

Fact sheet

Optyma™ iCO₂

Frequently Asked Questions

1. What is the maximum cooling capacity of the unit at MBP condition (Evap:-10°C, 32°C ambient SH 10k)?
19.60 kW

2. What is the maximum cooling capacity of the unit at LBP condition (Evap:-35°C, 32°C ambient SH 10k)?
10.20 kW

3. Is the unit PED certified? What is the PED category of this unit?
Yes. It is approved by Vincotte nv. It is approved under [PED category II](#)

4. Is the unit UKCA certified?
Yes. It is approved by PER ([S12016/1105](#))

5. How many Evaporator units can be connected with this unit?
1-8 Evaporators (maximum)

6. Is there any mandatory accessory needed for this unit?
Yes. One Module controller per unit must be ordered as an accessory (118U5498).
Oil tank should be considered upon oil charge calculation

7. What is the connection protocol for Module controller?
It is Modbus protocol.

8. Do you publish sound spectrum at 1/3 octave?
Yes. You can find it in Coolselector, Datasheet and user guide. [Click here to download](#)

9. What is the maximum frequent start/stop allowed?
10 start/stop cycles per hour. After hitting 10 LP-errors 5.8bar within 1hour, the system will block and needs manual intervention to restart.

10. What is the starting speed of the compressor?
After starting the condensing unit, the minimum speed of 40rps is maintained for 105 seconds regardless of the load.

11. What is the start delay control of the compressor after low pressure stop?
If CDU detect low pressure error, compressor will stop and restart after 4 minutes (Minimum).

12. Is it possible to activate Silent mode from Danfoss controller?
Yes. It is possible to activate Silent Mode by Danfoss CO₂ Module controller. There are 4 levels of silent mode is available. For specific sound level, please contact Danfoss.

13. How can we set silent mode? Any schedule setting?
AK-MC "ASSLY" can start and stop silent mode, however a schedule cannot be set because it does not have a calendar or weekly/daily schedule definition. If required, it must be prepared with external controller.

14. Do we have BIM file for this model? How do I get it?
Yes, we do have BIM file created for this model. [Click here to download](#)

15. What is the safe operating ambient conditions? What happens if it is not met?
The safe operating ambient condition is -20°C ~ +43°C. If ambient temperature (AT) is lower than -20°C or higher +43°C, unit does not stop. Cooling capacity decreases as ambient temperature rises above 43°C. If the ambient temperature goes below 0 and in case of snow fall the installation might need a snow hood.
For such application requirements please contact Danfoss.

16. Why evaporation temperature is up to +5°C?

If we use above +5°C evaporating temperature, capacity will decrease. Due to various protection control it is decided to restrict up to +5°C.

17. Why the indoor units cannot be installed up and down at the same time?

In this case, the field piping will be separated from the condensing unit in the upper and lower directions. In the case of the lower piping, there is a possibility of oil return shortage, this is because the flow velocity in the gas piping is not sufficient to ensure oil return.

18. Is there any reason why height limitation become much more severe (5m) in case of that indoor unit is above of outdoor unit?

This is to ensure reliable operation. If the outdoor unit is lower, pressure loss tends to be higher so it can easily cause flash (liquid and gas) condition at liquid piping.

19. If we consider 40m piping length, what is this still 22m height lower?

If it exceeds 22m or more, the oil level sensor located at oil pod can easily detect a drop in the oil level. Then oil return control work frequently and cause unstable operation and unstable indoor room temp trouble. Please refer Instruction manual [AN405821998738en](#) page 8. Or please contact Danfoss.

20. Is it possible to change compressor Start/Stop cycle?

No. we cannot adjust the operating duration.

21. How can we calculate Flow speed in pipe / heat exchanger path V (m/s)?

See instructions [AN405821998738en](#) page 9. The flow speed in pipe is given for the suction pipe velocity (evaporator).

22. How much subcooling does this outdoor unit control?

Target subcooling is about 7° Kelvin controlled by EEVSC.

23. What is the factory charge quantity of oil and where does the oil stay when shipping?

Factory charge of Oil is 1830cc. Oil stays within compressors and accumulators. For detailed oil charge calculation please refer coolselector2 and Instruction manual [AN405821998738en](#) Page no.15

24. In case of extra oil need to top up in the field, what is the supply unit quantity of spare part oil?

Danfoss have 4L and 0.5L bottle of spare part please order appropriate code number depending on field requirements. Please refer Coolselector or Data sheet [AI408320494220en](#) page no.13

25. Why the maximum refrigerant charge quantity is constant at around 85m pipe length?

This is due to the size of the receiver installed in the condensing unit.

