ENGINEERING
TOMORROW

User Guide

CO_2 Module controller
Universal Gateway

SW version 1.7

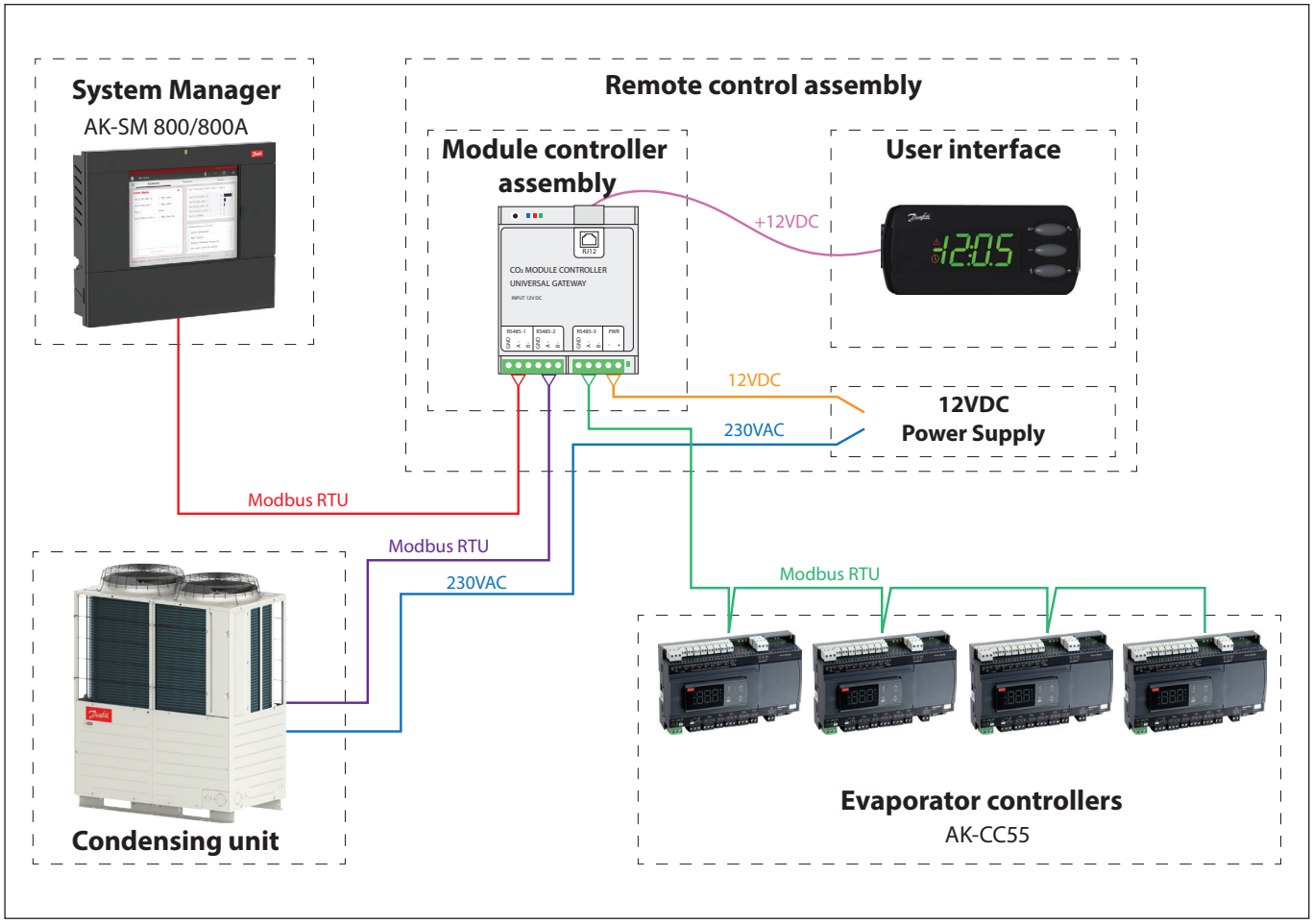
danfoss.com

Contents

Module controller

System Overview

Below is a topology over the system



System requirements

- Condensing unit iCO2 20kW; 40kW
- Case controller AK-CC55 Single Coil SW-V1.7

Functions

- Control of connected condensing unit (CDU).
- Coordination of oil recovery.
- Communication with a Danfoss System Manager.

