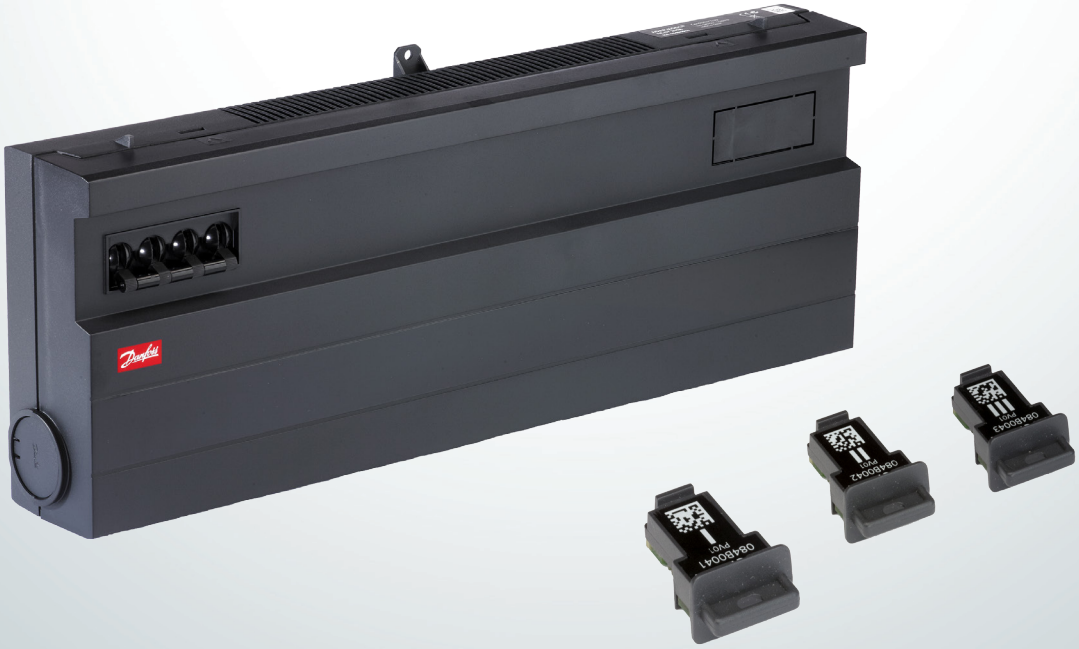
ENGINEERING
TOMORROW

User guide

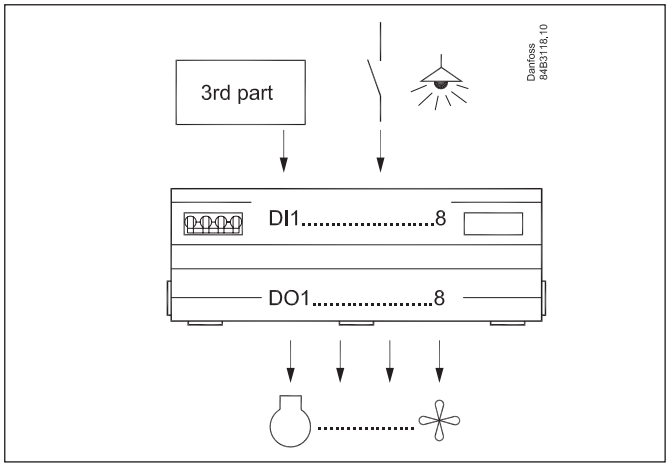
Controller tray for refrigeration appliance controller with signal from external controller AK-CT 200A + AK-CT 201A

ADAP-KOOL® Refrigeration control systems



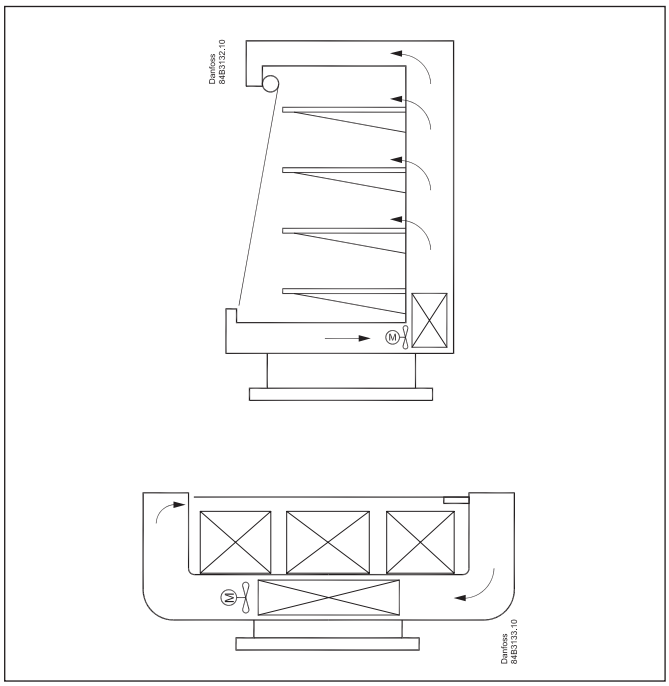
Introduction

Application
The controller is a complete auxiliary relay module with great flexibility for adaptation of signals from an external controller. The controller is optimised for connection of loads on refrigeration appliances and cold rooms, as well as for controlling the light and night blind.



Advantages
- Optimised for installation by manufacturer
- Electricity-controlled and voltage controlled relay connections
- Loads requiring electricity can be connected directly
- One controller for several different refrigeration appliances
- Quick set-up with predefined settings
- Built-in data communication

Principle
There are 8 digital inputs, all of which can be defined to connect to the 8 outlet relays. The relays are controlled by an internal measurement circuit that ensures an optimum connection time on the sine curve. The optimum time allows connections to be made with loads of up to 16 A on individual relays.
The current through each relay will be measured continuously, and if it becomes higher than the set permissible value, the relay will cut out and an alarm will be issued.



Functions
- Relays controlled by an external controller, e.g.:
  - Compressor and possibly compressor 2
  - Defrosting with 1, 2 or 3 phases
  - Rail heat
  - Fans and fans in eco-operation
  - Light and possibly extra lighting
  - Night blind
- AK-CT 200A has an alarm relay that is activated for alarms issued as the result of the cut-out of a relay due to excess current.

