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Danfoss 84B3240 Case Room Controller

Danfoss 84B3240 Case Room Controller Installation Guide

Contents

Danfoss 84B3240 Case Room Controller

Product Information

Specifications

- **Model:** AK-CC55 Multi Coil
- **Dimensions:** 132mm x 70mm x 71mm
- **Manufacturer:** Danfoss

Product Usage Instructions

Installation

1. Ensure correct labeling for the specific application you are mounting.
2. Follow the provided wiring diagram for proper installation.
3. Keep data communication cable installation separate from high voltage cables.

Data Communication

1. Use appropriate cables for sensors, low voltage DI inputs, and data communication.
2. Maintain a distance of at least 10 cm between different cables.
3. Avoid using long cables at the low voltage DI input.

Coordinated Defrost

1. Connect up to 10 controllers for coordinated defrost.
2. Ensure no significant pressure drop from the pressure transmitter to evaporators.
3. Refrigeration resumes simultaneously after defrosting by all controllers.

External Display Compatibility
The AK-UI55 external display is compatible with this controller for enhanced monitoring. Ensure a maximum distance of 100m between L1 and L2 connections for the display.

FAQ

- **Q: Can the AK-CC55 Multi Coil controller be used for heating applications?**

  A: Yes, the controller supports heating functions in addition to cooling operations.
- **Q: Is it possible to connect multiple AK-CC55 controllers together for a larger system?**

  A: Yes, you can connect multiple controllers for a coordinated system operation.
- **Q: What is the maximum load capacity for the AK-CC55 Multi Coil controller?**

  A: The controller supports a maximum load of 0.5 A for the coil operation.

Identification

084B4084

Dimensions

Principle

S4/S4B/S4C

S2/S2B/S2C

S5/S5B

AKV

P
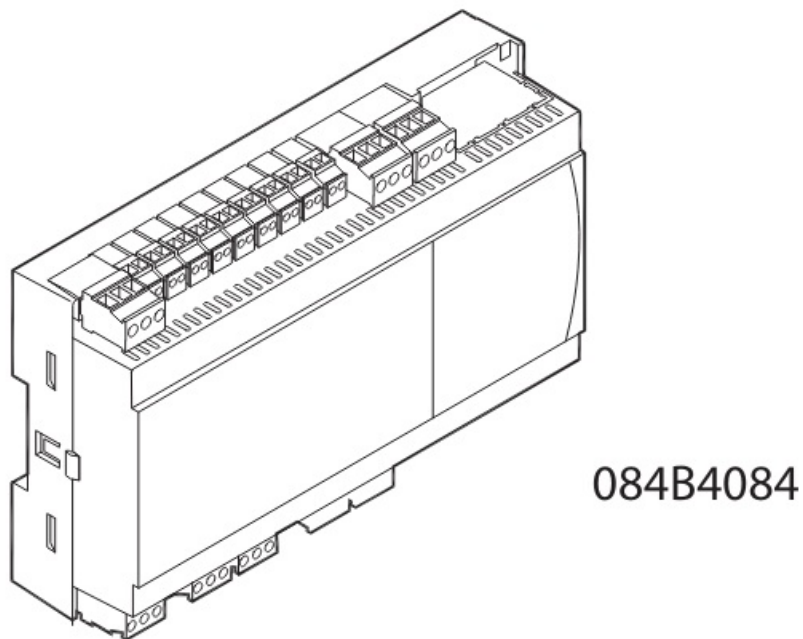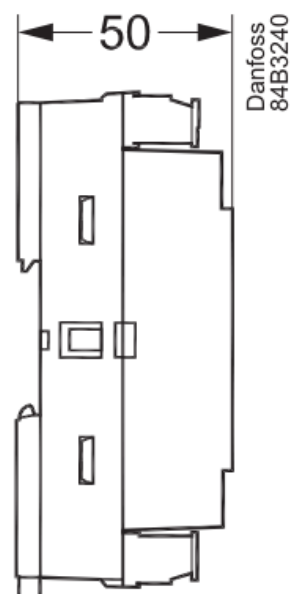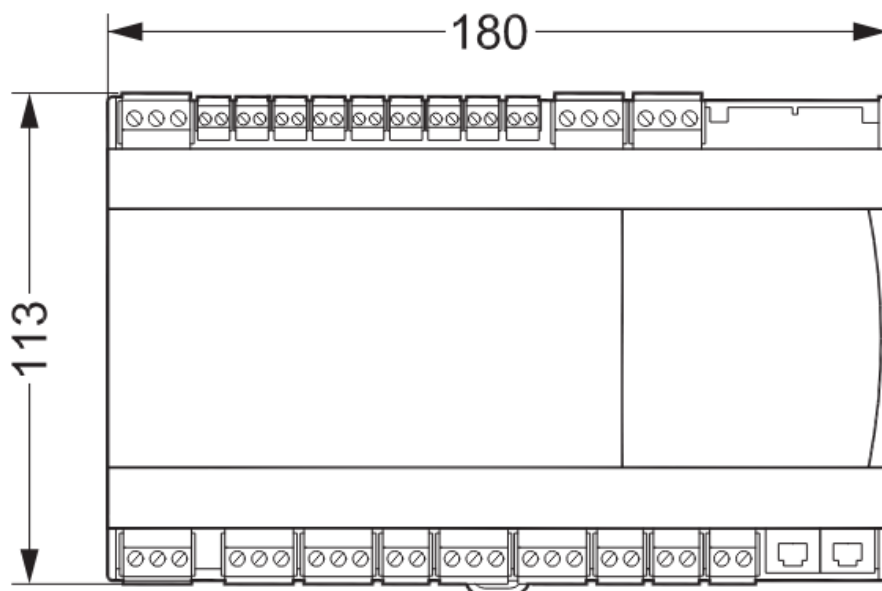
Controller

