

ENGINEERING
TOMORROW



ADAP-KOOL® Selection Guide

Optimize your HVAC/R application
with the **right** Danfoss **components**

**One-
Stop-Shop**

for flexible control
solutions

Engineering Tomorrow's Food Retail Solutions



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Temperature Control in stand-alone cabinets with ERC 21X Temperature Controller

Multipurpose refrigeration control. Temperature and defrost management for commercial refrigeration applications

Key Benefits

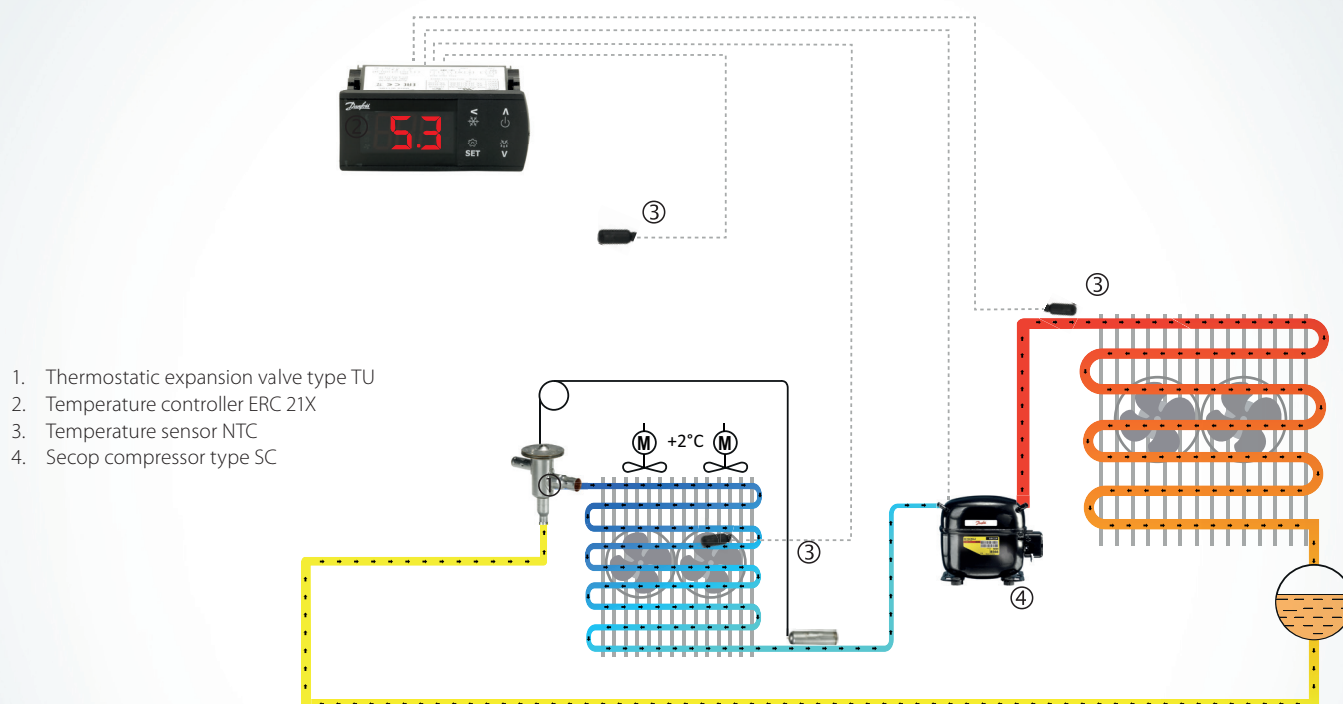
- Ease of use with four pushbuttons and pre-installed application set-ups
- Simple installation with direct connection of heavy loads
- Energy efficient control
- Safe and reliable operation

Functions

- 1, 3 or 4 Relay versions
- 120 or 240 V versions
- Sensor inputs:
 - NTC5000 Ohm at 25°C
 - NTC 10000 Ohm at 25°C
 - PTC 1000 Ohm at 25°C
 - PT 1000 Ohm at 25°C
- Protection: Front IP65

Energy Saving Features

- Defrost on demand
- Day/Night mode
- Smart evaporator fan management



Pcs	Description	Code Number
1	Temperature Controller	
	ERC 211, 120 V, 1 relay	080G3290 (080G3262*)
	ERC 211, 240 V, 1 relay	080G3293 (080G3263*)
	ERC 213, 120 V, 3 relay	080G3291 (080G3264**)
	ERC 213, 240 V, 3 relay	080G3294 (080G3265**)
	ERC 214, 120 V, 4 relay	080G3292
	ERC 214, 240 V, 4 relay	080G3295
1 or 2	EKS 211 NTC Sensor 5k Ohm 1.5 mt	084N1220
1 or 2	EKS 221 NTC Sensor 10K Ohm 3.5 mt	084N3210
1	Thermostatic Expansion Valve, TU	Quick Selection Catalogue Chapter 1
1	SECOP Compressor type SC	Quick Selection Catalogue Chapter 18

*) Kit versions including 1 NTC Sensor

**) Kit versions including 2 NTC Sensors

Superheat Control in Refrigeration Plants with **EKC 315A with AKV**

Superheat control in cold stores, processing plants or A/C plants with PWM Valve

Key Benefits

- The evaporator is charged optimally – even when there are great variations of load and suction pressure
- Exact temperature control – the combination of adaptive evaporator and temperature control ensures great temperature accuracy for the media
- The superheating is regulated to the lowest possible value at the same time as the average temperature is controlled by the thermostat function