Contents

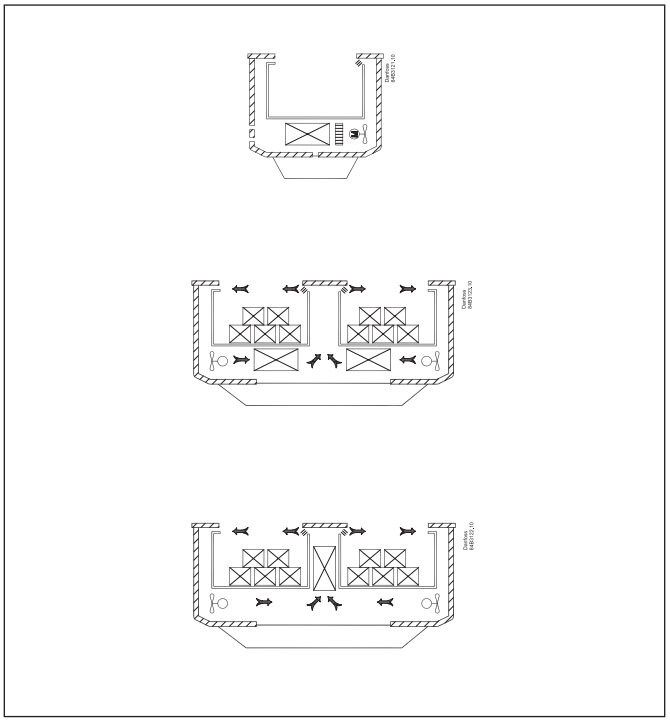
Applications

The controller can connect functions to different refrigeration appliances, such as:

- Standard appliances or cold rooms with one evaporator and one cooling section.
- Refrigeration appliances with two evaporators and two cooling sections.
- Refrigeration appliances with one evaporator and two cooling sections.

The external controller determines which functions are to be engaged.

A setting will configure the inputs and outputs, so that one input is destined for a specific relay output.



Installation benefits

The controller is designed to provide a number of advantages when installed by the refrigeration appliance manufacturer, such as:

High relay load

Load connection/disconnection is controlled by a voltage measurement and a current measurement, so that the relay's switch function can operate under optimal conditions.
The controller can then connect loads of up to 16 A, without the use of auxiliary relays.

Spring clamps

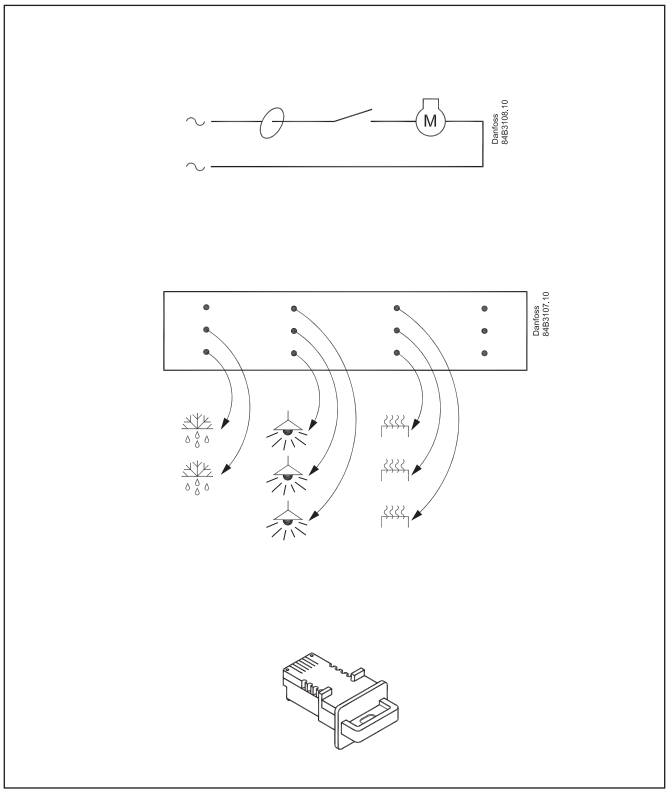
All cable connections are made using plugs with spring switches. This allows for fast and easy installation.

Parallel power point

Several of the outlets have double or triple connections points, so the use of external loop clips is not usually necessary.

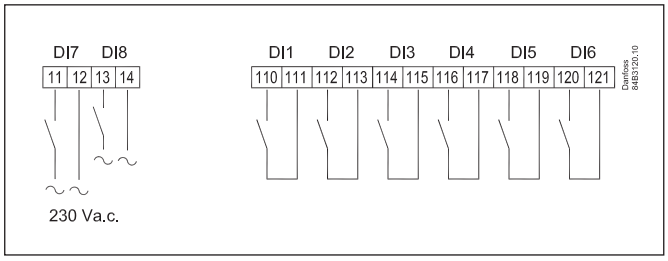
Structure of the controller

The controller consists of hardware type AK-CT 200A and a software identity code AK-CT 201A.
This software identity code is delivered in a separate plug and must be placed in an RJ45 plug in the hardware. It is first necessary to mount the plug when configuring the controller.



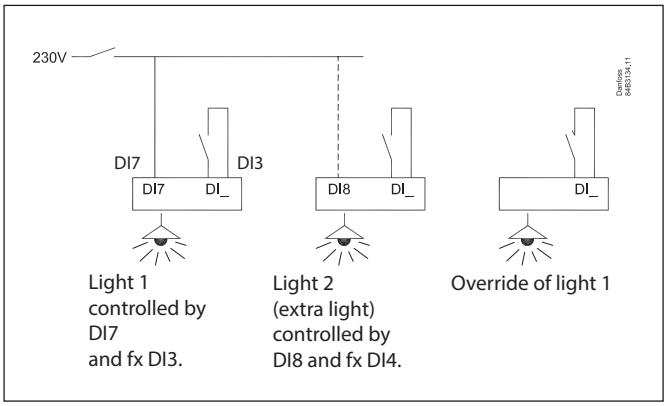
Operation

Digital inputs
There are six digital inputs with contact function and two digital inputs with high voltage signal.
They can be used for the following functions:
- Receive signals from an external controller and then activate the associated relay.
- Receive signals from switches for the activation of light and night blind.

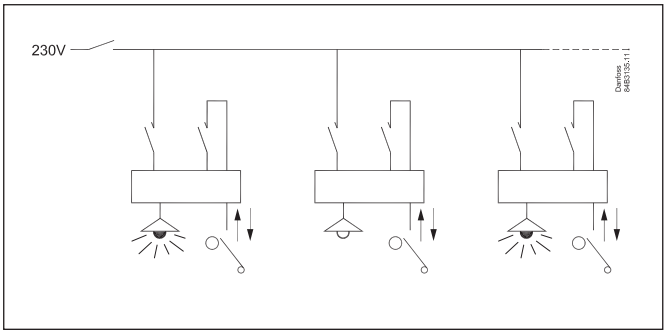


Light function
The function can be used for controlling the light in a refrigeration appliance or in a cold room.
The light function can be defined in two ways:
- The light is controlled by a DI input
- Two signals, **both** of which can be on before the light goes on. One can be a DI contact signal at the appliance (fx DI3) and the other can be a voltage signal on DI7.

Extra light (light 2)
Light 2 can also be activated by one DI input, e.g. DI4.
It can also be controlled with two signals. For two signals, the second signal must be sent with a voltage signal on DI8.



Night blind
Motorised night blind can be controlled automatically from the controller. The night blinds will follow the status of the light function. When the light is switched on, the night blinds opens and when the light is switched off, the night blinds close again.
When the night blinds are closed, it is possible to open them using a pulse signal on the digital input. If this input is activated, the night blinds will open and the refrigeration appliance can be filled with new products.
If the input is activated again, the blinds close again.
If the activation is omitted, the blind will close automatically when the delay time expires. A setting is used to define whether the light is to be on or off when the night blind is up.
This pulse signal must be connected to one of the following inputs: DI5, DI7 or DI8.

