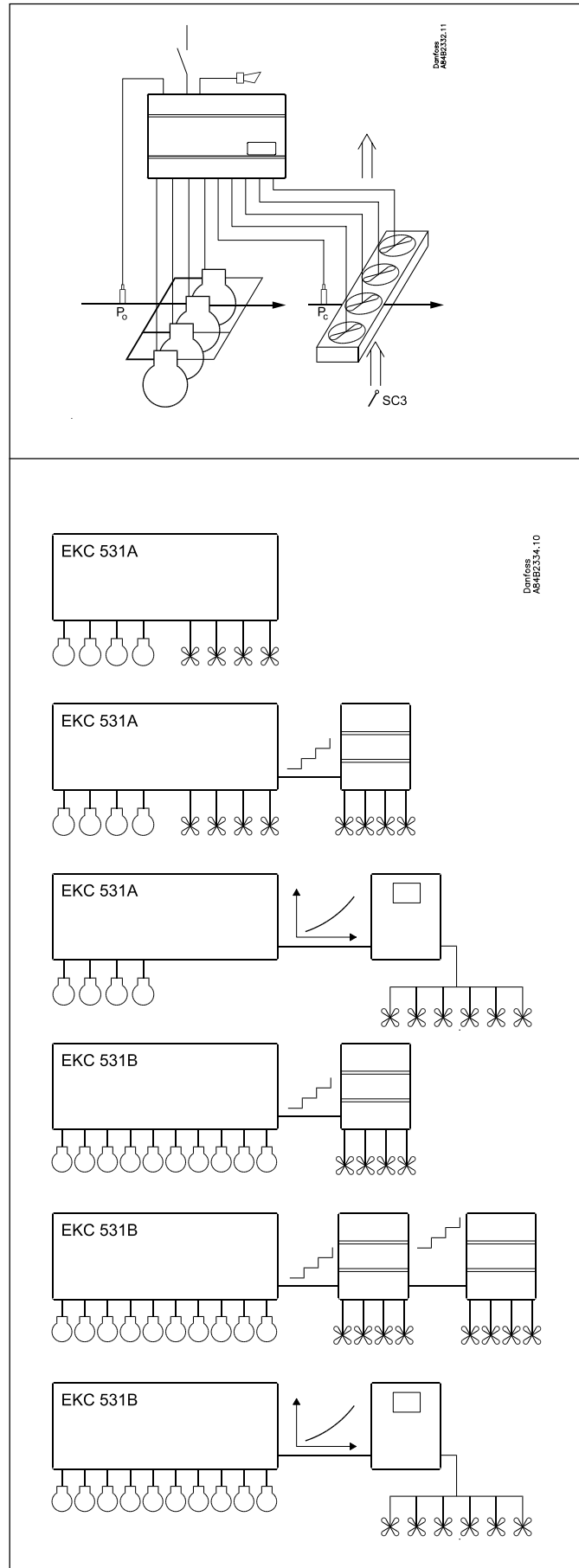
## Two controllers

### EKC 531A

This controller is capable of regulating up to four compressors and four fans. The condenser capacity can be increased by another four fans through connection of a module on the analog output. Or the entire condenser capacity can be regulated via the analog output and a frequency converter.

### EKC 531B

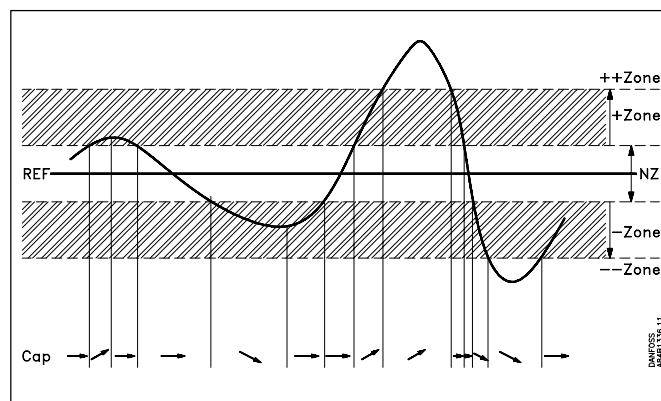
This controller can regulate up to ten compressors. The condenser capacity is regulated exclusively via the analog output – either with relay modules or with a frequency converter.



# Function

## Capacity regulation

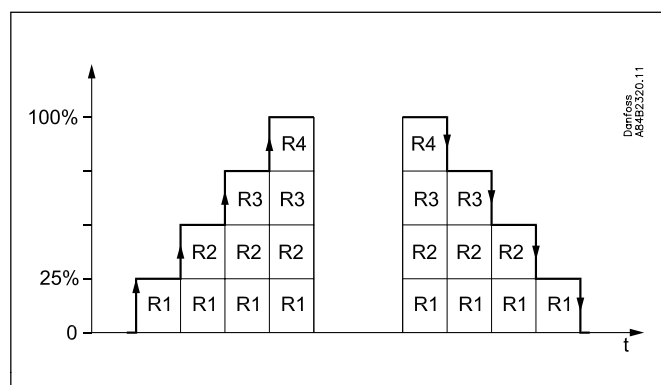
The cut-in capacity is controlled by signals from the connected pressure transmitter and the set reference. Outside the reference a neutral zone is set where the capacity will neither be cut in nor out. Outside the neutral zone (in the hatched areas named +zone and -zone) the capacity will be cut in or out if the regulation registers a change of pressure "away" from the neutral zone. Cutin and cutout will take place with the set time delays. If the pressure however "approaches" the neutral zone, the controller will make no changes of the cut-in capacity. If regulation takes place outside the hatched area (named ++zone and --zone), changes of the cut-in capacity will occur somewhat faster than if it were in the hatched area. Cutin of steps can be defined for either sequential, cyclic, binary or "mix & match" operation.



### Sequential (first in - last out)

The relays are here cut in in sequence – first relay number 1, then 2, etc.

Cutout takes place in the opposite sequence, i.e. the last cut-in relay will be cut out first.

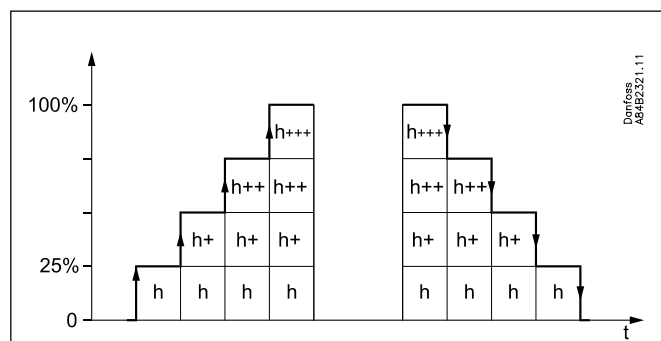
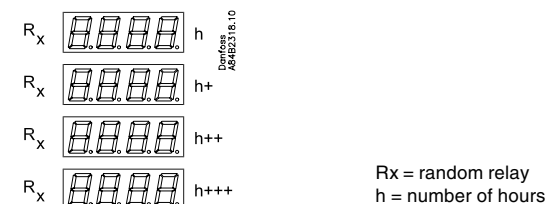


### Cyclic (first in - first out)

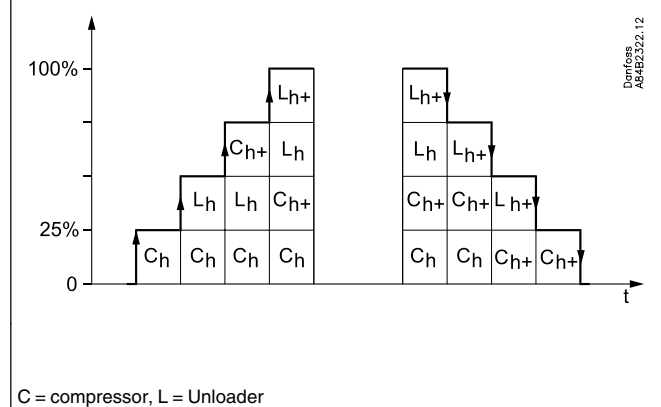
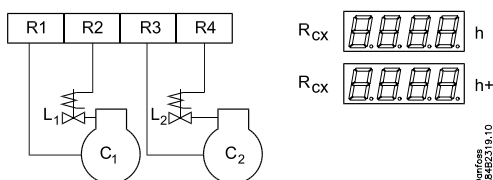
The relays are coupled here so that the operating time of the individual relays will become equalised.

At each cutin the regulation scans the individual relays' timer, cutting in the relay with least time on it.

At each cutout a similar thing happens. Here the relay is cut out that has most hours on the timer.



If capacity regulation is carried out on two compressors with one unloader each, the following function can be used: Relays 1 and 3 are connected to the compressor motor. Relays 2 and 4 are connected to the unloaders. Relays 1 and 3 will operate in such a way that the operating time for the two relays will become equalised.



