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NEW ADAP-KOOL® EVAPORATOR CONTROLLERS

Danfoss presents its new range of Evaporator controllers within the ADAP-KOOL® range.

EKC 204A is new in the evaporator controller series. It is a multi-purpose controller with easy set-up via predefined applications that makes it easy to commission and service. **EKC 204A** supports different types of sensors (Pt1000, NTC and PTC) and has built-in data communication and several option cards are available (HACCP, buzzer).

EKC 204A

- Built in 230 Vac supply
- Copy key with 25 setting
- 9 Applications via switch
- Temperature control
- Defrost and fan control
- Built-in real-time clock



EKC 204A Evaporator Controller

The updated version of - **EKC 414A1** - is a dedicated evaporator controller that can control one evaporator in a display case or cold room - it has been enhanced with more functions to make it a more complete evaporator controller. It features a remote displays and plug able screw connections for high flexibility in mounting and ease of installation and service.

EKC 414A1 - one AKV valve:

- Adaptive superheat control,
- Modulating temperature control,
- Defrost co-ordination
- Weighted alarm thermostat
- Railheat control
- Extended Door function
- Built-in RS 485 LON communication



EKC 414A1 Evaporator Controller

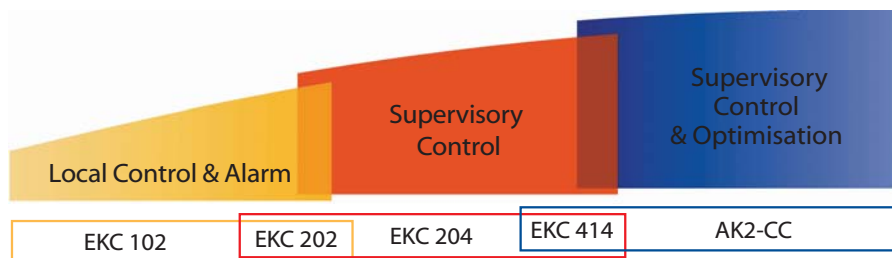
The **AK2-CC** controller is an intelligent evaporator controller that can be used for case or cold room applications. The fully flexible input/output definition of the controller together with the intelligent features makes it the optimal solution to any application. The set-up of applications is done via a pocket PC with a very user-friendly interface.

The intelligent features make the controller stand apart as the ideal solution in meeting market demands for energy savings and improved food safety.

- AK2-CC 303A with up to 4 AKV valves.
- New Intelligent defrost,
- Intelligent fault-detection on airflow
- Adaptive superheat control with AKV valves
- Built-in log facility
- Built-in RS485 Lon communication
- Flexible I/O configuration - with extension modules.
- Other relevant functions - see EKC 414A1.
- Remote display connection



AK2-CC 303A Evaporator controller



For more detailed technical documentation contact local Danfoss office or visit www.danfoss.com

ADAP-KOOL® offers savings of up to 30% with advanced intelligent control utilising electronic expansion valve, floating condensing pressure and suction pressure optimisation

DANFOSS ADAP-KOOL® - YOUR PARTNER IN TEMPERATURE CONTROL AND MONITORING

Increasing Consumer demands require all retailers to provide a high level of food quality in preparation, presentation and provision of food products. The local Food Safety Authorities in various countries demand constant traceability and control throughout the food chain. Such factors make it even more important for the Food Retailer to have a professional and competent partner like Danfoss, who can provide correct control and monitoring solutions to each of the levels within the food chain.



HACCP implementation through the present EN441 requirements and now the forthcoming ISO22000 further emphasises the importance of the process and procedures to support and maintain the Food Quality. For each level in the food chain it is required, for example, to identify, define

and implement the critical control points and its limits, establish proper monitoring and data collection for analysis and clearly demonstrate a responsible approach to the preparation, storage, transport and display of food products.