Danfoss
84B3238.11

1 - 5	⌇⌇⌇
1	⌇⌇⌇
2	⌇⌇⌇
3	⌇⌇⌇
4	⌇⌇⌇
5	⌇⌇⌇

The controller is provided with labels from the factory indicating a generic application. When selecting the required application, specific labels are provided so that you can mount the relevant one.
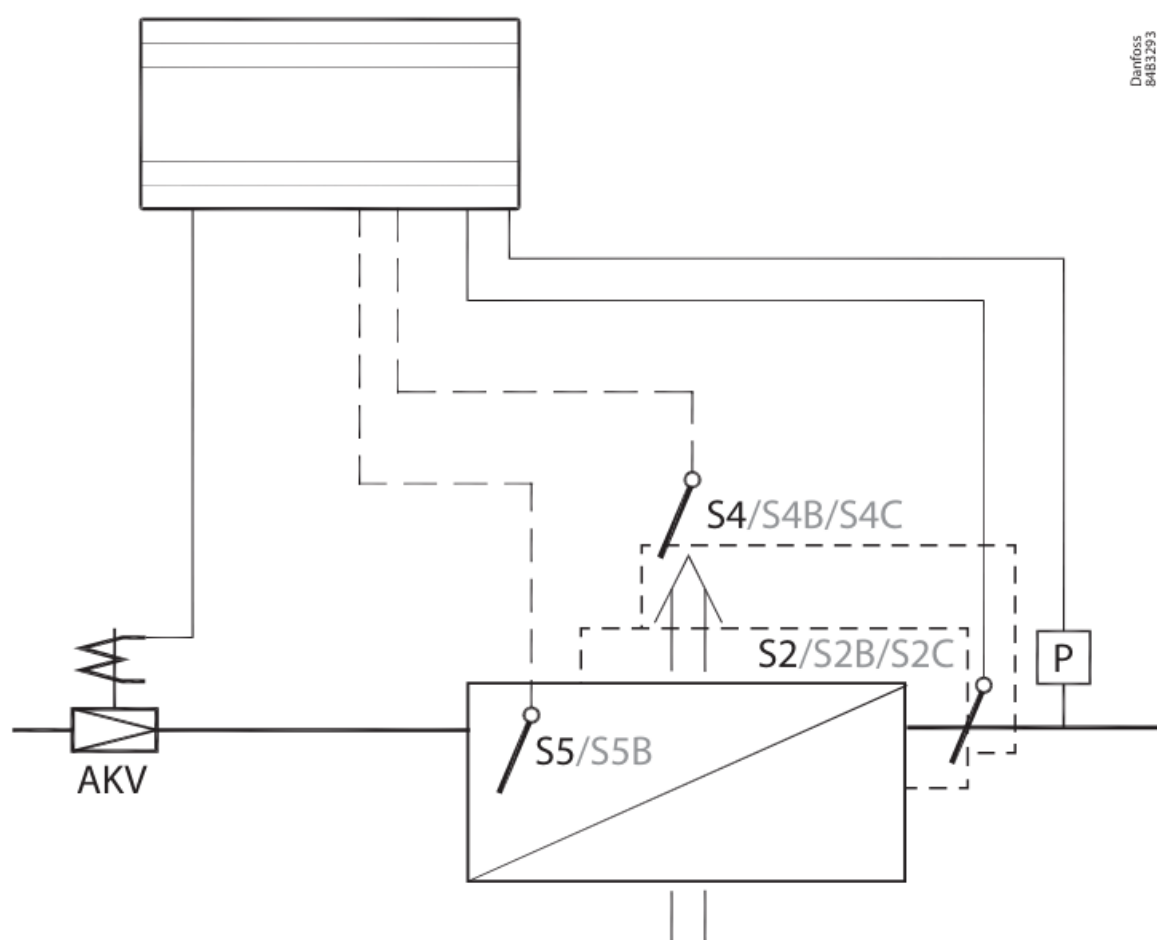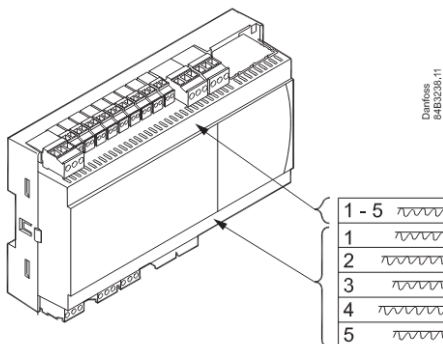
1.

P
1 3 2

0 – 10 V / PWM

1

| 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 60 | 61 | 70 | 71 | | 83 | 84 | 85 |
| 5V | s Pe | ⊥ | S2A | ⊥ | S4A | ⊥ | S5A | ⊥ | | ⊥ | | ⊥ | DI1 | ⊥ | DI2 | ⊥ | AO1 PWM | ⊥ | | B⁻ | A⁺ | ⊕ |
MODBUS

115 – 230 V AC | AKV A | Alarm | Railheat | Defrost | Light | Fan | | DI3 115 – 230 V AC

| L | N | ⊕ | ⊕ | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 30 | 31 |
| 1 | 2 | 3 |

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2.

