AK-CC55 Case controller
Kasper Hedberg

AK-CC55
Connectivity

AK-SM 350
080Z8500 v.2.50->
080Z8508 v.1.5->

AK-SM 800
v.8.091 +ed-file

AK-SM 720
v.2.73

AKA 245
v.6.23

System Manager

Only LON units &
only support for 250

Modbus

Modbus
LON/ TCP/IP (SNMP)

Modbus
LON/ TCP/IP (SNMP)

Compact

Multi Coil

Single Coil UI

KoolProg

Display Bus

Bluetooth

AK-CC55 Connect

AK-UI Bluetooth

AK-UI Set

AK-UI Info

Smart Device
(IOS or Android)

Case Controller

Remote Display

Service App

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Product Overview

Case Controllers

Type	EKC 202 / EKC 302	AK-CC 250/ AK-CC 350	AK-RC 101	AK-CC55 Compact	AK-CC55 Compact	AK-CC55 Single Coil	AK-CC55 Single Coil UI	AK-CC55 Multi Coil	AK-CC 750A Multi Case
Description	TXV Refrigeration Controller	TXV Refrigeration Controller	TXV Room Controller	Flexible TXV Evaporator Controller	Conventional EEV Controller	Flexible EEV Evaporator Controller	Flexible EEV Evaporator Controller	Flexible EEV Evaporator Controller	Flexible Evaporator Controller
Expansion Device	TXV	TXV	TXV	TXV (Appl. 1-4)	AKV (Appl. 5-9)	AKV	AKV	3 x AKV	4 x TXV/ AKV/Stepper
Control Principle	ON - OFF	ON - OFF	ON - OFF	Modulating or ON - OFF	MSS Superheat/ ALC Control	MSS Superheat/ ALC Control	MSS Superheat/ ALC Control	MSS Superheat/ ALC Control	MSS Superheat/ ALC Control
Communication	Optional Modbus or LON	Built-in Modbus Opt. LON	Built-in Modbus	Built-in Modbus	Built-in Modbus	Built-in Modbus Opt. LON	Built-in Modbus Opt. LON	Built-in Modbus Opt. LON	Built-in LON
Remote Displays / User Interfaces	-	-	-	1	1	2	1	2	4
Bluetooth Connection to AK-CC55 Connect APP*	-	-	-	√	√	√	√	√	

*)AK-UI55 Bluetooth display is required

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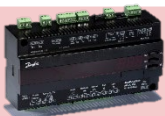
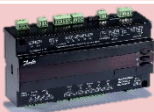# AK-CC55 Case controller

Product program

	AK-CC55 Compact	AK-CC55 Single Coil	AK-CC55 Single Coil UI	AK-CC55 Multi Coil
Valve	1 x TEV or AKV	1 x AKV	1 x AKV	3 x AKV
Digital Output (+)	3	5	5	4
Digital Input	1	3 (2)	3 (2)	3 (2)
Analog Output	1	1	1	1
Analog Input	5	6 (7)	6 (7)	6 (7)
Display	1 remote	2 remote	1 remote + 1 Integrated	2 remote
Modbus	Standard	Standard	Standard	Standard
LON	-	Option	Option	Option
Support for Bluetooth display	AK-UI55 Bluetooth	AK-UI55 Bluetooth	AK-UI55 Bluetooth	AK-UI55 Bluetooth

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Cross reference list for AK-CC55 vs AK-CC 4/5xx

	AK-CC55 Compact	AK-CC55 Single Coil	AK-CC55 Single Coil UI
AK-CC 450 (TXV)	(√)	-	-
AK-CC 550 (2 temp SH (S1))	-	-	-
AK-CC 525	(√)	√	√
AK-CC 550A/(F)	-	(√)	√
AK-CC 550B	-	(√)	√

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Applications for 3 versions

	AK-CC55 Compact	AK-CC55 Single Coil	AK-CC55 Single Coil UI	AK-CC55 Multi Coil
EEV – application (electrically operated expansion valve)	X	X	X	X
TEV – application (thermostatic expansion valve + solenoid valve compressor)	X			
Remote hot gas - application		X	X	
One valve, one evaporator, one refrigeration section	X	X	X	X
One valve, one evaporator, two refrigeration sections (AK-CC 550B)		X	X	
One valve and two evaporators, two refrigeration sections (AK-CC 550B)		X	X	
Two valves and two evaporators (same refrigeration section)				X
Three valves and three evaporators (same refrigeration section)				X
Custom configuration of relay outputs	X	X	X	
Two compressors (via custom setup)	X	X	X	
Heating function (via custom setup)	X	X	X	
Control of air humidity		X	X	X
Adaptive superheat	X	X	X	X
Adaptive Liquid Control (zero superheat control for trans critical CO_2 systems with liquid ejectors)	X	X	X	X
Adaptive defrosting		X	X	
Product sensor		X	X	
RS485 Lon, option		X	X	X

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AK-CC55 Case controller
Feature list (general)

- Fast commissioning via simple Quick menu
- List of active and historical alarms
- Minimum 24 hour log data of important status parameters
- Thermostat control according to ON/OFF or modulating principle
- Temperature alarms according to alarm temperature
- Thermostat bands via digital input
- Adaptive superheat injection algorithm
- Start of defrost via internal schedule, digital input or network signal
- Natural, electrical or hot gas defrost
- Defrost termination based on time or temperature
- Co-ordinated defrost between controllers
- Pulsing of fans when thermostat is cut out (alternative 2-speed ECO Fan)
- Door function and humidity control for cold rooms
- Control of lights according to day/night, door signal or network
- Rail heat pulsing according to day/night or dew point (PWM for accurate control)
- Multi functional digital inputs (incl. leak detection and Adaptive liquid control)
- Factory calibration guarantees HACCP class 1 compliance (Pt1000 ohm sensor)
- Support for NTC, PTC and Pt1000 sensors
- Real time clock
- Integrated MODBUS communication (Lon Works and TCP/IP as options)

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AK-CC55 Multi coil – Special features

- Display can readout Thermostat Air A, min/max/average S4
- Individual or common thermostat control (modulating not possible!)
- Defrost co-ordinated between case sections
- Defrost termination on time, S4 or S5
- Individual temperature alarm per case section

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AK-CC55 ^{Compact} version (TEV/AKV)

AK-CC55 Compact version (TEV/AKV)

AK-CC55 Compact Hardware

The overload protection of the DO1 AKV output is made in the same way as for the AK-CC 550 type controllers. It is designed to protect the AKV circuit also against shortcuts but not for coil protection. If e.g. an AKV coil is pulled off the AKV valve armature the electric current will increase and probably destroy the coil before the overload protection steps in.