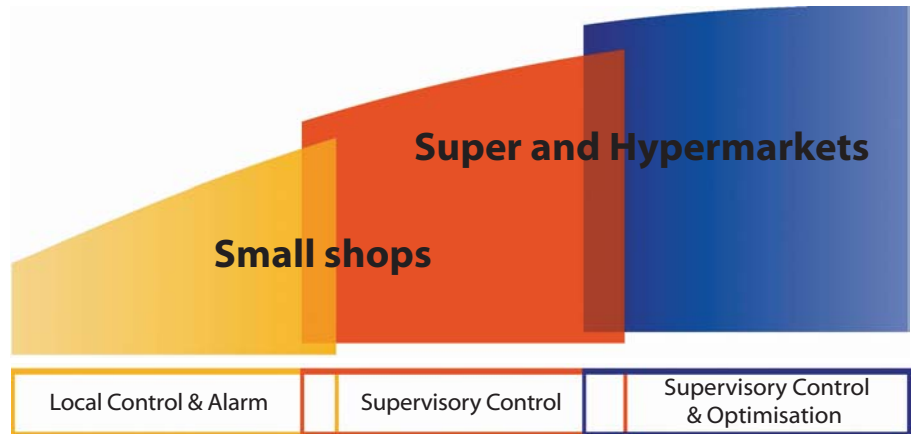
HACCP stands for Hazard Analysis and Critical Control Points and is a systematic approach to identifying and controlling food safety hazards

Danfoss ADAP-KOOL® refrigeration control systems are tailor made to suit all levels of the food chain supply and make to suit to HACCP demands in large/medium/small supermarkets, restaurants, hotels and speciality food outlets.

Danfoss ADAP-KOOL controllers and temperature sensors accurately maintain critical temperature points, to selected limits, at required and measured time intervals. The whole range of ADAP-KOOL Refrigeration controllers combined with

the AKS temperature sensors (PT1000 ohm) maintain close and accurate temperature control to ensure even the simplest cabinet design or standard cold room can be maintained to +/- 1°C accuracy across the range and hereby fulfil the HACCP requirements.

Danfoss AKS Temperature sensors/controllers support HACCP requirements (+/-1 °C) with precise accuracy across the temperature range.



ADAP-KOOL automatically monitors temperature levels, and stores readings to meet the Retailer HACCP procedures to show compliance through simple recordings of critical temperature points. Data can automatically be gathered and maintained at the retail outlet level, with a service provide or both, as required, avoiding manual data collection and reducing staff costs.

Danfoss ADAP-KOOL solutions ensure peace of mind for HACCP compliance to EN441.



Danfoss **m2** or **Micromon** acting as HACCP front end displays for small store systems have a min. of 16 AKS temperature monitoring points (expandable to 99), can store information up to one year on built-in memory, and can connect to remote service centre for monitoring alarms and/or additional support services

CO₂ IN SUPERMARKET REFRIGERATION¹

The CO₂ Supermarket of the Near Future

In many countries there is an increasing pressure from the politicians and from the public against using chemical refrigerants, as there is always a risk of unintentional release into the atmosphere, through leaks in the refrigeration system, harming the environment by increasing the Greenhouse Effect through the Greenhouse Warming Potential of these chemical refrigerants.

Therefore there is an increasing pressure upon the refrigeration industry to look seriously into the use of natural refrigerants.

The most obvious natural refrigerants are Hydrocarbons like R-290 Propane and R-1270 Propylene and R-744 Carbon Dioxide or CO₂.

Both Hydrocarbon and CO₂ have been evaluated technically and practically and there is an indication, that CO₂ will be the future refrigerant in many countries.

The types of CO₂ Cascade System in operation to-day

Because CO₂ is a high pressure refrigerant the refrigeration system has to be designed and built in a way which differs from the normal practice using HFC refrigerants. There are three or four ways of engineering practice:

Sub critical as a cascade system using CO₂ in the lower cascade and either R-404A, R-134a or Hydrocarbon in the top cascade, this counts for all sub critical applications:

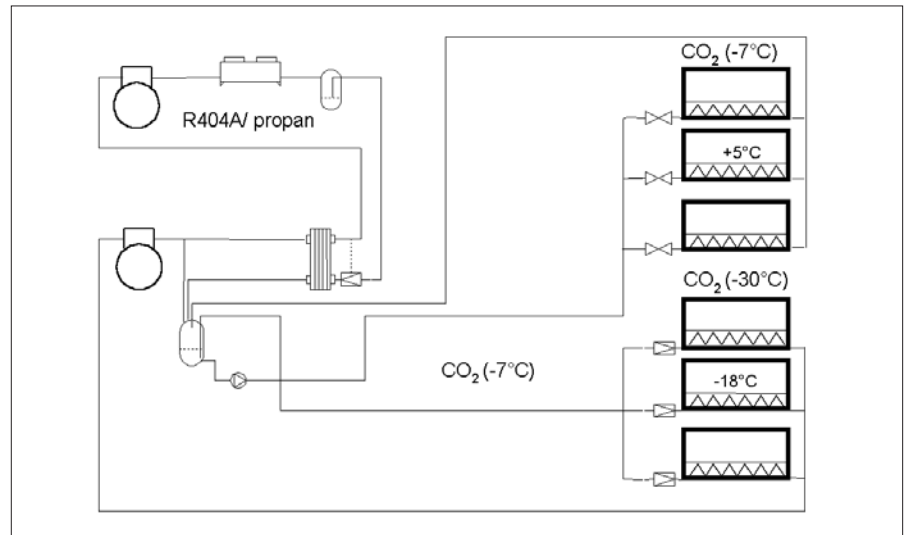
A short explanation of the of different systems

System 1:

Direct expansion for low temperature evaporators and pump circulation for the medium temperature evaporators all with CO₂.

This type of system has now been in operation for more than 3 years and generally there have been non or very few problems.

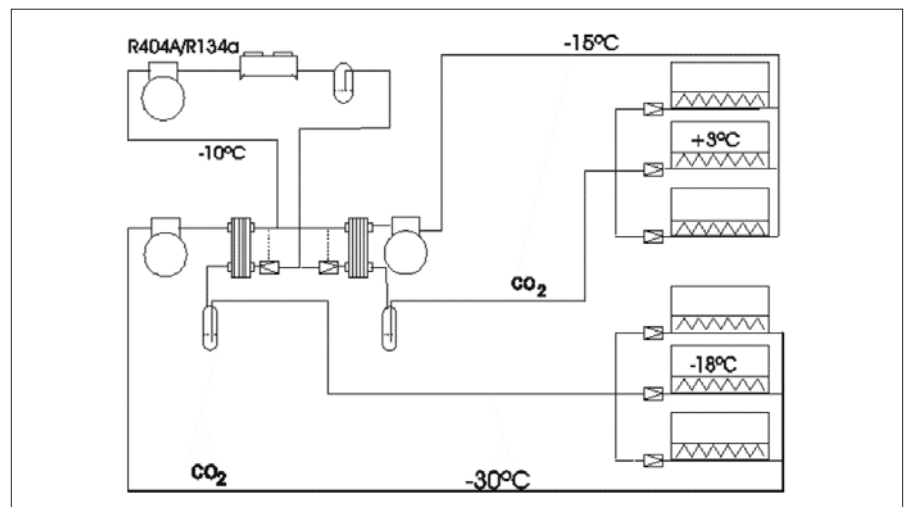
This type of cascade refrigeration system is the most commonly used today.



System 2:

Direct expansion for both the low and medium temperature evaporators all with CO₂.

This type of CO₂ cascade system might be the most commonly used system in the future.



Where are these CO₂ systems installed ?