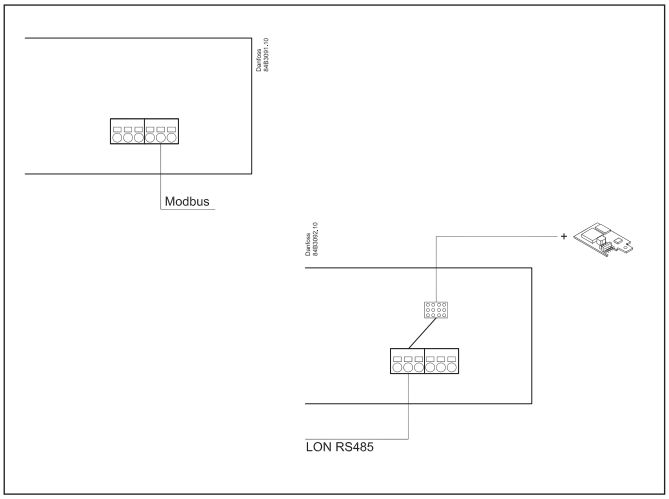


Data communication

The controller has fixed built-in MODBUS data communication. It can be connected to a Danfoss system unit, if required.

If there is a requirement for a different form of data communication, a Lon RS 485 module can be inserted in the controller.
The connection must then be to terminal RS 485.

(To use a Lon RS 485 module and gateway type AKA 245 the module must be Version 6.20 or higher.)



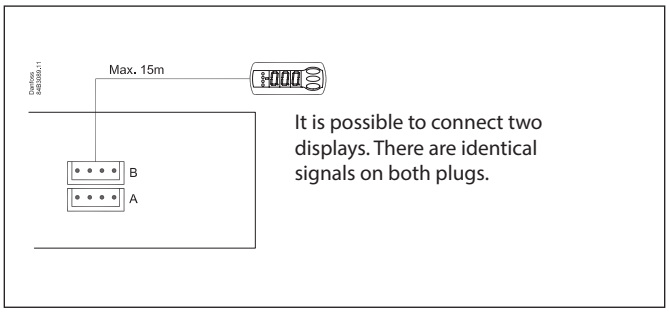
Important

All connections to the data communication MODBUS and RS 485 must comply with the requirements for data communication cables. See literature: RC8AC.

Display

The controller has two plugs for a display. Here display type EKA 163B or EKA 164B (max. length 15m) can be connected.
EKA 163B is a display for readings.
EKA 164B is both for readings and operation.

During standard operation the display will read "ON".
If one of the relays cuts out due to overcurrent, three LEDs will flash on the display. In this situation, you can access the alarm list on the display by pressing the top button.



It is possible to connect two displays. There are identical signals on both plugs.

Applications

Here is a survey of the controller's field of application.
The applications are all adapted for commercial refrigeration systems in the form of either refrigeration appliances or cold storage rooms.

Eight connection diagrams are shown on the following pages. We recommend using the connection diagram that comes closest to the application. This will result in the greatest degree of equalisation in the three phases.
Some functions are permanently bound to certain outputs. In this case, the connection diagram must be followed. The functions are:

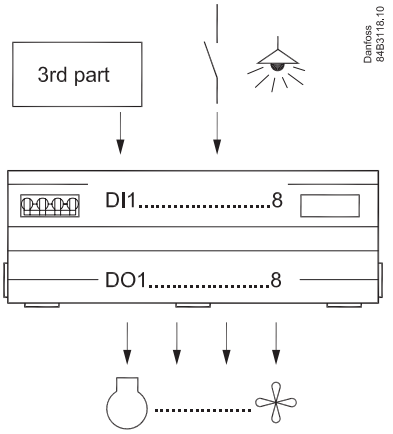
- Defrosting. Here is one or more of the DO outputs used, depending whether the application is a one, two or three-phase defrosting.
- Fan stop, when the night blind is down. In this case, DO7 is disconnected.
- Fan ECO function. DO8 is engaged.

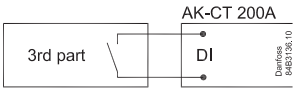
Outputs
There are 8 inputs and 8 outputs. Each output can be engaged by any input, which receives a signal from an external controller or other switch function.

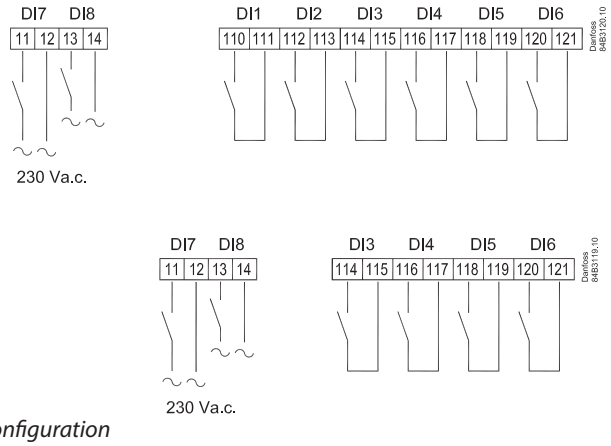
Alarm output
The alarm relay will be released when the controller registers an error, e.g. when a relay is disconnected due to excess current.

Digital input
DI1 to DI6 is the on/off input that can be used, for example, for one of the following functions: activate a relay for e.g. compressor, defrosting, fan, light, cancel defrost, etc.
DI7 and DI8 are 230 V inputs that can activate similar functions. See the functions in the respective settings o84, etc.
There are limitations on DO1 and DO2. They can only be used for signals from the external controller.

Control of night blinds
Night blinds follow the status of the light function – when the light is switched on, the night blinds are up and when the light is switched off, the night blinds are down. In addition a digital input provides the option of forced opening of the blinds so that the appliance can be filled with products.





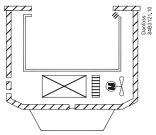


Configuration

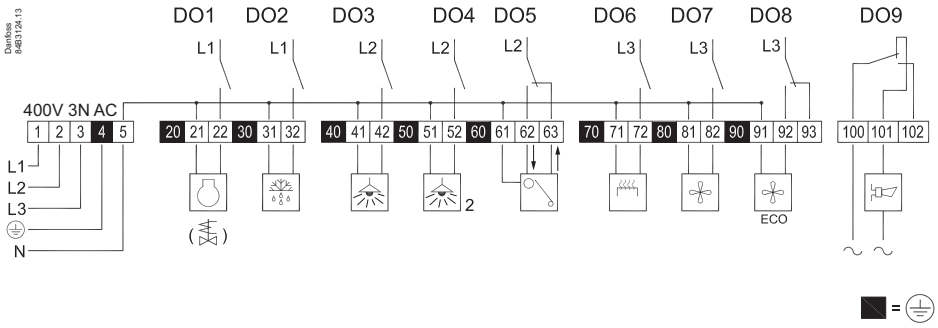
Function	Input/Settings menu						Setting
	DI3	DI4	DI5	DI6	DI7	DI8	
	o84	P55	P56	P57	P58	P59	
Not used	+	+	+	+	+	+	0
Night blind	+	+	+	+	+	+	12
Light	+	+	+	+	+	+	16
Extra light	+	+	+	+	+	+	17
No defrost	+	+	+	+	+	+	18
Override light	+	+	+	+	+	+	19
Central + decentral light override	16				16		
Central + decentral override of extra light		17				17	
Central + decentral override of night blind + on light			12			12	+o38 = 5
Central + decentral override of night blind, but without light			12			12	+o38 = 6

Example
If DI3 is used to activate a night blind, o84 must be set to 12.