Functions

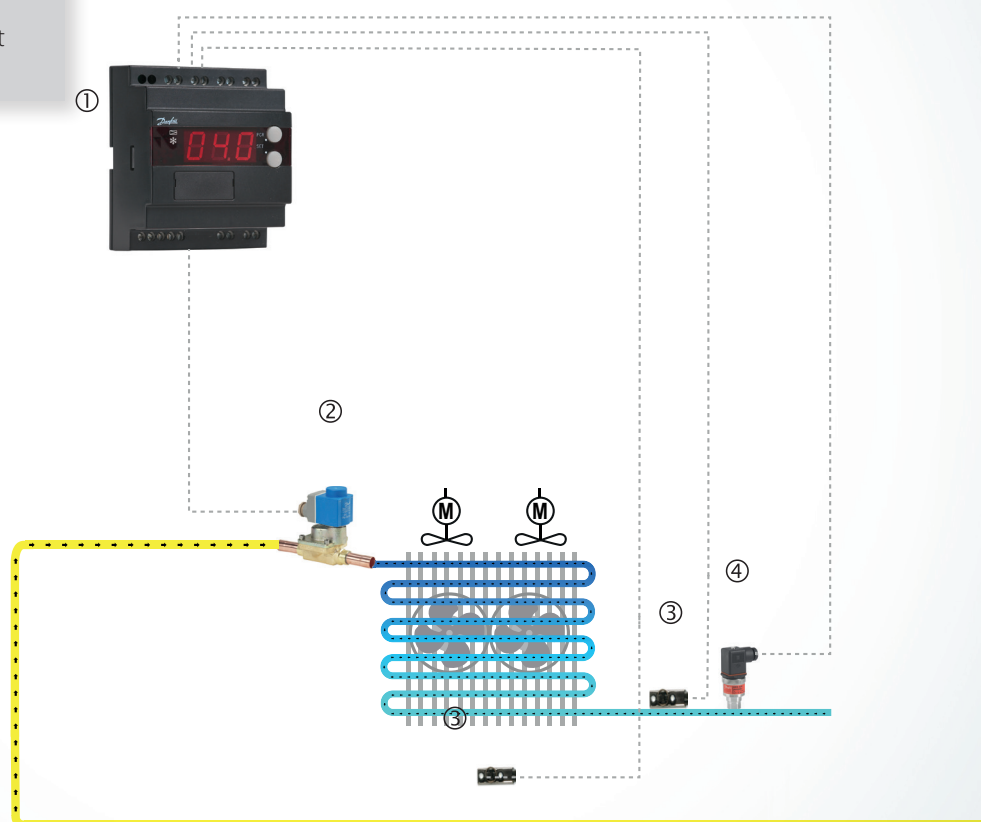
- Regulation of superheat
- Temperature control
- MOP function
- ON/OFF input for start/stop of regulation
- Input signal that can displace the superheat reference or the temperature reference
- Alarm if the set alarm limits are exceeded
- Relay output for solenoid valve

- PID regulation
- Output signal following the temperature showing in the display

Energy Saving Features

- The adaptive regulation of the refrigerant injection ensures optimum utilization of the evaporator and hence a high suction pressure

1. Superheat controller EKC 315A
2. Electric expansion valve AKV
3. Temperature sensor AKS 11
4. Pressure transmitter AKS 33



Pcs	Description	Code Number
1	Superheat controller, EKC 315A	084B7086
1	Data communication module RS485, EKA 174	084B7124
1	Pressure transmitter, AKS 33 (1/4" flare -1 to 12 bar)	060G2049
2	Temperature sensor, AKS 11 (5.5 m cable, -50 to 100°C)	084N0005
1	Electric Expansion Valve, AKV	Quick Selection Catalogue Chapter 2

Superheat Control in Refrigeration Plants with EKC 316A and ETS

Superheat control in Cold stores, processing plants or A/C plants with Stepper Valve

Key Benefits

- The evaporator is charged optimally – even when there are great variations of load and suction pressure.
- Energy savings
- The superheating is regulated to the lowest possible value at the same time as the media temperature is controlled by the thermostat function.

Functions

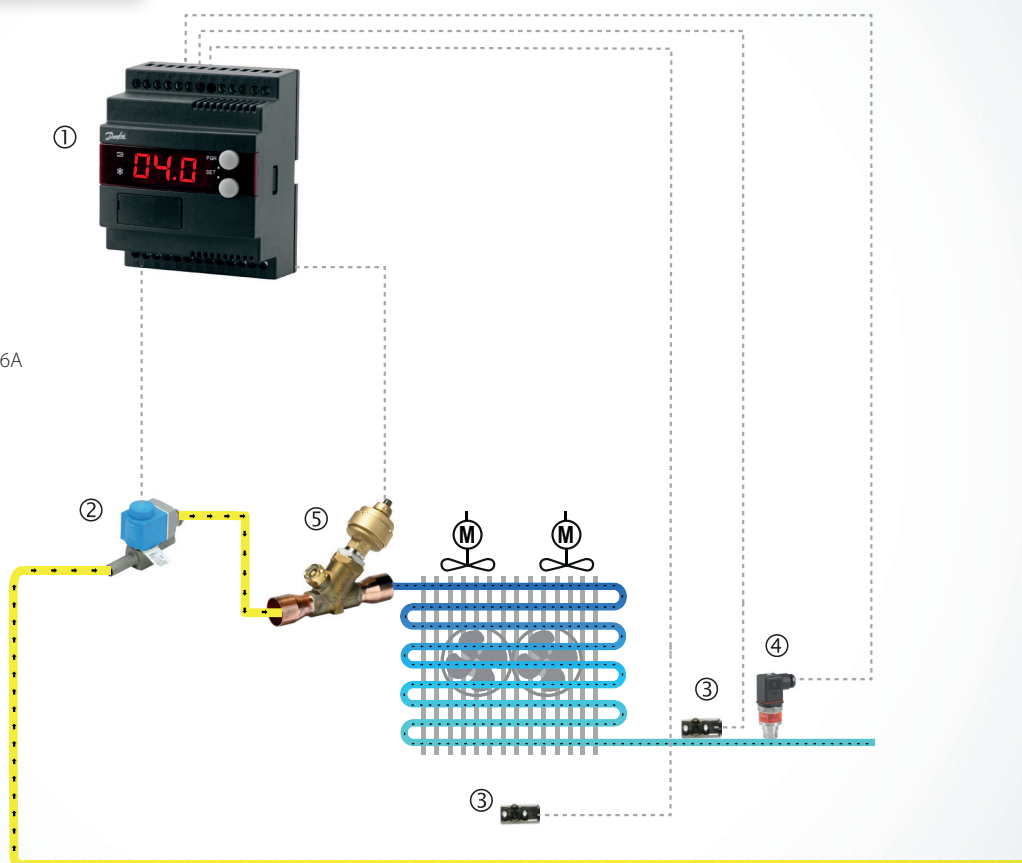
- Regulation of superheat
- Temperature control
- MOP function
- ON/OFF input for start/stop of regulation
- Input signal that can displace the superheat reference or the temperature reference
- Alarm if the set alarm limits are exceeded