26. How do I select Earth leakage breaker?

Please select type B earth leakage breaker that satisfy Danfoss recommendation as stated in Instruction manual [AN405821998738en](#) page no.21.

27. What is the minimum wire size for power cable?

8 Sq.mm

28. What is the maximum wire length for power cable?

70m for 8 Sq.mm wire size and 95m for 10 Sq.mm

29. How long would the power cable be when we use 6Sq.mm and 10Sq.mm power cable?

* 1) Wiring procedure is determined by JEAC8001

2) The Wire length show within 2% of voltage drop. If the wire length exceeds the value shown in the above, review the cable size.

Unit type		OP-UPAC015COP04E
Normal output (kW)		6.4
Power supply		3P, 380/400/415V, 50Hz
Electric characteristics	Power consumption (kW)	10.54/10.54/10.54
	Operation current (A)	17.4/16.5/15.9
Min. wire size (mm ²)		8mm ² X 3[70m] 10mm ² X 3[95m]
Earth cable size (mm ²)		3.5
Eart leakage breaker	Rated current (A)	30
	Rated sensitivity current (mA)	30 (Operation time 0.1 sec or less)

30. What is the H05VK of AWG22?

AWG means American wire gauge. Please see below comparison table. H05VK 0.5Sq.mm is equivalent to AWG20 but there is no exact equivalent size for AWG22, therefore Danfoss recommends to use/selecting same one for AWG20.

AWG size	European wire size
AWG20	H05VK 0.5 mm ²
AWG22	

31. What is the standard pressure to test the system for reliable installation and operation?

Danfoss standard is to be pressurise the system to 80bar for reliable installation and operation.

32. Is it OK to use oxygen or air to pressurise the system circuit?

No. It could cause fire or explosion. Please use oxygen free Nitrogen gas only.

33. What is the OCR (Oil Circulation Rate) of refrigerant and oil?

3.5% in Middle Temperature condition (MT; -10°C) 2.8% in Low Temperature condition (LT; -35°C). For more detail, Contact Danfoss technical team.

34. How does oil return control work?

It can be activated by monitoring the specific time that is calculated internally with some condition from the completion of last oil return control.

35. How to activate oil return control at preferable timing?

If Danfoss want to activate oil return control at their preferable timing, you can start it by using external input. (I.E. When CNS3 become short and P08 function is allocated to 4.). But if unit require oil return control as following above control before your timing, it will start.

See fig.33 in instruction manual for more information in which Oil return logic already included.

36. Where the OPE code is displayed?

OPE code can be displayed on only 7 segment displays on condensing unit.

37. Is it possible to confirm Error code on Danfoss controller side?

Yes, Error code can be displayed on System manager (AK-SM 800)

38. What is pipe size in inch?

Φ6.35 mm = ¼", Φ12.7 mm = ½", Φ19.05 mm = ¾".

39. What is the connection size is service valve?

It has ¼ SAE-TUBE SIZE (45)

40. Will the Service valve connections come with the unit in the packing?

Yes. Reducer assembly for service port (x3pcs) are packed inside of condensing unit from the factory shipment.

41. Can the 7 segments display accessible without taking panel off?

You can see 7segment display without taking panel off. But if you want to see specific 7segment code or change its setting, the front panel must be removed.

42. What is E code and what is OPE code?

E** is Error code (E**) or oPE** is maintenance code (oPE**) appear, it will keep displaying on the 7segment until it is released or reset.

43. Where is the oil from factory, is it all charged in the compressor or percentage in oil separator / compressor / suction pod / receivers?

Compressor is charged 1200cc oil at the compressor line. Additional oil 630cc is charged from accumulator in the assembling line.

44. What if the unit shows insufficient oil (C32)

Please follow our calculation method that can be done in our guideline. If unit shows insufficient oil (C32 = 011) during commissioning (after oil check operation), you might be required to refill additional oil (500cc as a guide at one time).

45. What is the standard refrigerant quantity of condensing unit?

In case evaporation temperature setting is higher than -5°C, it requires more refrigerant to achieve the performance. Therefore, there is a difference on standard ref. quantity as below table.