1



One cooling section - one evaporator



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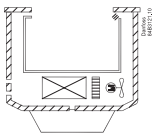
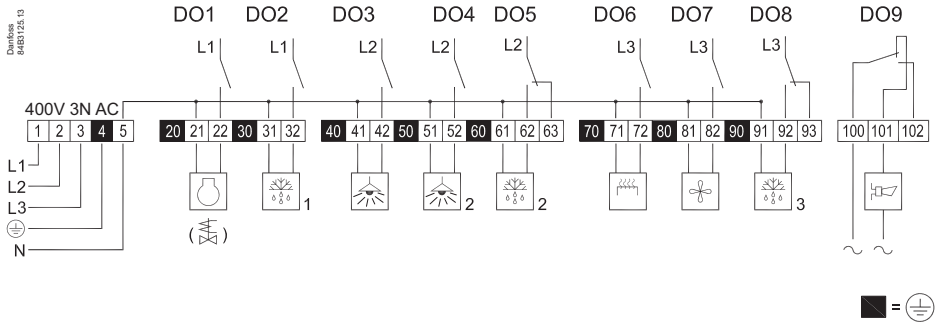


One cooling section - one evaporator
3-phase defrost



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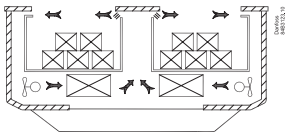
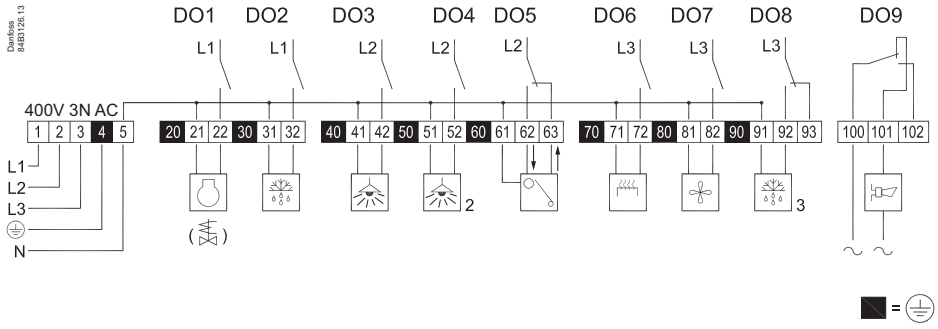


Two cooling sections - two evaporators
2-phase defrost



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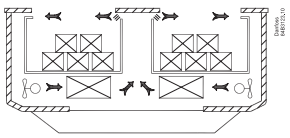
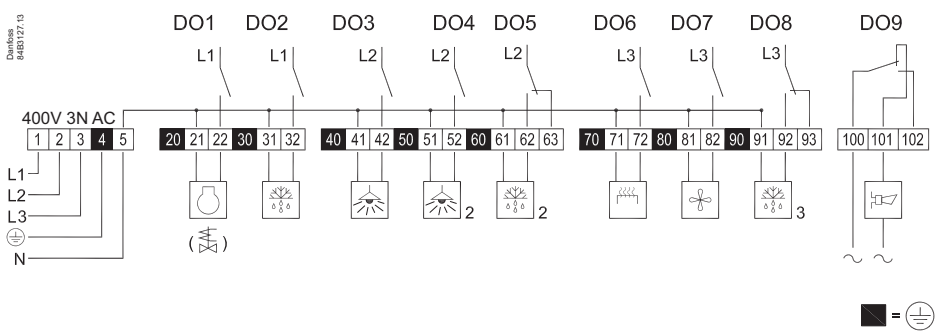


Two cooling sections - two evaporators
3-phase defrost



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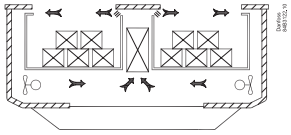
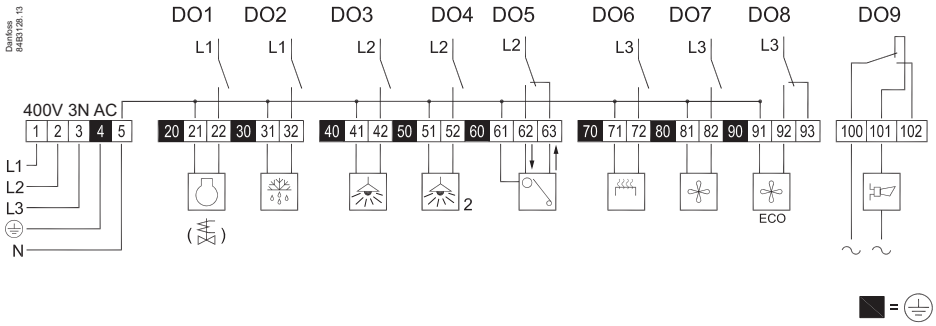


Two cooling sections - one evaporator



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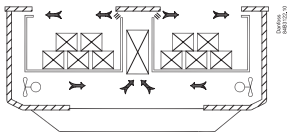
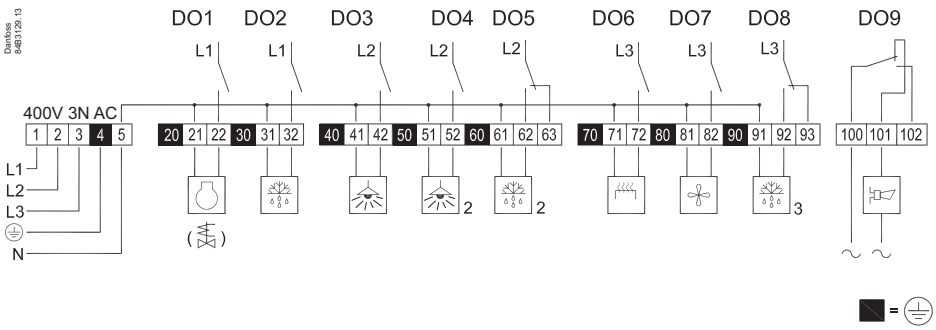


Two cooling sections - one evaporator
3-phase defrost



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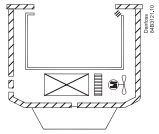
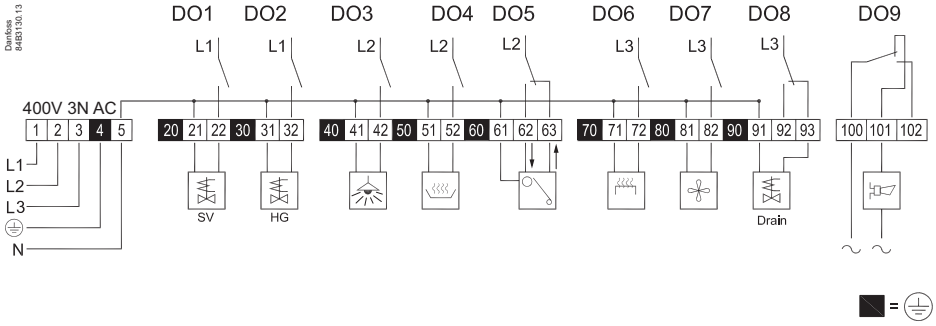


