

ENGINEERING
TOMORROW



Training Danfoss ADAPKOOL Controls

Adnan Güney, Technical Support Manager



www.danfoss.com

Kısaca ben



Adı: **Adnan Güney**

Sorumluluklar: Teknik Destek & Eğitim Müdürü

Deneyim: Mak.Yük.Müh., 4 yıldan fazla Danfoss'da, toplam 12 yıllık soğutma tecrübesi

İletişim:

Tel.: 0216 600 50 65 | Mobile: 0533 393 59 89

E-mail: adnan.guney@danfoss.com

Danfoss TR, Cooling, İçerenköy Ataşehir/İSTANBUL

Agenda

➤ **Market**

- Trends, position, Channels
- Segmentation
- Key applications and product coverage

➤ **Basic Case Controls**

- EKC 202

➤ **High End Case Controls**

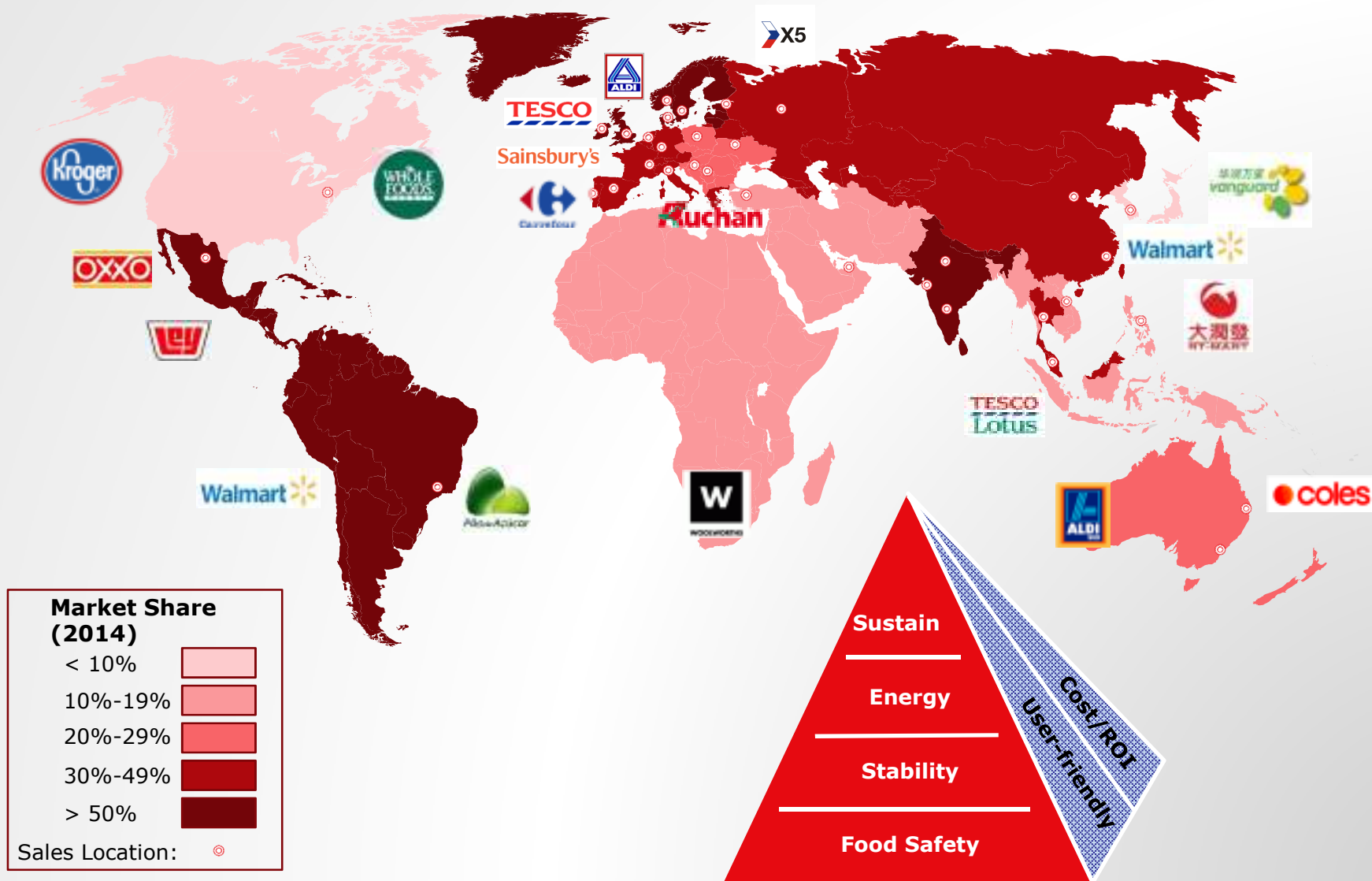
- ADAP-KOOL® History
- AKV(H) 10 vs. AKVP 10
- AK-CC550A