## Suvey of functions

Function	Parameter	Parameter by operation via data communication
<b>Normal display</b>		
If the two displays are mounted: P0 will be shown on EKA 162 (the one with buttons) Pc will be shown on EKA 161		P0 b (bar) Pc b (bar)
<b>Compressor regulation reference</b>		<b>Compressor control</b>
<b>P0 setpoint</b> Regulation is based on the set value plus an offset, if applicable. An offset can be created from night setback r13 and/or from a master gateway's override function.	r23	Set Point b
<b>Offset</b> The set reference may be displaced with a fixed value when a signal is received at the DI4 input or from the function "Night setback" (r27). (Cf. also Definition of DI4 input).	r13	Night offset
<b>Night setback</b> <b>OFF:</b> No change of the reference <b>ON:</b> Offset value forms part of the reference	r27	NightSetBack
The regulation reference is shown here	r24	Comp ref. b
<b>Set point limitation</b> With these settings the setpoint can only be set between the two values. (This also apply if regulation with "P0-optimisation function".)		
Max. permissible setpoint value.	r25	P0RefMax b
Min. permissible setpoint value.	r26	P0RefMin b
<b>Neutral zone</b> There is a neutral zone around the reference. See also page 3.	r01	Neutral zone
<b>Correction of pressure measurement</b> An offset adjustment of the registered pressure can be made.	r04	AdjustSensor
<b>Unit</b> Here you can select whether the display is to indicate pressure in bar or in Psig. And temperatures in °C or °F. <b>0:</b> Will give bar and °C. <b>1:</b> Will give Psig and °F.	r05	(In AKM only bar or °C is used, whatever the setting)
<b>Start/stop of refrigeration</b> With this setting the refrigeration can be started and stopped. Start/stop of refrigeration may also be performed with an external contact function connected to the input named "ON input".	r12	Main Switch
<b>Condenser regulation reference</b>		<b>Condenser control</b>
<b>Pc setpoint</b> Regulation is based on the set value plus an offset, if applicable. An offset can be created via the "r34" function and/or from a master gateway's override function.	r28	Set Point b
<b>Offset</b> The set reference may be displaced with a fixed value when a signal is received at the DI5 input. (Cf. also Definition of DI5 input).	r34	Press.offset
<b>Pc reference variation</b> <b>1:</b> No change of the reference. Regulation based on set setpoint. <b>2:</b> Outdoor temperature forms part of the reference. The outdoor temperature is measured with Sc3. When the outdoor temperature drops one degree, the reference is lowered one degree. Setting 1 and 2 operate with a PI regulation. If the system is unstable and the PI regulation not satisfactory the I element may be left out, so there will be P regulation only. <b>3:</b> As 1, but with P regulation <b>4:</b> As 2, but with P regulation	r33	Pc mode
The regulation reference is shown here.	r29	Cond ref. b
<b>Set point limitation</b> With these settings the setpoint can only be set between the two values.		
Max. permissible setpoint value.	r30	PcRefMax b
Min. permissible setpoint value.	r31	PcRefMin b

<b>Correction of pressure measurement</b> An offset adjustment of the registered pressure can be made.	r32	AdjustSensor
<b>Compressor capacity</b>		<b>Compressor pack config.</b>
<b>Running time</b> To prevent frequent start/stop, values have to be set for how the relays are to cut in and out.		
Min. ON time for relays. (The time is not used if the relay cuts an unloader in or out).	c01	Min.ON time
Min. time period between cutin of same relay.	c07	MinRecyTime
<b>Setting for neutral zone regulation</b>		
Regulation band over the neutral zonen	c10	+ Zone b
Time delay between step cut-ins in the regulation band over the neutral zone	c11	+ Zone m
Time delay between step cut-ins in the regulation band over the "+Zone band".	c12	+ + Zone m
Regulation band under the neutral zone	c13	- Zone b
Time delay between step cut-outs in the regulation band under the neutral zone	c14	- Zone m
Time delay between step cut-outs in the regulation band under the "-Zone band"	c15	- - Zone m
<b>Compressor configuration</b> Here you set the combination of number of compressors and any unloaders. 1 = One compressor, 2 = two compressors, 3 = three, 4 = four. 5 = One compressor + one unloader. 6 = One compressor + two unloaders. For 7 and 8: See survey on page 9. 9-20 (EKC 531B only): See survey on page 9. 0 = Mix and Match. This function cuts the relays in and out depending on the definitions in "c17" to "c28". (See example on page 18).	c16	Compr mode
<b>Selection of coupling mode</b> (See also the overview page 9) 1. Sequential: First relay 1 cuts in, then relay 2, etc. Cutout takes place in the opposite sequence. ("First in, last out"). 2. Cyclic: An automatic operating time equalisation is arranged here, so that all steps with motor connection will have the same operating time 3. Binary and cyclic (only for four compressors with well-selected capacity).	c08	Step mode
<b>Unloaders' cutin and cutout mode</b> The relays for unloaders can be set to switch on when more capacity is required (setting = 0), or they can switch off when more capacity is called for (setting = 1).	c09	Unloader (switch on = 0) (switch off = 1)
<b>Mix and Match step 1.</b> ("c17" to "c28" only used, if "c16" selected to "0"). (In Mix and Match couplings the settings "c08" and c09" are not used). Select the relays to be ON at step 1. Setting takes place with a numerical value representing the combination of relays. See the survey. Proceed by defining steps two, three, etc. The definition ends at the first c18 - c28 which is set to "0". The time delays "c01" and "c07" belong to the individual relay outputs. If a relay output is captured by the time delay, a changeover from one step to another will only take place when all the relay outputs concerned have been released. The time delay will not interfere with a relay which is ON in two successive couplings. If a compressor drops out there will be an alarm. The regulation will continue as emergency operation, as if the compressor were present.	c17	M&M Step 1
Here you select the relays to be ON at step 2.	c18	M&M Step 2
Etc.	c19	M&M Step 3
	c20	M&M Step 4
	c21	M&M Step 5
	c22	M&M Step 6
	c23	M&M Step 7
	c24	M&M Step 8
	c25	M&M Step 9
	c26	M&M Step 10

Relay no.	Calculation value	Combination of relays that must be cut in																
1	1	1																
2	2		2															
3	4				4													
4	8							8										
5	16																16	
6	32																	
7	62																	
8	128																	
The sum of 1-8 is the setting value for each step		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	etc.

	c27	M&M Step 11
	c28	M&M Step 12
<b>Definition of condenser and number of fans</b> <i>Version A</i> <b>c29=1:</b> One fan on connection 12-13 <b>c29=2:</b> Two fans on 12-15 <b>3:</b> Three fans on 12-17 <b>4:</b> Four fans on 12-19 <b>5:</b> Five fans. When there are five or more fans a relay module type EKC 331 must be connected to the analog output. The four first ones are connected to 12-19, No. 5 to the relay module. See the drawing on page 9. <b>6-8:</b> Four as above. The rest on the relay module. <b>9:</b> All fans controlled via the analog output and a frequency converter. (Terminals 12-13 supply the start/stop signal. 14-19 are not used). <i>Version B (see drawing on page 9)</i> <b>1-8:</b> All fans connected to EKC 331 via the analog output. <b>9:</b> All fans are controlled via the analog output and a frequency converter.	c29	No. of Fans
<b>Read temperature at sensor Sc3</b>	u44	Sc3 temp
<b>Read temperature at sensor Sc4</b> (sensor is only used for monitoring)	u45	Sc4 temp
	-	- - - Comp. Cap % Read cut-in compressor capacity
	-	- - - Cond. Cap % Read cut-in condenser capacity
<b>Regulation parameters for the condenser regulation</b>		
<b>P: Amplification factor Xp (P = 100/Xp)</b> If the Xp value is increased, the regulation becomes steadier	n04	Xp b
<b>I: Integration time Tn</b> If the Tn value is increased, the regulation becomes steadier	n05	Tn s
<b>Alarm</b>		<b>Alarm settings</b>
The controller can give alarm in different situations. When there is an alarm all the light-emitting diodes (LED) will flash on the EKA 162, and the alarm relay will cut in. (In EKC 531B the alarm relay may be used for a compressor No. 10, if required).		
<b>P0 min.</b> Here you set when the alarm at too low suction pressure is to enter into effect. The value is set as an absolute value.	A11	Min. P0. b
<b>Pc max.</b> Here you set when the alarm at too high condensing pressure is to enter into effect. The value is set as an absolute value.	A30	Max. Pc. b
<b>Alarm delay DI1 (an interrupted input will give alarm).</b> The time delay is set in seconds. At max. setting the alarm is cancelled.	A27	DI1AlrmDelay
<b>Alarm delay DI2 (an interrupted input will give alarm).</b> The time delay is set in seconds. At max. setting the alarm is cancelled.	A28	DI2AlrmDelay
<b>Alarm delay DI3 (an interrupted input will give alarm).</b> The time delay is set in seconds. At max. setting the alarm is cancelled.	A29	DI3AlrmDelay
<b>Alarm limit for high temperature of the "Housing temp." sensor</b> With setting = 0 the alarm has been opted out.	A32	Housing temp
<b>Alarm delay from "Housing temp"</b> If the limit value 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
Give the top button a brief push to zeroset the alarm and to have the message shown on the display.		Reset alarm The function zerosets all alarms when set in pos. ON.
		With data communication the importance of the individual alarms can be defined. Setting is carried out in the " <b>Alarm destinations</b> " menu. See also page 17.