Hot gas defrosting
With relays for:
Main valve in suction line
Hot gas valve
Drainage valve



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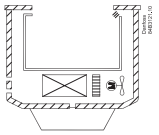
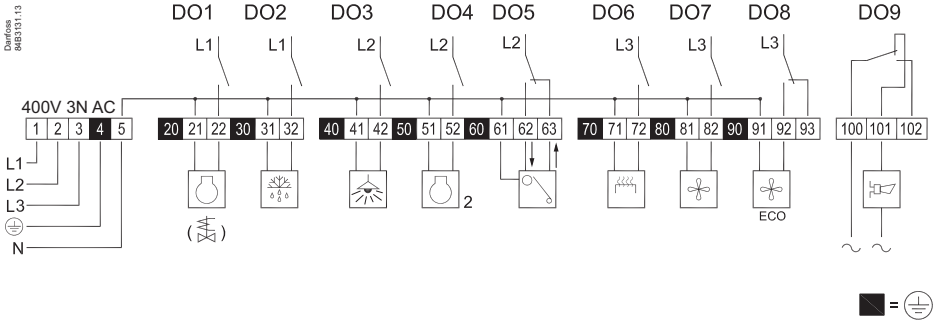
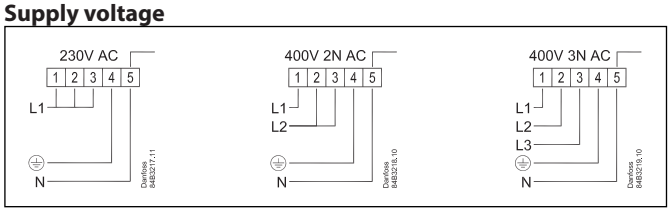


"Two-compressor" operation



Connections

Supply voltage



230 V, or 2 phases + neutral, or 3 phases + neutral. 50 Hz.
Neutral **must** be fitted. If neutral is not in place, the controller can be damaged. During assembly and disassembly, the power supply must be interrupted).

DO1 - DO8
If the functions "Defrosting", "Fan stop" or "Fan ECO" are used, internal functions will connect to the affected outputs. The connection will be performed as shown in the diagram.
Otherwise, the connection will, in principle, be optional; however, with regard to the connection diagram, the following is recommended:

DO1
Cooling or suction line valve

DO2
Defrost cycle or hot gas valve

DO3
Light

DO4
Light 2, compressor 2 or heating element in drip tray

DO5
Night blind or defrost cycle 2

DO6
Rail heat

DO7
Fan

DO8
Fan in economy mode or defrost 3 or drain valve

Configuration

Relay output	**DO1**	**DO2**	**DO3**	**DO4**	**DO5**	**DO6**	**DO7**	**DO8**
Menu	L41	L42	L43	L44	L45	L46	L47	L48
	Setting							
The relay output must not be used	0	0	0	0	0	0	0	0
DI input that will activate the output	1 - 8	1 - 8	1 - 8	1 - 8	1 - 8	1 - 8	1 - 8	1 - 8

DO9
Alarm
There is a connection between terminal 100 and 101 in an alarm situation, as well as when the controller is without voltage.

DOA
Not used

S2 ... S6B
The sensor input is not used

Pressure transmitter
Not used

AO1
Not used**DI1-DI6**
Digital input signal.
The defined function is active when the input is closed/opened.

DI7-DI8
Digital input signal.
The defined function is active when the input receives 230 V.

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…

MODBUS
For data communication.
Terminal 133 = B-
Terminal 134 = A+
Terminal 135 = screen

RS485 (terminal 130, 131,132)
For data communication, but only if a data communication module is inserted in the controller. The module can be a LON RS485.
Terminal 130 = B (B-)
Terminal 131 = A (A+)
Terminal 132 = screen

(For LON RS485 and gateway type AKA 245 the gateway must be version 6.20 or higher.)

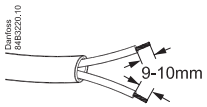
EKA Display
If there is be external reading/operation of the controller, display type EKA 163B or EKA 164B can be connected.

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.

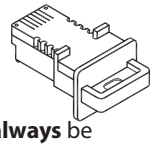
Installation considerations
Accidental damage, poor installation, or site conditions, can give rise to malfunctions of the control system, and ultimately lead to a plant breakdown.
Every possible safeguard is incorporated into our products to prevent this. However, a wrong installation, for example, 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.

Extra connection/terminal strip
There are 3 holes on the base in which a terminal strip (type Wago 862-8593) can be mounted.
There are holes for 2 terminal strips.

Stripping wire
The following demands for stripping, so the insulation does not enter the spring clip.



ID-module AK-CT 201A
This module contains a code which release a regulation with a extern controller.



The installation and removal of the module **must always** be performed while the appliance is voltage-free.

When the module is inserted in the plug, the controller can be set. The settings will be saved in both the controller and the module. A module with settings will **always** overwrite the settings in the controller. An overwrite will be finished 3 seconds after the controller is turned on.

The module can be removed from the controller for a short period of time in order to transfer the settings to another, corresponding controller. Remember to disconnect the voltage to ensure the system is voltage-free.

If the controller registers a missing module, an alarm will be issued. This alarm will be regularly repeated until the module is inserted in the controller again.
If the controller is without a module for a longer period of time (several days), the regulation will stop and all outputs are reset.

If it becomes necessary to erase all settings from the module, it can be inserted into the controller and setting P61 can then be activated. Then remove the module without restarting the controller.

A factory-new or "empty" module can be used to retrieve settings based on a corresponding controller.
Insert the module into the controller from which the settings are to be retrieved.
Turn on voltage.
Wait 3 seconds. Turn off again.
The module now contains all settings — including the Modbus address.
Remember to change the address when the module has been inserted into the receiving apparatus.

