

ENGINEERING
TOMORROW



ADAP-KOOL® Selection Guide

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

**One-
Stop-Shop**
for flexible control
solutions

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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

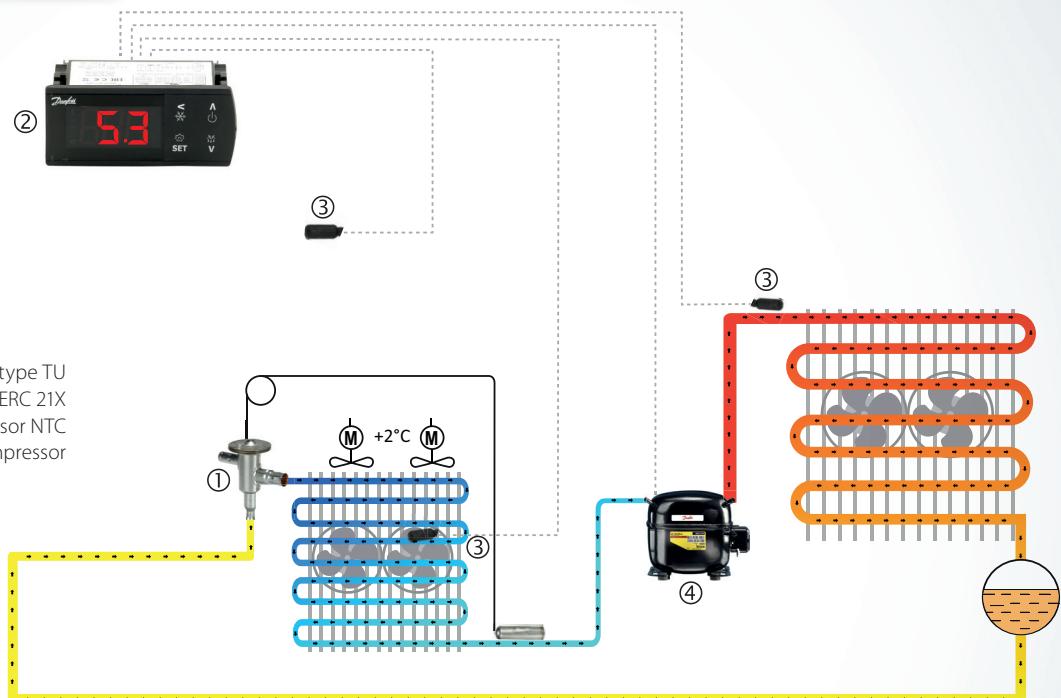
Functions

- 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

1. Thermostatic expansion valve type TU
2. Temperature controller ERC 21X
3. Temperature sensor NTC
4. Compressor



Pcs	Description	Code Number
1	Temperature Controller ERC 211, 240 V, 1 relay	080G3293 (080G3263*)
	ERC 213, 240 V, 3 relay	080G3294 (080G3265**)
	ERC 214, 240 V, 4 relay	080G3295
1 or 2	EKS 221 NTC Sensor 10K Ohm 3.5 mt	084N3210

*) Kit versions including 1 NTC Sensor

**) Kit versions including 2 NTC Sensors

Superheat Control in Refrigeration Plants **EKC 315A WITH AKV/AKVP**

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

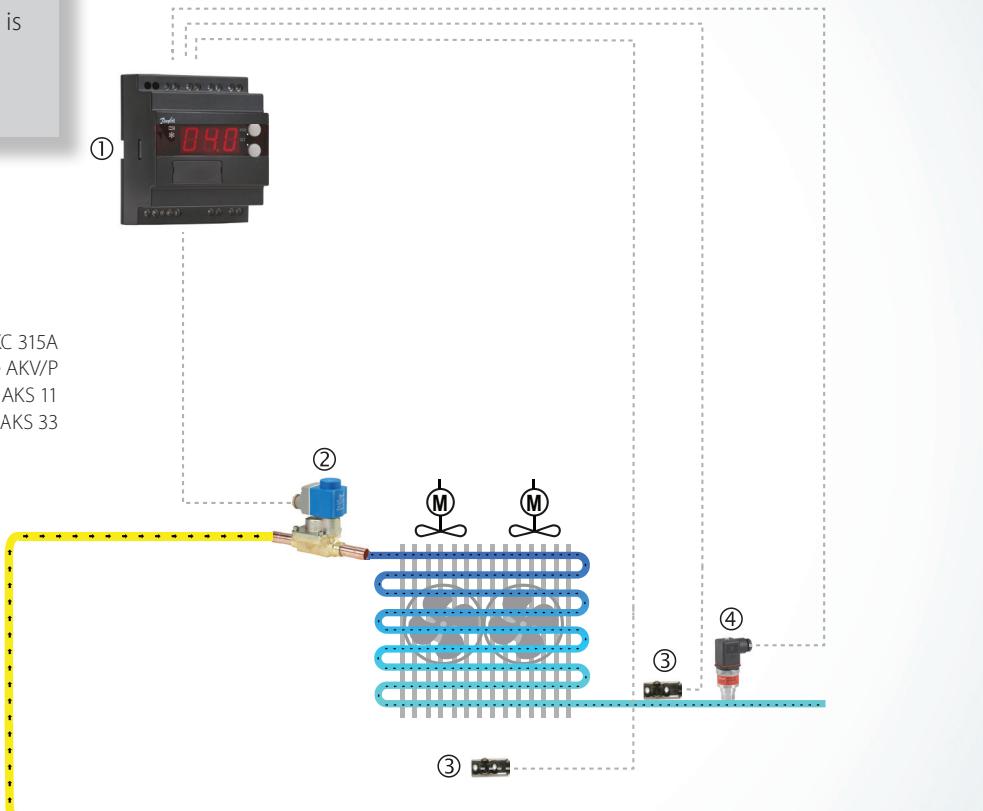
- Regulation of superheat
- Temperature control
- MOP function
- ON/OFF input for start/stop of regulation
- Input signal that can displace the superheat reference or the temperature reference
- Alarm if the set alarm limits are exceeded