Hypermarkets & superstores set to experience the slowest rate of growth

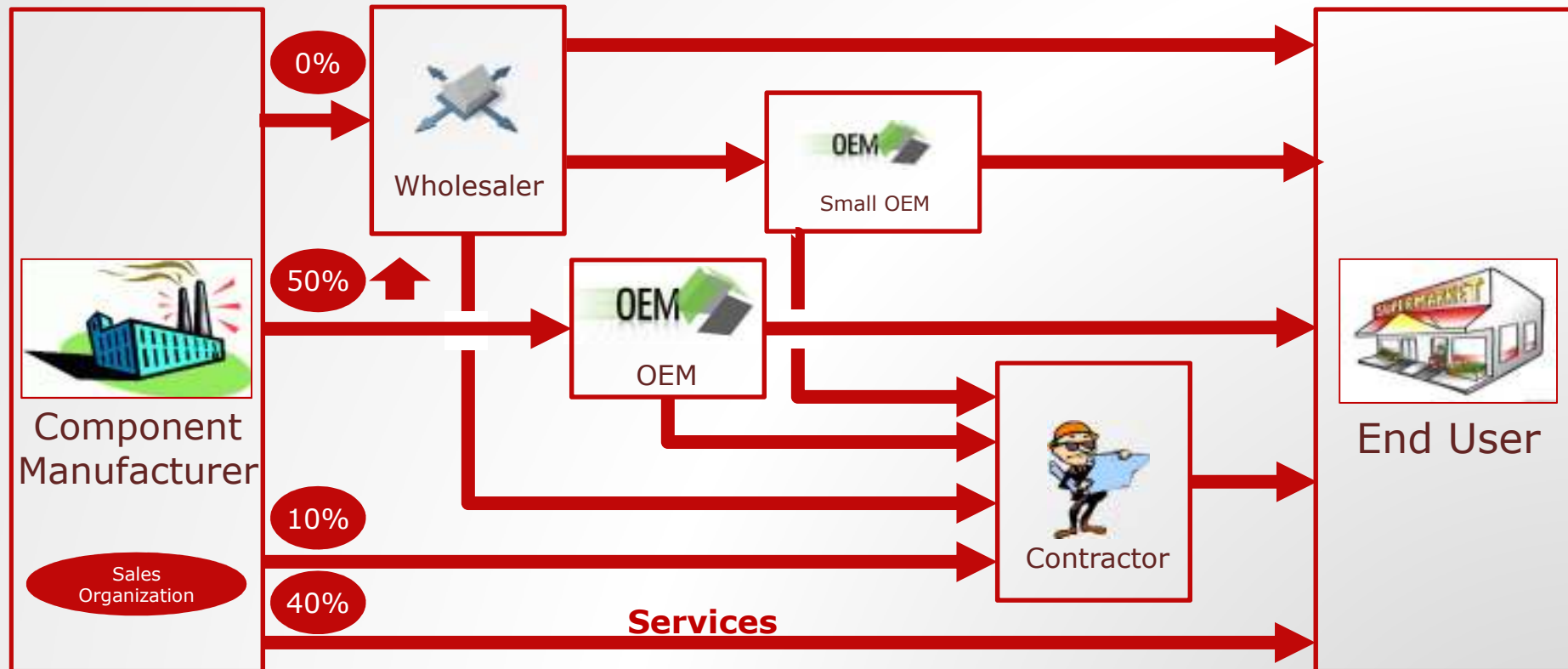
Global: Channel Sizes by Banner Sales, 2010^e-2020^f



Danfoss holds the leading position globally



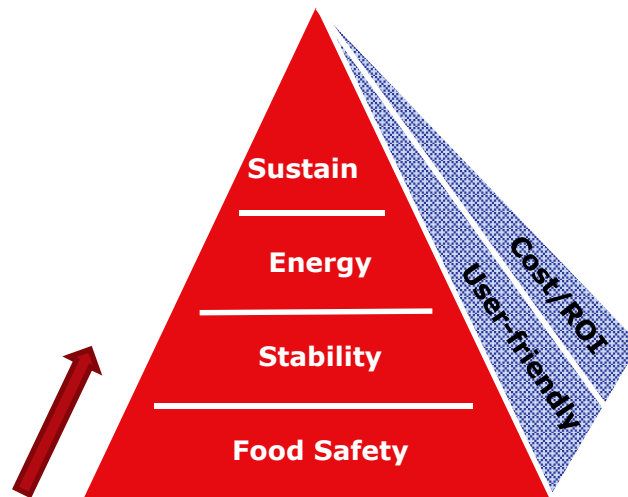
Large OEMs are gaining influence within the push/pull structure – Channels of influence



Small format store are largely OEM driven
Large format stores are largely end user driven