Survey of functions

Function	Para-meter	Parameter by operation via data communication
Normal display		
The normal display reads "ON" to indicate regulation.		
Start / stop of regulation With this setting refrigeration can be started, stopped or a manual override of the outputs can be allowed. (For manual control the value is set at -1. Then the relay outlets can be force-controlled by the respective reading parameters (u23, u58, etc.). Here the read value can be overwritten.) Refer also to the menu overview on page 15. Stopped regulation will give a "Standby alarm".	r12	Main Switch 1: Start 0: Stop -1: Manual control of outputs permitted
Electricity monitoring		
Current amount of electricity through relay 1	L11	DO1 Amp
Same for relays 2-8	L12-18	DO2 Amp.....DO8 Amp
Fuse status for relay circuit 1, Off=interrupted, On=ok. An interrupted fuse must be re-established with the setting = "On"	L21	DO1 Fuse
Same for relays 2-8	L22-28	DO2 Fuse..... DO8 Fuse
Set the electricity value at which the relay should cut out in the event of overcurrent. Recommended setting = measured consumption +25%. (When setting = 0 current monitoring will be cancelled.)	L31	DO1 FuseSize
Same for relays 2-8	L32-38	DO2 FuseSize..... DO8 FuseSize
Setting for relay DO1. Here the user can set the DI input that causes DO1 to engage.	L41	DO1 wired DI
Same for relays 2-8	L42-48	DO2 wired DI..... DO8 wired DI
Current voltage on phase F1	L51	L1 voltage
Current voltage on phase F2	L52	L2 voltage
Current voltage on phase F3	L53	L3 voltage
Alarm limit for low DO2 load. (not application 7) An alarm is issued if the electricity consumption becomes lower than the set value.	L62	DO2 Low Load
Alarm limit for low DO5 load (Application 2, 4 and 6 only)	L65	DO5 Low Load
Alarm limit for low DO6 load	L66	DO6 Low Load
Alarm limit for low DO8 load (Application 2, 3, 4 and 6 only)	L68	DO8 Low Load
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.
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 address is set between 0 and 240, depending on the system unit and the selected data communication. If the system unit is gateway type AKA 245, the version must be 6.20 or higher.	o03	
The address is sent to the gateway when the menu is set in pos. ON IMPORTANT: Before you set o04, you MUST set o61. Otherwise you will be transmitting incorrect data. (The function is not used when the data communication is MODBUS)	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	Acc. code
Configuration of light function 5) Light controlled with local DI switch and a central 230 V signal on DI7. Both must be on before the light is turned on. (If night blind is selected, it will be synchronised with the light function) 6) Like "5", but the light will follow a manual control of the night blind. (1-4 Not used)	o38	Light config
Selection of application The controller can be defined in various ways. Here you set which of the 8 applications is required. On page 7 to 8 you can see a survey of applications. *This menu can only be set when regulation is stopped, i.e. "r12" is set to 0.*	o61	Appl. Mode

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	Acc. code 2
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	-
Digital input signal - DI3 Switch signal The controller has a digital input 3 which can be used for one of the following functions: Off: The input is not used. Setting 1-11 is not used 12) Night blind. Pulse signal activates night blind 13) Not used 14-15) Not used 16) Light. Light function when there are signals on both DI3 and DI7. 17) Extra light. Light function when there are signals on both DI4 and DI8. 18) Cancel defrost cycle. All defrost cycles are cancelled when the input is closed. 19) Override light on appliance without night blind (pulse signal).	o84	DI3 config.
Digital input signal - DI4. Switch signal. See DI3 above	P55	DI4 config.
Digital input signal - DI5. Switch signal. See DI3 above	P56	DI5 config.
Digital input signal - DI6. Switch signal. See DI3 above	P57	DI6 config.
Digital input signal - DI7. High voltage signal. Functions the same as those for DI3, but signal is 0 V/230 V. See also the summary on page 6.	P58	DI7 config.
Digital input signal - DI8. High voltage signal. See DI7 above	P59	DI8 config.
Max. opening time for night blind after manual DI activation The delay time before the night blind automatically goes down again after being manually opened for product stocking.	P60	BlindOpenTim
Reset settings on ID module Reset all settings so that the ID module can receive settings from another controller.	P61	ResetID Mem.
Configuration of night blind function On= night blind function used. Off=night blind function not used.	P64	Blind config
Fan pause while night blind rolls down Here you can set the fan pause time, so the night blind can roll down unhindered to the correct position.	P65	BlindFanStop
Max. on time for light after manual DI activation Delay time before light goes off again following light is on manually due to product stocking.	P66	Light On Time

Service		**Service**
Status on DI1 input. on/1=closed	u10	DI1 status
Status on DI2 input. on/1=closed	u37	DI2 status
* Status on relay for cooling	u58	Comp1/LLSV
* Status on relay for fan	u59	Fan relay
* Status on relay for defrost	u60	Def. relay
* Status on relay for railheat	u61	Railh. relay
Status on relay for alarm	u62	Alarm relay
Status on relay for light	u63	Light relay
* Status on relay for hot gas valve	u64	SuctionValve
* Status on relay for compressor 2	u67	Comp2 relay
* Status on relay for hot gas	u80	Hotgas valve
* Status on relay for heating element in drip tray	u81	Drip tray
* Status on relay for night blinds	u82	Blinds relay
* Status on relay for defrost 2	u83	Def. relay 2
Status on input DI3 (closed / open)	u87	DI3 status
* Status of relay for light 2	U36	Extra light
* Status of relay for ECO fan	U37	Fan Eco
* Status on relay for defrost 3	U38	Def. relay 3
Status of DI4 input. On=closed	U39	DI4 status
Status of DI5 input. On=closed	U40	DI5 status
Status of DI6 input. On=closed	U41	DI6 status
Status of high-voltage input DI7	U42	DI7 status
Status of high voltage input DI8	U43	DI8 status

Modbus communication status, 0% = none; 100% = everything ok	U45	Comm. status
* Status on relay for drain valve 1=on	U55	Drain valve

*) Not all will be displayed. Only the function belonging to the selection application is displayed.

Operating status		**(Measurement)**
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:		Ctrl. state: (Shown in all menu displays)
Manual control of outputs	S25	25
Power module application	S46	46
Other displays:		
Display of normal operating conditions	on	
Password required. Set password	PS	
Regulation is stopped via main switch	OFF	

Fault message

In an error situation the LED's on the display 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.
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:

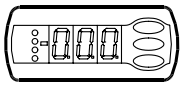
Code / Alarm text via data communication	**Description**
A45/--- Standby mode	Standby position (stopped regulation via r12)
E1/--- Ctrl. error	Faults in the controller
E40/--- ID ModuleErr	Incorrect communication with ID module
E41/--- DO1 Fuse err.	Excess current on DO1. Fuse has cut out
E42.....E48 / DO2....DO8	As above; fuse has cut out on the respective relay(s)
E52/--- DO2 Low Load	Low power consumption on DO2. Check the load
E55/--- DO5 Low Load	Low power consumption on DO5. Check the load
E56/--- DO6 Low Load	Low power consumption on DO6. Check the load
E58/--- DO8 Low Load	Low power consumption on DO8. Check the load

Data communication
The importance of individual alarms can be defined with a setting. The setting must be carried out in the group "Alarm priorities" / "Alarm destinations"

Settings from System manager	Settings from AKM (Alarm destination)	Log	Alarm relay			Send via Network
			Non	High	Low-High	
High	1	X		X	X	X
Middle	2	X			X	X
Low	3	X			X	X
Log only		X				
Disabled						

Operation

Display
The values will be shown with three digits and are used when setting.



LED on front
The three bottom LEDs will indicate an alarm situation:
°
°
°
°

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.

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.