P
1 3 2

0 – 10 V / PWM

2

| 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 60 | 61 | 70 | 71 | | 83 | 84 | 85 |
| 5V | s Pe | ⊥ | S2A | ⊥ | S4A | ⊥ | S5A | ⊥ | S2B | ⊥ | S4B | ⊥ | S5B | ⊥ | DI2 | ⊥ | AO1 PWM | ⊥ | | B⁻ | A⁺ | ⊕ |
MODBUS

115 – 230 V AC | AKV A | Railheat | AKV B | Defrost A | Light | Fan | Defrost B | DI3 115 – 230 V AC

| L | N | ⊕ | ⊕ | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 30 | 31 |
| 1 | 2 | 3 |

A   B   A   B

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84B3259

3.

P
1 3 2

0 – 10 V/ PWM

3

| 40 | 41 | 42 | 43 44 | 45 46 | 47 48 | 49 50 | 51 52 | 53 54 | 60 61 | 70 71 | | 83 | 84 | 85 |
| 5V | s Pe | ⊥ | S2A ⊥ | S4A ⊥ | S2B ⊥ | S4B ⊥ | S2C ⊥ | S4C ⊥ | DI2 ⊥ | AO1 ⊥ PWM | | B- | A+ ⊕ MODBUS | |

115 – 230 V AC · AKV A · Alarm · AKV B · Railheat · Light · Fan · AKV C · DI3 115 – 230 V AC

| L | N | ⊕ | ⊕ | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 30 | 31 |

A   B   C

Danfoss 84B3270

4.

P
1 3 2

RH 0-10   U

0 – 10 V/ PWM

4

| 40 | 41 | 42 | 43 44 | 45 46 | 47 48 | 49 50 | 51 52 | 53 54 | 60 61 | 70 71 | | 83 | 84 | 85 |
| 5V | s Pe | ⊥ | S2A ⊥ | S4A ⊥ | S2B ⊥ | S4B ⊥ | RH% ⊥ | DI1 ⊥ | DI2 ⊥ | AO1 ⊥ PWM | | B- | A+ ⊕ MODBUS | |

115 – 230 V AC · AKV A · Alarm · AKV B · Humidity · Light · Fan · Heat · DI3 115 – 230 V AC

| L | N | ⊕ | ⊕ | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 30 | 31 |

A   B

Danfoss 84B3271

5.

P
1 3 2

0 – 10 V/ PWM

5

| 40 | 41 | 42 | 43 44 | 45 46 | 47 48 | 49 50 | 51 52 | 53 54 | 60 61 | 70 71 | | 83 | 84 | 85 |
| 5V | s Pe | ⊥ | S2A ⊥ | S4A ⊥ | S5A ⊥ | S2B ⊥ | S4B ⊥ | S5B ⊥ | DI2 ⊥ | AO1 ⊥ PWM | | B- | A+ ⊕ MODBUS | |

115 – 230 V AC · AKV A · Alarm · AKV B · Defrost A · Light · Fan · Defrost B · DI3 115 – 230 V AC

| L | N | ⊕ | ⊕ | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 30 | 31 |

A   B   A   B
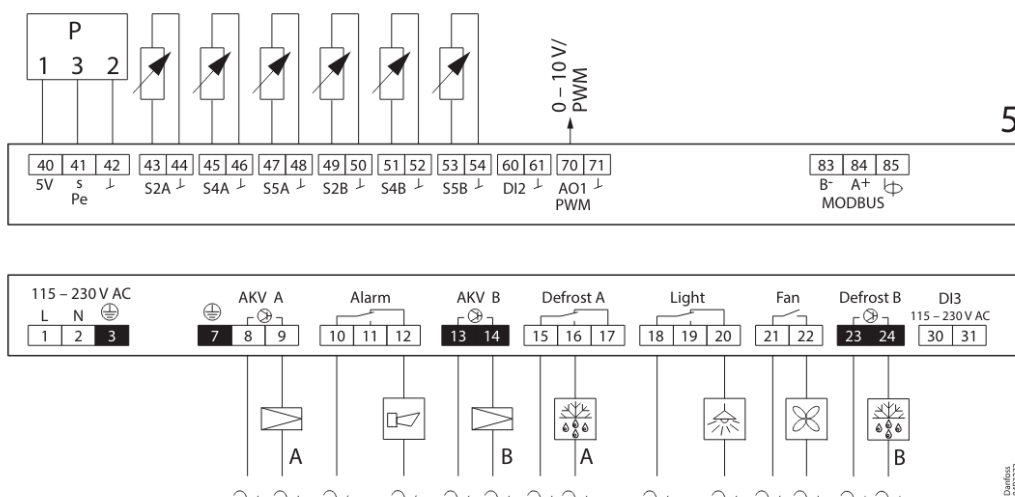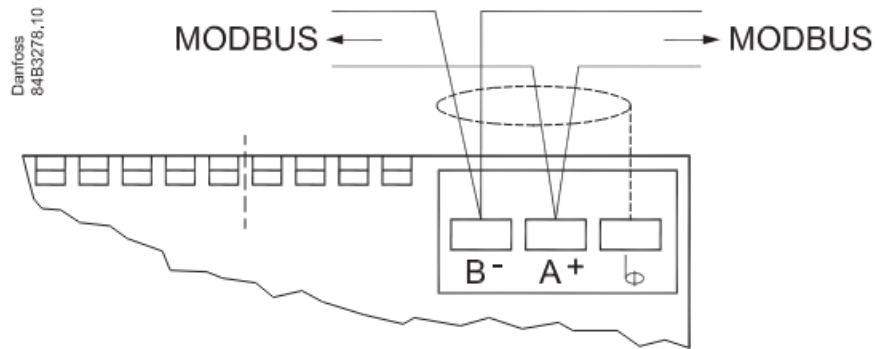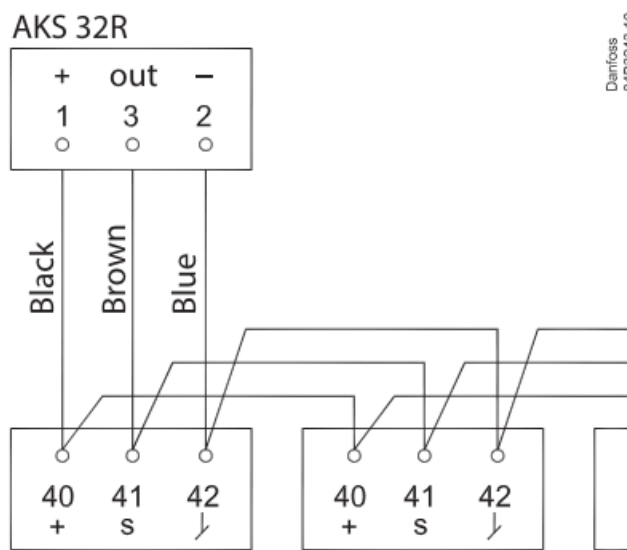
Danfoss 84B3272