Miscellaneous		Miscellaneous
<b>Sensor type</b> (Sc3, Sc4 and "Housing") Normally a Pt1000 sensor with great signal accuracy is used. But a PTC sensor may also be used (r25 = 1000) in special situations. <b>0=PT1000. 1=PTC1000</b>	o06	Sensor type
<b>Pressure transmitter's working range</b> Depending on the pressure, a pressure transmitter with a given working range is used. This working range must be set in the controller (e.g.: -1 to 12 bar). The values must be set in bar if display in °C has been selected. And in psig, if °F has been selected.		If the values are to be set from the AKM programme, they must be set in bar.
P0-Min. value	o20	P0MinTrsPres
P0-Max. value	o21	P0MaxTrsPres
Pc-Min. value	o47	PcMinTrsPres
Pc-Max. value	o48	PcMaxTrsPres
<b>Use of DI4 input</b> The digital input can be connected to a contact function, and the contact can now be used for one of the following functions: Setting / function: <b>0:</b> DI input not used <b>1:</b> Regulation reference P0 displaced when contact is cut in <b>2:</b> Alarm function when the contact cuts out. Alarm "A31" is given when the time delay has elapsed.	o22	Di4 control
<b>Use of DI5 input</b> The digital input can be connected to a contact function, and the contact can now be used for one of the following functions: Setting / function: <b>0:</b> DI input not used <b>1:</b> Regulation reference Pc displaced when contact is cut in <b>2:</b> Alarm function when the contact cuts out. Alarm "A32" is given when the time delay has elapsed.	o37	Di5 control
<b>Read temperature at sensor "Housing"</b>	o49	Housing temp
<b>Operating hours</b> The operating hours for the compressor relays can be read in the following menus. The read value is multiplied by 1000 to obtain the number of hours (f.ex. shows 2.1 for 2100 hours). On reaching 99.9 hours the counter stops and must now be reset to, say, 0. There will be no alarm or error message for counter overflow.		(In the AKM display the hour number has not been multiplied)
Value for relay number 1	o23	DO1 run hour
Value for relay number 2	o24	DO2 run hour
Value for relay number 3	o25	DO3 run hour
Value for relay number 4	o26	DO4 run hour
Value for relay number 5 to 10 (EKC 531B only)	o50- o55	DO5 run hour ..... DO10 run hour
<b>Refrigerant setting</b> Before refrigeration is started, the refrigeration must be defined. You may choose between the following refrigerants: 1=R12. 2=R22. 3=R134a. 4=R502. 5=R717. 6=R13. 7=R13b1. 8=R23. 9=R500. 10=R503. 11=R114. 12=R142b. 13=User defined. 14=R32. 15=R227. 16=R401A. 17=R507. 18=R402A. 19=R404A. 20=R407C. 21=R407A. 22=R407B. 23=R410A. 24=R170. 25=R290. 26=R600. 27=R600a. 28=R744. 29=R1270. 30=R417A Warning: Wrong selection of refrigerant may cause damage to the compressor.	o30	Refrigerant
<b>Manual control</b> (stopped regulation only) From this menu the relays can be cut in and out manually. 0 gives no override, but a number between 1 and 10 will cut in a belonging relay. 1 will cut in relay number 1, 2 relay 2, etc. 11-18 will produce voltage on the analog output. In this way the relays on the external relay module can be activated. Setting 11 will give a voltage of 1.25 V, setting 12 will give 2.5 V, etc.	o18	- - -
<b>Frequency</b> Set the net frequency.	o12	50 / 60 Hz (50=0, 60=1)



<p><b>Address</b> 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. These settings can only be made when a data communication module has been mounted in the controller and the installation of the data communication cable has been completed. This installation is mentioned in a separate document "RC.8A.C".</p>		<p>Following installation of a data communication module, the controller can be operated on a par with the other controllers in ADAP-KOOL® refrigeration controls.</p>
<p>The address is set between 1 and 60</p>	o03	
<p>The address is sent to the gateway when the menu is set in pos. ON</p>	o04	
<p><b>Access code</b> If the settings in the controller are to be protected by a numerical code, you can set a numerical value between 0 and 100. If not, you can cancel the function with setting OFF.</p>	o05	
<p><b>Operating status</b></p>		
<p>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</p>		<p>EKC state (0 = regulation)</p>
<p>S2: When the relay is operated, it must be activated for min. x minutes (cf. c01)</p>		2
<p>S5: Renewed cutin of the same relay must not take place more often than every x minutes (cf. c07)</p>		5
<p>S8: The next relay must not cut in until x minutes have elapsed (cf.c11-c12)</p>		8
<p>S9: The next relay must not cut out until x minutes have elapsed (cf. c14-c15)</p>		9
<p>S10: Regulation stopped with the internal og external start/stop</p>		10
<p>S25: Manuel control of outputs via function "o18"</p>		25
<p><b>Alarm messages</b></p>	<p><b>Alarms "Destinations"</b></p>	
<p>A2: Low P0</p>	<p>- - - Low P0 alarm</p>	
<p>A11: No refrigerant has been selected (cf. o30)</p>	<p>- - - No RFG Sel</p>	
<p>A17: High Pc</p>	<p>- - - Hi Pc alarm</p>	
<p>A19 - 26: Compressor fault. Interrupted signal on input "Comp 1" /2/3/4/5/6/7/8</p>	<p>- - - Comp_ fault</p>	
<p>A27: High temperature alarm for sensor "Housing"</p>	<p>- - - Housing temp</p>	
<p>A28 - 32: External alarm. Interrupted signal on input "DI1" /2/3/4/5</p>	<p>- - - DI_ Alarm</p>	
<p>A34 - 37: Fan failurel. Interrupted signal on input "Fan 1" /2/3/4 (EKC 531A)</p>	<p>- - - Fan _ fault</p>	
<p>A45: Regulation stopped with setting or with external switch</p>	<p>A45 Stand by</p>	
<p>E1: Error in the controller</p>	<p>Ctrl. fault</p>	
<p>E2: Control signal outside the range (short-circuited/interrupted)</p>	<p>Out of range</p>	

Configuration settings (compressor and fan definitions, coupling mode and refrigerant) can only take place when regulation is stopped.

Compressor connections										Coupling mode	
Relay no.										Set "C16" to	Set "C08" to
1	2	3	4	5	6	7	8	9	10		
1										1	1
1	2									2	1 / 2
1	2	3								3	1 / 2
1	2	3	4							4	1 / 2 / 3
1	1a									5	1
1	1a	1b								6	1
1	1a	1b	1c							7	1
1	1a	2	2c							8	1 / 2
1	2	3	4	5						9	1 / 2
1	2	3	4	5	6					10	1 / 2
1	2	3	4	5	6	7				11	1 / 2
1	2	3	4	5	6	7	8			12	1 / 2
1	2	3	4	5	6	7	8	9		13	1 / 2
1	2	3	4	5	6	7	8	9	10	14	1 / 2
1	1a	1b	2	2a	2b					15	1 / 2
1	1a	1b	1c	2	2a	2b	2c			16	1 / 2
1	1a	2	2a	3	3a					17	1 / 2
1	1a	1b	2	2a	2b	3	3a	3b		18	1 / 2
1	1a	2	2a	3	3a	4	4a			19	1 / 2
1	1a	2	2a	3	3a	4	4a	5	5a	20	1 / 2
User-defined combination. See Mix and Match settings.										0	1

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All capacity steps are presumed to be identical. The only exception is setting with coupling mode 3. See below.

Coupling mode 1 = sequential operation.

Coupling mode 2 = cyclic operation.

Coupling mode 3 = cyclic and binary operation where the compressor capacities are, as follows:

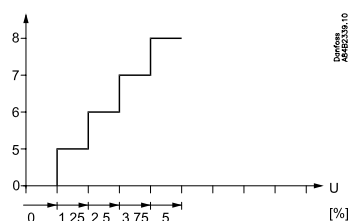
- 1: 11%
- 2: 21%
- 3: 34%
- 4: 34%

There is cyclic coupling at 3 and 4, and binary on 1, 2 and 3/4. (for c16=4 only)

When there is cyclic operation and connections with unloaders there will in some capacity cutins and cutouts be overlappings where the unloaders from either one compressor or another may be active.

