ENGINEERING
TOMORROW

Overview Brochure | ADAP-KOOL® Case Controllers

Save energy and operational costs without compromising food safety

Danfoss ADAP-KOOL® Case Controls take retail cooling to the next level.

33%
energy savings on optimized control of retail cooling

www.casecontrol.danfoss.com

ADAP-KOOL® the way you work

Adapting to a changing world for over 30 years **with state-of-the-art refrigeration control systems**

ADAP-KOOL® is a family of high-end adaptive refrigeration controls developed by Danfoss for all food retail applications.

First introduced in 1987, Danfoss ADAP-KOOL® products have a long history of adapting to change. And ever since their introduction, the solutions have been defined by the same basic values: **robust, reliable**, and **adaptive** display-case and cold-room refrigeration that ensures high food safety and significant energy savings.

Robust and reliable control

A robust adaptive superheat algorithm can save 8-12% of energy use by ensuring the evaporator is always fully utilized under all conditions. But it requires several components to work together perfectly, and each new advance in technology makes a system more complex.

This is where modern case control solutions make the difference. As refrigeration technology gets more sophisticated, you can rely on ADAP-KOOL® case control to handle that complexity - optimizing efficiency and supporting valuable decisions.

The power of adaptive refrigeration

If operating conditions in food retail refrigeration never varied, setting up a refrigeration solution would be a lot easier. But conditions do change, and that means constantly fluctuating system loads.

To optimize refrigeration efficiency, ADAP-KOOL® avoids the "one size fits all" approach. With adaptive controls, you don't need to manually adjust system operation for changing conditions.

The name **"ADAP-KOOL®"** is a shortened adaptation of the phrase **"adaptive cooling"**

FULL RANGE OF CONTROLLERS

Thermostatic Expansion Valve solutions (TXV)

- EKC 202
- EKC 223/224
- EKC 302
- AK-CC 210
- AK-CC 250
- AK-CC 350
- AK-CC55 Compact
- AK-CC55 Water Loop

Electronic Expansion Valve solutions (EEV)

- AK-CC55 Compact
- AK-CC55 Single Coil
- AK-CC55 Single Coil UI
- AK-CC55 Multi Coil

Find more information on each controller in the product overview on pages 6-7

Save energy and enhance food safety **with adaptive control algorithms**

Over the decades, data from thousands of installations have proved the superiority of adaptive superheat control.

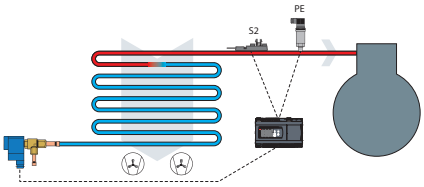
In refrigeration, superheat is the temperature difference between the actual temperature of the refigerant vapor and its saturation temperature.

For every Kelvin the superheat can be decreased, there is an equal potential to increase the evaporating temperature. For every Kelvin the evaporating temperature is increased, 2-3% energy can be saved in a refrigeration system.

Danfoss Adaptive Minimum Stable Superheat Control (MSS)

With MSS, utilization of the evaporator surface is maximized while ensuring that no liquid exits the evaporator.

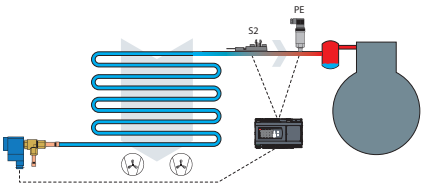
The MSS algorithm, in combination with suction pressure optimization, delivers maximum system efficiency in systems with dry expansion.



Danfoss Adaptive Liquid Control (ALC)

The ALC algorithm typically used in transcritical CO_2 systems with a suction accumulator and liquid ejectors, injects greater amounts of refrigerant into the evaporator, fully utilizing the entire surface. Increasing the amount of the refrigerant in the evaporator increases the evaporation temperature, bringing the superheat very close to zero.

The new Danfoss ALC algorithm provides the highest utilization of evaporator capacity, enabling up to 5 Kelvins higher suction pressure compared to MSS control and even twice as much compared to systems with fixed superheat.



The Danfoss ADAP-KOOL® case controls solution enables advanced analytics and visibility of the store operations with reduced energy cost.