Power supply
SMPS 85 – 265 Vac

Digital outputs:
1 SSR for AKV valve (Not overload protected)
3 Relay outputs

Analogue outputs:
1 AO: PWM or 0-10Vdc

Analogue inputs:
5 universal inputs
1 Digital input

Fieldbus:
RS 485 Modbus

Display bus:
Up to 2 remote displays

Classified as Business

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AK-CC55 Compact – Applications

TEV applications	DO1 SSR	DO2 SPDT	DO3 SPST	DO4 SPDT	0-10V PWM	AI1	AI2	AI3	AI4	DI1	DI2	Display	Mod bus
1 Standard case MT/LT with alarm							S3	S4	S5	DI1	DI2		x
2 Standard case MT/LT w. light							S3	S4	S5	DI1	DI2		x
3 Standard case MT/LT w. railheat							S3	S4	S5	DI1	DI2		x
4 Flexible case w. 1 evaporator		Aux	Aux	Aux			S3	S4	S5	DI1	DI2		x

EEV applications	DO1 SSR	DO2 SPDT	DO3 SPST	DO4 SPDT	0-10V PWM	AI1	AI2	AI3	AI4	AI5	DI1	Display	Mod bus
5 Standard case MT/LT w. comp						Pe	S2	S3	S4	S5	DI1		x
6 Standard case MT/LT w. alarm						Pe	S2	S3	S4	S5	DI1		x
7 Standard case MT/LT w. light						Pe	S2	S3	S4	S5	DI1		x
8 Standard case MT/LT w. railheat						Pe	S2	S3	S4	S5	DI1		x
9 Flexible case w. 1 evaporator		Aux	Aux	Aux		Pe	S2	S3	S4	S5	DI1		x

Flexible DO options:
- Fan
- Fan Eco
- Defrost
- Rail heat
- Alarm
- Light
- Blinds
- Compressor
- Compressor 2
- Heating element

DI1 options:
- Status
- Door function
- Door alarm
- Defrost start
- Main switch
- Night
- Thermostat band
- Alarm at open
- Alarm at closed
- Case cleaning
- Forced cooling
- Night blinds opening
- Forced closing
- Case shutdown
- Light control
- **Leak detection**
- **Adaptive liquid control**

AO option:
0: Not used
1: PWM railheat

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AK-CC55 Single Coil version (AKV)

AK-CC55 Single Coil Hardware

Power supply
SMPS 85 – 265 Vac

Digital outputs:
1 SSR for AKV valve (Overload protected)
5 Relay outputs

Analogue outputs:
1 AO: PWM or 0-10Vdc

Analogue inputs:
7 universal inputs (AI 1-6 + DI1)
1 Digital input (DI2)
1 Digital input high voltage

Fieldbus:
RS 485 Modbus

Display bus:
Blind version: 2 remote displays
DIN version: 1 remote display

Option module:
LON or TCP/IP (SNMP)

Yellow marking: Added compared

Left side		Right side
Main + PE 85 – 265V	SMPS Power supply	5V
	ON	AI.1 / AKS32R
		AI.2
SSR / AKV	Protected Triac	AI.3
Reinforced		AI.4
DO.2 Alarm	Relay Alarm	AI.5
Reinforced		AI.6 / 0-10V
DO.3	Relay	AI.7 / DI.1 ALS32R
DO.4	Relay	DI.2 / DO
		Ao.1 PWM Out 0-10V out
DO.5	Relay	
DO.6	Relay	LAN / IO
		Modbus Up
DI.3 HV	Opto-coupler DI	
Display A bus	h16mm	Option Module / Option bus
Display B bus		

175mm
110mm

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AK-CC55 Single Coil - Applications

	EEV applications	DO1 AKV	DO2 SPDT	DO3 SPST	DO4 SPDT	DO5 SPDT	DO6 SPST	0-10V PWM	AI1	AI2	AI3	AI4	AI5	AI6	AI7 DI1	DI2	DI3 230V	Option bus	Display	Mod bus
1	Standard case MT/LT								Pe	S2	S3	S4	S5	S6	DI1	DI2	DI3	X		X
2	Standard case MT/LT								Pe	S2	S3	S4	S5	S6	DI1	DI2	DI3	X		X
3	Standard case MT/LT								Pe	S2	S3	S4	S5	S6	DI1	DI2	DI3	X		X
4	Standard case MT/LT								Pe	S2	S3	S4	S5	S6	DI1	DI2	DI3	X		X
5	Remote case w. hot gas defrost		Suction	Drain	Hot gas				Pe	S2	S3	S4	S5	S6	DI1	DI2	DI3	X		X
6	Back to back w. 1 evaporator								Pe	S2	S3	S4	S5	S3B	DI1	DI2	DI3	X		X
7	Back to back w. 2 evaporator (1 valve)			B	A				Pe	S2	S3	S4	S5	S3B	S5B	DI2	DI3	X		X
8	Coldroom			Hum					Pe	S2	S3	S4	S5	S6	RH%	DI2	DI3	X		X
9	Flexible case w. 1 evap.		AUX	AUX	AUX	AUX	AUX		Pe	S2	S3	S4	S5	S6	DI1	DI2	DI3	X		X

Flexible DO options:
- Fan
- Fan Eco
- Defrost
- Rail heat
- Alarm
- Light
- Blinds
- Compressor
- Compressor 2
- Heating element

DI1 options:
- Status
- Door function
- Door alarm
- Defrost start
- Main switch
- Night
- Thermostat band
- Alarm at open
- Alarm at closed
- Case cleaning
- Forced cooling
- Night blinds opening
- Co-ordinated defrost
- Forced closing
- Case shutdown
- Light control
- **Leak detection**
- **Adaptive liquid control**