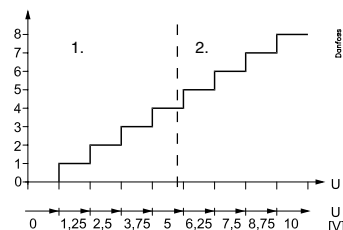
In such cases the unloaders on the compressor with the lowest number of hours will be cut in, and the others cut out. The changeover will take place at 6-second intervals.

### Condenser couplings



Output signal from EKC 531A

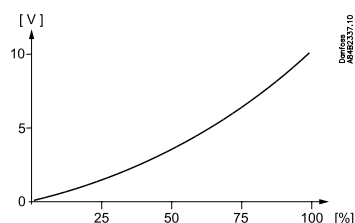
In EKC 331 the voltage range must be set to 0-5 V ("o10" = 6).  
In EKC 331 the number of steps must be set to 4 ("o19" = 4) (also when fewer fans are connected).



Output signal from EKC 531B

In the first EKC 331, set 0-5 V ("o10" = 6).  
In the second EKC 331, set 5-10 V ("o10" = 7).  
In both EKC's the number of steps must be set to 4 ("o19" = 4) (also when fewer fans are connected to the second EKC).

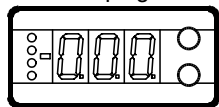
If the entire condenser capacity is to be controlled by a frequency converter, EKC 531 must send an analog signal about the required capacity ("c29" = 9). The signal varies from 0 to 10 V. Signal and capacity have the following context.



## Operation

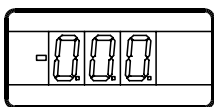
### Display

The values will be shown with three digits, and with a setting you can determine whether the pressures are to be shown in bar or in psig.



EKA 162

For operation and display of evaporating pressure. The light-emitting diodes on the left-hand side flash when there is an alarm.



EKA 161

For display of condensing pressure.

### The buttons

When you want to change a setting, the two 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 two buttons simultaneously. When you have changed the value, save the new value by once more pushing the two buttons simultaneously.

- Gives access to the menu (or cutout an alarm)
- Gives access to changes
- Saves a change

### Operation

1. Push the upper button until a parameter is shown
2. Push one of the buttons and find the parameter you want to change
3. Push both buttons simultaneously until the parameter value is shown
4. Push one of the buttons and select the new value
5. Push both buttons again to conclude the setting

### 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 both buttons depressed at the same time as you reconnect the supply voltage

## Menu survey EKC 531A

SW: 1.2x

Function	Parameter	Min.	Max.
<b>Normal display</b>			
Shows P0 in EKA 162 (display with buttons)	-		bar
Shows Pc in EKA 161	-		bar
<b>P0 reference</b>			
Neutral zone	r01	0,1 bar	5 bar
Correction of signal from P0 sensor	r04	-1 bar	1 bar
Select unit (0=bar and °C, 1=Psig and °F)	r05	0	1
Start/Stop of regulation	r12	OFF	ON
Reference offset for P0	r13	-1 bar	1 bar
Set regulation setpoint for P0	r23	-1 bar	40 bar
Shows total P0 reference	r24		bar
Limitation: P0 reference max. value *	r25	-1 bar	40 bar
Limitation: P0 reference min. value *	r26	-1 bar	40 bar
Displacement of P0 (ON=active "r13")	r27	OFF	ON
<b>Pc reference</b>			
Set regulation setpoint for Pc	r28	0 bar	60 bar
Shows total Pc reference	r29		bar
Limitation: Pc referencen max. value	r30	0 bar	60 bar
Limitation: Pc referencen min. value	r31	0 bar	60 bar
Correction of signal from Pc sensor	r32	-2 bar	2 bar
Pc reference variation. 1 and 2 are PI-regulation 1: Fixed reference. "r28" is used 2: Variable reference. Outdoor temperature (Sc3) included in the reference 3: As 1, but with P-regulation 4: As 2, but with P-regulation	r33	1	4
Reference offset for Pc	r34	-5 bar	5 bar
<b>Capacity</b>			
Min. ON time for relays	c01	0 min.	30 min.
Min. time period between cutins of same relay	c07	0 min.	60 min.
Definition of regulation mode 1: Sequential (step mode / FILO) 2: Cyclic (step mode / FIFO) 3: Binary and cyclic	c08	1	3
If a regulation mode with unloaders is selected, the relay must be defined to: 0: Cut in when more capacity is required 1: Cut out when more capacity is required	c09	0	1
Regulation parameter for + Zone	c10	0,1 bar	2 bar
Regulation parameter for + Zone min.	c11	0,1 min.	60 min.
Regulation parameter for ++ Zone seconds	c12	0,1 min.	3,0 min.
Regulation parameter for - Zone	c13	0,1 bar	2 bar
Regulation parameter for - Zone min.	c14	0,1 min.	60 min.
Regulation parameter for - - Zone seconds	c15	0,1 min.	10 min.
Definition of compressor connections. See options on page 9.	c16	0	8
<i>The following "c17" to "c28" is only relevant if "c16" has been selected to 0. A code will then have to be set for the relays that are to be ON at the different steps:</i>			
Step 1 (M&M operation)	c17	0	15
Step 2 (M&M operation)	c18	0	15
Step 3 (M&M operation)	c18	0	15
Step 4 (M&M operation)	c20	0	15
Step 5 (M&M operation)	c21	0	15
Step 6 (M&M operation)	c22	0	15

\* applies also at P0-optimisation

To be continued

Step 7 (M&M operation)	c23	0	15
Step 8 (M&M operation)	c24	0	15
Step 9 (M&M operation)	c25	0	15
Step 10 (M&M operation)	c26	0	15
Step 11 (M&M operation)	c27	0	15
Step 12 (M&M operation)	c28	0	15
Definition of condenser: <b>1-4:</b> The number of fans starting from connection 12-13 <b>5-8:</b> Further max. four fans via analog output <b>9:</b> Only via analog output and start of frequency converter	c29	0/OFF	9
Amplification factor Xp for condenser regulation	n04	0,2 bar	10 bar
l: Integration time Tn for condenser regulation	n05	30 s	600 s
<b>Alarm</b>			
Delay time for a "Housing" alarm	A03	0 min.	90 min
Low alarm limit for P0	A11	-1 bar	40 bar
Delay time for a DI1 alarm	A27	0 s	600 s /off
Delay time for a DI2 alarm	A28	0 s	600 s /off
Delay time for a DI3 alarm	A29	0 s	600 s /off
Upper alarm limit for Pc	A30	0 bar	60 bar
Upper alarm limit for sensor "Housing"	A32	0 °C /off	100 °C
<b>Miscellaneous</b>			
Controllers address	o03*	1	60
On/off switch (service-pin message)	o04*	-	-
Access code	o05	off(-1)	100
Used sensor type for Sc3, Sc4 and "Housing" <b>0=PT1000, 1=PTC1000</b>	o06	0	1
Set supply voltage frequency	o12	50 Hz	60 Hz
Manual control of outputs: <b>0:</b> No override <b>1-10:</b> 1 will cut in relay 1, 2 relay 2, etc. <b>11-18:</b> Gives voltage signal on the analog output. (11 gives 1.25 V, and so on in steps of 1.25 V.	o18	0	18
P0 pressure transmitter's working range - min. value	o20	-1 bar	0 bar
P0 pressure transmitter's working range - max. value	o21	1 bar	40 bar
Use of DI4-input <b>0=not used. 1=P0 displacement. 2=alarm function. Alarm="A31"</b>	o22	0	2
Operating hours of relay 1 (value time 1000)	o23		h
Operating hours of relay 2 (value time 1000)	o24		h
Operating hours of relay 3 (value time 1000)	o25		h
Operating hours of relay 4 (value time 1000)	o26		h
Setting of refrigerant 1=R12. 2=R22. 3=R134a. 4=R502. 5=R717. 6=R13. 7=R13b1. 8=R23. 9=R500. 10=R503. 11=R114. 12=R142b. 13=User defined. 14=R32. 15=R227. 16=R401A. 17=R507. 18=R402A. 19=R404A. 20=R407C. 21=R407A. 22=R407B. 23=R410A. 24=R170. 25=R290. 26=R600. 27=R600a. 28=R744. 29=R1270. 30=R417A	o30	0	30
Use of DI5-input <b>0=not used. 1=Pc displacment. 2=alarm function. Alarm="A32"</b>	o37	0	2

Continues...

Pc pressure transmitter's working range - min. value	o47	-1 bar	0 bar
Pc pressure transmitter's working range - max. value	o48	1 bar	60 bar
Read temperature at sensor "Housing"	o49		°C
<b>Service</b>			
Read temperature at sensor "Sc3"	u44		°C
Read temperature at sensor "Sc4"	u45		°C

\*) This setting will only be possible if a data communication module has been installed in the controller.