Data communication

Important: It is important that the installation of the data communication cable is performed correctly with sufficient distance to high voltage cables
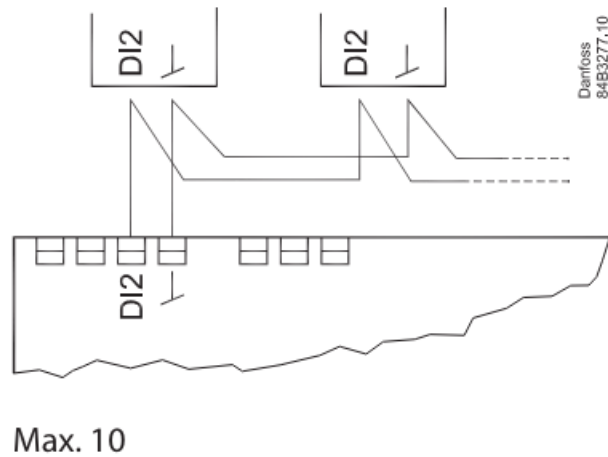
AKS 32R info

The signal from one pressure transmitter can be received by up to 10 controllers. There must not be a significant pressure drop from the pressure transmitter's position in the suction line to the individual evaporators.
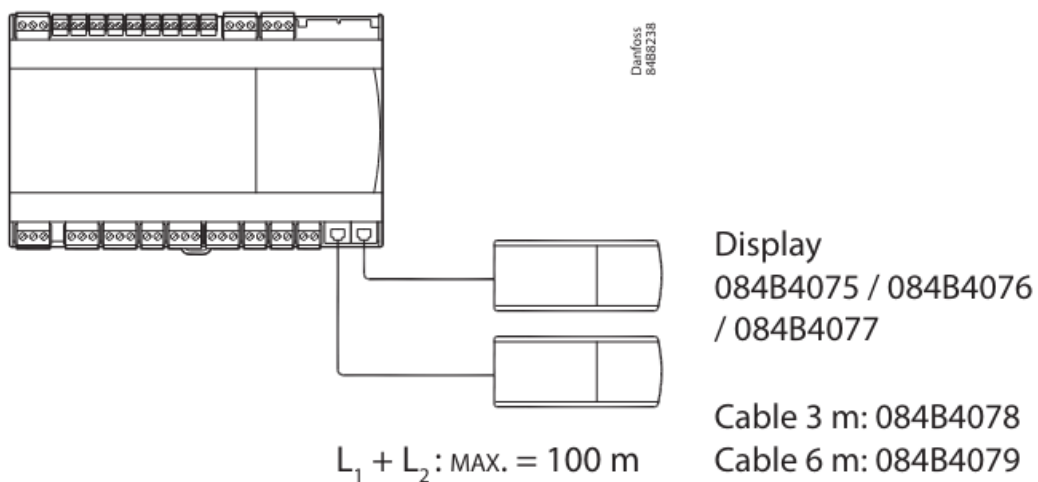
AKV info
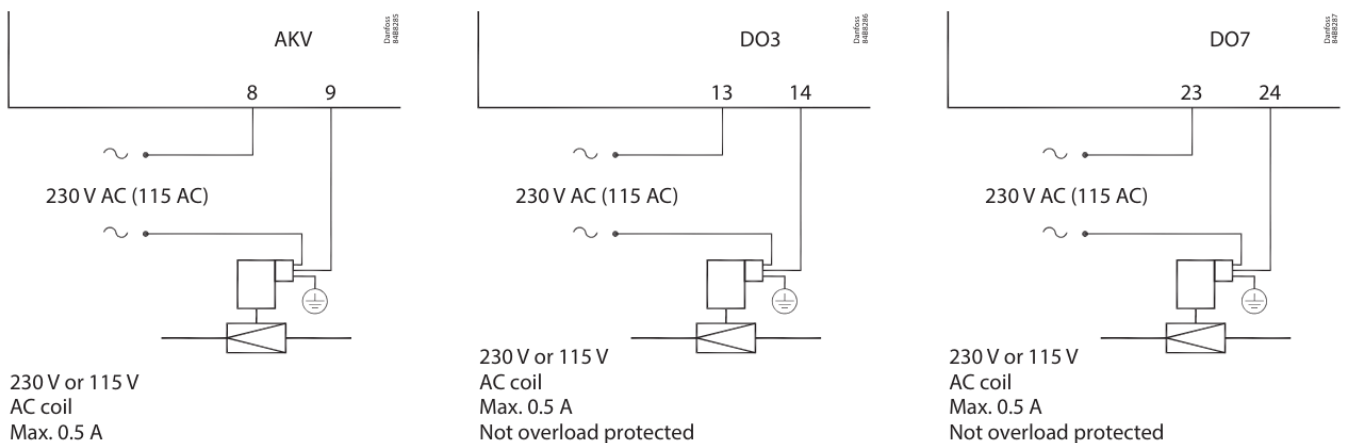
Coordinated defrost via cable connections