- **Ensure food quality**
- **Improve energy savings**
- **Optimize store operations**
- **Minimize climate impact**

Superior as always. **Stronger than ever**

Introducing the **next generation** case control series: AK-CC55

Now, Danfoss can offer a solution that makes it easier than ever to save on adaptive and reliable food retail refrigeration:

The new AK-CC55 case controls deliver energy savings of 6-10% compared to the next best alternative. They rely on acknowledged and advanced Danfoss adaptive superheat algorithms to control refrigerated display cases and cold rooms.

The new ADAP-KOOL® Case Control generation ensures that the system provides the same great value as always and now delivers a much better user experience, no matter whether you're an OEM, installer, service technician or food retailer. For example, the new modern white LED AK-UI55 display, makes it easy to read out food temperatures and operating status.

AK-CC55 Compact

AK-UI55 Bluetooth

AK-CC55 Single Coil

AK-UI55 Set

AK-UI55 Info

AK-CC55 Single Coil UI

AK-CC55 Multi Coil

AK-CC55 Water Loop

BENEFITS

Significant energy savings with adaptive superheat control algorithms and adaptive defrost

Simplified installation and service with smartphone app and large terminals

Suitable for any store size with Compact, Single Coil, and Multi Coil variants

Take user-friendliness to the next level with **AK-CC55 Connect app**

AK-CC55 Connect is an industry-first wireless tool for the configuration and service of AK-CC55 controlling refrigerated display cases and cold rooms.

Simplified and convenient with Bluetooth

The AK-UI55 remote display comes in a Bluetooth version, which enables wireless connection to the AK-CC55 Connect service app on a smartphone or tablet supported by iOS or Android operating systems.

The app allows for configuration and testing in a user-friendly, intuitive manner. Without the need to unload product, remove panels or make physical connections. And real-time, operating conditions can be monitored while at the display cases or cold room, which ensures better evaluation and troubleshooting.

Full text and graphic display

The enhanced user interface provides full text and graphic display of data not available on conventional multi-segment displays typical of these existing products.

Truly, for installers, commissioning agents, and service technicians, AK-CC55 Connect is a tool that makes the task easier and more efficient.

DOWNLOAD THE APP HERE:

Play Store

App Store

24-Hour
historical log curves for primary control parameters

BENEFITS

Installation

- Controller setup in less than 2 minutes
- Send and receive setting files via email

Service

- Real-time overview of cabinet performance with 24-hour history
- Alarms including checklist function
- Monitoring and manual operation of inputs/outputs

Value

- Ease-of-use optimized for installation and service
- No need to unload cases to configure or troubleshoot equipment
- Enabling time savings and first-time fix
- Safe operation with patented Bluetooth lock function

Case controller
Overview




	EKC 223/224	EKC 202 / EKC 302	AK-CC 2xx / AK-CC 350	AK-CC55 Water Loop
	Conventional TXV Case controller			Flexible TXV Case controller (Semi plug-in)
Expansion device	**TXV**	**TXV**	**TXV**	**TXV**
Control principle	ON – OFF	ON – OFF	ON – OFF	Modulating or ON – OFF
Quick set-up with application macros	✓	–	✓	✓
Communication	Modbus external adapter	Modbus or LON option module	(Modbus built-in), LON option module	Modbus built-in
Sensor inputs: Pt 1000 / AKS 32R	2 / –	2 / –	3 / –	5/– (S3/S4/S5/S7/S8)
Flexible sensor input: PTC/NTC/User defined	–	–	–	(S3/S4/S5/S7/S8)
Digital inputs: Dry Cont. / 230 VAC	2 / –	1 / –	2 / –	2 / –
Digital Outputs (relays)	3-4	2-4	4	5
Customized setup of output functions	-	–	–	✓
SSR Digital Outputs (AKV)	-	–	–	–
Overcurrent protected AKV outputs	-	–	–	–
CO_2 injection control with EEV	-	–	–	–
R290 compliant	✓	x	(✓ - only selected SKUs)	✓
Analogue output (PWM/0-10V/freq.)	-	–	–	Variable speed compressor/pump control (PWM/0-10V/freq.)
Dual compressor control	-	–	✓	✓
Adaptive defrost	-	–	–	–
Rail heat on/off control	-	Day/night	Day/night	Day/night
Rail heat PWM control	-	–	–	✓
Hot gas defrost control	–	–	–	–
Heating thermostat	✓	–	✓	–
Humidifier on/off control	-	–	–	–
Remote displays – UI	-	–	–	1
Bluetooth connection to AK-CC55 Connect app (via AK-UI55 BLE)	-	–	–	✓
Supply Voltage	115 VAC – 230 VAC	115 VAC – 230 VAC	115 VAC – 230 VAC	115 VAC – 230 VAC