Condensing unit

The connected condensing unit is allowed to start when any of the evaporator controllers have a cooling demand.

Oil recovery

The controller coordinates oil recovery operation between the condensing unit and the evaporator controllers. During oil recovery the expansion valves are opened and the speed of the compressor is increased.

Data communication

The controller is delivered with three interfaces for Modbus communication, each with their own function:

1. Communication with System Manager
   This interface lets a Danfoss System Manager find both the connected condensing unit and all the connected evaporator controllers.

2. Communication with condensing unit
3. Communication with evaporator controllers

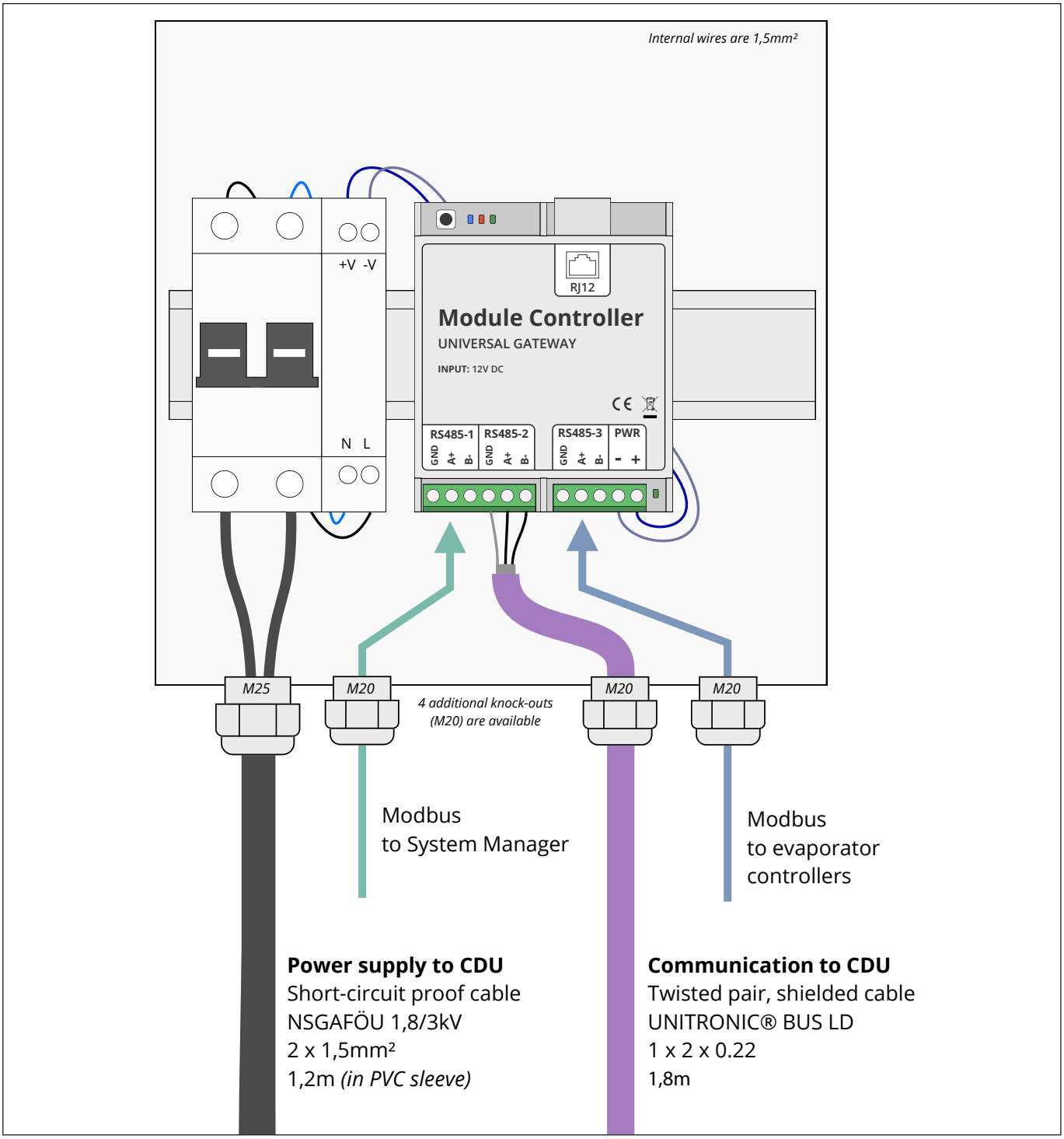
Important

All connections to the data communication must comply with the requirements for data communication cables.
See literature: Design guide RC8AC Data communication between ADAP-KOOL® Refrigeration Controls.