Small Stores with first cost focus

	Small	Medium	Large
High End (TCO)			
Basic (First cost)	✓		



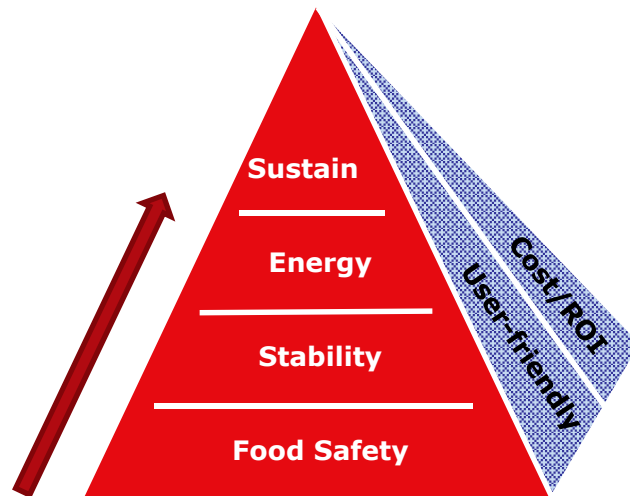
ERC11x EKC 102



- Key decision maker
 - OEM / contractors on behalf of independent shop owner
- Main drivers
 - Legislation (Food Safety)
 - Cost – Cost – Cost
- Typical stand alone
- Refrigeration focus
 - Stand alone plug in cabinets
 - Remote cabinets and rooms with condensing units
- Controls factory installed by OEM's
- Channel to market OEM's / WS

Small Stores with Total Cost of Ownership Focus

	Small	Medium	Large
High End (TCO)	✓		
Basic (First cost)			



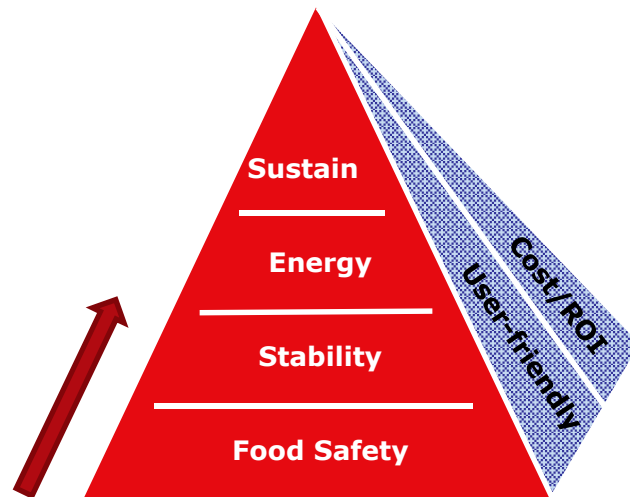
AK-SM 820 EKC/AK-CC 2xx/3xx AK-PC 351



- Key decision maker
 - Technical department at Chain / HQ
- Main drivers
 - Minimize Operation cost across chain
 - Legislation (HACCP / Refrigerant)
- System integration of technical equipment for remote monitoring and service
- Full store focus
 - Plug in cabinets
 - Remote cabinets and rooms with condensing units
 - HVAC and light controls
- Controls factory installed by OEM's
- Channel to market OEM's / WS
- System integrator needed for system solution

Medium size stores with first cost focus

	Small	Medium	Large
High End (TCO)			
Basic (First cost)		✓	



AK-SM 850



AK-CC 2xx/3xx



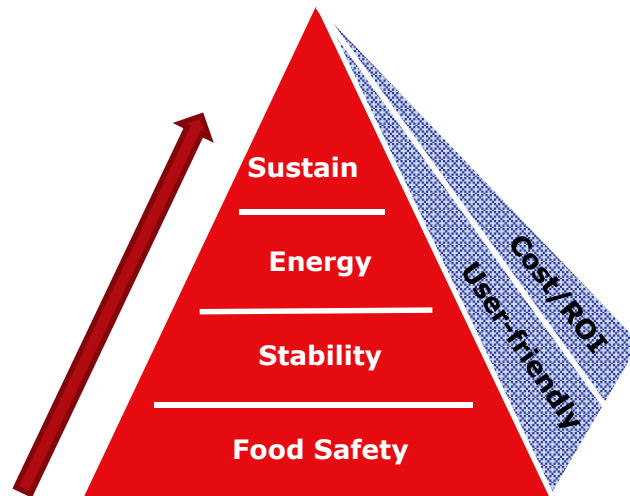
AK-PC 551



- Key decision maker
 - OEM / contractors/ Consultant on behalf of independent shop owner
- Main drivers
 - Legislation (Food safety)
 - First cost
- Refrigeration focus
 - Plug in cabinets
 - Remote cabinets and rooms centralized pack control
- Controls factory installed by OEM's or mounted by refrigeration contractor
- Channel to market
 - OEM's, Contractors

Medium size stores with total cost of ownership focus

	Small	Medium	Large
High End (TCO)		✓	
Basic (First cost)			