- Relay output for solenoid valve
- PID regulation

Energy Saving Features

- The adaptive regulation of the refrigerant injection ensures optimum utilization of the evaporator and hence a high suction pressure

1. Evaporator controller EKC 316A
2. Solenoid valve EVR
3. Temperature sensor AKS 11
4. Pressure transmitter AKS 33
5. Stepper valve ETS



Pcs	Description	Code Number
1	Superheat Controller, EKC 316A	084B7088
1	EKA 174 data communication module RS485	084B7124
1	Pressure transmitter, AKS 33 (1/4" flare -1 to 12 bar)	060G2049
2	Temperature sensor, AKS 11 (5.5 m cable, -50 to 100°C)	084N0005
1	Solenoid Valve, EVR	Quick Selection Catalogue Chapter 3
1	Stepper Valve, ETS	Quick Selection Catalogue Chapter 2

Basic Evaporator Control with TXV with Case Controller AK-CC 210

Basic evaporator control for display cases with thermostatic expansion valve (TXV)

Key Benefits

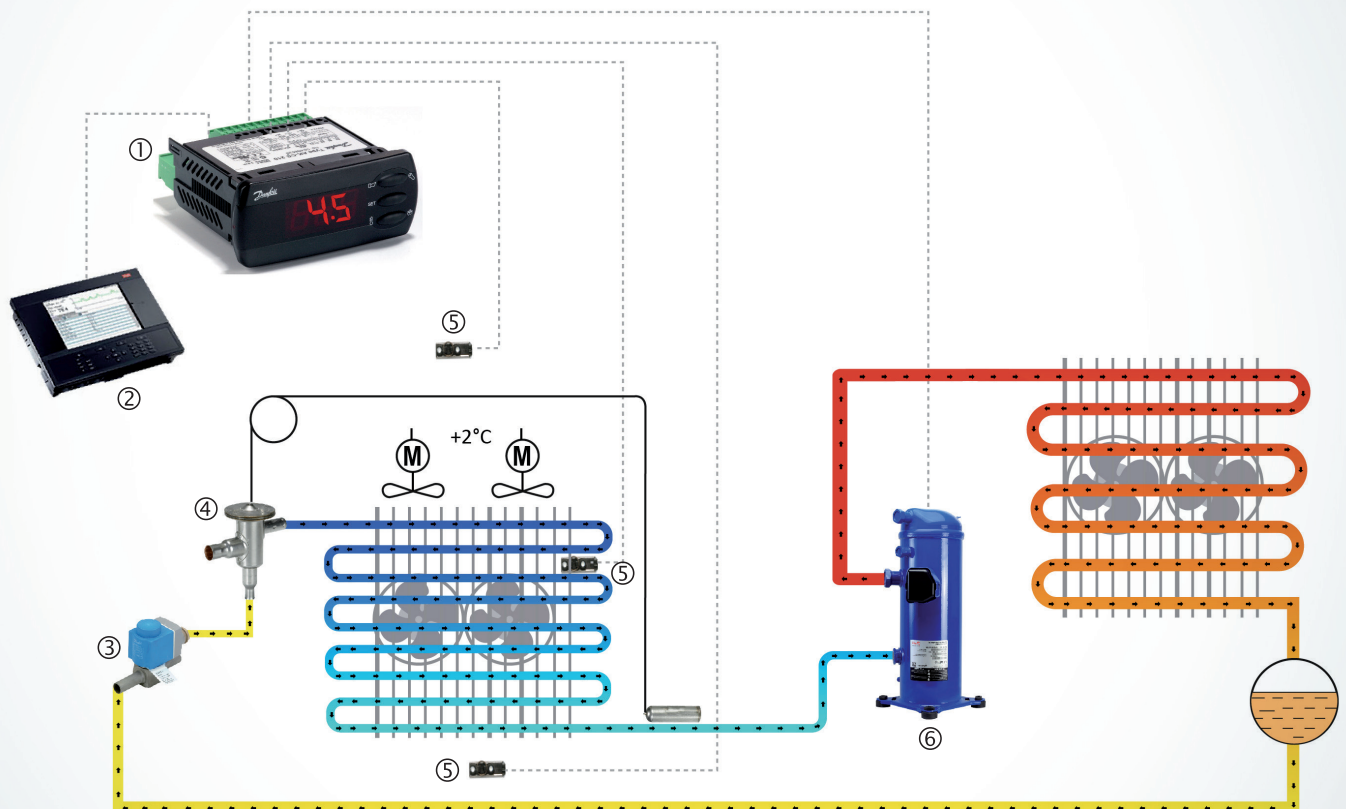
- Easy set-up with application macros
- HACCP compliant temperature measurement accuracy
- Optional LON or Modbus data communication for integration to ADAP-KOOL® system
- Control of 2 compressors
- Robust and proven design

Functions

- Multi purpose Digital inputs
- Light control
- Case cleaning function
- Door contact function
- Electrical, natural or hot gas defrost
- Anti-cycle timer for optimum protection of compressor
- Direct connection of compressors