- 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/P
3. Temperature sensor AKS 11
4. Pressure transmitter AKS 33



Pcs	Description	Code Number
1	Superheat controller, EKC 315A	084B7086
1	Pressure transmitter, AKS 33 (1/4" flare -1 to 12 bar)	060G2049
2	Temperature sensor, AKS 11 (3.5 m cable, -50 to 100°C)	084N0003
1	Electric Expansion Valve, AKV	Refer Data Sheet for AKV Selection

Superheat Control in Refrigeration Plants with **LP-ETS kit 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

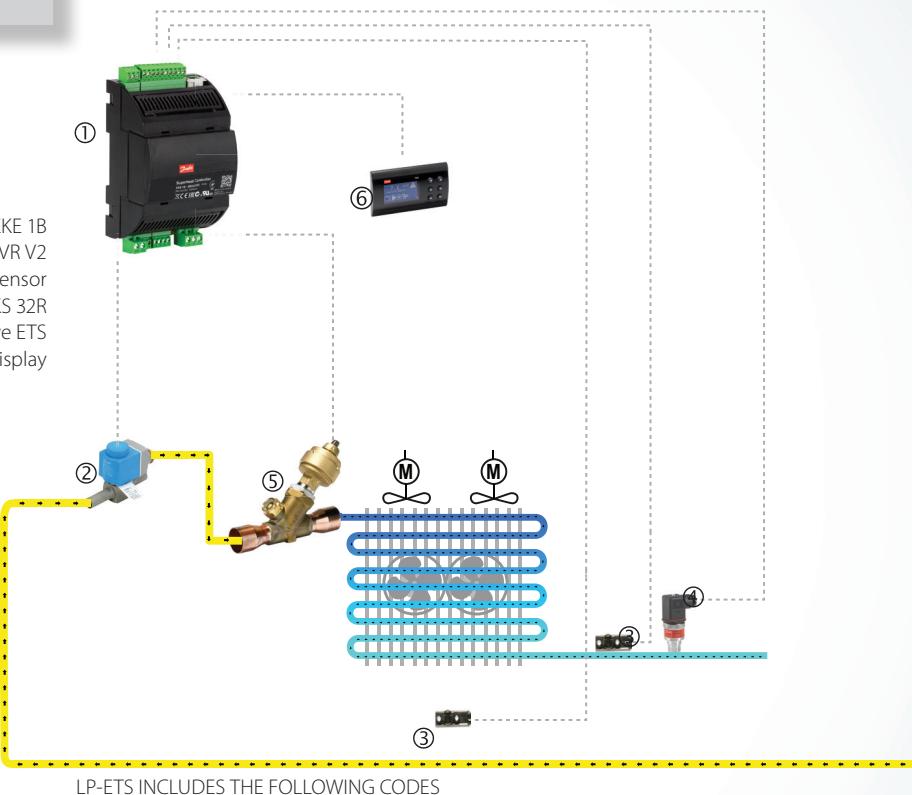
- Regulation of superheat
- Temperature control
- MOP function
- ON/OFF input for start/stop of regulation
- Input signal that can displace the superheat reference or the temperature reference

- 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

- Evaporator controller EKE 1B
- Solenoid valve EVR V2
- ACCPBT, NTC Temperature sensor
- Pressure transmitter AKS 32R
- Stepper valve ETS
- MMIGRS2 Display



Pcs	Description	Code Number
1	Superheat Controller, EKE 1B	080G5350
1	Pressure transmitter, AKS 32R (1/4" flare -1 to 12 bar)	060G0090
2	ACCPBT, NTC TEMPERATURE PROBE, IP68 6X20, 3m CABLE	080G0202
1	Din Plug	060G0008
2	120 Ohm Resistors	LP-RR0550
1	Control Panel	080G0294
1	Solenoid Valve, EVR V2	Refer to Data Sheet for selection of EVR. Not Included in the kit
1	Stepper Valve, ETS	Refer to Data Sheet of ETS. Not Included in the kit
1	ACCCBI Cable, Telephone U.I. 1.5m	080G0075