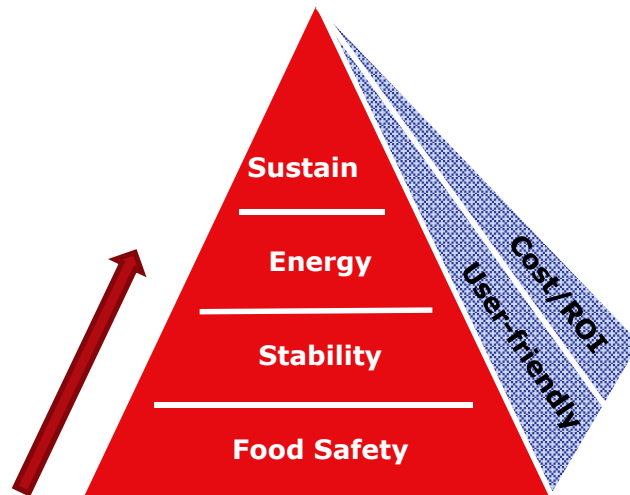
AK-SM 880 AK-CC 5xx AK-CT 200 AK-PC 7XX



- Key decision maker
 - Technical department at Chain / HQ
- Main drivers
 - Legislation (HACCP / Refrigerant)
 - Operation cost reduction
 - Green Image
- Full store energy saving (refrigeration highest share)
 - Plug in cabinets
 - Remote cabinets and rooms centralized pack control
 - Basic HVAC and light controls / override
- Controls factory installed by OEM's or mounted by refrigeration contractor
- Channel to market
 - OEM's, Contractors

Large stores with first cost focus

	Small	Medium	Large
High End (TCO)			
Basic (First cost)			✓



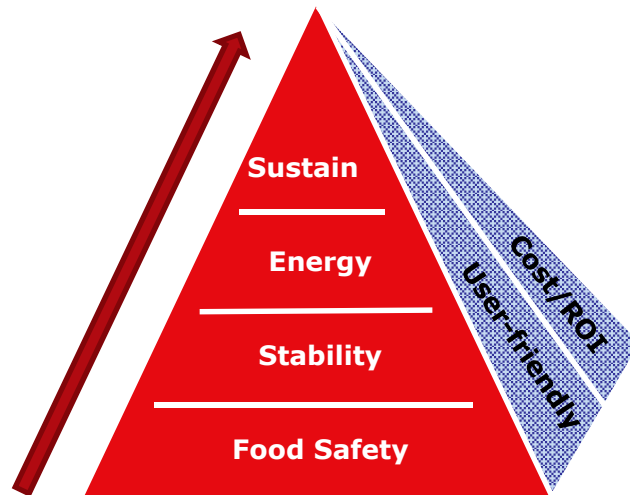
AK-SM 880 AK-CC2xx/3xx AK-XM AK-PC 5/651



- Key decision maker
 - Technical department at Chain / HQ
- Main drivers
 - Legislation (Food safety)
 - Energy cost reduction
- Full store focus
 - Remote cabinets and rooms centralized pack control
 - Plug in cabinets
 - Basic HVAC and light controls / override
- Controls factory installed by OEM's or mounted by refrigeration contractor
- Channel to market
 - OEM's, Contractors
 - System integration by ?

Large stores with total cost of ownership focus

	Small	Medium	Large
High End (TCO)			✓
Basic (First cost)			