AO option:
0: Not used
1: PWM railheat

ENGINEERING **TOMORROW**

AK-CC55 Multi Coil version

AK-CC55 Multi Coil Hardware

Power supply
SMPS 85 – 265 Vac

Digital outputs:
3 SSR for AKV valve (1 overload protected)
4 Relay outputs

Analogue outputs:
1 AO: PWM or 0-10Vdc

Analogue inputs:
7 universal inputs (AI 1-6 + DI1)
1 Digital input (DI2)
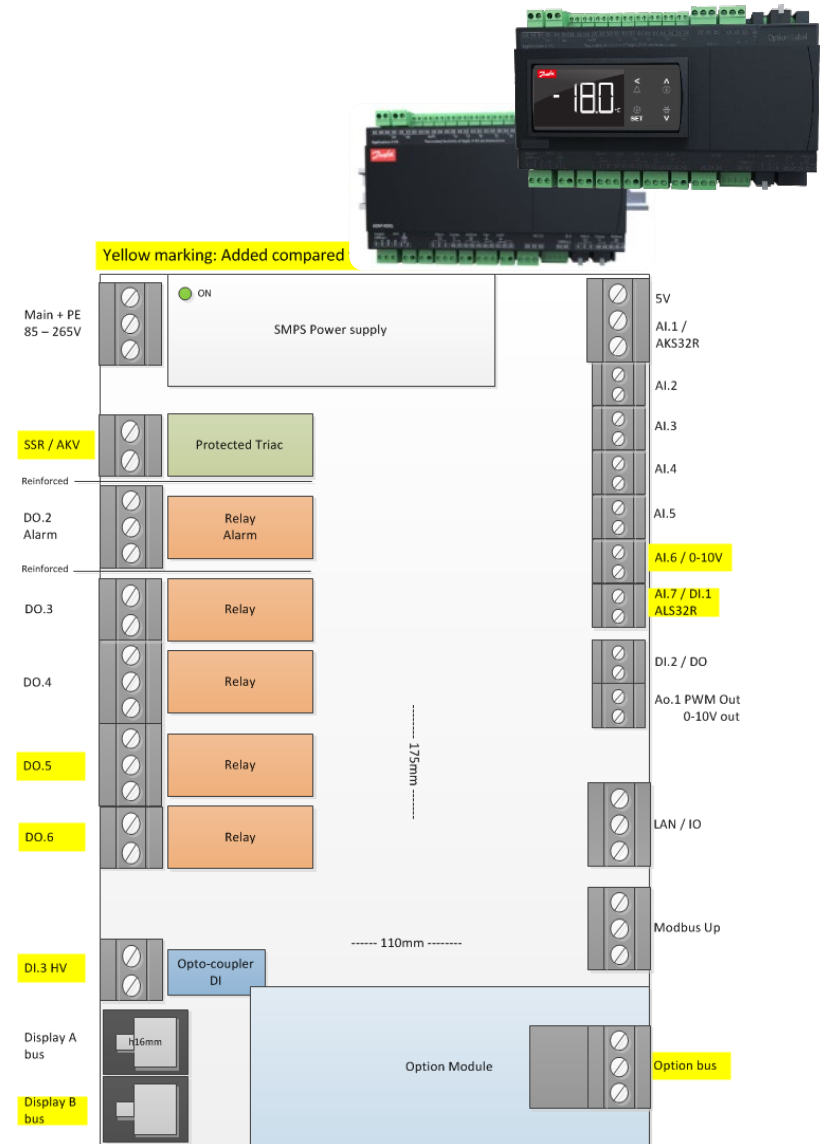1 Digital input high voltage

Fieldbus:
RS 485 Modbus

Display bus:
2 remote displays

Option module:
LON or TCP/IP (SNMP)

Yellow marking: Changed/Added compared to advanced

Left terminals	Block	Right terminals
Main + PE 85 – 265V	SMPS Power supply / ON	5V, AI.1 / AKS32R
SSR / AKV (Reinforced)	Protected FET	AI.2, AI.3, AI.4
DO.2 Alarm (Reinforced)	Relay Alarm	AI.5, AI.6 / 0-10V
DO.3	SSR, Triac	AI.7 / DI.1 AKS32R
DO.4	Relay	DI.2 / DO, Ao.1 PWM Out / 0-10V out
DO.5	Relay	
DO.6	Relay	LAN / IO
DO.7	SSR, Triac	M
DI.3 HV	Opto-coupler DI	
Display A bus		Option Module, Option bus
Display B bus		

175mm / 110mm / h16mm

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AK-CC55 Multi Coil - Applications

	EEV applications	DO1 AKV	DO2 SPDT	DO3 SSR	DO4 SPDT	DO5 SPDT	DO6 SPST	DO7 SSR	0-10V PWM	AI1	AI2	AI3	AI4	AI5	AI6	AI7 DI1	DI2	DI3 230V	Option bus	Display	Mod bus
1	1 x Evaporator LT/MT	A			A					Pe	S2A	S4A	S5A			DI1	DI2	DI3	X		X
2	2 x Evaporator LT/MT	A		B	A			B		Pe	S2A	S4A	S5A	S2B	S4B	S5B	DI2	DI3	X		X
3	3 x Evaporator MT	A		B				C		Pe	S2A	S4A	S2B	S4B	S2C	S4C	DI2	DI3	X		X
4	Coldroom HT 2 evap	A		B Hum				Heat		Pe	S2A	S4A	S2B	S4B	RH%	DI1	DI2	DI3	X		X
5	Coldroom LT 2 evap	A		B	A			B		Pe	S2A	S4A	S5A	S2B	S4B	S5B	DI2	DI3	X		X

3 Evaporator application

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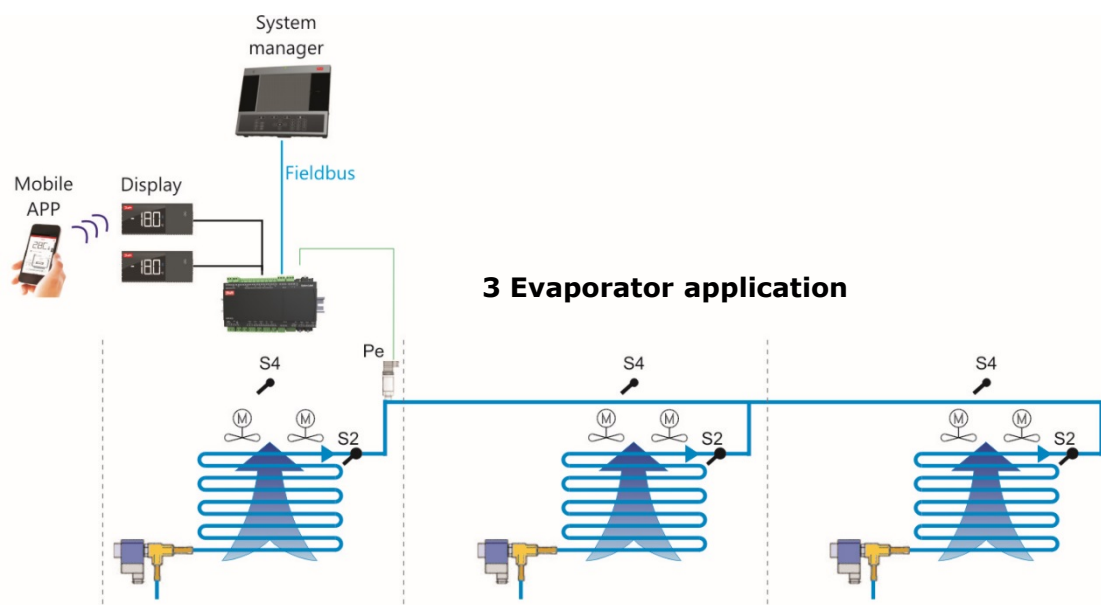
Interfaces