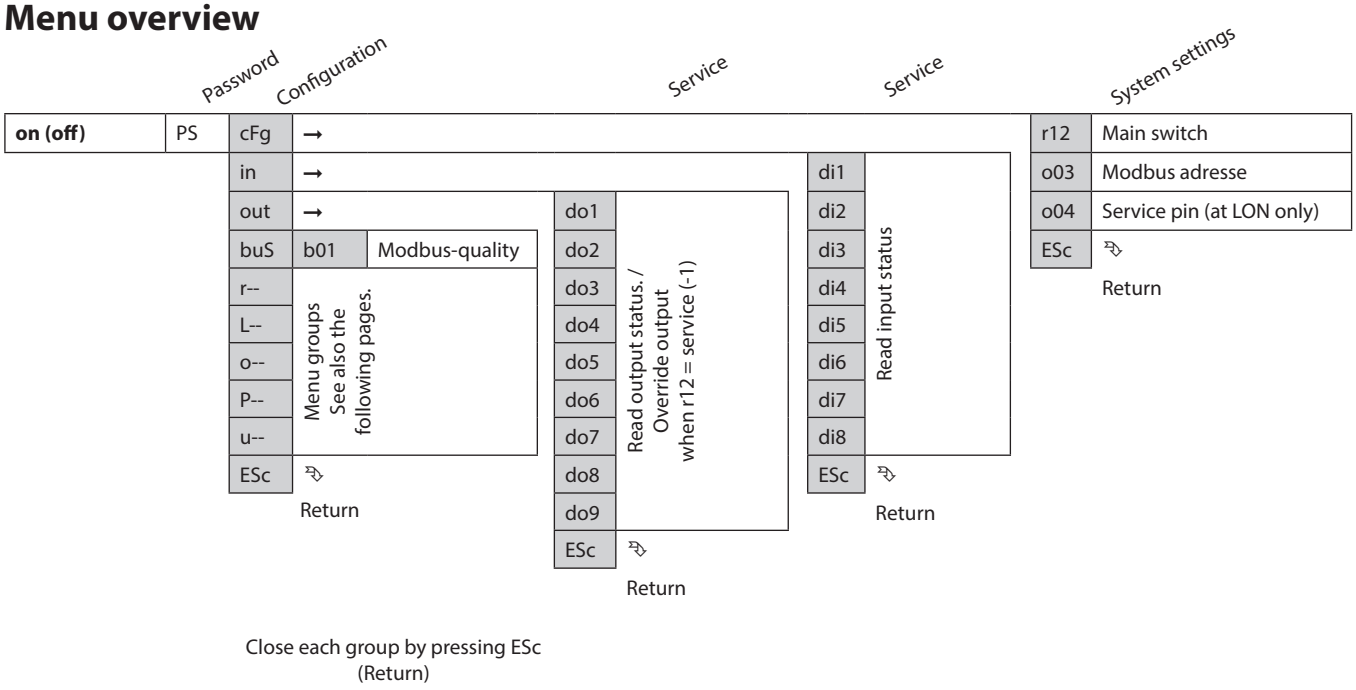
Examples

Set menu
1. Push the upper button until configuration access cFg is shown.
2. Push the upper or the lower button and find that parameter you want to change.
3. Push the middle button to enter the group.
4. Push the upper or the lower button and find that parameter you want to change.
5. Push the middle button until the parameter value is shown.
6. Push the upper or the lower button and select the new value
7. Push the middle button again to freeze the value.

Cutout alarm relay / receipt alarm/see alarm code
• A short press of 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.

Return to previous menu
1. Press the top or bottom button until ESc is shown.
2. Press the middle button.

Menu overview



Get a good start

With the following procedure you can start regulation very quickly:

1 Basic settings entered by appliance manufacturer

2 Enter the system-defined settings as shown above

3 End with parameter r12 = 1 to start the regulation
(in a new and not previously set unit, r12 will already be set to 0 which means stopped regulation.)

4 Send address to system unit:
- MODBUS: Activate scan function in system unit
- If another data communication card is used in the controller:
  - LON RS485: Activate the function o04

Menu

SW = 1.8x

Parameter			El-diagram page 7 to 8								Min.-value	Max.-value	Factory setting	Actual setting
Function		Code	1	2	3	4	5	6	7	8				
Normal operation	r-													
Display during regulating		on	1	1	1	1	1	1	1	1				
Manual service, stop regulation, start regulation (-1, 0, 1)		r12	1	1	1	1	1	1	1	1	-1	1	0	
Electricity monitoring	L-													
Current measured electricity through relay 1 (DO1)		L11	1	1	1	1	1	1	1	1	Ampere			
Same for relays 2 to 8		L12-L18	1	1	1	1	1	1	1	1	Ampere			
Fuse status for relay 1/Reconnection		L21	1	1	1	1	1	1	1	1	0/off	1/on	1/on	
Same for relays 2 to 8		L22-L28	1	1	1	1	1	1	1	1	0/off	1/on	1/on	
Electrical current value at which relay cuts out; Recommended setting = measured consumption + 25% . 0 = not used.		L31	1	1	1	1	1	1	1	1	0 / 4 A	16 A	16	
Same for relays 2 to 8		L32-L38	1	1	1	1	1	1	1	1	0 / 4 A	16 A	16	
Define which DI input is to activate relay DO1		L41	1	1	1	1	1	1	1	1	0	8	0	
Same for relays 2 to 8		L42 L43 L44 L45 L46 L47 L48	1	1	1	1	1	1	1	1	0	8	2 3 8 0 4 5 6	
Current measured voltage in phase L1		L51	1	1	1	1	1	1	1	1	V			
Current measured voltage in phase L2		L52	1	1	1	1	1	1	1	1	V			
Current measured voltage in phase L3		L53	1	1	1	1	1	1	1	1	V			
Alarm limit for low consumption on DO2		L62	1	1	1	1	1	1		1	0 A	10 A	1	
Alarm limit for low consumption on DO5		L65		1		1		1			0 A	10 A	1	
Alarm limit for low consumption on DO6		L66	1	1	1	1	1	1	1	1	0 A	10 A	0	
Alarm limit for low consumption on DO8		L68		1	1	1		1			0 A	10 A	1	
Miscellaneous	o-													
Delay of output signals after start-up		o01	1	1	1	1	1	1	1	1	0 sec	600 sec	5	
Network address		o03	1	1	1	1	1	1	1	1	0	240	0	
On/Off switch (Service Pin message) IMPORTANT! o61 **must** be set prior to o04 (used at LON 485 only)		o04	1	1	1	1	1	1	1	1	0/Off	1/On	0/Off	
Access code 1 (all settings)		o05	1	1	1	1	1	1	1	1	0	100	0	
Configuration of light and night blind function: 1-4 = Not used; 5 = Manual control of night blind, does not affect light; 6 = Manual control of night blind + affects light (light is turned on when the night blind is up, and is turned off when it is down.)		o38	1	1	1	1	1	1	1	1	1	6	1	
Select application. See overview page 7 to 8	*	o61	1	1	1	1	1	1	1	1	1	8	1	
Access code 2 (partial access)		o64	1	1	1	1	1	1	1	1	0	100	0	
Replace the controllers factory settings with the present settings		o67	1	1	1	1	1	1	1	1	0/Off	1/On	0/Off	
Input signal on DI3. Switch signal. 0-11=not used. 12=night cover. 13-15=not used. 16=light. 17=extra light. 18=cancel defrost. 19=override light.		o84	1	1	1	1	1	1	1	1	0	19	0	
Input signal on DI4. Switch signal. See DI3 above		P55	1	1	1	1	1	1	1	1	0	19	0	
Input signal on DI5. Contact switch. See DI3 above		P56	1	1	1	1	1	1	1	1	0	19	0	
Input signal on DI6. Contact switch. See DI3 above		P57	1	1	1	1	1	1	1	1	0	19	0	
Input signal on DI7. High voltage signal. See DI3 above		P58	1	1	1	1	1	1	1	1	0	19	0	
Input signal on DI8. High voltage signal. See DI3 above		P59	1	1	1	1	1	1	1	1	0	19	0	
Max. opening time of night blind following manual override with DI activation.		P60	1		1		1		1	1	0 min.	60 min.	5	
Erase all current controller settings on ID module.		P61	1	1	1	1	1	1	1	1	0 / off	1 / on	0 / off	
Configuration of night blind relay. On= night blind used		P64	1		1		1		1	1	0 / off	1 / on	1 / on	
Stop time for fan while night blind rolls down		P65	1		1		1		1	1	0 sec	300 sec	60	
Max. on time for light and night blind following manual DI activation		P66	1	1	1	1	1	1	1	1	0 min.	60 min.	30	