Basic Evaporator Control with TXV with Case Controller AK-CC250

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

Key Benefits

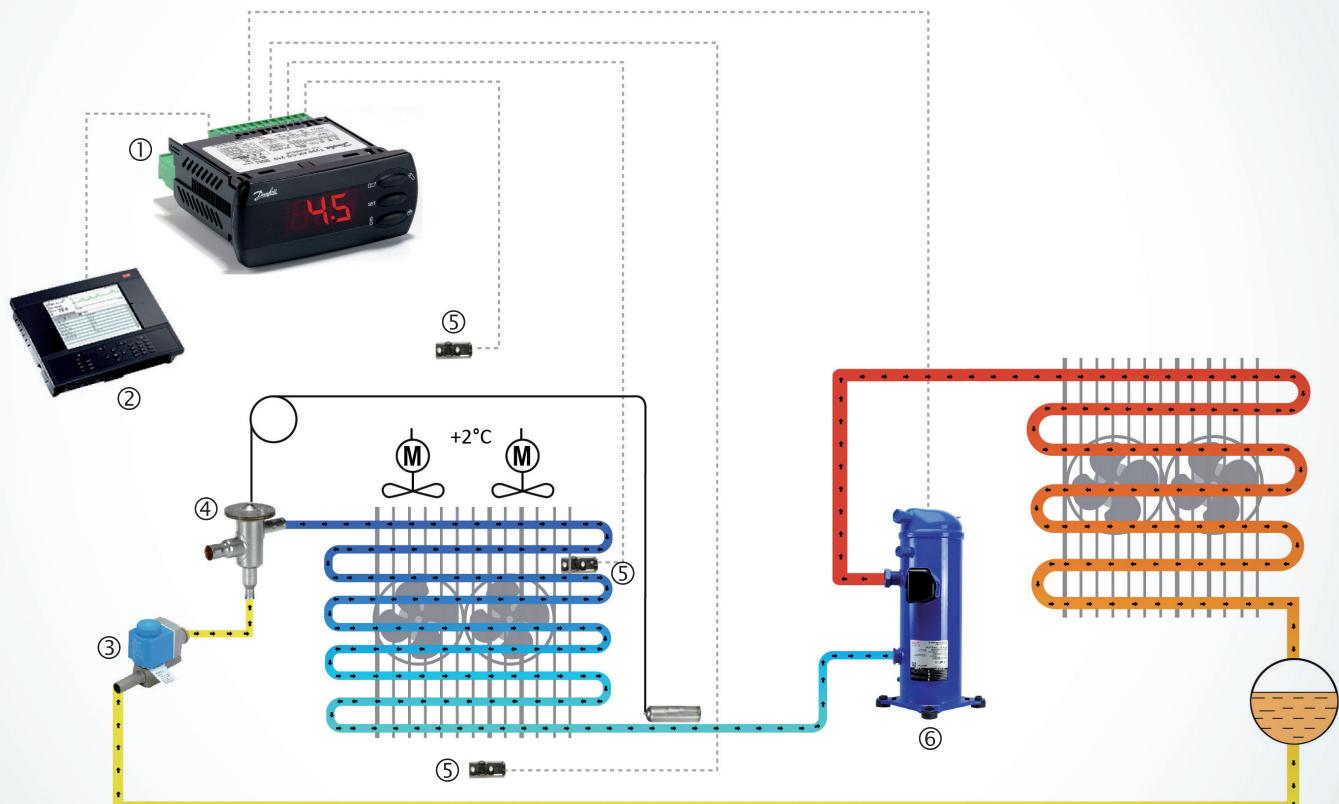
- Easy set-up with application macros
- HACCP compliant temperature measurement accuracy
- Built in Modbus data communication for integration to ADAP-KOOL® system
- Control of 2 compressors
- Robust and proven design

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 250
2. System manager AK-SM 800
3. Solenoid valve EVR V2
4. Thermostatic expansion valve type TU
5. Temperature sensor AKS 11
6. Compressor

Pcs	Description	Code Number
1	Case Controller, AK-CC 250	084B8528
2	Temperature sensor, AKS 11 (3.5 m cable, -50 to 100°C)	084N0003
1	Thermostatic Expansion Valve, TU	Refer to data sheet for selection
1	Solenoid Valve, EVR	Refer to data sheet for selection
	Scroll Compressor	Refer to compressor data sheet