AK-SM 880



AK-CC5 xx



AK-CT200

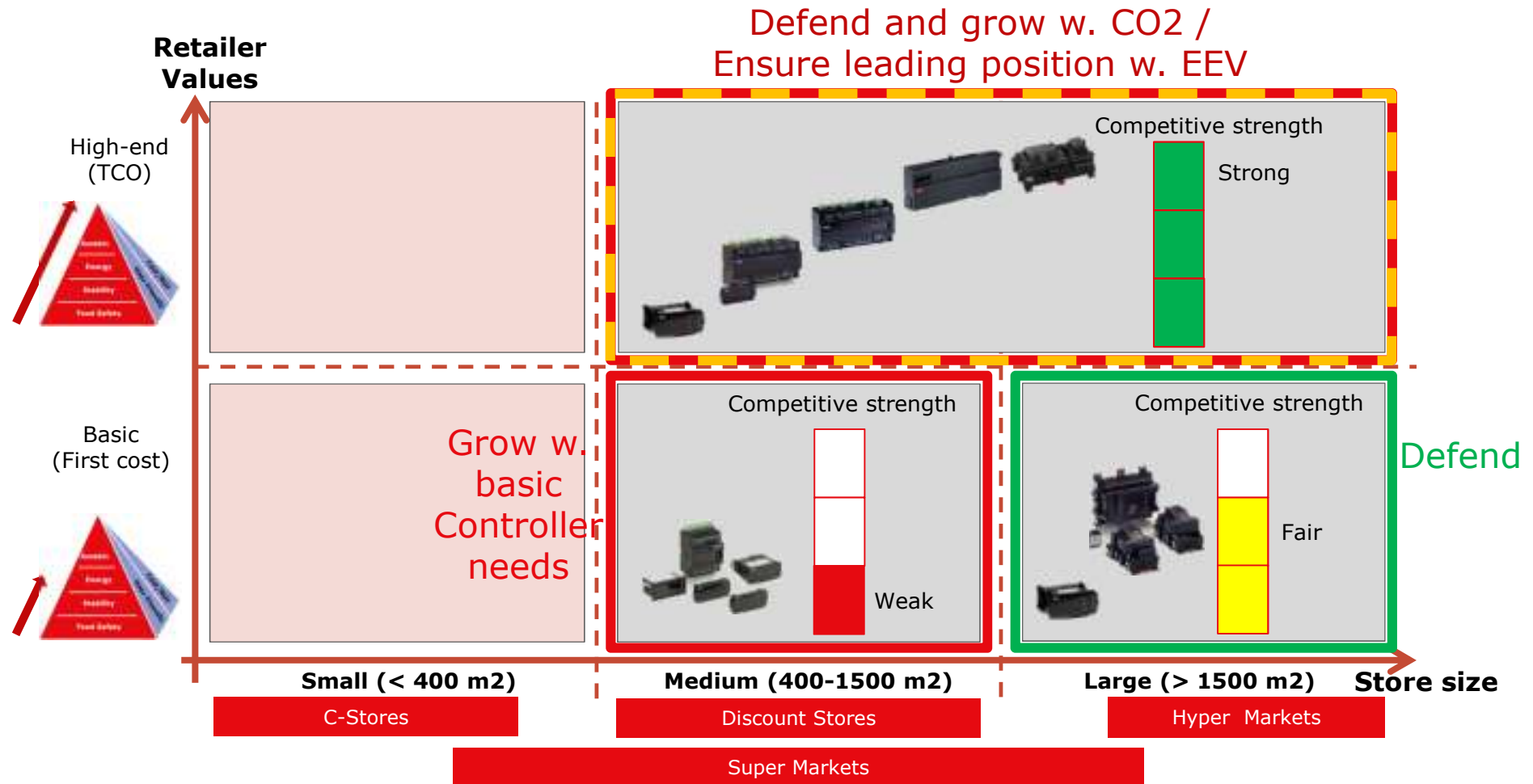


AK-PC 78x



- Key decision maker
 - Technical department at Chain / HQ
- Main drivers
 - Legislation (HACCP / Refrigerant)
 - Operation cost reduction
 - Green Image
- Full store energy saving
 - Remote cabinets and rooms centralized pack control
 - Plug in cabinets
 - HVAC and light controls
- Controls factory installed by OEM's or mounted by refrigeration contractor
- Channel to market
 - OEM's, Contractors

Competitive strength - Case controls focus



Food Retail Controls Portfolio



Total Store Control Portfolio



Remote cases:

Roll in



Semi Verticals



Vertical freezers and combinations



Multi deck



Islands & Wall-sited



Semi Plug-ins :

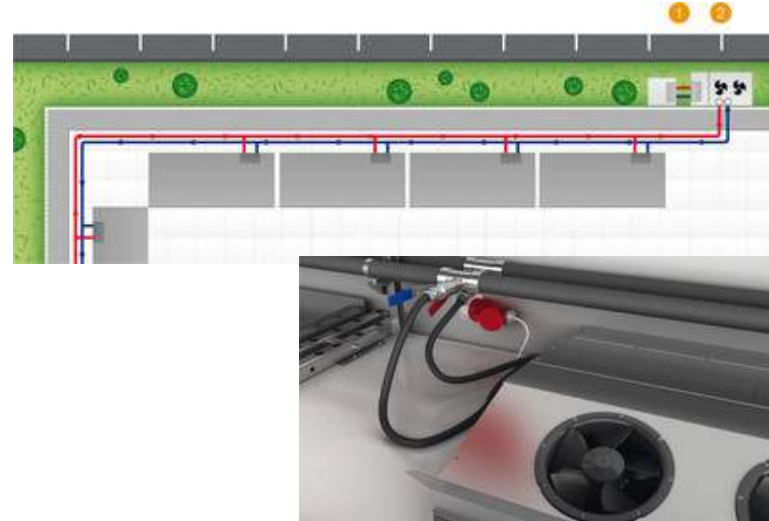
- Multi deck Chiller - Water



Multi deck Chiller - Hybrid



Plug & Chill



Plug-ins : Supermarket Islands, Multi deck, Ice Cream Merchandisers, Fresh & Beverage