The controller can give the following messages		
E1	<b>Error message</b>	Fault in controller
E2		Regulation is outside the range, or the control signal is defective.
A2	<b>Alarm message</b>	Low P0
A11		Refrigerant not selected
A17		High Pc
A19		Compressor 1 alarm. Terminal 29 is open
A20		Compressor 2 alarm. Terminal 30 is open
A21		Compressor 3 alarm. Terminal 31 is open
A22		Compressor 4 alarm. Terminal 32 is open
A27		Room temperature alarm (housing temp.)
A28		DI 1 alarm. Terminal 46 interrupted
A29		DI 2 alarm. Terminal 47 interrupted
A30		DI 3 alarm. Terminal 49 interrupted
A31		DI 4 alarm. Terminal 50 interrupted
A32		DI 5 alarm. Terminal 52 interrupted
A34		Condenser 1 alarm. Terminal 33 is open
A35		Condenser 2 alarm. Terminal 34 is open
A36		Condenser 3 alarm. Terminal 35 is open
A37		Condenser 4 alarm. Terminal 36 is open
A45		Regulation stopped
S2	<b>Status message</b>	Wait for "c01"
S5		Wait for "c07"
S8		Wait for "c11" or "c12"
S9		Wait for "c14" or "c15"
S10		Refrigeration stopped by the internal or external start/stop function
S25		Manual control of output

# Menu survey EKC 531B

SW: 1.2x

Function	Parameter	Min.	Max.
<b>Normal display</b>			
Shows P0 in EKA 162 (display with buttons)	-		bar
Shows Pc in EKA 161	-		bar
<b>P0 reference</b>			
Neutral zone	r01	0,1 bar	5 bar
Correction of signal from P0 sensor	r04	-1 bar	1 bar
Select unit (0=bar and °C, 1=Psig and °F)	r05	0	1
Start/Stop of regulation	r12	OFF	ON
Reference offset for P0	r13	-1 bar	1 bar
Set regulation setpoint for P0	r23	-1 bar	40 bar
Shows total P0 reference	r24		bar
Limitation: P0 reference max. value *	r25	-1 bar	40 bar
Limitation: P0 reference min. value *	r26	-1 bar	40 bar
Displacement of P0 (ON=active "r13")	r27	OFF	ON
<b>Pc reference</b>			
Set regulation setpoint for Pc	r28	0 bar	60 bar
Shows total Pc reference	r29		bar
Limitation: Pc referencen max. value	r30	0 bar	60 bar
Limitation: Pc referencen min. value	r31	0 bar	60 bar
Correction of signal from Pc sensor	r32	-2 bar	2 bar
Pc reference variation 1 and 2 are PI-regulation 1: Fixed reference. "r28" is used 2: Variable reference. Outdoor temperature (Sc3) included in the reference 3: As 1, but with P-regulation 4: As 2, but with P-regulation	r33	1	4
Reference offset for Pc	r34	-5 bar	5 bar
<b>Capacity</b>			
Min. ON time for relays	c01	0 min.	30 min.
Min. time period between cutins of same relay	c07	0 min.	60 min.
Definition of regulation mode 1: Sequential (step mode / FILO) 2: Cyclic (step mode / FIFO) 3: Binary and cyclic	c08	1	3
If a regulation mode with unloaders is selected, the relay must be defined to: 0: Cut in when more capacity is required 1: Cut out when more capacity is required	c09	0	1
Regulation parameter for + Zone	c10	0,1 bar	2 bar
Regulation parameter for + Zone min.	c11	0,1 min.	60 min.
Regulation parameter for ++ Zone seconds	c12	0,1 min.	3,0 min.
Regulation parameter for - Zone	c13	0,1 bar	2 bar
Regulation parameter for - Zone min.	c14	0,1 min.	60 min.
Regulation parameter for - - Zone seconds	c15	0,1 min.	10 min.
Definition of compressor connections. See the options on page 9.	c16	0	20
<i>The following "c17" to "c28" is only relevant if "c16" has been selected to 0. A code will then have to be set for the relays that are to be ON at the different steps:</i>			
Step 1 (M&M operation)	c17	0	255
Step 2 (M&M operation)	c18	0	255
Step 3 (M&M operation)	c19	0	255
Step 4 (M&M operation)	c20	0	255
Step 5 (M&M operation)	c21	0	255
Step 6 (M&M operation)	c22	0	255

To be continued

Step 7 (M&M operation)	c23	0	255
Step 8 (M&M operation)	c24	0	255
Step 9 (M&M operation)	c25	0	255
Step 10 (M&M operation)	c26	0	255
Step 11 (M&M operation)	c27	0	255
Step 12 (M&M operation)	c28	0	255
Definition of fan connections and number: 1-4: Number of fans starting from the first EKC 331. 5-8: Total number if there are two EKC 331 units. 9: Only via analog output and frequency converter	c29	0/off	9
Amplification factor Xp for (P = 100/Xp) condenser regulation	n04	0,2 bar	10 bar
l: Integration time Tn for condenser regulation	n05	30 s	600 s
<b>Alarm</b>			
Delay time for a "Housing" alarm	A03	0 min.	90 min
Low alarm limit for P0	A11	-1 bar	40 bar
Delay time for a DI1 alarm	A27	0 s	600 s /off
Delay time for a DI2 alarm	A28	0 s	600 s /off
Delay time for a DI3 alarm	A29	0 s	600 s /off
Upper alarm limit for Pc	A30	0 bar	60 bar
Upper alarm limit for sensor "Housing"	A32	0 °C /off	100 °C
<b>Miscellaneous</b>			
Controllers address	o03*	1	60
On/off switch (service-pin message)	o04*	-	-
Access code	o05	off(-1)	100
Used sensor type for Sc3, Sc4 and "Housing" 0=PT1000, 1=PTC1000	o06	0	1
Set supply voltage frequency	o12	50 Hz	60 Hz
Manual control of outputs: 0: No override 1-10: 1 will cut in relay 1, 2 relay 2, etc. 11-18: Gives voltage signal on the analog output. (11 gives 1.25 V, and so on in steps of 1.25 V).	o18	0	18
P0 pressure transmitter's working range - min. value	o20	-1 bar	0 bar
P0 pressure transmitter's working range - max. value	o21	1 bar	40 bar
Use of DI4-input 0=not used. 1=P0 displacement. 2=alarm function. Alarm="A31"	o22	0	2
Operating hours of relay 1 (value time 1000)	o23		h
Operating hours of relay 2 (value time 1000)	o24		h
Operating hours of relay 3 (value time 1000)	o25		h
Operating hours of relay 4 (value time 1000)	o26		h
Setting of refrigerant 1=R12. 2=R22. 3=R134a. 4=R502. 5=R717. 6=R13. 7=R13b1. 8=R23. 9=R500. 10=R503. 11=R114. 12=R142b. 13=User defined. 14=R32. 15=R227. 16=R401A. 17=R507. 18=R402A. 19=R404A. 20=R407C. 21=R407A. 22=R407B. 23=R410A. 24=R170. 25=R290. 26=R600. 27=R600a. 28=R744. 29=R1270. 30=R417A	o30	0	30

To be continued

\* applies also at P0-optimisation

Use of DI5-input 0=not used. 1=Pc displacment. 2=alarm function. Alarm="A32"	o37	0	2
Pc pressure transmitter's working range - min. value	o47	-1 bar	0 bar
Pc pressure transmitter's working range - max. value	o48	1 bar	60 bar
Read temperature at sensor "Housing"	o49		°C
Operating hours of relay 5 (value time 1000)	o50		h
Operating hours of relay 6 (value time 1000)	o51		h
Operating hours of relay 7 (value time 1000)	o52		h
Operating hours of relay 8 (value time 1000)	o53		h
Operating hours of relay 9 (value time 1000)	o54		h
Operating hours of relay 10 (value time 1000)	o55		h
<b>Service</b>			
Read temperature at sensor "Sc3"	u44		°C
Read temperature at sensor "Sc4"	u45		°C