Standard refrigerant quantity of condensing unit (Kg)	
Evaporation temperature setting ≤ -5°C	Evaporation temperature setting > -5°C
10.2	12.2

46. How to set the Night/silent mode: who do we set the clock?

This will be done by installer side or Danfoss controller side because our unit does not have a calendar or weekly/daily schedule definition.

47. What is snow mode?

Snow mode is to keep condenser fans running or boost speed to stop snow building up on the top of fan grill.

48. How to activate snow mode?

The snow protection control can be activated from Danfoss controller (AK-MC). If snow protection control is enabled, it will start when ambient temp is lower than 3°C for 10mins successively and it will stop when ambient temp is higher than 5°C.

49. What is the type of RCD breaker?

Please use type B.

50. What is the level of RCD leakage?

30mA

51. How to Convert all AWG20 to European sizing indication

H05VK 0.5Sq.mm.

52. Is Solenoid magnet will lift all valves within unit (bypass & gas cooler valve)?

Solenoid magnet is common tool for service agent so please prepare locally.

53. Is the Oil level is measured in the oil pod?

Yes, there is an oil level sensor at the oil pod.

54. While charging liquid and if the compressor stops will liquid going in?

Basically, please charge the refrigerant from liquid line while unit is in OFF condition.

55. What is default setting to set the unit target suction temperature?

Default setting is set by Condensing unit side.

56. How to change the setting from Module Controller?

If we want to change the setting from the CDU controller, we must change the controller setting (r28) from 1 to 0. Then the CDU controller rotary switch setting for target evaporation setting is always prioritised.

Please see user guide [BC408445719305en](#) page No 29.

57. How many errors code history is recorded?

It can store the last 2 error data in condensing unit side.

58. What is the criteria and duration of oil recovery?

Comp speed: AT<18°C 90rps, AT≥18°C 70rps and Oil return time: 13 min

59. How to change the oil recovery duration?

It can be changed from 7 seg P64

60. Is the 50% minimum duty related to the rated capacity or 50% load in any ambient condition – Is there a minimum volume of evaporator or is it more duty related?

50% rated capacity. However, it is just reference, please design the system to ensure the system does not operate short capacity or short cycle operation.

61. What is the pump down setting and what is the preset pressure?

If the CDU MP medium pressure is below 70bar at that time, CDU will continue pump down operation for 60~120sec when the indoor unit cooler stop. If MP exceeds 70bar during pump down operation, CDU will stop.

62. When the PC sensor is disconnected or in error the unit stops the fans, usually is the opposite the fans go to maximum speed?

The fans should stop when the unit is in error condition.

63. During oil recovery mode at very low load will SVHG1 valve open to generate more load?

SVHG1 will not open in this condition. Capacity will change as compressor speed changes during oil recovery.

64. How to fix the power cord?

Secure the power cord to the resin clamp under the control box using the TY-RAP (Thomas & Betts TY -350WX). The photo shows the lower right of the five resin clamps used to pull the power cord from the right side of the control box. If you want to pull it from the left side or the bottom side, change the resin clamp that passes the TY-RAP arbitrarily.

1. Thread the TY-RAP through the hole of resin clamp
2. Pass the tip of the TY-RAP about 150 mm through the resin clamp and then stop passing.
3. Place the power cord inside the TY-RAP loop. Then use the TYRAP to restrain the power cord. Be sure to secure the power cord so that it does not slip and change position when you pull it.
4. Cut the tied end of the TY-RAP and secure the power line to the terminal block.

65. Is there any emergency stop to prevent water freezing?

Yes, we have.

66. What is A4:C21the reasoning for the limitations on piping maximum height differences, particularly the 5m difference when the indoor unit is higher?

When the indoor loads are located excessively higher than the CDU, the subcooling diminishes ($\leq 0K$), at the point of the upward of EEV causes capacity decreasing. On the other hand, when the loads are allocated excessive lower than CDU, influences the returning of the refrigerator oil, this results in reduced compressor reliability. To increase the 5m higher limit on the load side, an actual evaluation test is required.

67. Has the Gas Cooler coil been subjected to a salt spray test?

In accordance with JIS Z 2371, a salt spray test was performed (480 H) and passed.

68. What coating is the Gas Cooler fin material?

Blue fin - organic resin film coating

69. How many fins per inch is the Gas Cooler coil?

Fin pinch is 1.3mm.(19.5 fins/inch).

70. What brand and model are the Gas Cooler fans?

Fan motor manufacture is NIDEC.