Energy Saving Features

- Day and Night functions
- Defrost on demand
- Door function
- ADAP-KOOL® connection



1. Case controller AK-CC 210
2. System manager AK-SM 800
3. Solenoid valve EVR
4. Thermostatic expansion valve type TU
5. Temperature sensor AKS 11
6. Scroll compressor

Pcs	Description	Code Number
1	Case Controller, AK-CC 210	084B8520
1	Data communication module MODBUS	084B8564
2	Temperature sensor, AKS 11 (5.5 m cable, -50 to 100°C)	084N0005
1	Thermostatic Expansion Valve, TU	Quick Selection Catalogue Chapter 1
1	Solenoid Valve, EVR	Quick Selection Catalogue Chapter 3
	Scroll Compressor	Quick Selection Catalogue Chapter 18

Basic Room Control with Optyma Controller **AK-RC 101/103**

Basic evaporator control for cold rooms with thermostatic expansion valve (TXV) and condensing unit

Key Benefits

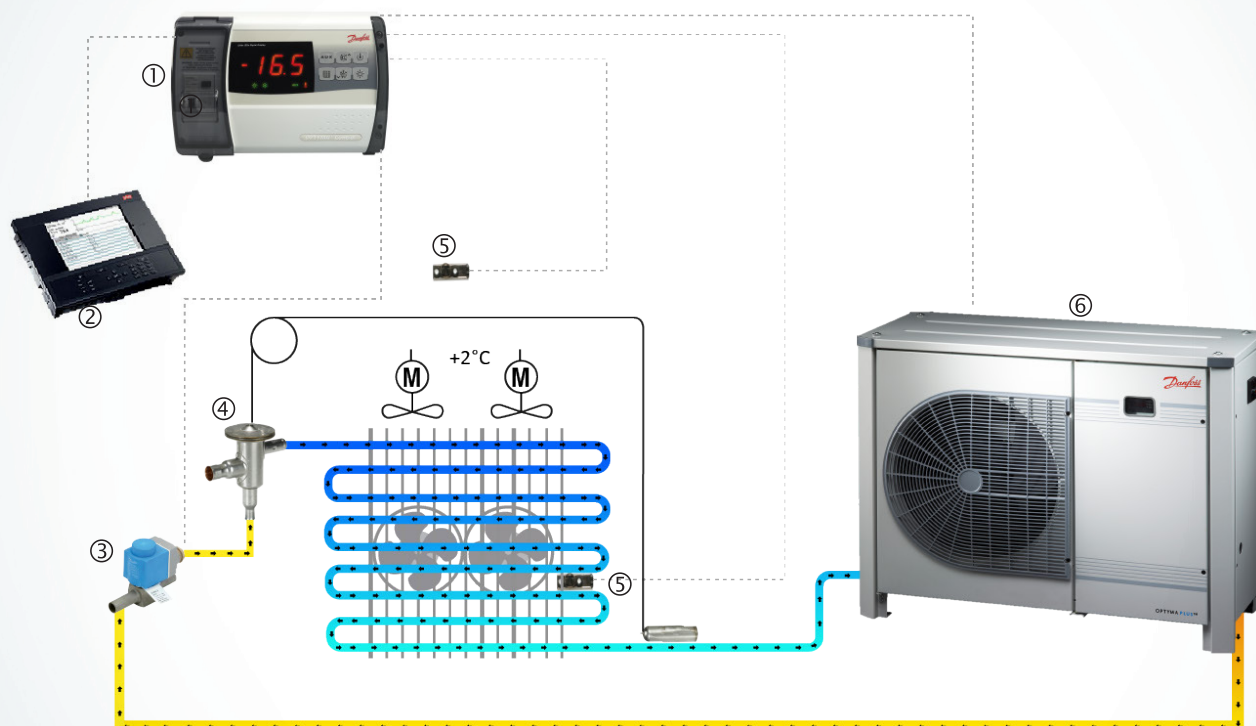
- Complete cold room control solution with built in protection and circuit breaker
- Single and Three phase
- Simple wiring
- ADAP-KOOL® integration via Modbus
- Protected housing – IP65

Functions

- LED icons to signal plant status
- Electronic control with wide LED display and easy to use buttons
- Display and adjustment of cold room temperature accurate to 0.1 deg. C
- Display of evaporator temperature from parameter
- Alarm signalling: sensor errors, min. and max. temperature alarm, compressor protection.

Energy Saving Features

- Evaporator fan control
- Automatic and manual defrost control
- Room light activation



1. Optyma control - AK-RC 101/103
2. System manager AK-SM 800
3. Solenoid valve EVR
4. Thermostatic expansion valve TU
5. Temperature sensor NTC
6. Condensing unit - Optyma plus

Pcs	Description	Code Number
1	Optyma controller (incl. 2 pcs. EKS 221 temperature sensors)	
	AK-RC 101, single phase	080Z3200
	AK-RC 103, Three phase – (3 kW) 4.5-6.3A	080Z3201
	AK-RC 103, Three phase – (3 kW) 7-10A	080Z3202
	AK-RC 103, Three phase – (5 kW) 11-16A	080Z3206
	AK-RC 103, Three phase – (5 kW) 14-20A	080Z3207
2	EKS 221 NTC Sensor 10K Ohm 3.5 mt	084N3210
1	Optyma Plus New Generation	Quick Selection Catalogue Chapter 19
1	Thermostatic Expansion Valve, TU	Quick Selection Catalogue Chapter 1
1	Solenoid Valve, EVR	Quick Selection Catalogue Chapter 3

High-end **EEV case control** with case controller **AK-CC 550A and AKV**

Energy optimized evaporator control with electronic expansion valve (AKV)