Max. 10

- The following controllers can be connected in this way: EKC 204A, AK-CC 210, AK-CC 250, AK-CC 450, AK-CC 550 and AK-CC55.
- Refrigeration is resumed at the same time when all controllers have terminated defrost.

External display
AK-UI55

Display
084B4075 / 084B4076
/ 084B4077

$L_1 + L_2$: MAX. = 100 m

Cable 3 m: 084B4078
Cable 6 m: 084B4079

Electric noise
Cables for sensors, low voltage 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 low voltage 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 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 t 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.

Technical data

Electrical specifications

Electrical data	Value
Supply voltage AC [V]	115 V / 230 V, 50/60 Hz
Power consumption [VA]	5 VA
Power ON indicator	Green LED
Electrical cable dimensioning [mm2]	Max. 1.5 mm2 multi-core cable

Function data

Function data	Value
Display	LED 3 digit
External display, AK-CC55 Multi Coil	2 external display
External display connection	RJ12
Max. display cable length [m]	100 m
Data communication built-in	MODBUS
Data communication option	AK-OB55 Lon RS485 module
Clock battery backup power reserve	4 days
Mounting	DIN rail

Sensor and measuring data

Sensor and measuring data	Value
Sensor S2	Pt 1000 AKS11
Sensor S4, S5	Pt 1000 AKS11 PTC 1000 EKS111 NTC5K EKS211 NTC10K EKS221 sensor (Both must be of the same type)
Temperature measuring accuracy	Pt1000: -60 – 120 °C. ±0.5 K PTC1000: -60 – 80 °C. ±0.5 K NTC5K: -40 – 80 °C. ±1.0 K NTC10K: -40 – 120 °C. ±1.0 K
Pt1000 sensor specification	±0.3 K at 0 °C ±0.005 K per degree
Pe measuring	AKS 32R Ratiometric pressure transmitter: 10 – 90%
RH measuring	0 – 10 V Ri > 10K ohm Accuracy ±0.3% FS

Input and output relay specifications

Input and output relay specifications	Input/ output	Description
Digital input	DI1 DI2	Signal from dry contact functions Requirements to contacts: Gold plating Cable length must be max. 15 m Use auxiliary relays when the cable is longer Open loop: 12 V (SELV) Contact 3.5 mA
Digital input	DI3	115 V / 230 V AC
Solid state output	DO1 (for AKV coil) DO3 DO7	115 V / 230 V AC Max. 0.5 A DO3 and DO7 (No overload protection!) Max. 1 x 20 W AKV for 115 V AC 2 x 20 W AKV for 230 V AC **Note:** 2 EC coils are not supported.
Relays	DO2 DO4 DO5 DO6	115 V / 230 V AC Load max.: CE. 8 (6)A UL. 8A res. 3FLA 18LRA Load min.: 1VA Inrush: DO5 DO6 TV-5 80A
Analogue output/PWM	AO1	0 / 10 V Pulse Width Modulated (PWM) max. 15 mA. 0 – 10 V variable, max. 2 mA

NOTE:

- DO2, DO4, DO5 and DO6 are 16 A relays.
- Max. load must be observed
- DO5 / DO6 is recommended for load with high inrush current e.g. EC Fan and LED light.
- All relays are sealed for use with flammable refrigerant like Propane R290.
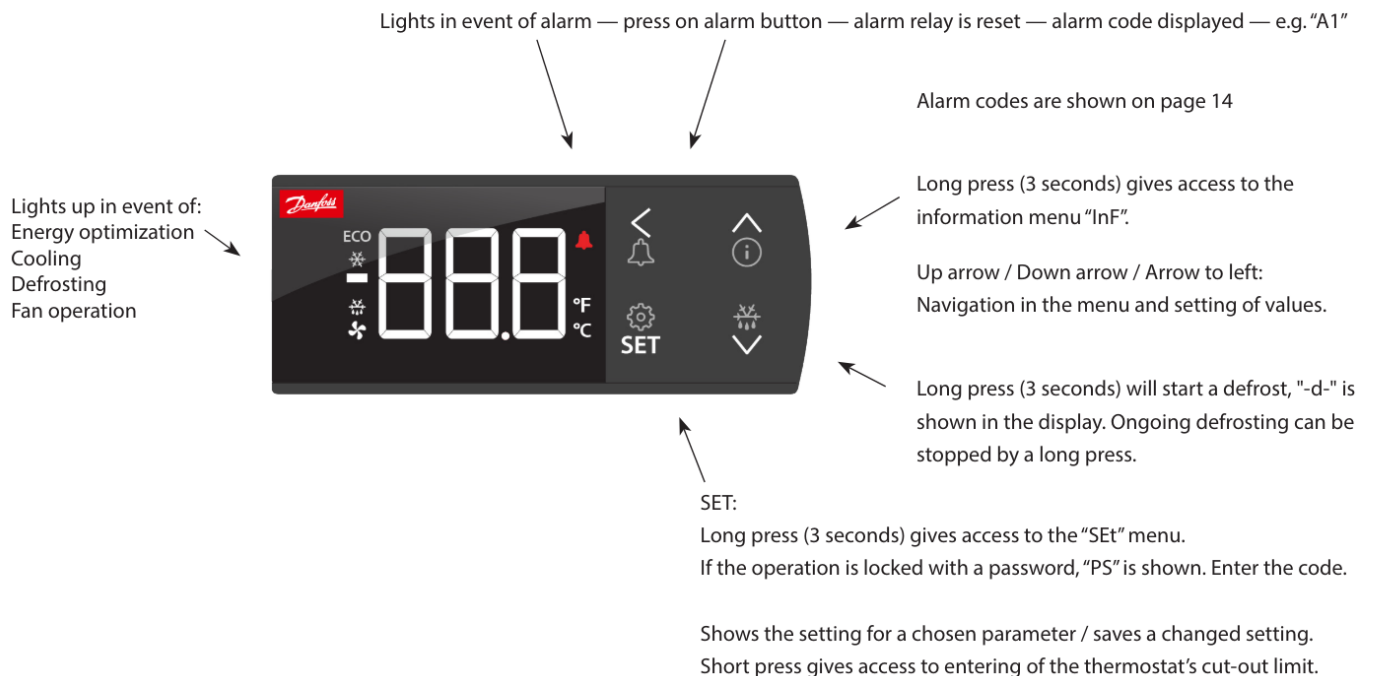- Compliance with EN 60 335-2-89: 2010 Annex BB.

Environmental conditions

Environmental conditions	Value
Ambient temperature range, operating [°C]	0 – 55 °C
Ambient temperature range, transport [°C]	-40 – 70 °C
Enclosure rating IP	IP20
Relative humidity range [%]	20 – 80%, non-condensing
Shocks/Vibrations	No shocks and vibrations allowed

Operation with setting display

Display AK-UI 55 Set
The values will be shown with three digits, and with a setting you can determine whether the temperature is to be shown in °C or in °F.

Lights in event of alarm — press on alarm button — alarm relay is reset — alarm code displayed — e.g. "A1"

Alarm codes are shown on page 14

Long press (3 seconds) gives access to the information menu "InF".

Up arrow / Down arrow / Arrow to left: Navigation in the menu and setting of values.

Lights up in event of:
Energy optimization
Cooling
Defrosting
Fan operation

Long press (3 seconds) will start a defrost, "-d-" is shown in the display. Ongoing defrosting can be stopped by a long press.

SET:
Long press (3 seconds) gives access to the "SEt" menu.
If the operation is locked with a password, "PS" is shown. Enter the code.

Shows the setting for a chosen parameter / saves a changed setting.
Short press gives access to entering of the thermostat's cut-out limit.

The display can give the following messages:

- **d-** Defrost is in progress.
- **Err** The temperature cannot be displayed due to a sensor error.
- **Err1** The display cannot load data from the controller. Disconnect and then reconnect the display.
- **Err2** Lost display communication.
- **ALA** The alarm button is activated. The first alarm code is then shown.
- **– – –** At top position of the menu or when max. value has been reached, the three dashes are shown in the top of the display.
- **– – –** At bottom position of menu or when min. value has been reached, the three dashes are shown in the bottom of the display.
- **Loc** The menu operation is locked. Unlock by pressing (for 3 seconds) on the 'up arrow' and 'down arrow' simultaneously.
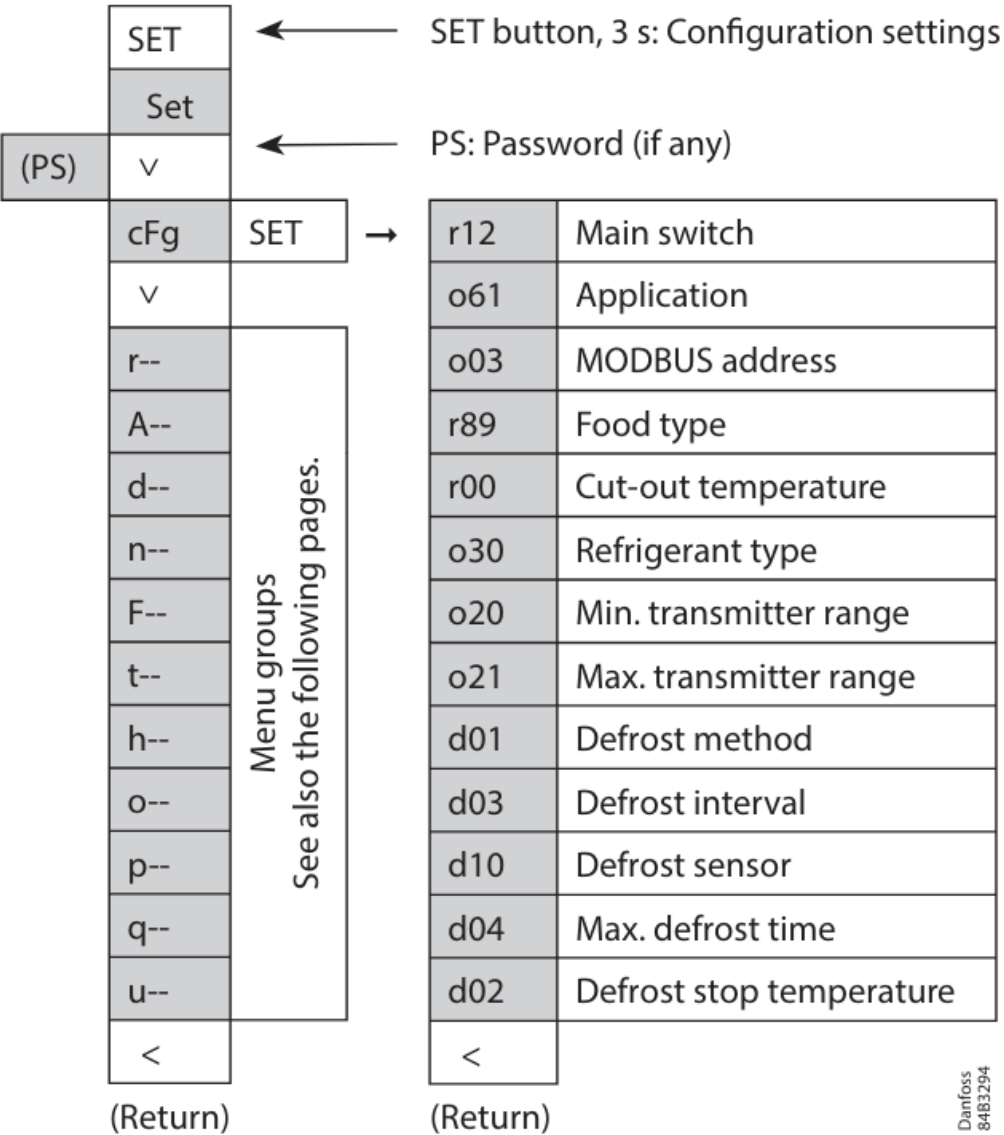- **UnL** The menu operation is unlocked.

- **– – –** The parameter has reached min. or max. limit.
- **PS** A password is required for access to the menu.
- **Fan** Appliance cleaning has been initiated. The fans are running.
- **OFF** Appliance cleaning is activated and the appliance can now be cleaned.
- **OFF** The main switch is set to Off.
- **SEr** The main switch is set to service / manual operation.
- **CO2** Flashes: Will display in event of a refrigerant leakage alarm, but only if the refrigerant is set up for CO2.

Factory setting
If you need to return to the factory-set values, do the following:

- Cut off the supply voltage to the controller.
- Keep up " ∧ " and down " ∨ " arrow buttons depressed at the same time as you reconnect the supply voltage.
- When FAc is shown in the display, select "yes".

Parameter grouping at display operation

	SET	←		SET button, 3 s: Configuration settings
	Set			
(PS)	∨	←		PS: Password (if any)
	cFg	SET	→	r12 — Main switch
	∨			o61 — Application
	r--			o03 — MODBUS address
	A--			r89 — Food type
	d--			r00 — Cut-out temperature
	n--			o30 — Refrigerant type
	F--	Menu groups	See also the following pages.	o20 — Min. transmitter range
	t--			o21 — Max. transmitter range
	h--			d01 — Defrost method
	o--			d03 — Defrost interval
	p--			d10 — Defrost sensor
	q--			d04 — Max. defrost time
	u--			d02 — Defrost stop temperature
	< (Return)			< (Return)

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Info button, 3 s: Information for service use

∧ Inf		
StA	SET	See control state message
App	SET	See selected application
in	SET	→
out	SET	→
buS	SET	MODBUS quality
SoF	SET	See SW version
< (Return)		

Read output status

do1	Akv
do2	*
do3	*
do4	*
do5	*
do6	*
do7	*
Ao1	*
< (Return)	

Read input status

di1/ AI7	**
di2	**
di3	**
AI1	PE
AI2	S2
AI3	S4
AI4	S5
AI5	**
AI6	**
< (Return)	

Output status
When you want info on a relay output, the dot will show whether the relay is activated (energized) for, e.g.:
do4 = not activated
do.4 = activated

*)
The output's function. (Determined at configuration).
The DOs and AOs can also be forced controlled from this menu, when r12 Main switch has been set in position "service".
Forced control of a function can also be performed in codes q11 to q27.