71. Is the solenoid magnet used for commissioning 018F0091? Does the magnet come with units?

Yes if needed but it is not supplied

72. For the 20 Kw unit is the MMILDS controller an optional accessory or compulsory requirement as it seems there are two methods for setting evaporating SST?

Danfoss module controller is required to communicate with outdoor unit and Danfoss load controllers. Evaporation temperature can be set from outdoor unit or from Danfoss module controller.

73. Is the gateway & MMILDS the same unit for both units

Yes but it has specific software for each unit

74. Can other evaporator controllers other than Danfoss brand be connected to the Module Controller on the 20 KW CDU?

No, only Danfoss. This is due to the various control strategies of the application such as adaptive liquid control, oil harvest and forced cooling function to ensure reliable operation

75. Can the oil return function on the 20 KW still work using load controllers and EEV's other than Danfoss brand?

Only Danfoss controllers can connect to the Module controller. Correct, connection is specific to Danfoss controllers.

76. Can the units be used close to the coast?

You need to take the same precautions as for any CDU, avoid direct wind from the sea going straight into the gas cooler

77. Is the Mente PC Converter available for the 20 KW CDU?

Danfoss can purchase MentePC converter - Danfoss can choose how to control supply of MentePC converter to their service agents. MentePC can be quite complex and not recommended for all installers, just specific service agents or Danfoss local engineers.

78. What is the minimum and maximum RPM/Hz rating of the compressor for the two units?

20 KW = 2400 to 6240rpm / 40 rps – 104 rps

79. What is the minimum downturn in capacity of the unit for lowest load conditions?

20 KW = 36 to 100% - However this depends on what part of the envelope the unit is working within

80. Is there low SSH protection for the compressor?

Yes. The unit has suction superheat reduction protection control in it.

81. Is there a high compressor temperature protection?

Yes. It controls the liquid bypass electronic solenoid valve and reduces the operation frequency further, when the discharge temperature (Td) is too higher.

82. What is the setting of the Pressure relief device?

Setting is 87 bar

83. Is the PRV re-seatable or does it need to be changed after being discharged?

Yes. It is re-seatable

84. IS the PRV available as a spare part?

Yes

85. Will the condensing unit work with any other evaporator controllers?

No

86. What type of compressor is used in the units and what are the benefits?

BLDC Rotary & Scroll compressor in one unit

87. Is the gateway the same in both the units?

Yes but the software is specific to each unit

88. What is the correct version of AKC55 to be used?

Single coil version with oil recovery 084B4083 with user interface (buttons) and 084B4082 blank - must be SW version 1.7 or later

89. What is the correct version of front end to used ?

AKSM800A

89. Is there a liquid line sight glass?

Yes

90. Is there an oil sight glass in the compressor?

No

91. Can the use of MTR on the AKCC550A be used?

Yes, it will benefit the operation because the evaporators continue to be utilised and are not operated by a thermostat

92. What is the PED category of the units ?

PED Cat 2

93. Is the unit fitted with a CCH ?

Yes

94. Are the test certificates available for the PRV?

Yes. We have Danfoss declaration is available. The PRV is fitted in the unit and risk assessment and evaluations is done.

95. What is the smallest duty evaporator we can connect to the unit ?

Where two or more indoor units are connected and low pressure side devices are turned off by the thermostat changed to OFF, ensure that the minimum demand asked by the cold rooms / Display cabinets will be higher than 50% of the minimum cooling load of the condensing unit.

Example:- on Low temperature application, if minimum load (At compressor lowest speed 30%) 2.81kW then minimum demand from cold rooms/display cabinets should be maintain around 1.4kW (you can use defrost time or modulating thermostat control)

96. What is the smallest volume evaporator that can connected to the unit ?

If the load capacity remains low, the compressor of the condensing unit will start and stop frequently. It may cause the condensing unit to malfunction. The minimum load capacity of the connected load unit should be designed so that the compressors do not exceed 10 start/stop cycles per hour.

97. What is the factory position of the dip switches?

see document <https://assets.danfoss.com/documents/259424/AX451923145808en-000101.pdf>

98. Is there any subcooling feature ?

yes, subcooler factory fitted, tube in tube type, expect about 2K

99. How do you connect a service manifold ?

3 x service port connectors are supplied with the unit

100. Do we have security for low SH on the compressor ?

Unit fitted with suction accumulator

101. Is there security for high compressor shell temperature ?

yes

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