Key Benefits

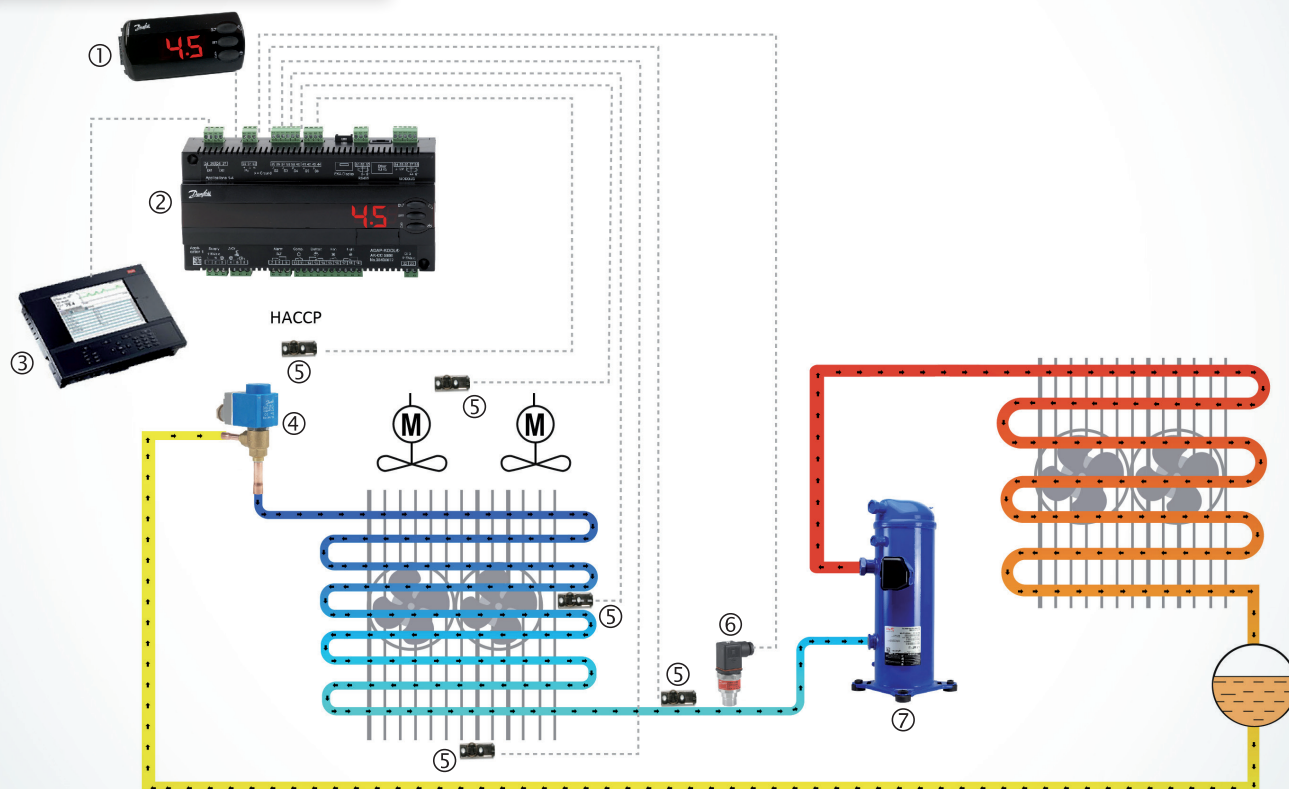
- Proven and robust control solution
- Easy set-up with application macros and no further adjustment of vales or superheat
- Adaptive superheat control for premium energy efficiency
- AKV valve with normally closed functionality avoids refrigerants floating back to compressor at power outage
- Operates with HFC and CO₂

Functions

- ON/OFF or modulating control
- Product sensor "S6" with separate alarm limits
- Build-in Modbus, Opt. LON
- Sensor Inputs 6xPT1000 and 1xPressure transmitter (AKS32R)
- Supply voltage 230 V

Energy Saving Features

- ADAP-KOOL Integration
- Adaptive superheat – Optimum utilization at all load conditions.
- Adaptive Defrost
- Rail heat optimization
- Day and night functions (case temperature, blinds and lights)
- Hot gas defrost
- Typical 8-12% energy savings compared to TXV or other EEV solutions with fixed superheat.



1. Temperature display EKA 163B
2. Case controller AK-CC 550A
3. System manager AK-SM 800
4. Electric expansion valve AKV
5. Temperature sensor AKS 11
6. Pressure transmitter AKS 32R
7. Scroll compressor

Pcs	Description	Code Number
1	Case controller with MODBUS Data Communication, AK-CC 550A	084B8030
5	Temperature sensor, AKS 11 (5.5 m cable, -50 to 100°C)	084N0005
1	Pressure transmitter, AKS 32R (1/4" flare -1 to 12 bar)	060G1036
1	Electric Expansion Valve, AKV	Quick Selection Catalogue Chapter 2
1	Data Communicatio Modules and display	Quick Selection Catalogue Chapter 16

Small **HFC** pack control with **Pack Controller** **AK-PC 351**

Capacity regulation of compressors and condensers in small size refrigeration applications