Note: All components sold individually

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

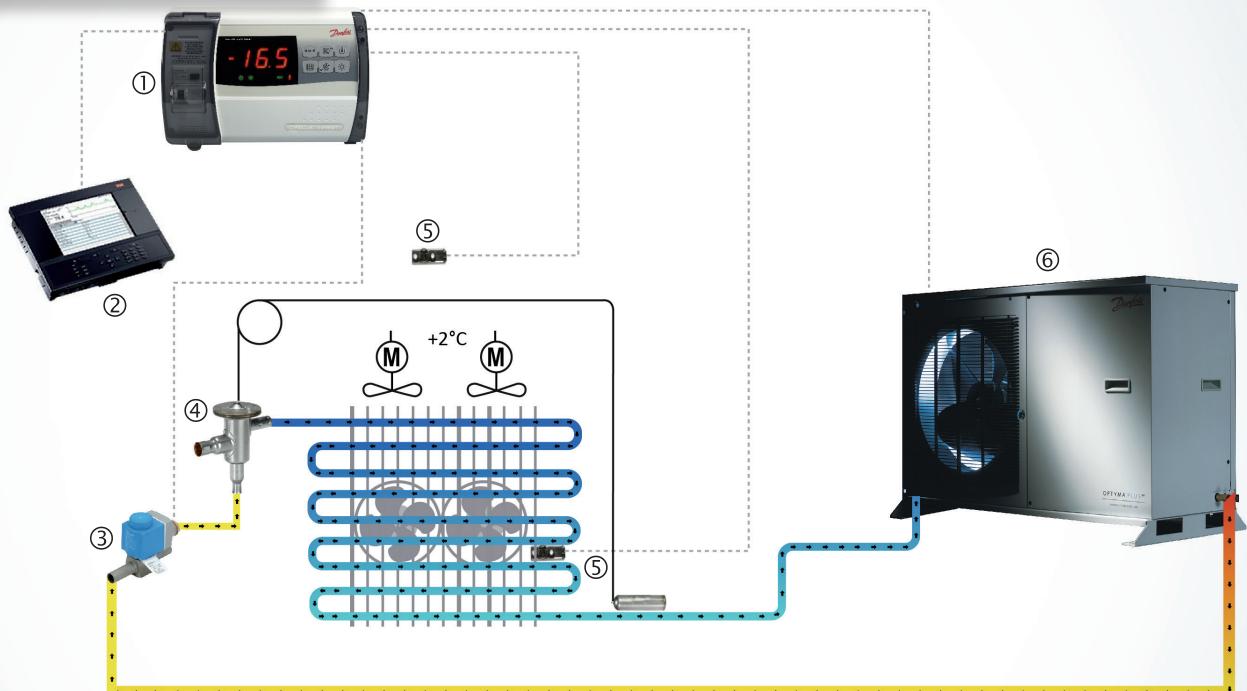
- Complete cold room control solution with built in protection and circuit breaker
- Single and Three phase
- Simple wiring
- ADAP-KOOL® integration via Modbus
- Protected housing – IP65
- Built in MODBUS®

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 V2
4. Thermostatic expansion valve TU
5. Temperature sensor AKS 11
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	Temperature sensor, AKS 11, (3.5 m cable, -50 to 100°C)	084N0003
1	Condensing Unit	
1	Thermostatic Expansion Valve, TU	Refer to data sheet for selection
1	Solenoid Valve, EVR	Refer to data sheet for selection

Note: All components sold individually

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

Energy optimized evaporator control with electronic expansion valve (AKV/AKVP)

Key Benefits

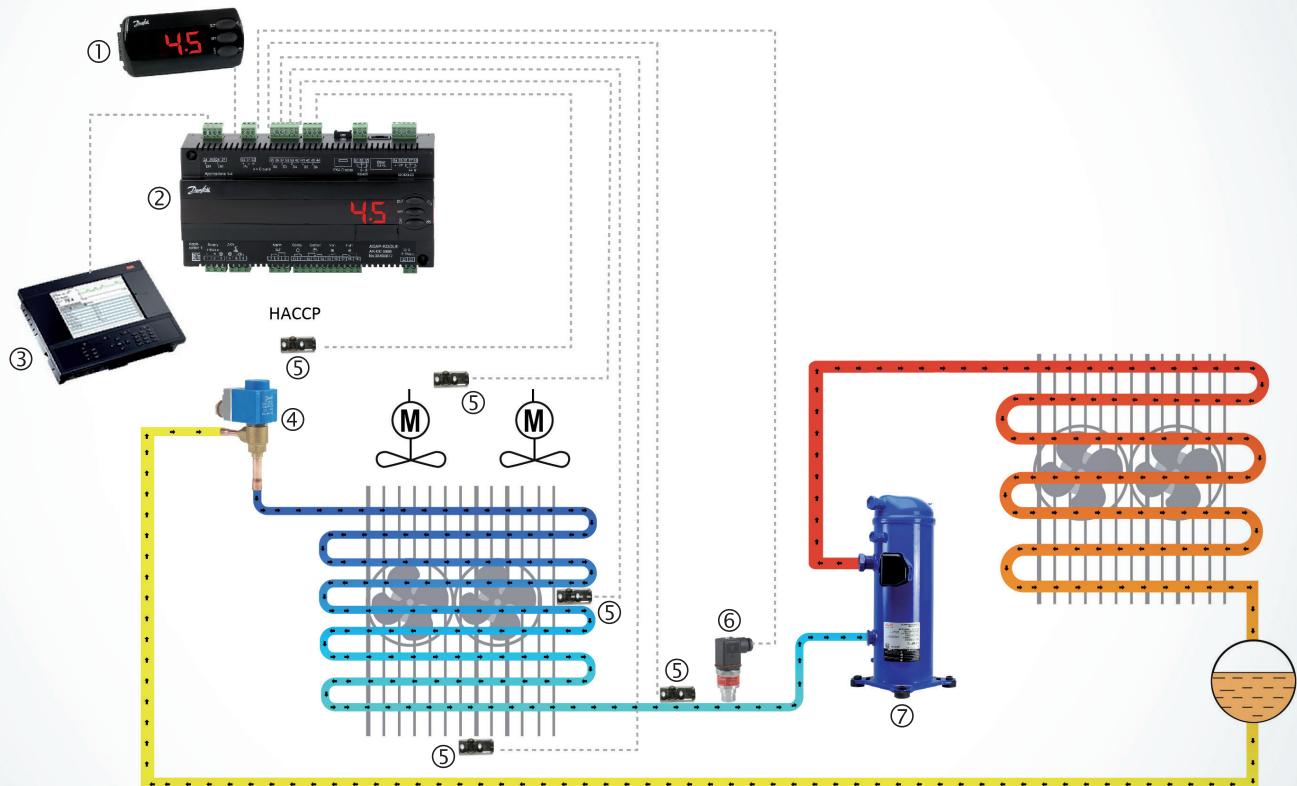
- Proven and robust control solution
- Easy set-up with application macros and no further adjustment of valves or superheat
- Adaptive superheat control for premium energy efficiency
- AKV valve with normally closed functionality avoids refrigerants floating back to compressor at power outage
- Standard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