**)
The input's function.
(Determined at configuration).

Get a good start

With the following procedure you can start regulation very quickly:

1. Open parameter r12 and stop the regulation (in a new and not previously set unit, r12 will already be set to 0 which means stopped regulation.)
2. Select application based on the wiring diagrams on pages 2-3
3. Open parameter o61 and set the application number
4. For network. Set the address in o03
5. Then select a set of presets from the "Food type" help table
6. Open parameter r89 and set the number for the array of presettings. The few selected settings will now be

transferred to the menu

7. Set the desired cut-out temperature r00

8. Select refrigerant via parameter o30

9. Set the pressure transmitter min. and max. range via parameter o20 and o21.

10. Set the desired defrost method in d01

11. Set the interval time between defrost starts in d03

12. Set the desired defrost sensor in d10

13. Set the maximum defrost time in d04

14. Set the defrost stop temperature in d02

15. Open parameter r12 and start the regulation

16. Go through the parameter list and change the factory values where needed.

17. Get the controller up and running on network:

- MODBUS: Activate scan function in system unit
- If another data communication card is used in the controller:
- Lon RS485: Activate the function o04

Food type

Setting of presettings (r89). After setting 1-5, setting is returned to 0. Food type =	1 Vege- tab les	2 Milk	3 Meat/ fis h	4 Frozen fo od	5 Ice cream
Temperature (r00)	8 °C	0 °C	-2 °C	-20 °C	-24 °C
Max. temp. setting (r02)	10 °C	4 °C	2 °C	-16 °C	-20 °C
Min. temp. setting (r03)	4 °C	-4 °C	-6 °C	-24 °C	-28 °C
Upper alarm limit (A13)	14 °C	8 °C	8 °C	-15 °C	-15 °C
Lower alarm limit (A14)	0 °C	-5 °C	-5 °C	-30 °C	-30 °C

Can only be set when r12=0.

Fault message

In an error situation the alarm LED on the front will be on and the alarm relay will be activated (depending on priority). If you push the alarm button for 3 seconds you can see the alarm report in the display. (Alarm priorities can be changed. See the User Guide.)
Here are the messages that may appear:

Code	Alarm text	Description
E01	Hardware failure	The controller has a hardware failure
E06	Clock lost time	Clock has lost valid time
E20	Pe Evap. pressure A – Sensor error	Sensor signal is out of range. Please check the sensor for correct operation

E24	S2 Gas outlet A – Sensor error	Sensor signal is out of range. Please check the sensor for correct operation
E26	S4 Air OFF evap. A – Sensor error	Sensor signal is out of range. Please check the sensor for correct operation
E27	S5 Evaporator A – Sensor error	Sensor signal is out of range. Please check the sensor for correct operation
E37	S5 Evaporator B – Sensor error	Sensor signal is out of range. Please check the sensor for correct operation
E59	Humidity sensor – Sensor error	Sensor signal is out of range. Please check the sensor for correct operation
E60	S4 Air OFF evap. B – Sensor error	Sensor signal is out of range. Please check the sensor for correct operation
E61	S4 Air OFF evap. C – Sensor error	Sensor signal is out of range. Please check the sensor for correct operation
E62	S2 Gas outlet B – Sensor error	Sensor signal is out of range. Please check the sensor for correct operation
E63	S2 Gas outlet C – Sensor error	Sensor signal is out of range. Please check the sensor for correct operation
A01	High temperature alarm A	The alarm temperature has been above the max alarm limit for a longer time period than the set alarm delay.
A02	Low temperature alarm A	The alarm temperature has been below the min alarm limit for a longer time period than the set alarm delay.
A04	Door open alarm	The door has been open for a too long time
A05	Max defrost hold time exceeded	The controller has been waiting longer time than permitted after a co-ordinated defrost.
A11	Refrigerant not selected	The refrigerant has not been selected hence control can not be initiated
A15	DI alarm 1	Alarm signal from digital input signal
A16	DI alarm 2	Alarm signal from digital input signal
A45	Main switch set OFF	The controller manin switch has been set to either Stop or Manaual control. Alternatively a digital input set up for "main switch" function, has stopped control
A59	Case in cleaning mode	A case cleaning operation has been started on a case
A70	High temperature alarm B	The alarm temperature has been above the max alarm limit for a longer time period than the set alarm delay.
A71	Low temperature alarm B	The alarm temperature has been below the min alarm limit for a longer time period than the set alarm delay.
AA2	CO2 leak detected	CO2 is leaking from the refrigerantion system
AA3	Refrigerant leak detected	Refrigerant is leaking from the refrigeration system
a02	High humidity alarm	The humidity level is too high
a03	Low humidity alarm	The humidity level is too low

a05	High temperature alarm C	The alarm temperature has been above the max alarm limit for a longer time period than the set alarm delay.
a06	Low temperature alarm C	The alarm temperature has been below the min alarm limit for a longer time period than the set alarm delay.

Data communication

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

Additional information not relevant for safe installation and use can be found on Danfoss Store:

For more detailed information, please see the respective User Guide.
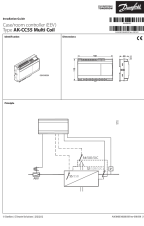
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Documents / Resources

Danfoss 84B3240 Case Room Controller [pdf] Installation Guide
84B3240 Case Room Controller, 84B3240, Case Room Controller, Room Controller, Controller

References

- **User Manual**