Key Benefits

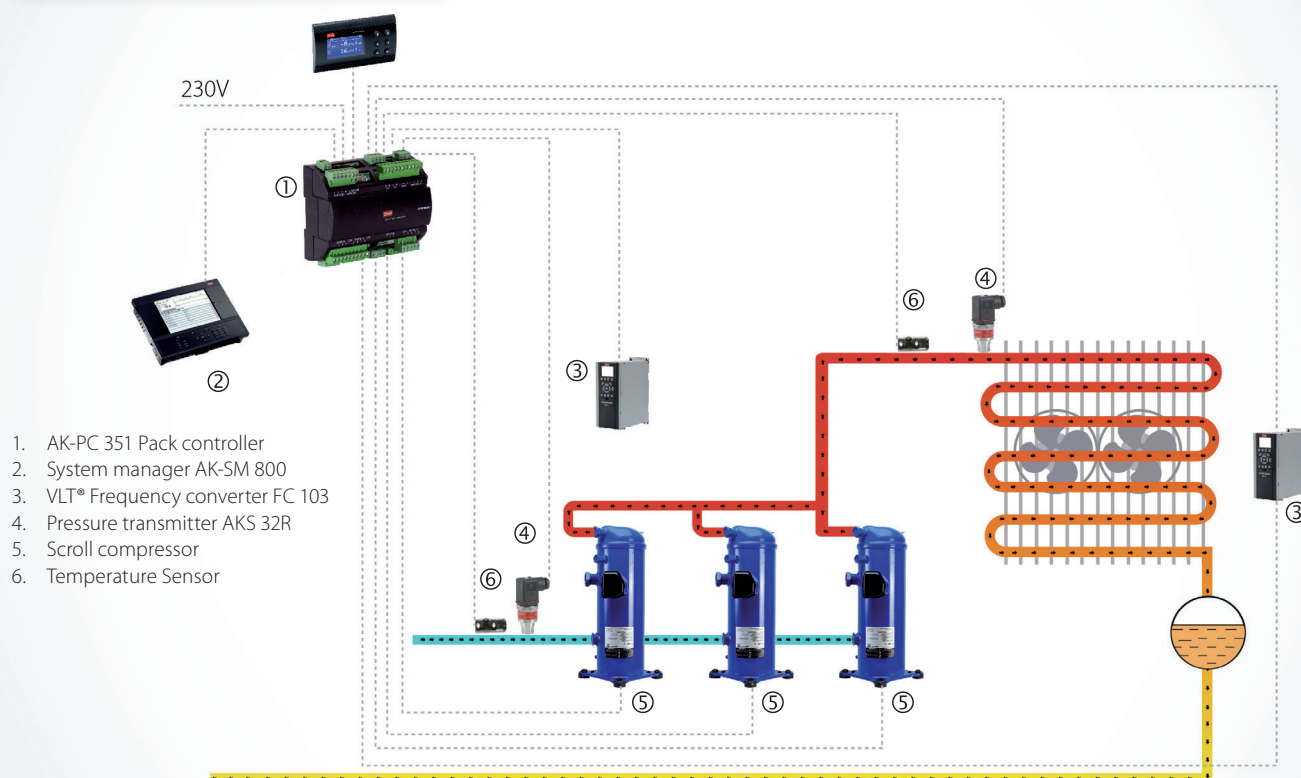
- Covers most commonly used HFC pack applications for commercial refrigeration
- Fast and Easy wizard setup
- Robust control with optimised control algorithms and factory default
- Energy saving features to reduce operating costs
- Graphical, easy to use interface

Functions

- 1 suction group
- Up to 4 compressors and 4 condenser fans (Maximum 6 in total)
- Variable speed on lead compressor
- Variable speed on condenser fans
- Built in display
- Modbus connection to AK-SM 800 or AK-SC 355

Energy Saving Features

- ADAP-KOOL Integration
- Suction Pressure Optimization
- Night Setback
- Floating condenser control



1. AK-PC 351 Pack controller
2. System manager AK-SM 800
3. VLT® Frequency converter FC 103
4. Pressure transmitter AKS 32R
5. Scroll compressor
6. Temperature Sensor

Pcs	Description	Code Number
1	Pack Controller AK-PC 351 (24 V)	080G0289
1	Pressure transmitter AKS 32R for suction (1/4" flare -1 to 12 bar)	060G1036
1	Pressure transmitter AKS 32R for discharge (1/4" flare -1 to 34 bar)	060G0090
2	Plug with 5 m. cable	060G1034
1	Temperature sensor AKS 11 for suction (5.5 m cable, -50 to 100°C)	084N0005
1	Temperature sensor AKS 21A for discharge (5 m cable, -70 to 180°C)	084N0008
	Speed drive FC-103 for lead compressor and condenser	consult FC-103 configuration tool (drives.danfoss.com)
	Scroll Compressor	Quick Selection Catalogue Chapter 18

Mid-range **HFC pack control** with **Pack Controller AK-PC 551** – one suction

Capacity regulation of compressors and condensers in medium size refrigeration applications

Key Benefits

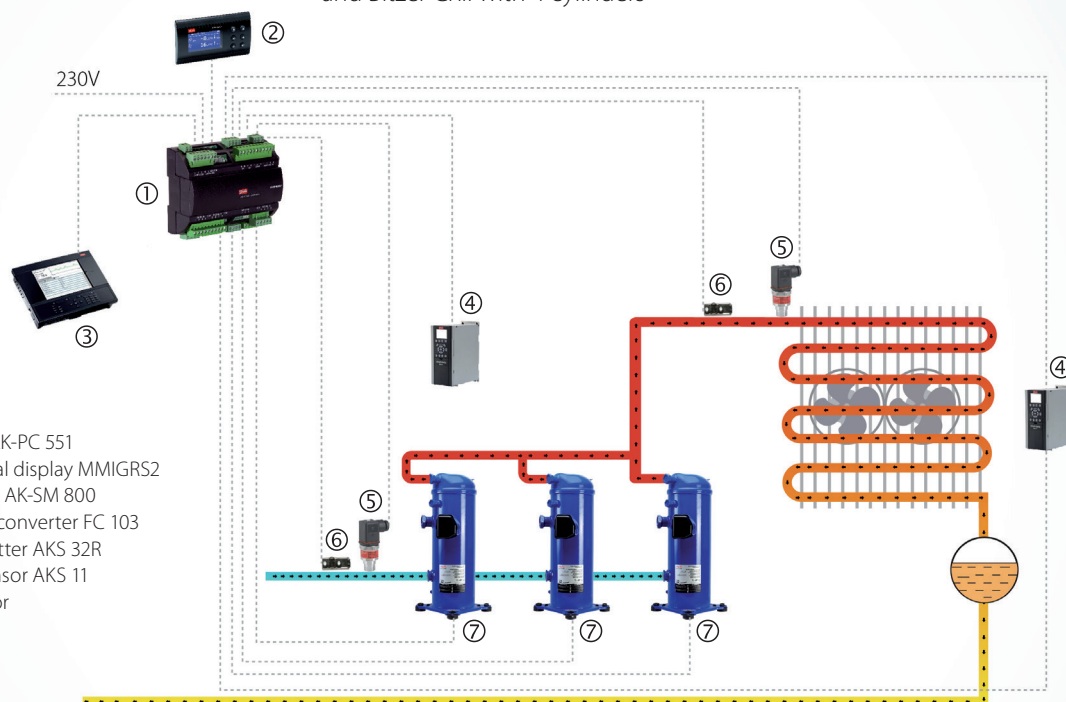
- Covers most commonly used HFC pack applications for commercial refrigeration
- Fast and Easy wizard setup
- Robust control with optimised control algorithms and factory default
- Energy saving features to reduce operating costs
- Graphical, easy to use interface