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, CO ₂ version	084B8030
1	Case-Controller, Std.ver.230V	084B8020
5	Temperature sensor, AKS 11 (3.5 m cable, -50 to 100°C)	084N0003
1	Pressure transmitter, AKS 32R (1/4" flare -1 to 12 bar)	060G1036
1	Electric Expansion Valve, AKV/AKVP	Refer Data Sheet for Selection

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

Capacity regulation of compressors and condensers in small size refrigeration applications

Key Benefits

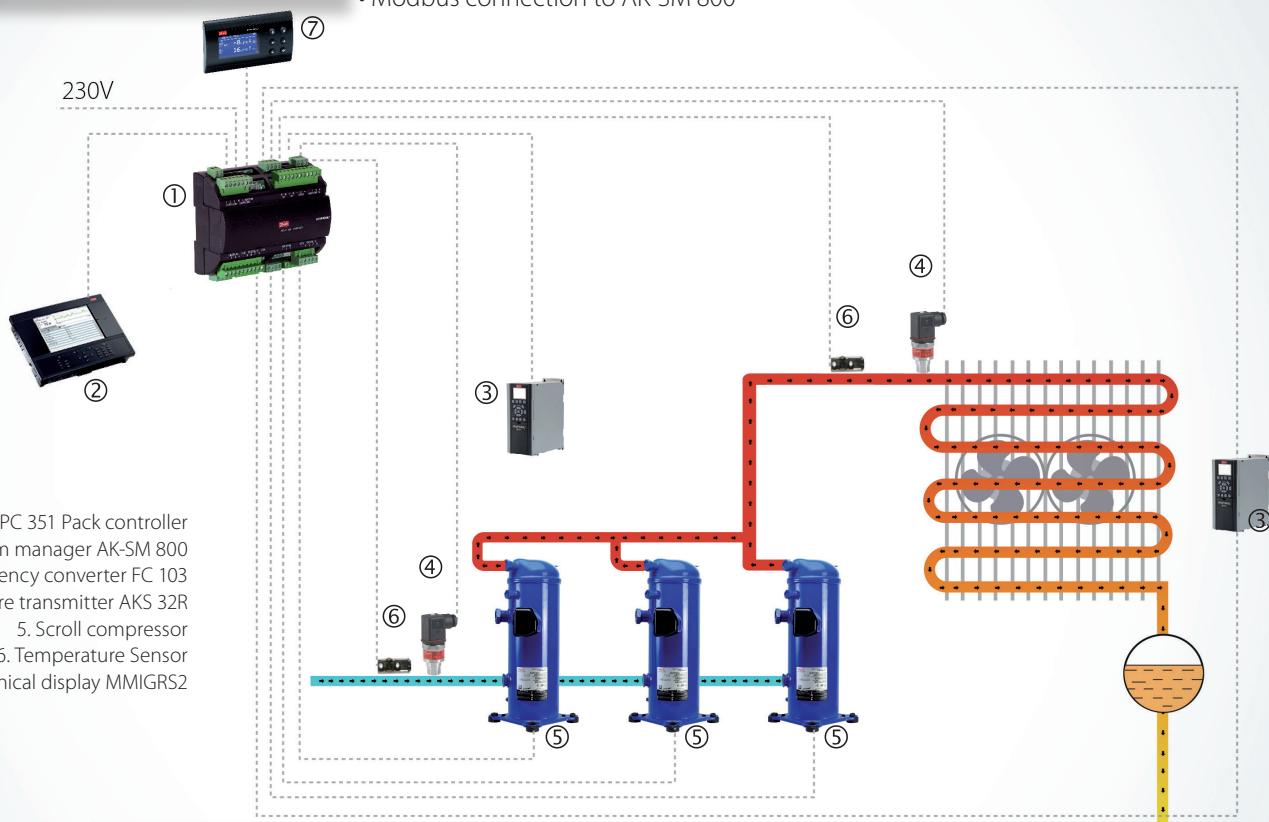
- Covers most commonly used HFC pack applications for commercial refrigeration
- Fast and Easy wizard setup
- Robust control with optimised control algorithms and factory default
- Energy saving features to reduce operating costs
- Graphical, easy to use interface