AK-CC55 Case controller Interfaces
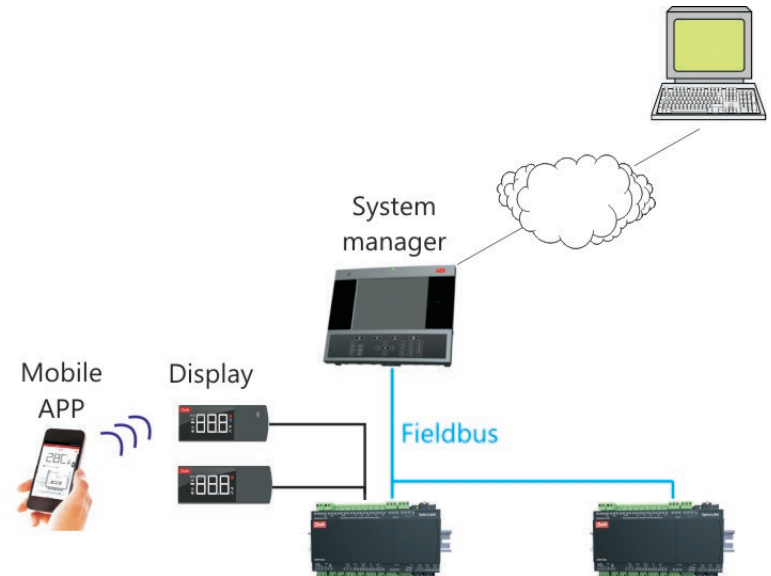
Fieldbus:
RS485 Modbus

Display:
Display bus for up to 2 displays

Mobile APP:
Wireless Bluetooth LE interface to mobile service APP running on smart phone/tablet

Option module:

- Alternative fieldbuses (LON, TCP-IP)

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AK-CC55 Case controller Option module - Fieldbus

The case controller has a flexibility when it comes to support of various fieldbuses and protocols.

For backward compatibility the following optional fieldbuses are provided via a fieldbus option card.

Optional fieldbus options:
- RS 485 LonWorks (Max address 123)
- TCP/IP (SNMP) coming!

Fieldbus options

AK-SM 7

Lon Works

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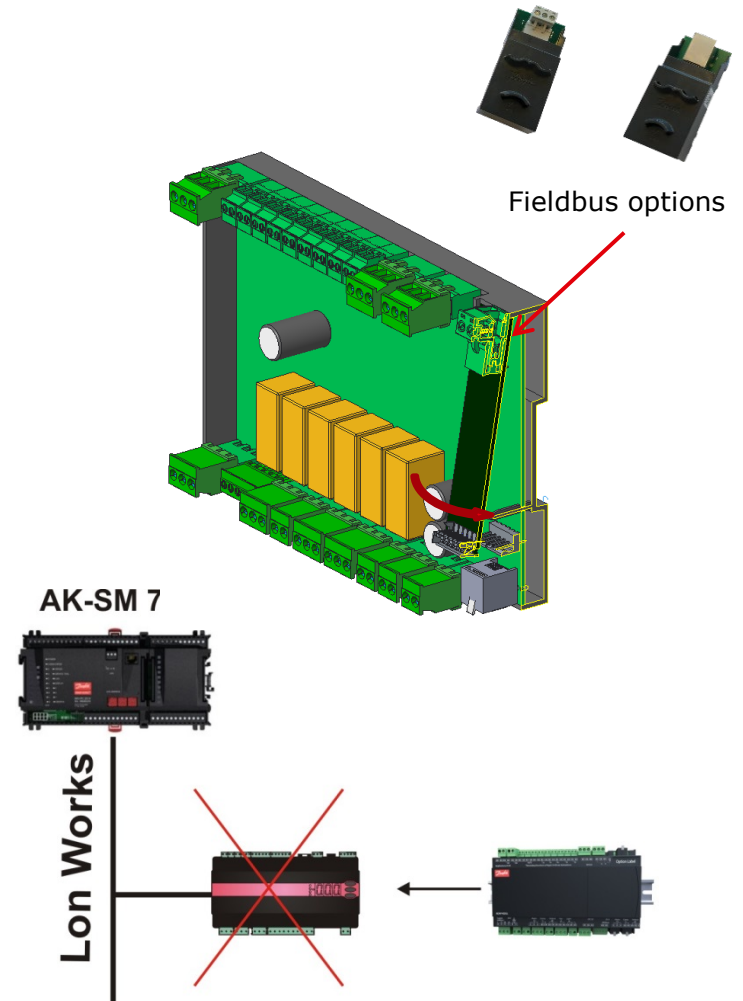
AK-UI55
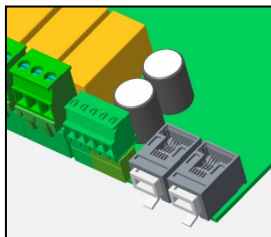# Remote displays

Three display variants:
- AK-UI55 ^{Set} (Key board version)
- AK-UI55 ^{Info} (Display only)
- AK-UI55 ^{Bluetooth} (Bluetooth version)

Up to 2 displays can be connected to each case controller. The displays are connected via RJ12 connectors
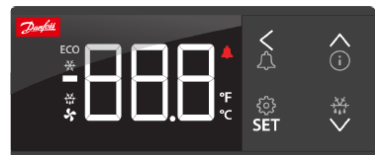
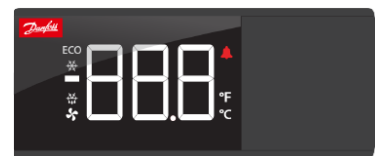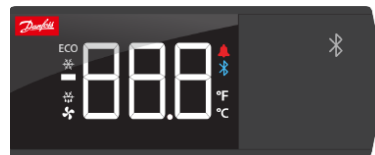The displays can be connected up to 100m from the controller
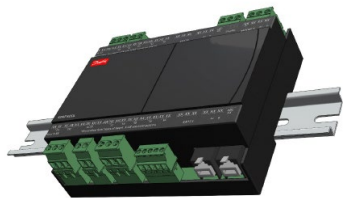
RJ12 connectors