Supermarket Islands



Multideck Chiller



Ice cream



Fresh & Beverage

Upright Coolers & Freezers



CO2 Bottle Cooler



Stainless Steel Coolers & Freezers



Impulse sales



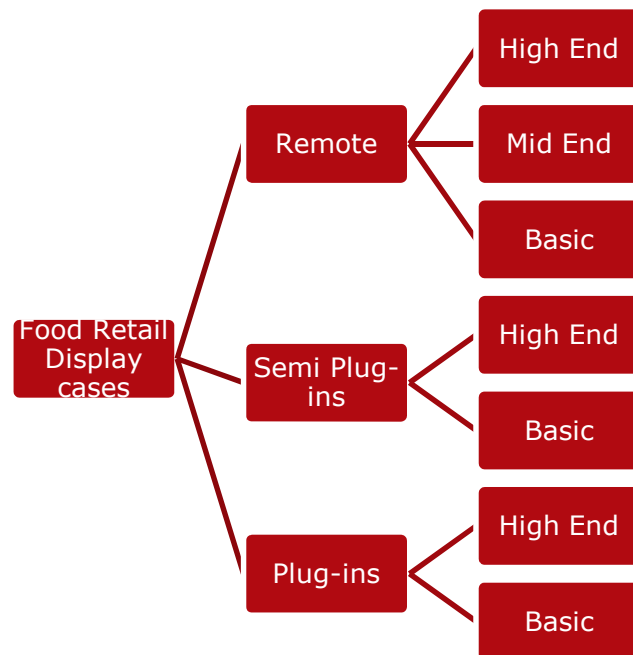
ADAP-KOOL® Case Controller Overview















	EKC 202 /302	AK-CC 2xx /350	AK-CC450	AK-CC 525 /550	AK-CC 750	AK-CT 200
Controller type	Basic Refrigeration Controller	Conventional Refrigeration Controller	High-end Evaporator Controller	High-end Evaporator Controller	High-end Evaporator Controller	Controller Tray Evaporator and power control
Valve control	TEV	TEV	TEV/ Pumped CO ₂	AKV(H)	4x AKV(H) /Stepper/ TEV	TEV or AKV(H)
Control method	ON-Off	ON-Off	Modulating or ON-Off	MMS Superheat Control	MMS Superheat Control	MMS Superheat Control
Application	-	Application Macros	Application Macros	Application Macros	Application Macros	Application Macros
Data communication	Modbus or Lon Optional	Build-in Modbus Opt. LON	Build In Modbus Opt. LON Opt. TCP-IP	Build-in Modbus Opt. LON Opt. TCP-IP	Build-in LON	Build-in Modbus Opt. LON

Food Retail Application / product coverage

Case Controls



Small Stores	Medium -> Large Stores
AK-CC 2/3xx 	AK-CT 200 AK-CC 550 AK-CC 525 
AK-CC 2/3xx EKC 202/302 	AK-CC 2/3xx AK-CC 450 
EKC 202/302 	AK-CC 2xx EKC 2xx 
EEV / Variable speed Comp Build-in data coms	EEV / Variable speed Comp Build-in data coms
AK-CC 210 AK-CC 210A (R290) 	AK-CC 210 AK-CC 210A (R290) 
AK-CC 210 AK-CC 210A (R290) (No VS) 	AK-CC 210 AK-CC 210A (R290) (No VS) 
ERC 21x ERC 11x (Stand alone) 	EKC 202 

Not covered by Danfoss controllers today

Cold room and condensing unit controls

Room controls

AK-CC 2/3xx
TXV / Comp.



AK-CC 550
1 AKV



AK-CC 750A
1 -> 4 AKV/ETS/CCM



AK-RC 101
TXV / Comp.



Condensing unit controls

Optyma Plus
Condensing unit
controller



Optyma
controllers
Stand alone



Room & compressor controls



Basic evaporator controls

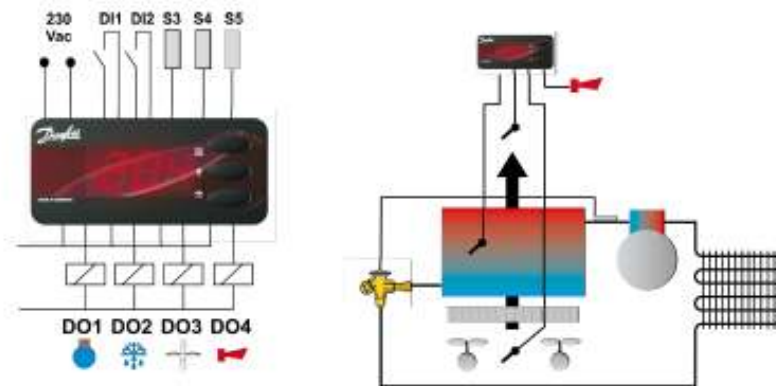
EKC 2xx/3xx AK-CC 2xx/3xx

EKC 202 Product overview

Electric connections and applications

Below example is showing electrical wiring diagram for application 1 of EKC 202D.

The table on the right hand side shows an overview for all controllers.



Controller	Application no.	Outputs				Inputs				
		DO1	DO2	DO3	DO4	S3	S4	S5	DI1	DI2
EKC 202A	Only 1						•	•	•	
EKC 202B	Only 1						•	•	•	
EKC 202C	Only 1						•	•	•	
EKC 202D	1					•	•	•	•	•
	2					•	•	•	•	•
	3					•	•	•	•	•



HACCP Compliant

Factory calibration ensures that all EKC 202 controllers in combination with a Pt 1000 sensor have a measuring accuracy better than $\pm 1^\circ\text{C}$ in the temperature range between -30°C and $+15^\circ\text{C}$.



Quick and easy installation:

The integrated mounting brackets in the controller's housing ensure a quick and easy mounting of the panel.



IP 65 rating guarantee:

Integration of push buttons and packing in the controller's front panel ensures a cleaning-safe tightness.

EKC 202 Functions

Thermostat

- ON/OFF heating or cooling thermostat
- Sensors: Danfoss Pt1000, PTC1000 or NTC5000
- Day / night control
- Thermostat band
- Alarm thermostat with delay

Defrost

- Electrical, natural or hot gas defrost
- Start via DI input, time interval or schedule (RTC)
- Defrost on demand
- Stop on time or temperature
- Coordinated defrost

Compressor

- Anti cycle timers for optimum protection
- High-effect 16A relays for connection of compressors without use of intermediate relays

DI input

- Multi purpose DI input for defrost start, door function, night setback, main switch, appliance cleaning, general alarm, defrost coordination and thermostat band.