Functions

- 1 suction group
- Up to 4 compressors and 4 condenser fans (Maximum 6 in total)
- PWM Capability to control mechanically modulated compressor
- Variable speed on lead compressor
- Variable speed on condenser fans
- Built in display
- Modbus connection to AK-SM 800

Energy Saving Features

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



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 (3.5 m cable, -50 to 100°C)	084N0003
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 Compressors, third party compressors	

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

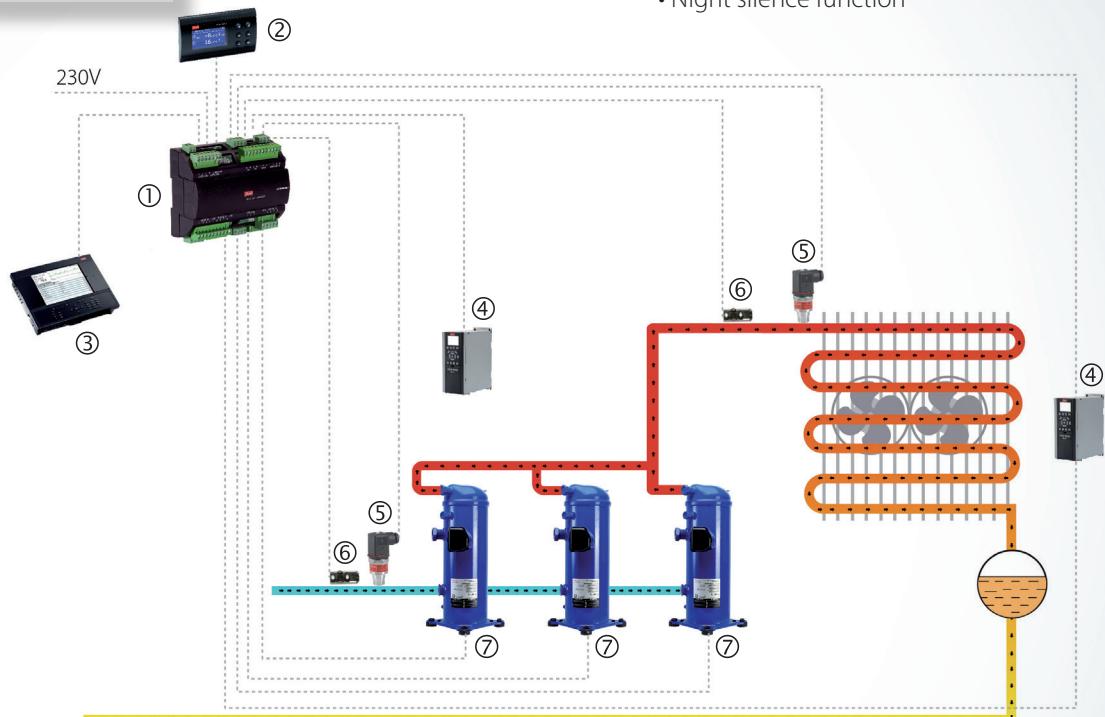
Functions

- 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 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	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 (3.5 m cable, -50 to 100°C)	084N0003
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	