AK-UI55 ^{Set}

AK-UI55 ^{Info}

AK-UI55 ^{Bluetooth}

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Display details

AK-CD Case controller Displays
Display details

Eco mode

Cooling

Defrost

Fan

Long press: Alarms
Short press: Back

Long press: Info menu
Short press: Up

Long press: Start defrost
Short press: Down

Long press: Parameter menu
Short press: Setpoint

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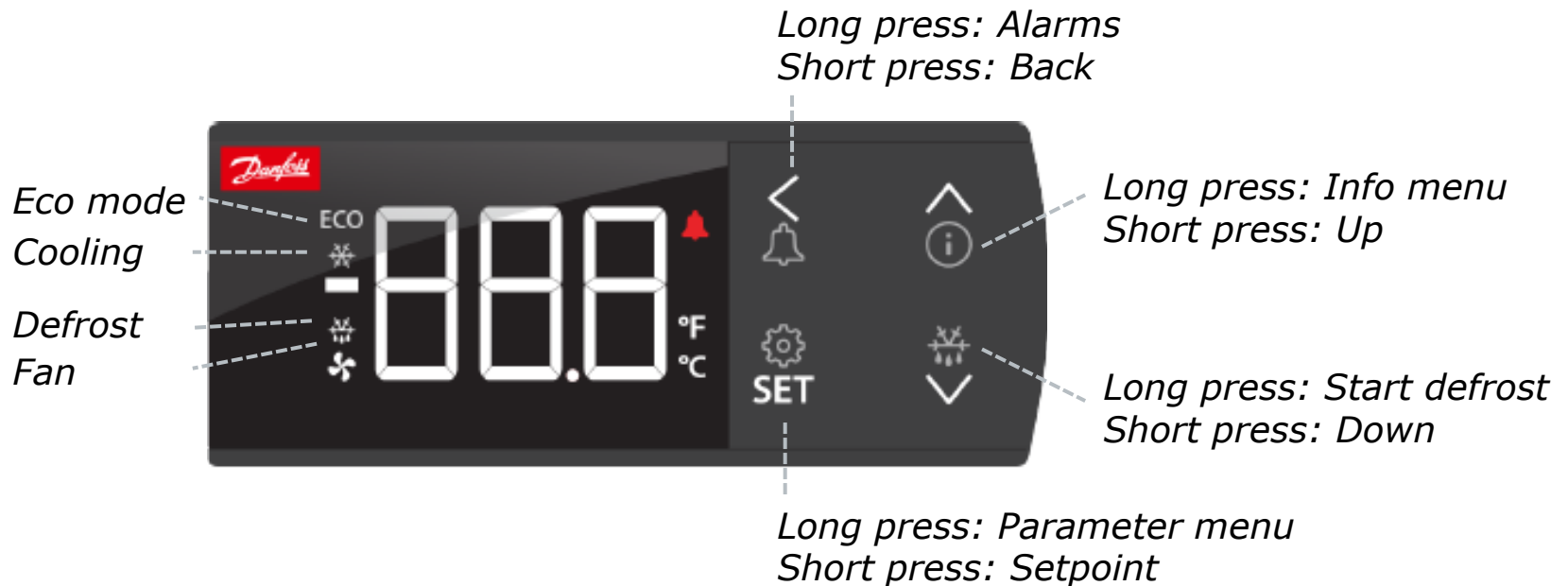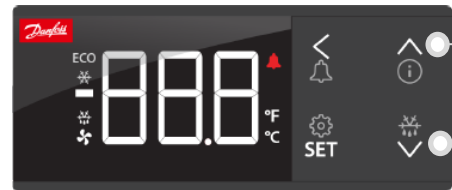
AK-UI Case controller Displays
Display details

Lock keypad:

The keypad lock can be enabled by a parameter setting in the controller

If enabled, keypad interaction will require that the keypad is unlocked by pressing the upper and lower buttons for 3 seconds

The keypad can be locked again via the same procedure or it will lock itself if the keypad has not been touched for 15 minutes

Press UP and DOWN simultanously for 3 seconds to lock and unlock keypad

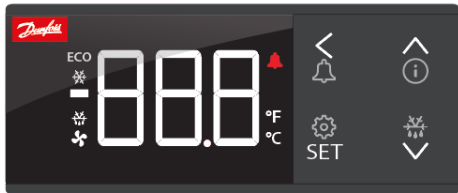*The keypad will lock after 15 min. If no activity*

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AK-UI Case controller Displays
Display details

Power up:

The first time the display is connected to a controller it will have to upload the controller description file from the controller. While uploading the file the LED light will spin in the controller

Power up

At power up all icons in the display turns on. Then a "progress" is shown via lighting up the outer segments one after the other, until the display has read the complete controller description file.

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KoolProg programming tool

AK-CC55 Case controller KoolProg programming tool

"KoolProg" is a PC based programming tool for efficient handling of controller setup files.

The tools supports the following procedures:

- Offline programming of controller
- Online programming
- Backup and restore setting files
- Upgrade of controller firmware

Furthermore the tool also provide help text for all parameters

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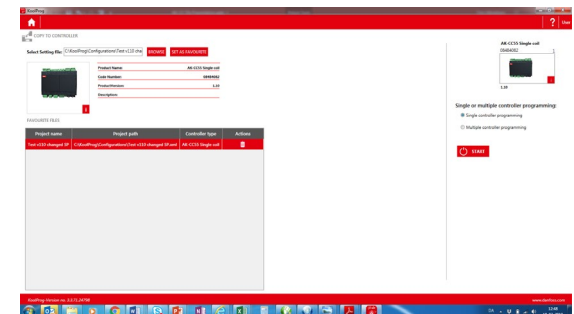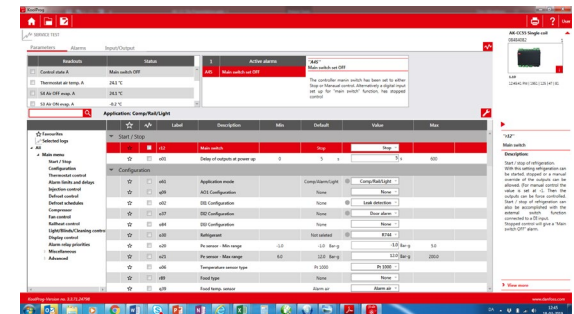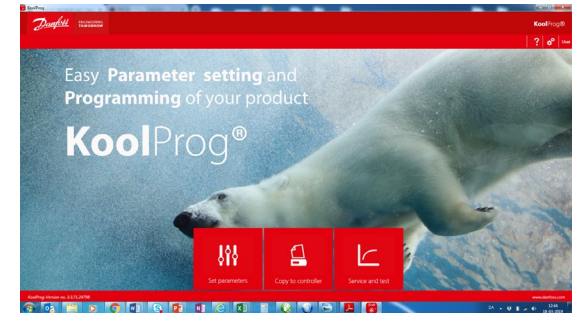
Connect APP