Fan

- Fan delay during defrost
- Fan stop when compressor cuts out
- Fan stop at high S5 temperature

Light control

- Light control of day/night, door, or via network

Other functions

- S5 sensor can be used for monitoring of condenser temperature or as product sensor
- Door function with alarm monitoring
- Manual control of outputs
- Case cleaning function

Supplementary options

- RS 485 network card for connection to network
- Battery back-up card for real time clock
- "Copy key" programming key

EKC 202D specialities

- 3 applications selectable
- Weighted thermostat, alarm thermostat and display readout between S3 and S4
- Railheat control for day/night load

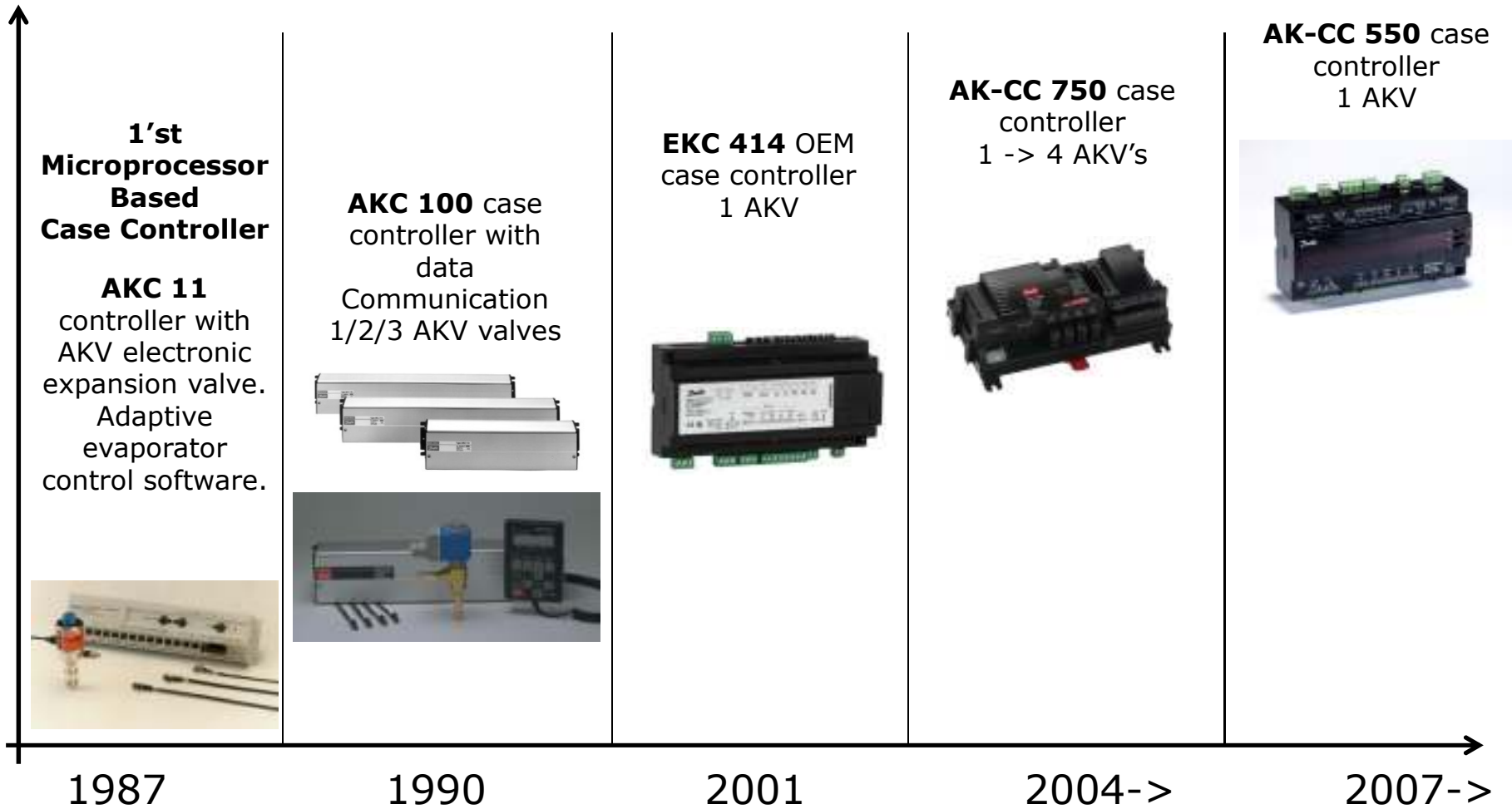
High End Case Controls

AK-CC 450 / 5XX / 7xx

AK-CT200, AKV

ADAP-KOOL® Case Controls History

Generation



ENGINEERING
TOMORROW

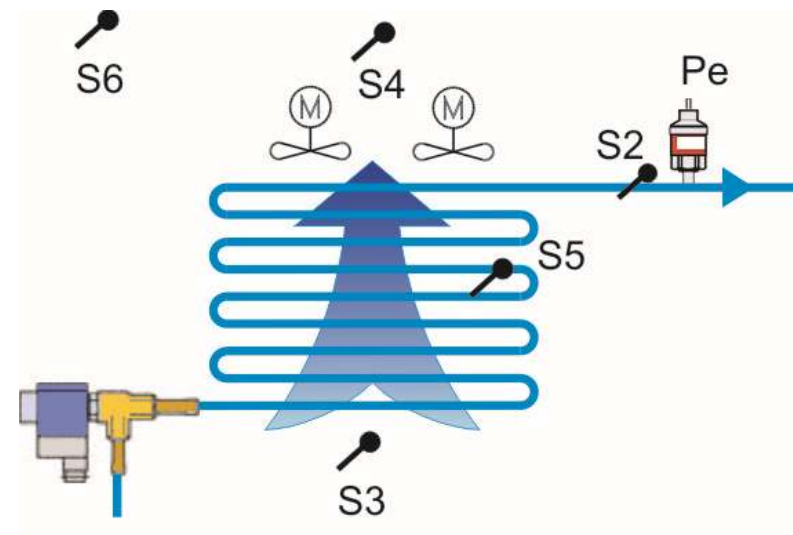
Danfoss

AK-CC 550 Case Controller



AK-CC 550 – Case controller

- ✓ Energy optimization
- ✓ Adaptive Super Heat control
- ✓ Adaptation to many applications
- ✓ Integrated display
- ✓ Dedicated HACCP sensor
- ✓ Quick setup via pre sets
- ✓ Integrated communication



AK-CC 550 – Case controller

Benefits – Energy optimisation

Adaptive superheat via AKV valve

- ✓ Optimum utilisation of evaporator at all load conditions => Pre condition for major energy savings via optimised suction pressure and floating condensing pressure control