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

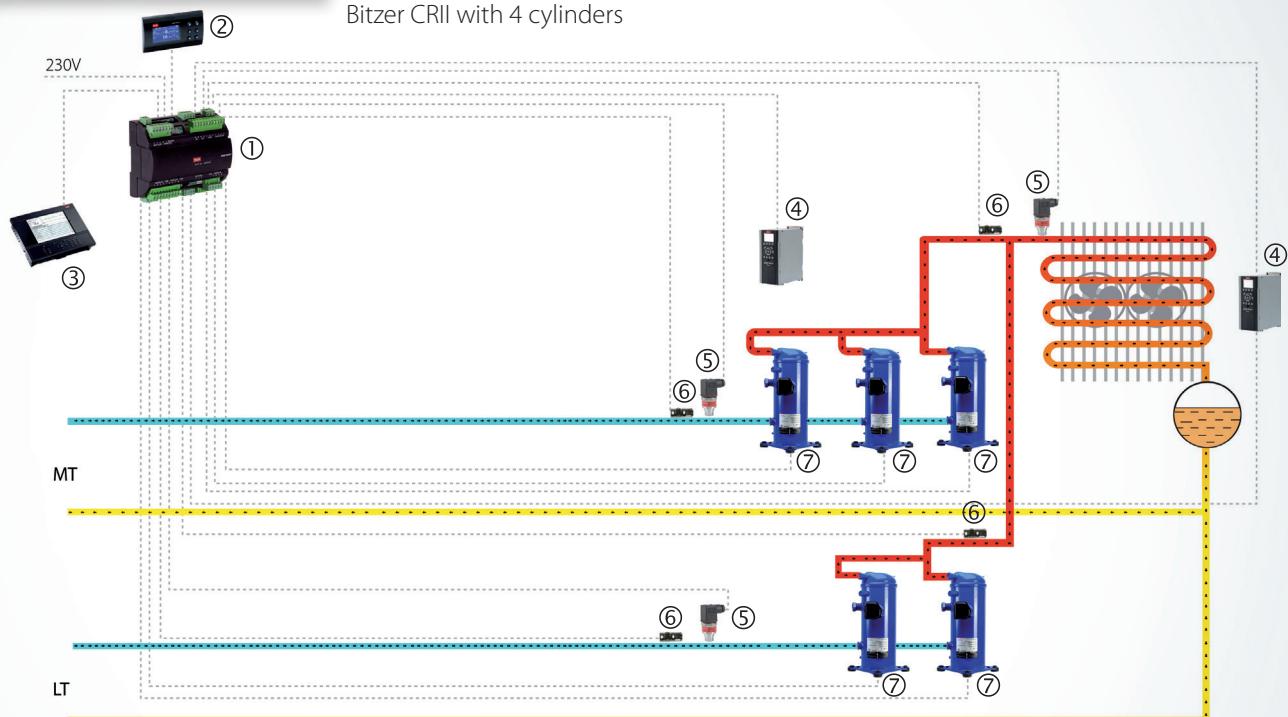
- Covers most commonly used HFC pack applications for commercial refrigeration
- Fast and Easy wizard setup
- Robust control with optimised control algorithms and factory default
- Energy saving features to reduce operating costs
- Graphical, easy to use interface

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 CR II 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	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 (3.5 m cable, -50 to 100°C)	084N0003
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	

Mid-range HFC pack control with Pack Controller AK-PC 651

Capacity regulation of 10 compressors and one condensing unit in medium size refrigeration applications

Key Benefits

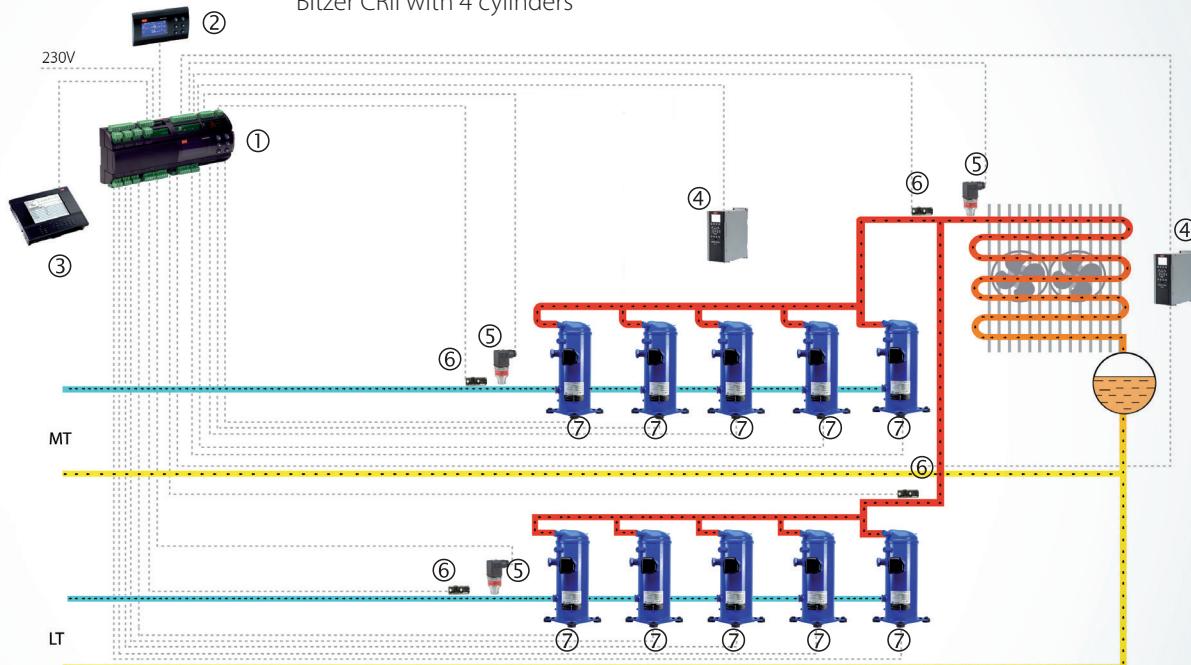
- Covers most commonly used HFC pack applications for commercial refrigeration
- Fast and Easy wizard setup
- Robust control with optimised control algorithms and factory default
- Energy saving features to reduce operating costs
- Graphical, easy to use interface