AK-CC55 Case controller
Mobile service APP via Bluetooth

The mobile APP supports the service technician to perform his tasks in an easy and efficient way – supporting the following use cases / features:

- Guided quick setup procedure
- Backup/Restore of controller setup
- Live graphical presentation of case performance with primary status readings
- 24h historical log curves for primary control parameters
- Quick overrides
- Active and historical alarm lists
- Full parameter access
- 32 character text descriptions
- Language support
- iOS, Android operating systems

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AK-CC55 Case controller
Mobile service APP via Bluetooth

In order to connect to the controller the user must provide a passcode if set.

The Bluetooth interface can be locked by the system manager. This means that a user needs to authenticate himself on the system manager in order to enable the Bluetooth pairing.

Removing the fieldbus connection to the controller will unlock the Bluetooth connection (service backdoor)
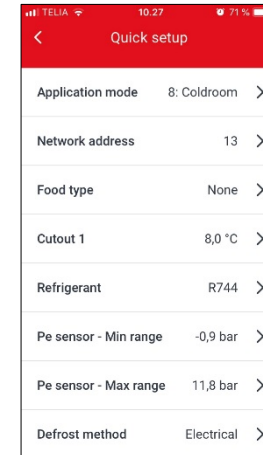
ENGINEERING **TOMORROW**
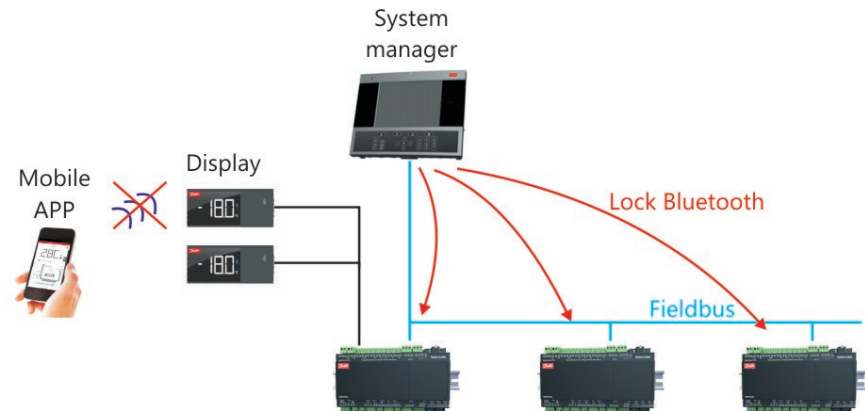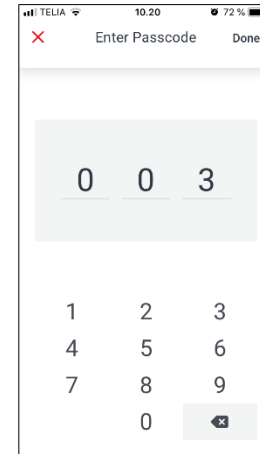
AK-CC55 Case controller
Mobile service APP - Screens

Quick setup:

Supports a fast an efficient start up of a new controller.

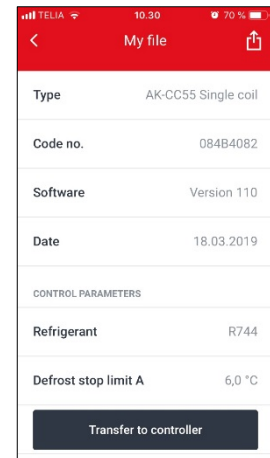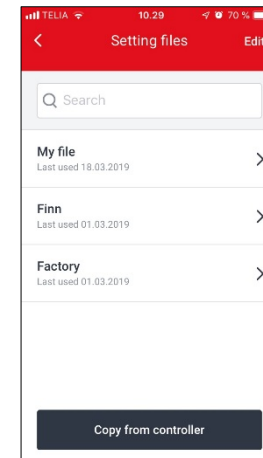Within 3 minutes the controller will be up and running
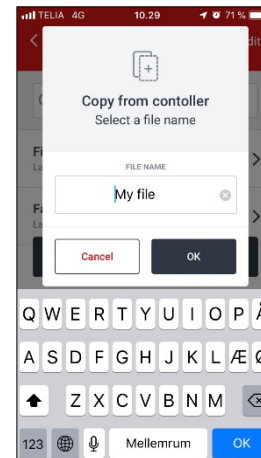
Copy/Paste of settings:

Supports failure proof replacement of an defective controller by copying the settings from the old controller to the new one.

Comes also in handy when commissioning a controller with standardized setup files

Setup files can also be shared via e-mail and other mobile applications

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File Management

You have to receive the files with an app that can read and associate the files to the correct App. For instance if you get the file from Whatsapp, Viber it will be opened by the correct tool. Once it is opened you can always find it again.

Samsungs File manager can't open it but there is another tool called File Commander that also works ok.

Connect App & Kool Prog *.bck files can be used in both programs

(Notice! Version must match)

ENGINEERING **TOMORROW**

AK-CC55
SM-8xx Bluetooth lock function

To enable the Bluetooth lock function the user must navigate and enable this function at:

Configuration→Control→Overide→Device Access

When the function is enabled, it gives the user some possibillities to manage this. One of them is to automatically unlock once the user logs in.

It is also possible to manually enable or disable the Bluetooth lock function by using one of these options.

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AK-CC55 Case Controllers

Type	Function	Packing	Code no.
AK-CC55 Compact	Case controller with one AKV or solenoid valve	S/M-Pack	084B4081
AK-CC55 Single Coil	Case controller with one AKV valve	S/M-Pack	084B4082
AK-CC55 Single Coil UI	Case controller with one AKV valve Integrated display with control buttons	S/M-Pack	084B4083
AK-CC55 Multi Coil	Case controller with one, two or three AKV valves	S/M-Pack	084B4084

Type	Function	Packing	Code no.
AK-UI55 Bluetooth	Bluetooth Display	S/M-Pack	084B4075
AK-UI55 Set	Set Display	S/M-Pack	084B4076
AK-UI55 Info	Info Display	S/M-Pack	084B4077
AK-OB55 LON	LON Com. Module	S/M-Pack	084B4070
Accessory	UI 3 M cable	S/M-Pack	084B4078
Accessory	UI 6 M cable	S/M-Pack	084B4079

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AK CC-55 additional notice!