Functions

- 1 suction and 1 condenser group
- Up to 8 compressors and 8 condensers (Maximum 8 in total)
- PI control with Neutral Zone settings
- 8 DO, 8 DI, 8 AI and 2 AO
- Variable speed on lead compressor
- Variable speed on condenser fans
- Built in display and remote display
- Can control Copeland Digital Scroll, Copeland Stream with 4 cylinders and Bitzer CR11 with 4 cylinders

Energy Saving Features

- ADAP-KOOL Integration
- Suction Pressure Optimization
- Night Setback
- Load shedding
- Floating condenser control
- Heat recovery set point via DI
- Night silence function



1. Pack controller AK-PC 551
2. Remote graphical display MMIGRS2
3. System Manager AK-SM 800
4. VLT® Frequency converter FC 103
5. Pressure transmitter AKS 32R
6. Temperature sensor AKS 11
7. Scroll compressor

Pcs	Description	Code Number
1	Pack Controller AK-PC 551 with built-in display	080G0281 (230 V) or 080G0283 (24 V)
1	Remote Display MMIGRS2	080G0294
1	Wire for Display	080G0075 (1.5 m) or 080G0076 (3 m)
1	Pressure transmitter AKS 32R for suction (1/4" flare -1 to 12 bar)	060G1036
1	Pressure transmitter AKS 32R for discharge (1/4" flare -1 to 34 bar)	060G0090
2	Plug with 5 m. cable	060G1034
1	Temperature sensor AKS 11 for suction (5.5 m cable, -50 to 100°C)	084N0005
1	Temperature sensor AKS 21A for discharge (5 m cable, -70 to 180°C)	084N0008
	Variable Speed drive FC-103 for lead compressor and condenser	Consult FC-103 configuration tool (drives.danfoss.com)
	Scroll Compressor	Quick Selection Catalogue Chapter 18

Mid-range **HFC pack control** with **Pack Controller AK-PC 551** – two suctions

Capacity regulation of compressors and condensers in medium size refrigeration applications

Key Benefits

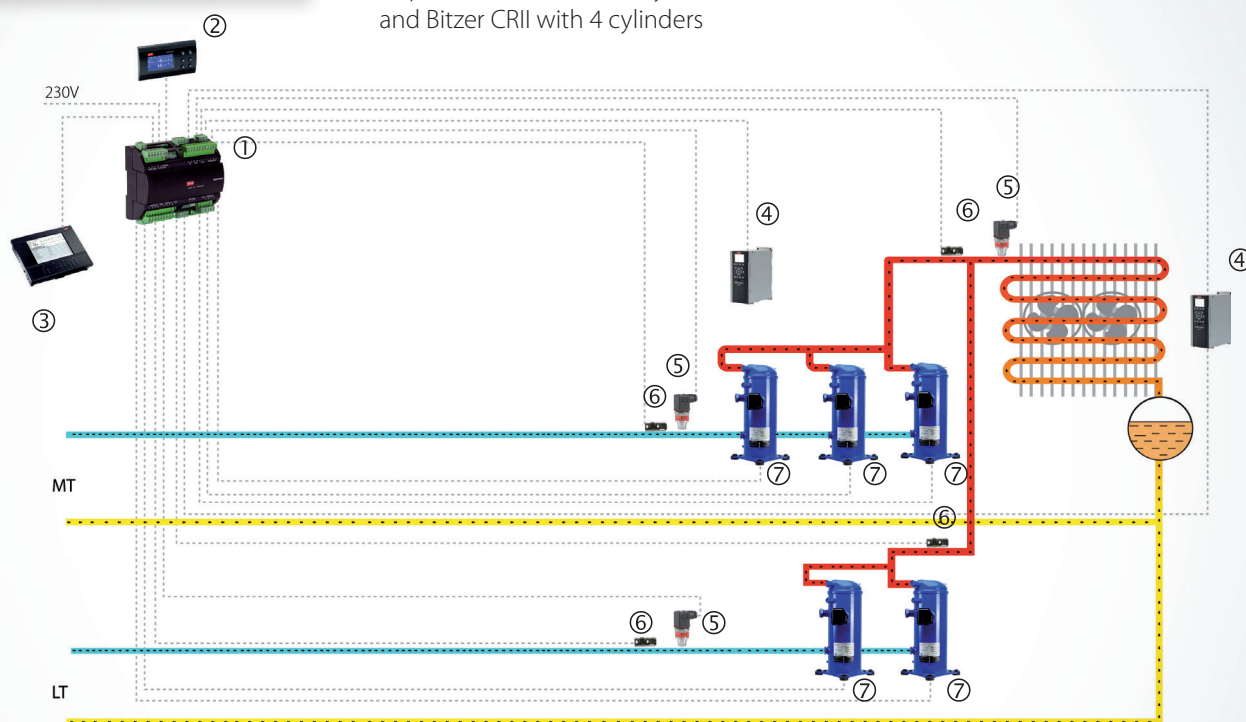
- Covers most commonly used HFC pack applications for commercial refrigeration
- Fast and Easy wizard setup
- Robust control with optimised control algorithms and factory default
- Energy saving features to reduce operating costs
- Graphical, easy to use interface