Adaptive defrost

- ✓ Intelligent defrost based on performance monitoring of evaporator

Dew point pulsing of rail heat

- ✓ Pulsing of rail heat according to actual load condition

Pulsing of fans

- ✓ Pulsing of fans at thermostat cut out



AK-CC 550 – Case control

Benefits – Food quality / HACCP compliance

Modulating temperature control

- ✓ Accurate temperature control

Measuring accuracy

- ✓ Factory calibration guarantees a better measuring accuracy than $\pm 1^\circ \text{K}$ ($-30^\circ \rightarrow +15^\circ \text{C}$) no subsequent calibration on site (AKS Pt 1000 ohms sensor)

Product temperature

- ✓ Separate product temperature independent of control function for compliance

Case cleaning

- ✓ Case cleaning function for documentation of case cleanings carried out according to HACCP procedures



AK-CC 550 – Case controller

Benefits – Service and commissioning

Easy handling and operation

- ✓ Integrated display
- ✓ Simple menu operation

Versatile controller

- ✓ One controller covering many applications
- ✓ One or two remote displays
- ✓ Flexible System integration (MOD-bus, LON, IP)

Fast and easy commissioning

- ✓ Pre set setup for fast start up
- ✓ Only 5 settings required
- ✓ Copy key for fast and reliable copying



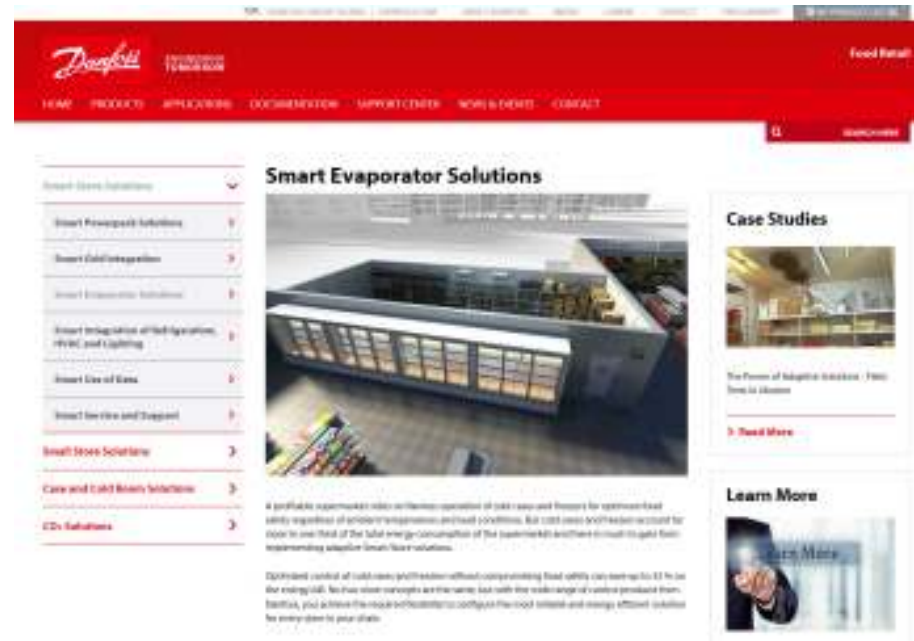
Additional information

Overview Brochure



➤ [11 Languages](#)

Danfoss.com



[Link to Site](#)