Functions

- 1 Suction group plus 1 Condenser group
- 1 Compressor group, maximum 10 steps
- 1 Condenser Group, maximum 8 steps
- PI Control with Neutral Zone Settings
- 4 Voltage Free Outputs, 18 DI, 10 AI and 2 Solid State Relays
- 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 651
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 651 with built-in display	080G0312
1	Remote Display MMIGRS2	080G0294
1	Wire for Display	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 (3.5 m cable, -50 to 100°C)	084N0003
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	

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

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

Key Benefits

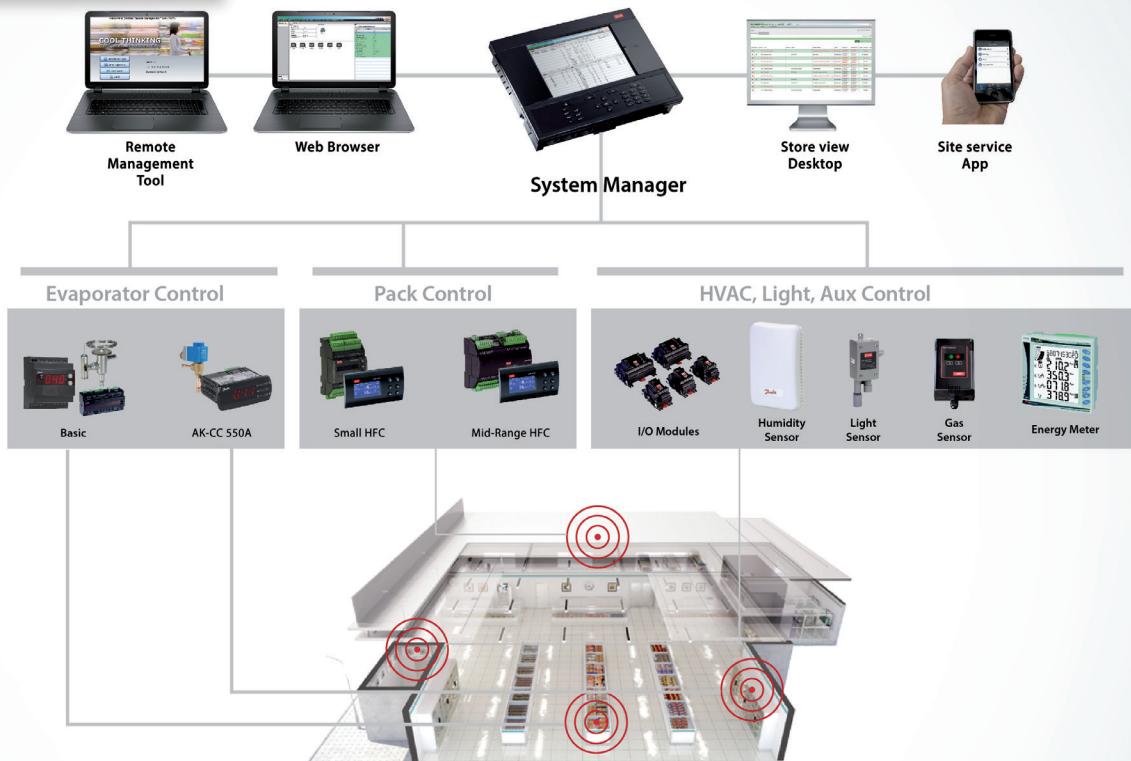
- Control and monitor all key applications
- Access the system via local screen/keypad, via web browser or tablet/smartphone
- Customized screens for fast diagnostics
- Set-up wizards

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	
Compressor Controllers	
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	
Energy Meters, WattNode Modbus	080Z2146

Next Generation DGS for Gas Detection

Refrigerants monitoring with peace of mind

Key Benefits

- Higher flexibility, yet reduced complexity
- Remote monitoring and service capability
- 5 Year calibration interval with CO₂
- Semi-automated calibration
- Fast response time and backward compatible

Functions

- 2 Alarm Relays (warning, critical) Full
- Handheld tool for configuration
- IP65 Protection
- Adap-Kool System Integration

Typical Refrigerant gas applications include:

- Halocarbons: HFC's, HCFC's, CFC's.
- Carbon Dioxide (CO₂/R744)
- Hydrocarbons (e.g. R290)



Old DGS (phase-out)			New DGS (phase-in)
Refrigerant / function	Cold room (IP66)	Machine room (IP41)	Buzzer & Light (IP65)
CO ₂ + failsafe + heartbeat	080Z2996 080Z2993 080Z2960	080Z2995 080Z2994 080Z2959	080Z2807
Rem. CO ₂ + failsafe + heartbeat	080Z2997 080Z2992 080Z2961	- - -	080Z2808
Duct CO ₂	080Z2958	-	080Z2807 + 148H6238
R134A R422D R407A R449A R407F	080Z2989 080Z2949 080Z2944 080Z2948 080Z2957	080Z2942 - 080Z2943 080Z2947 080Z2956	080Z2810
R404A/507 R410A R448A	080Z2999 080Z2987 080Z2946	080Z2998 080Z2988 080Z2945	080Z2811
R1234ze	080Z2986	080Z2985	080Z2809