Continued		Code	1	2	3	4	5	6	7	8	Min.	Max.	Fac.	Actuel
Service	u													
Status on DI1 input. on/1=closed		u10	1	1	1	1	1	1	1	1				
Status on DI2 input. on/1=closed		u37	1	1	1	1	1	1	1	1				
Status on relay for cooling	**	u58	1	1	1	1	1	1		1				
Status on relay for fan	**	u59	1	1	1	1	1	1	1	1				
Status on relay for defrost	**	u60	1	1	1	1	1	1		1				
Status on relay for railheat	**	u61	1	1	1	1	1	1	1	1				
Status on relay for alarm	**	u62	1	1	1	1	1	1	1	1				
Status on relay for light	**	u63	1	1	1	1	1	1	1	1				
Status on relay for hot gas valve	**	u64							1					
Status on relay for compressor 2	**	u67								1				
Status on relay for hot gas- / drain valve	**	u80							1					
Status on relay for heating element in drip tray	**	u81							1					
Status on relay for night blinds	**	u82	1		1		1		1	1				
Status on relay for defrost 2	**	u83		1		1		1						
Status on DI3 input. on/1=closed		u87	1	1	1	1	1	1	1	1				
Status of relay for light 2	**	U36	1	1	1	1	1	1						
Status of relay for ECO fan	**	U37	1				1			1				
Status on relay for defrost 3	**	U38		1	1	1		1						
Status of DI4 input. On=closed		U39	1	1	1	1	1	1	1	1				
Status of DI5 input. On=closed		U40	1	1	1	1	1	1	1	1				
Status of DI6 input. On=closed		U41	1	1	1	1	1	1	1	1				
Status of high-voltage input DI7, 1 = Receives voltage		U42	1	1	1	1	1	1	1	1				
Status of high voltage input DI8, 1 = Receives voltage		U43	1	1	1	1	1	1	1	1				
Modbus communication status, 0% = none; 100% = everything ok		U45	1	1	1	1	1	1	1	1				
Status on relay for drain valve. 1=on	**	U55							1					

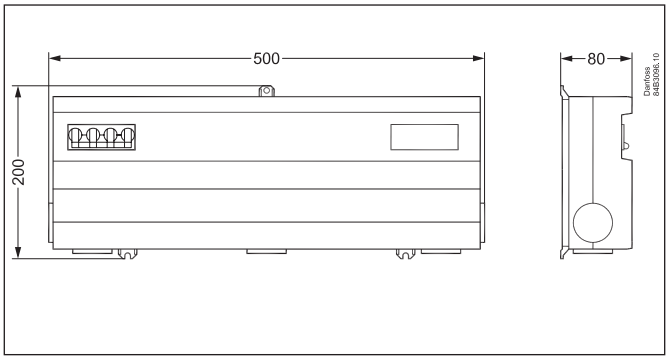
*) Can only be set when regulation is stopped (r12=0)
**) Can be controlled manually, but only when r12=-1
Password 2 only gives access to service readings, as well as r12 and o64.

Factory setting
Follow these steps if you need to return to the factory-set values:
- Connect a display with control buttons to the controller
- Activate setting P61 to reset the ID module
- Disconnect the supply voltage to the controller
- Remove the ID module from the controller
- Hold in the top and bottom buttons on the display while reconnecting the supply voltage
- Disconnect the supply voltage to the controller
- Insert the ID module into the controller
- Connect the supply voltage to the controller

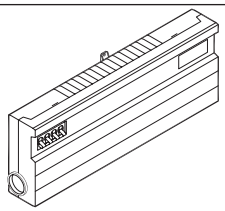
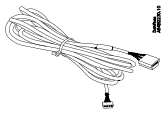
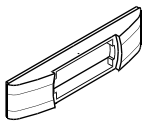
Data

Supply voltage	400 V 3N a.c. / 400 V 2N a.c. / 230 V N a.c. +10/-15%, 30 VA, 50 Hz		
Main switch	Automated fuse, 4 terminals, 16 A, SIL-approved		
Display	2 plugs for connecting external display		
External display	EKA 163B or 164B		
Digital inputs DI1, DI2, DI3, DI4, DI5, DI6	Signal from contact functions Requirements to contacts: None Cable length must be max. 15 m Use auxiliary relays when the cable is longer		
Digital inputs DI7, DI8	230 V a.c.	On: DI > 80 V a.c. Off: DI < 24 V a.c.	
Electricity supply cable	Max. 2.5 mm^2		
Accuracy	I - reading L11 - L18	0-10 A: +/-15% min. +/- 1 A	
Relays	DO1-DO8	Max. 16 A (12) A I max: Adjustable 4-16 A I max. = 0 = cut out cancelled	
	Alarm relay	4 (3) A. Min. 100 mA*	
Environments	0 to +55°C, During operations -40 to +70°C, During transport		
	20 - 80% Rh, not condensed		
	No shock influence / vibrations		
Enclosure	IP 20		
Mounting	ON wall		
Weight	3.8 Kg		
Data communication	Fixed		MODBUS
	Extension options		LON RS485
Approvals	EU Low Voltage Directive and EMC demands re CE-marking complied with LVD-tested acc. EN 60730-1, EN 60730-2-1 and EN 60730-2-9 EMC-tested acc. EN 61000-6-2 and EN 61000-6-3		

*) Gold plating ensures make function with small contact loads.



Ordering

Type		Function	Code no.
AK-CT 200A		Controller tray for controlling refrigeration appliance. With MODBUS data communication	**084B0040**, (1 pc.) **084B0070**, (6 pcs.)
AK-CT 201A		ID module with code for controlling signals from external controller	**084B0041**, (1 pcs.) **084B0071**, (60 pcs.)
EKA 163B		External display with plug for direct connection	**084B8574**
EKA 164B		External display with operation buttons and plug for direct connections	**084B8575**
		Cable with plug for display unit (24 pcs.) 0.3 m 2 m 3 m 6 m 9 m	 **084B7500** **084B7179** **084B7099** **084B7097** **084B7630**
		Console for mounting display on wall	**084B8584**
EKA 175		Data communication module LON RS 485	**084B8579**