LON card max address 123

CALM mode (ALC function) don't work (Contact Danfoss for workaround)

SM 800 Copy wizard problem:
Address copied & Only Summery menu in the copy wizard
Corrected EDF file to come

KoolProg
Don't use special characters (äöå?&%¤) in file names!

EEC coil must not be used

Notice different connection terminals (power supply)

Supply voltage 85 – 265V

DO2 to DO6 are 16 A relays. All relays are sealed for use with flammable refrigerant like Propane R290.

MMIMYK bios 5v01
Bios 5v01 fixes a problem when the MMIMYK is used with KoolProg software to configure the AK-CC 55 case controller.
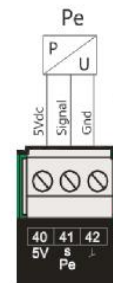The Product Version is updated from
PV1 to PV2 on MMIMYK produced with bios 5v01

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Be aware of when exchanging an AK-CC550 controller with a new AK-CC55 controller – new wiring principles!
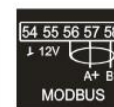
- Pressure sensor has new connection – signal and ground are switched

- STDT relays have a new wiring scheme – NO and NC terminals are switched (e.g. defrost heater on when should be off)

- Modbus has new connection scheme (A, B and screen)
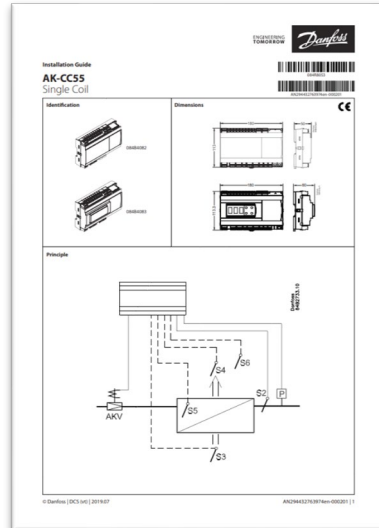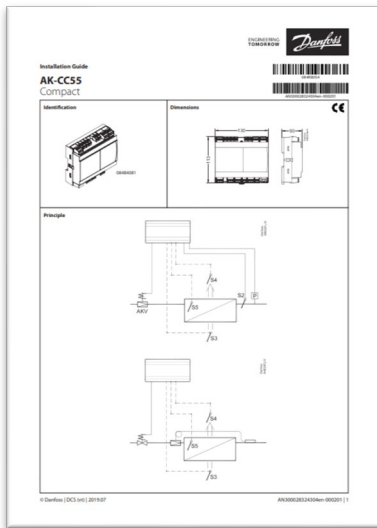
AK-CC550

AK-CC55

- AK-CC55 does not support EEC coils connected to AKV output.
- Pressure transmitter can be shared between AK-CC 550 and AK-CC55.
- DI2 defrost coordination can be wired between AK-CC 550 and AK-CC55.

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Installation guides

English:

- [AK-CC55 Compact](#)
- [AK-CC55 Single Coil](#)
- [AK-CC55 Multi Coil](#)
- [AK-OB55](#)
- [AK-UI55](#)

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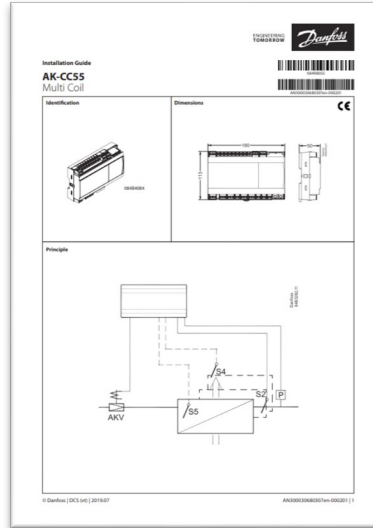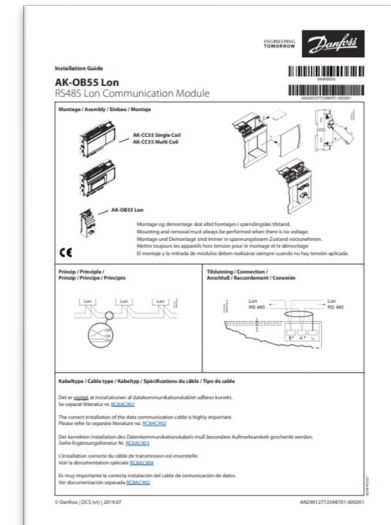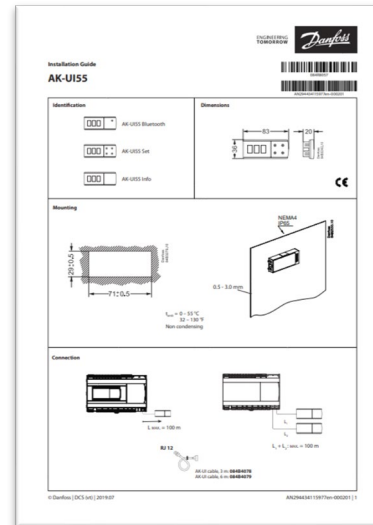
User Guide

- Very comprehensive document

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Next step

- IP SNMP communication is in development
  - Solution for Single Coil
  - M5 aimed for December 2020