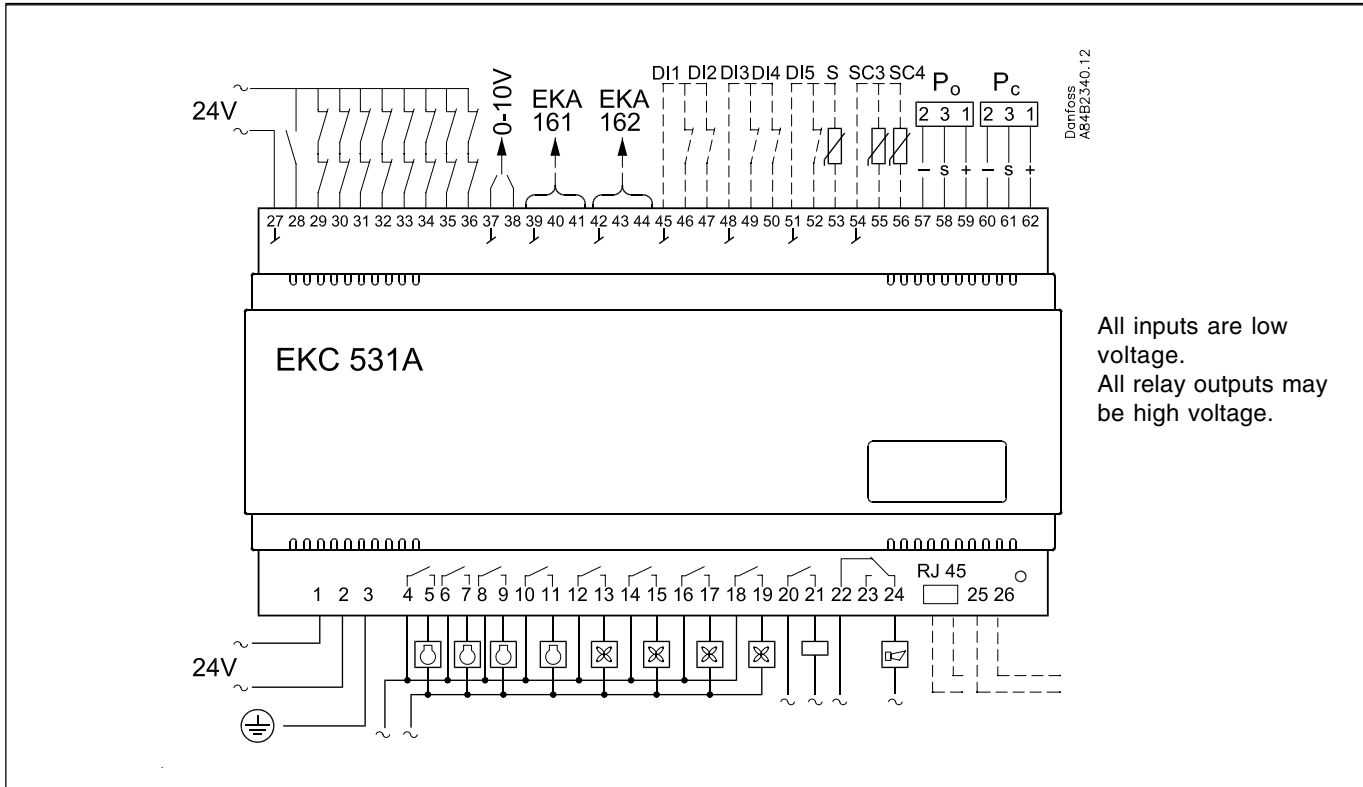
\*) This setting will only be possible if a data communication module has been installed in the controller.

The controller can give the following messages		
E1	<b>Error message</b>	Fault in controller
E2		Regulation is outside the range, or the control signal is defective
A2	<b>Alarm message</b>	Low P0
A11		Refrigerant not selected
A17		High Pc
A19		Compressor 1 alarm. Terminal 29 is open
A20		Compressor 2 alarm. Terminal 30 is open
A21		Compressor 3 alarm. Terminal 31 is open
A22		Compressor 4 alarm. Terminal 32 is open
A23		Compressor 5 alarm. Terminal 33 is open
A24		Compressor 6 alarm. Terminal 34 is open
A25		Compressor 7 alarm. Terminal 35 is open
A26		Compressor 8 alarm. Terminal 36 is open
A27		Room temperature alarm (housing temp.)
A28		DI 1 alarm. Terminal 46 interrupted
A29		DI 2 alarm. Terminal 47 interrupted
A30		DI 3 alarm. Terminal 49 interrupted
A31		DI 4 alarm. Terminal 50 interrupted
A32		DI 5 alarm. Terminal 52 interrupted
A45	Regulation stopped	
S2	<b>Status message</b>	Wait for "c01"
S5		Wait for "c07"
S8		Wait for "c11" or "c12"
S9		Wait for "c14" or "c15"
S10		Refrigeration stopped by the internal or external start/stop function
S25		Manual control of output

#### 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 both buttons depressed at the same time as you reconnect the supply voltage



## Connections EKC 531A

### Necessary connections

Terminals:

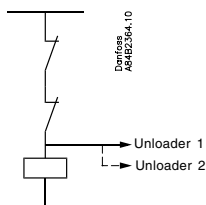
- 1-2 Supply voltage 24 V a.c.
- 4- 11 Relay connections compressor no. 1, 2, 3 and 4
- 12-19 Relay connections fan no. 1, 2, 3 and 4
- 22-24 Alarm relay  
There is connection between 22 and 24 in alarm situations and when the controller is dead
- 27-28 24 V signal to start / stop of regulation
- 27-29 24 V signal from the safety circuit compressor 1
- 27-30 24 V signal from the safety circuit compressor 2
- 27-31 24 V signal from the safety circuit compressor 3
- 27-32 24 V signal from the safety circuit compressor 4
- 27-33 24 V signal from the safety circuit fan 1
- 27-34 24 V signal from the safety circuit fan 2
- 27-35 24 V signal from the safety circuit fan 3
- 27-36 24 V signal from the safety circuit fan 4
- 57-59 Suction pressure. Voltage signal from AKS 32R
- 60-62 Condenser pressure. Voltage signal from AKS 32R
- 54-55 Out temperature (Sc3). Sensor signal from AKS 11, AKS 12 or EKS 111

### Application dependent connections

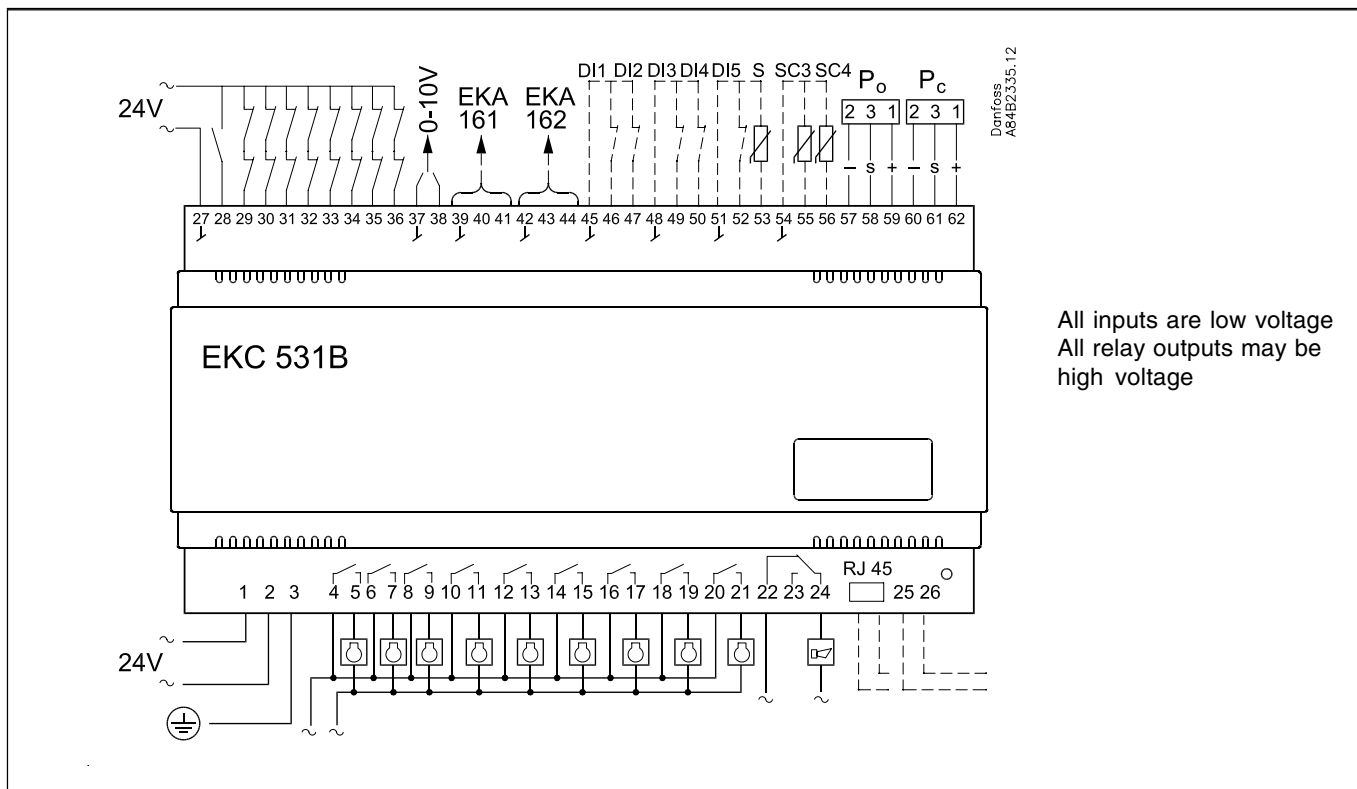
- 20-21 Safety function. The contact cuts off if the data communication is interrupted.
- 37-38 Voltage signal to external condenser control
- 39-41 Possibility of connecting an external display type EKA 161 for display of Pc
- 42-44 Possibility of connecting an external display type EKA 161 for display of P0, or EKA 162 for operation and display of P0
- 45-46 Contact function for alarm signal
- 45-47 Contact function for alarm signal
- 48-49 Contact function for alarm signal
- 48-50 Contact function for displacement of the suction pressure reference or for alarm signal.
- 51-52 Contact function for displacement of the condenser pressure reference or for alarm signal.
- 51-53 Room temperature. Sensor signal fra AKS 11, AKS 12 or EKS 111
- 54-56 Air temperature at condenser outlet. Sensor signal from AKS 11, AKS 12 or EKS 111

### Data communication

- 25-26 Mount only, if a data communication module has been mounted.  
For ethernet communication the plug connection RJ45 must be used. (LON FTT10 can also be connected in this way.  
It is important that the installation of the data communication cable be done correctly. Cf. separate literature No. RC.8A.C...