- Denmark types 1, 2, 3 and 4 installed
- Norway type 1 installed
- Finland type 1 installed

- Sweden type 3 and 4
- Germany type 1 and 3 installed
- Luxemburg type 3 installed

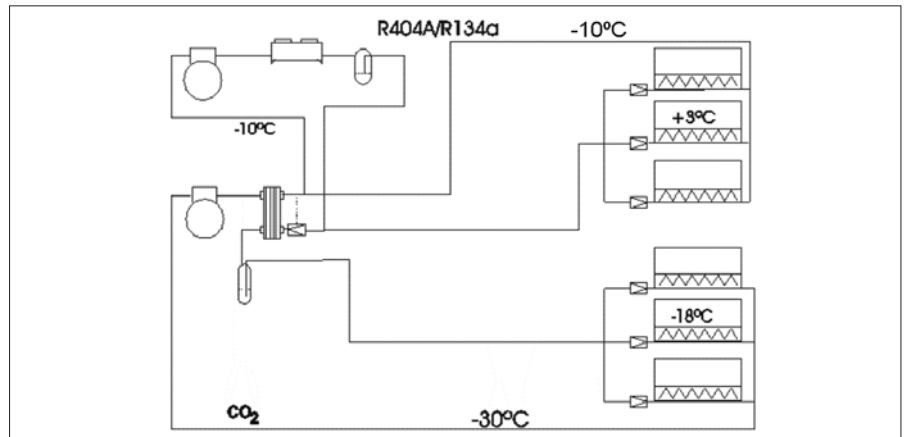
- Switzerland type 1 and 2
- Australia type 1
- Italy type 4

¹ The principal authors of this article are Jørgen Bargsteen Møller, manager of special projects, training, & education, Danfoss A/S (Nordborg, Denmark) and Preben Alfred Bertelsen, application engineer, Danfoss A/S, Denmark

System 3:

Direct expansion for low temperature evaporators with CO₂ and direct expansion for medium temperature evaporators connected to the top cascade with R-404A

This type of cascade system is preferred by some parties, especially for rebuilding existing supermarket.

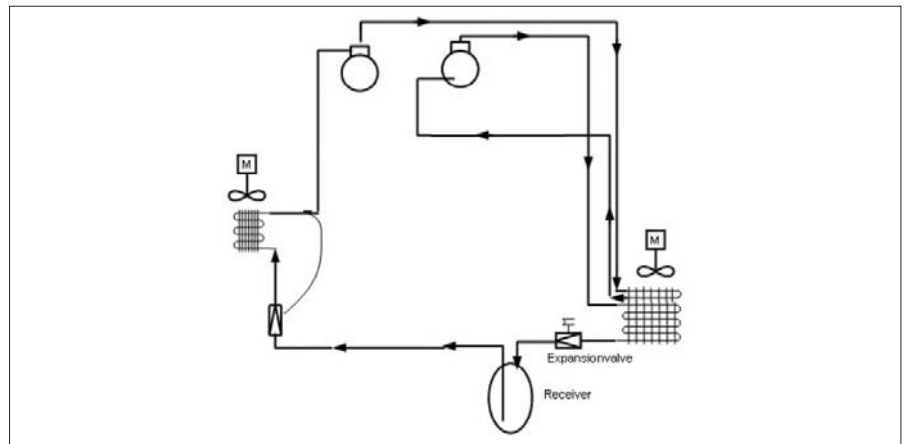


Trans critical CO₂ system as a single stage system:

System 4:

Direct expansion for low temperature evaporators connected to a low pressure single stage CO₂ system and direct expansion for medium temperature evaporators connected to a medium temperature single stage CO₂ system. The trans critical CO₂ refrigeration system 4 is at the moment at an extended field test.

Trans critical - a good idea if heat is recovered



The installations are equipped with ADAP-KOOL® refrigeration controls that provides efficient and optimal control of the CO₂ installations. In the future Newsletters there will be more about CO₂ applications.

COME AND VISIT US AT:



Come and see our solutions at stand no. **16D60 in hall 16.** So, book time for us between 19th and 23rd February 2005 in Düsseldorf, Germany.

Among many news Danfoss will present:

- New Range of EKC controllers
- RETAIL-CARE™ - services
- HACCP solutions
- Compressors
- Condensing units
- CO₂ application

If you would like to visit Danfoss on EuroShop ask your local office for free entrance-ticket.

In next edition:

- News EKC controllers
- Compressors and condensing units
- RETAIL-CARE™
- CO₂ application

ADAP-KOOL® Refrigeration Controls is a trademark of Danfoss A/S

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