- Stepper solution – short term
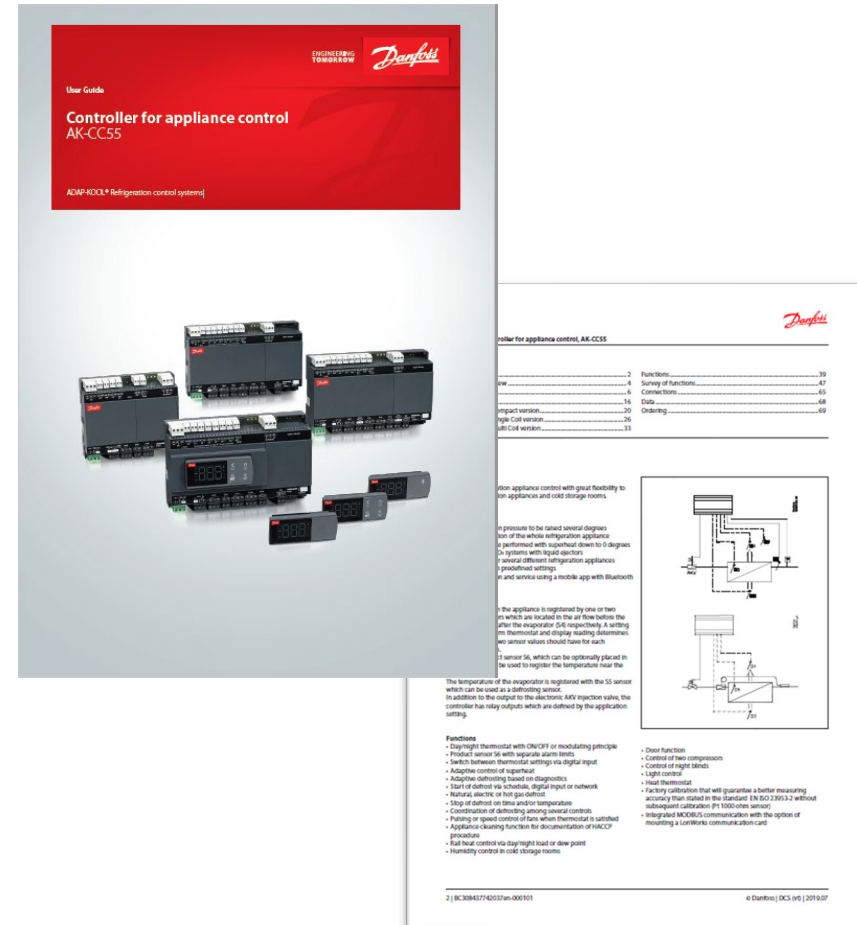 - Enable Single Coil software for both PWM and AO, to connect external stepper driver (0-10 Volt)
  - Expect to be ready end December 2020

- Integrated stepper solution – long term
  - New hardware required

Classified as Business

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AK-CC55 Connect App LIVE DEMO

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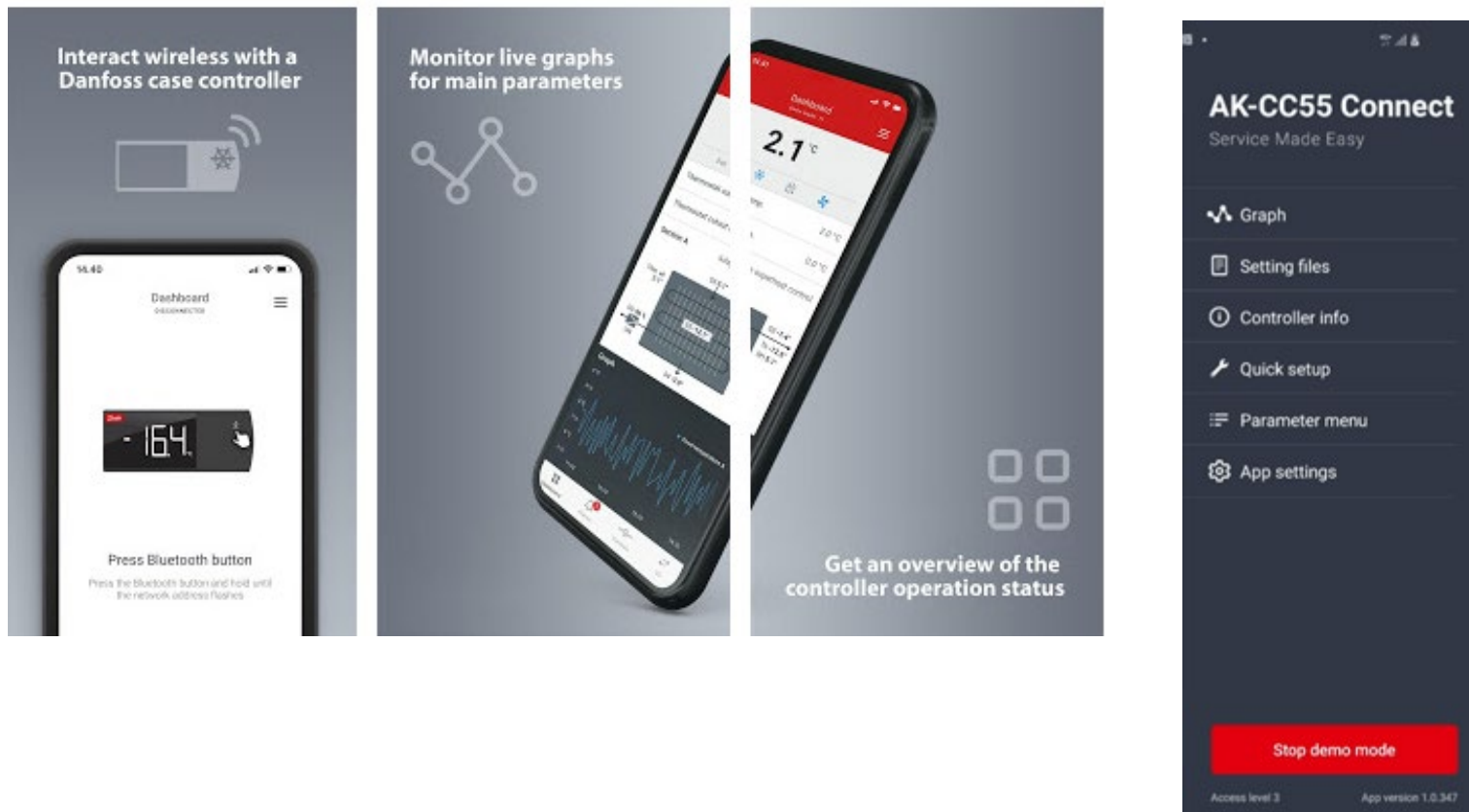
AK-UI Case controller Displays
Display details

Bluetooth pairing:

The Bluetooth pairing with the mobile APP must be initiated by pressing the Bluetooth button for 3 seconds

When the display starts advertising its ID the blue Bluetooth icon will flash and the controller display will show the controller address (Alternating between screens showing "Adr" and the address value i.e. "Adr" ⇔ "056").

Once the pairing is done the Bluetooth icon will be constantly ON and the display will show the normal display readout

App connection via Bluetooth

Press BLUETOOTH for 3 seconds to connect to the app

Bluetooth LED flashes when connected to the app

The controller address and "Adr" flashes during connection with the app

Bluetooth LED is shown when connected to the app

Press BLUETOOTH to disconnect (or disconnet via the app)

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