If an output is used for an unloader, the unloader's safety signal must be downloaded from the compressor's safety circuit.



## Connections EKC 531B

### Necessary connections

Terminals:

- 1-2 Supply voltage 24 V a.c.
- 4- 19 Relay connections compressor no. 1 to 8
- 27-28 24 V signal to start / stop of regulation
- 27-29 24 V signal from the safety circuit compressor 1
- 27-30 24 V signal from the safety circuit compressor 2
- 27-31 24 V signal from the safety circuit compressor 3
- 27-32 24 V signal from the safety circuit compressor 4
- 27-33 24 V signal from the safety circuit compressor 5
- 27-34 24 V signal from the safety circuit compressor 6
- 27-35 24 V signal from the safety circuit compressor 7
- 27-36 24 V signal from the safety circuit compressor 8
- 57-59 Suction pressure. Voltage signal from AKS 32R
- 60-62 Condenser pressure. Voltage signal from AKS 32R
- 37-38 Voltage signal to external condenser control
- 54-55 Out temperature (Sc3). Sensor signal from AKS 11, AKS 12 or EKS 111

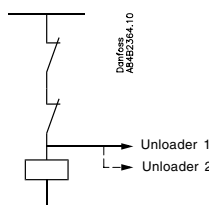
### Application dependent connections

- 20-21 Compressor 9, if applicable  
Or any safety function. The contact cuts off if the data communication is interrupted
- 22-23 Compressor 10, if applicable  
Or alarm relay on 22-24, if there is one  
There is connection between 22 and 24 in alarm situations and when the controller is de-energised
- 45-46 Contact function from the safety circuit compressor 9 or contact function for alarm signal
- 45-47 Contact function from the safety circuit compressor 10 or contact function for alarm signal, if applicable

- 39-41 Possibility of connecting an external display type EKA 161 for display of Pc
- 42-44 Possibility of connecting an external display type EKA 161 for display of P0, or EKA 162 for operation and display of P0
- 48-49 Contact function for alarm signal
- 48-50 Contact function for displacement of the suction pressure reference or for alarm signal.
- 51-52 Contact function for displacement of the condenser pressure reference or for alarm signal.
- 51-53 Room temperature. Sensor signal fra AKS 11, AKS 12 or EKS 111
- 54-56 Air temperature at condenser outlet. Sensor signal from AKS 11, AKS 12 or EKS 111

### Data communication

- 25-26 Mount only, if a data communication module has been mounted.  
For ethernet communication the plug connection RJ45 must be used. (LON FTT10 can also be connected in this way.  
It is important that the installation of the data communication cable be done correctly. Cf. separate literature No. RC.8A.C...



If an output is used for an unloader, the unloader's safety signal must be downloaded from the compressor's safety circuit.



## Data

Supply voltage	24 V a.c. +/-15% 50/60 Hz, 5 VA	
Input signal	2 pcs. Pressure transmitters type AKS 32R	
	3 pcs. temperature sensor input for PT 1000 ohm/0°C or PTC 1000 ohm/25°C	
Digitale input from contact function.	1 pcs. for Start/stop of regulation	
	8 pcs. for monitoring of safety circuits	
	3 pcs. for alarm function	
	2 pcs. for alarm function or for displacement of references	
Relay output for capacity regulation	8 pcs. SPST	AC-1: 3 A (ohmic) AC-15: 2 A (inductive)
Backup relay	1 pcs. SPST	
Alarm relay	1 pcs. SPDT	AC-1: 6 A (ohmic) AC-15: 3 A (inductive)
Voltage output	0-10 V d.c.	
Display outputs	EKA 161	Pc display
	EKA 162	Operation and P0 display
Data communication	Possible to connect a data communication module	
Environments	0 - 55°C, during operation	
	-40 - 70°C, during transport	
	20 - 80% Rh, not condensing	
	No shock influence / vibrations	
Enclosure	IP 20	
Weight	0.4 kg	
Mounting	DIN rail or on wall	
Terminals	max. 2.5 mm <sup>2</sup> multicore	
Approvals	EU Low voltage Directive and EMC demands re CE-marking complied with. LVD-tested acc. to EN 60730-1 and EN 60730-2-9 EMC-tested acc. to EN61000-6-2 and 3	

### Pressure transmitter / temperature sensor

Please refer to catalogue RK.OY.G...

### Installation considerations

Accidental damage, poor installation, or site conditions, can give rise to malfunctions of the control system, and ultimately lead to a plant breakdown.

Every possible safeguard is incorporated into our products to prevent this. However, a wrong installation, for example, could still present problems. Electronic controls are no substitute for normal, good engineering practice.

Danfoss will not be responsible for any goods, or plant components, damaged as a result of the above defects. It is the installer's responsibility to check the installation thoroughly, and to fit the necessary safety devices.

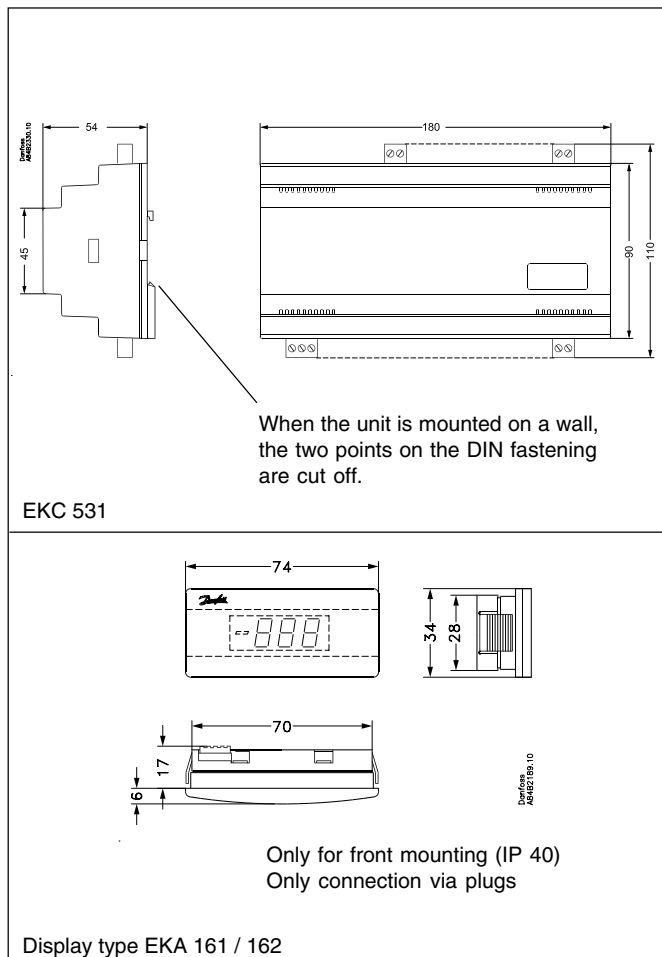
Special reference is made to the necessity of signals to the controller when the compressor is stopped and to the need of liquid receivers before the compressors.

Your local Danfoss agent will be pleased to assist with further advice, etc.