Functions

- 1 suction and 1 condenser group
- Up to 8 compressors and 8 condensers (Maximum 8 in total)
- PI control with Neutral Zone settings
- 8 DO, 8 DI, 8 AI and 2 AO
- Variable speed on lead compressor
- Variable speed on condenser fans
- Built in display and remote display
- Can control Copeland Digital Scroll, Copeland Stream with 4 cylinders and Bitzer CRII with 4 cylinders

Energy Saving Features

- ADAP-KOOL Integration
- Suction Pressure Optimization
- Night Setback
- Load shedding
- Floating condenser control
- Heat recovery set point via DI
- Night silence function



1. Pack controller AK-PC 551
2. Remote graphical display MMIGRS2
3. System Manager AK-SM 800
4. VLT® Frequency converter FC 103
5. Pressure transmitter AKS 32R
6. Temperature sensor AKS 11
7. Scroll compressor

Pcs	Description	Code Number
1	Pack Controller AK-PC 551 with built-in display	080G0281 (230 V) or 080G0283 (24 V)
1	Remote Display MMIGRS2	080G0294
1	Wire for Display	080G0075 (1.5 m) or 080G0076 (3 m)
2	Pressure transmitter AKS 32R for suction (1/4" flare -1 to 12 bar)	060G1036
1	Pressure transmitter AKS 32R for discharge (1/4" flare -1 to 34 bar)	060G0090
3	Plug with 5 m. cable	060G1034
1	Temperature sensor AKS 11 for suction (5.5 m cable, -50 to 100°C)	084N0005
1	Temperature sensor AKS 21A for discharge (5 m cable, -70 to 180°C)	084N0008
	Variable Speed drive FC-103 for lead compressor and condenser	Consult FC-103 configuration tool (drives.danfoss.com)
	Scroll Compressor	Quick Selection Catalogue Chapter 18

System Management for small stores with **System Manager AK-SM 820**

Controlling and monitoring of refrigeration, HVAC, light and misc. Applications

Key Benefits

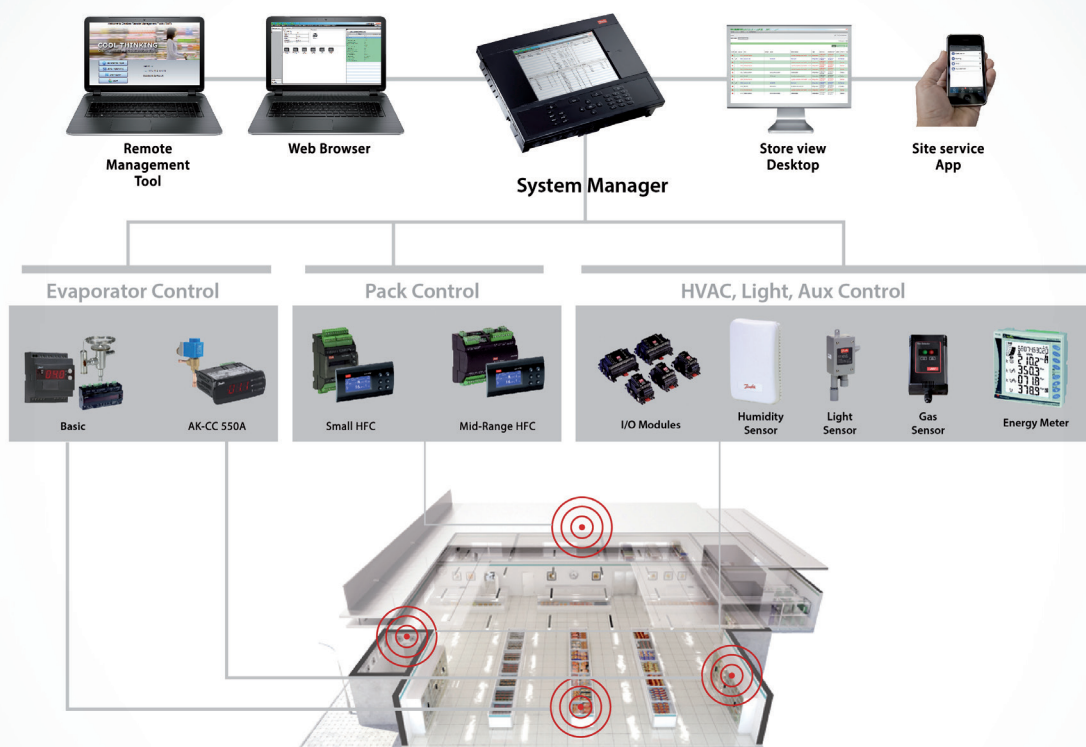
- Control and monitor all key applications
- Access the system via local screen/keypad, via web browser or tablet/smartphone
- Customized screens for fast diagnostics
- Set-up wizards

Functions

- Up to 32 generic device support
- Wall or panel mounting
- RS485 LON
- Ethernet
- Modbus
- USB
- Connects to all Danfoss ADAP-KOOL controllers

Energy Saving Features

- Suction pressure optimization
- Master control functions
- Control of refrigeration, Light, HVAC and misc. points via decentral controllers or directly from front-end (schedules, override, simple logic)



Description	Code Number
System Manager AK-SM 820	080Z4004
Evaporator Controllers	Quick Selection Catalogue Chapter 16
Compressor Controllers	Quick Selection Catalogue Chapter 16
HVAC, Light, Misc. Control and Sensors:	
I/O modules	(Contact Danfoss)
Moisture and Temperature Sensor	080Z2171
Indoor Light Sensor	080Z2177
Outdoor Light and Temperature Sensor	080Z2172
Gas Detection	Quick Selection Catalogue Chapter 17
Energy Meters, WattNode Modbus	080Z2146