AK-CC55 Compact	AK-CC55 Compact	AK-CC55 Single Coil	AK-CC55 Single Coil UI	AK-CC55 Multi Coil
Flexible TXV Case Controller	Conventional EEV case controller	Flexible EEV Case controller		
TXV (Appl. 1-4)	AKV (Appl. 5-9)	AKV	AKV	3 x AKVP
Modulating or ON – OFF	MSS Superheat / ALC Control	MSS Superheat / ALC Control	MSS Superheat / ALC Control	MSS Superheat / ALC Control
✓	✓	✓	✓	✓
Modbus built-in	Modbus built-in	Modbus built-in, LON option module	Modbus built-in, LON option module	Modbus built-in, LON option module
5/– (S3/S4/S5)	4/1 (S2/S3/S4/S5)	6/1 (S2/S3/S4/S5/S6/(S5b))	6/1 (S2/S3/S4/S5/S6/(S5b))	6/1 (S2A/S4A/S2B/S4B/S2C/S4C)
(S3/S4/S5)	(S3/S4/S5)	(S3/S4/S5/(S5b))	(S3/S4/S5/(S5b))	(S4A/S4B/S4C)
2 / –	2 / –	2 / 1	2 / 1	2 / 1
4	3	5	5	4
✓	✓	✓	✓	✓
–	1	1	1	3
–	–	1	1	1
–	✓	✓	✓	✓
✓	✓	✓	✓	✓
–	–	0-10V External stepper driver control	0-10V External stepper driver control	–
✓	✓	✓	✓	–
–	✓	✓	✓	✓
Day/night Dew point	Day/night Dew point	Day/night Dew point	Day/night Dew point	Day/night Dew point
✓	✓	✓	✓	✓
–	–	✓	✓	–
✓	✓	✓	✓	–
–	–	✓	✓	✓
1	1	2	1	2
✓	✓	✓	✓	✓
115 VAC – 230 VAC	115 VAC – 230 VAC	115 VAC – 230 VAC	115 VAC – 230 VAC	115 VAC – 230 VAC

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	AK-CC 210 is used for temperature control of refrigeration appliances in supermarkets. Modbus or LON communication for system integration with ADAP-KOOL installations is feasible via optional communication modules.
	AK-CC55 Water Loop is a flexible TXV Case controller for Semi plug-ins . It is designed with user experience in focus, resulting in bigger connectors and AK-CC55 Connect app.
	AK-CC55 Compact is a standard case controller for TXV/EEV. It is designed with user experience in focus, resulting in bigger connectors and AK-CC55 Connect app.
	AK-CC55 Single Coil is an advanced case controller for EEV with adaptive algorithms. It is designed with user experience in focus, resulting in bigger connectors and AK-CC55 Connect app.
	AK-CC55 Single Coil UI is an advanced case controller for EEV with adaptive algorithms and user interface. It is designed with user experience in focus, resulting in bigger connectors and AK-CC55 Connect app.
	AK-CC55 Multi Coil is an advanced case controller controlling from 1 to 3 EEV's in same refrigeration section. It is designed with user experience in focus, resulting in bigger connectors and AK-CC55 Connect app.
	AK-UI55 Info displays information.
	AK-UI55 Set is designed with 4 menu buttons for easy control.
	AK-UI55 Bluetooth is with built in Bluetooth communication for wireless communication between the display and a smart phone or device through the AK-CC55 Connect app.
	AK-CC55 Connect app is an industry first wireless tool for configuration and service of AK-CC55 controlling refrigerated display cases and cold rooms.
	EKC 223/224 The EKC 22x family brings modern, yet familiar design, convenient setting menu navigation, support for different sensor types, 16A compressor relay, and system integration to Danfoss front ends via EKA 206 RS-485 (Modbus) adapter.