## Ordering

Type	Function	Code no.
EKC 531A	Capacity controller	<b>084B8003</b>
EKC 531B	Capacity controller	<b>084B8004</b>
EKA 161	Display unit	<b>084B7019</b>
EKA 162	Display unit with operation buttons	<b>084B7062</b>
	Cable for display unit 2 m, 1 pcs.	<b>084B7298</b>
	Cable for display unit 6 m, 1 pcs.	<b>084B7299</b>
EKA 173	Data communication module, FTT 10	<b>084B7092</b>
EKA 175	Data communication module, RS 485	<b>084B7093</b>
EKA 177	Data communication module, Ethernet	<b>084B8202</b>

## Mounting

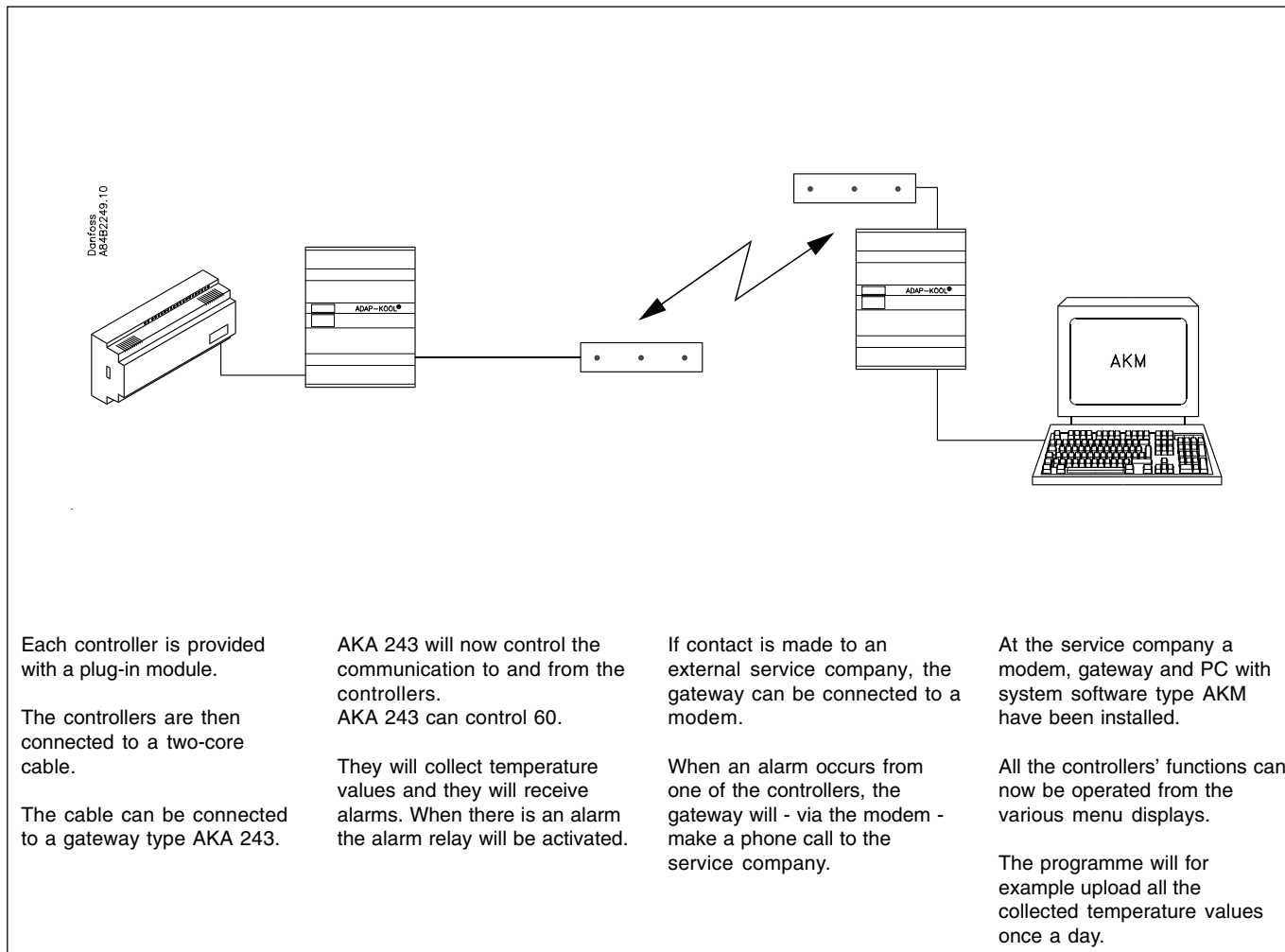


## Data communication

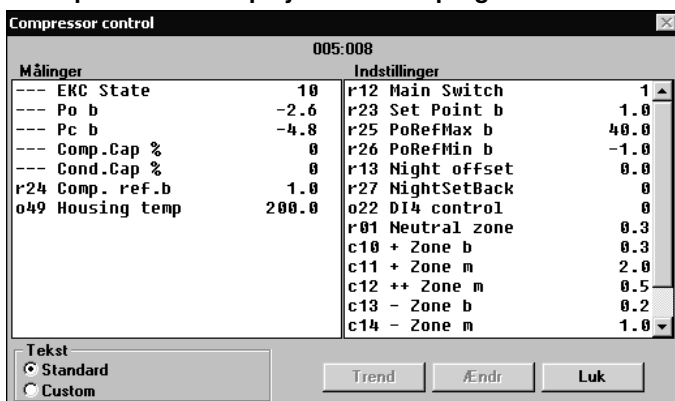
This page contains a description of a few of the possibilities you will have when the controller is provided with data communication.

*It is important that the installation of the data communication cable is carried out correctly. Please refer to separate literature No. RC.8A.C*

### Example



### Example of menu display in the AKM-programm



Measurements are shown at one side and settings at the other.

You will also be able to see the parameter names of the functions on page 4 - 8.

With a simple change-over the values can also be shown in a trend diagram.

If you wish to check earlier temperature measurements, you can see them in the log collection.

### Alarms

If the controller is extended with data communication, it will be possible to define the importance of the transmitted alarms. The importance is defined with the setting: 1, 2, 3 or 0. When the alarm then arises at some time, it will result in one of the following activities:

#### 1 = Alarm

The alarm message is sent off with alarm status 1. This means that the gateway that is the master in the system will have its alarm relay output activated for two minutes. Later, when the alarm ceases, the alarm text will be retransmitted, but now with status value 0.

#### 2 = Message

The alarm text is transmitted with status value 2. Later, when the "message" lapses, the alarm text is retransmitted, but now with status value 0.

#### 3 = Alarm

As "1", but the master gateway's relay output is not activated.

#### 0 = Suppressed information

The alarm text is stopped at the controller. It is transmitted nowhere.

## Override

The controller contains a number of functions that can be used together with the override function in the master gateway. They can therefore only be used in combination with data communication.

Function via data communication	Functions to be used in the gateway's override function	Selection of parameter in EKC 531A 084B8003 Sw.1.2x
Stop of injection when the compressor is stopped	AKC ON	- - - MC Inject ON
Night setback	Day/night control and time schedule	r27 NightSetback
Suction pressure optimisation	P0 optimisation	Select controller address (The parameters are found automatically and do not become visible).
EKC 531 registers the refrigeration point which handles the largest capacity (requires the lowest suction pressure). The parameter may be logged for use in a service situation.		- - - MLC

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## Safety function

### Monitoring of maximum discharge pressure

The function cuts in all condenser steps and gradually cuts out compressor steps, if the condensing pressure exceeds the permitted value. The cutout limit is the setting in "A30".

The function starts at a value that is 3 K below the set value. At this point the entire condenser capacity is cut in at the same time as 33% of the compressor capacity is cut out. (however min. one step). This is repeated for each 30-second interval. The alarm function is activated.

If the temperature (pressure) rises to the set limit value, the following happens:

- all compressor steps are immediately cut out
- the condenser capacity remains cut in

The alarm ceases when the temperature (pressure) has dropped to the 3 K below the limit value for 60 seconds.

Renewed cut in of compressor steps is allowed when the temperature (pressure) has dropped to the 3 K below the limit value. Restart of the compressor is dependent on expiry of the restart timer.

### Monitoring of minimum suction pressure

The function immediately cuts out all compressor steps if the suction pressure becomes lower than the permitted value. The cut out limit is the setting in "A11".

Cut outs activate the alarm function.

The alarm ceases when the pressure (temperature) is above the cut out limit.

Renewed cut in of compressor steps is allowed when the alarm has stopped (the time delay has expired).

### Emergency procedure

If the controller registers irregularities in the registered signals, it will start an emergency procedure:

For compressor regulation:

- If the signal from the pressure transmitter becomes smaller than expected, the controller will continue operating with the average capacity that has been cut in during the past 60 minutes. This cut-in capacity will gradually decline as time passes.
- If the signal for the suction pressure becomes smaller than the set value of A11, the capacity will instantly be cut out.

For condenser regulation:

- If the signal from the pressure transmitter becomes smaller than expected, or if the condensing pressure becomes bigger than the set value of A30, the entire capacity will instantly be cut in.

## List of literature

Instructions EKC 531A: RI.8H.B (extract from this manual).  
EKC 531B: RI.8H.C (extract from this manual).  
Here you can see how controllers are mounted and programmed.

Installation guide for extended operation RC.8A.C  
Here you can see how a data communication connection to ADAP-KOOL® Refrigeration controls can be established.

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