Installation

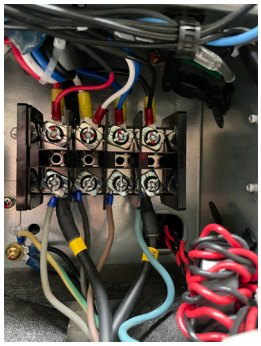
Electric Installation

Below is an illustration of the external connections that can be made in the remote control assembly.



Power supply to CDU
230V AC 1,2m cable for this is included.
Connect Module controller power supply cable to L1 (left terminal) and N (right terminal) of the condensing unit control panel - power supply terminal block

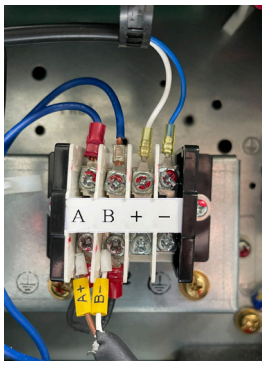
Caution: If the cable needs to be replaced, it must either be short-circuit proof or it must be protected by a fuse on the other end.



RS485-1
Modbus interface for connection to the System Manager

RS485-2
Modbus interface for connection to the CDU.
1,8 m cable for this is included.

Connect this RS485-2 Modbus cable to terminal A and B of the condensing unit control panel - Modbus interface terminal block. Do not connect insulated shield to ground



RS485-3
Modbus interface for connection to the evaporator controllers

3x LED Function explanation
- Blue led is ON when the CDU is connected and polled operation is complete
- Red led is flashing when there is a communication fault with an evaporator controller
- Green led is flashing during communication with an evaporator controller

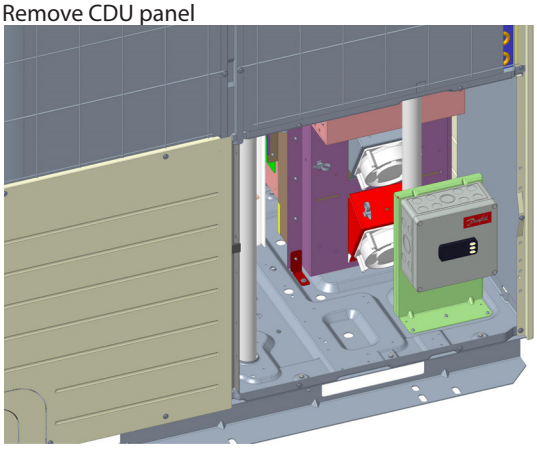
The green LED next to the 12V power supply terminals indicates "Power OK".

Electric noise
Cables for data communication must be kept separate from other electric cables:
- Use separate cable trays
- Keep a distance between cables of at least 10 cm.

Mechanical Installation

1. Installation in the backside of the unit / backside of e-panel with provided rivets or screws (3 mounting holes provided)

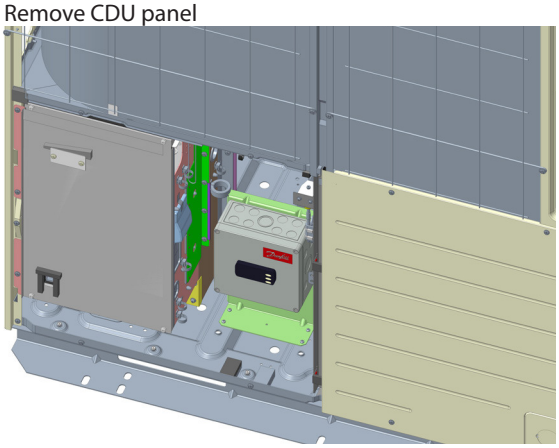
Procedure:
• Remove CDU panel



• Mount the bracket with provided screws or rivets
• Fix the e-Box to the bracket (4 screws provided)
• Route and connect the provided Modbus and power supply cables to the CDU control panel
• Route and connect the evaporator controller Modbus cable to the Module controller
• Option: Route and connect the System Manager Modbus cable to the Module controller

2. Optional installation on the frontside (only for 10HP unit, just beside the CDU control panel, holes to be drilled)

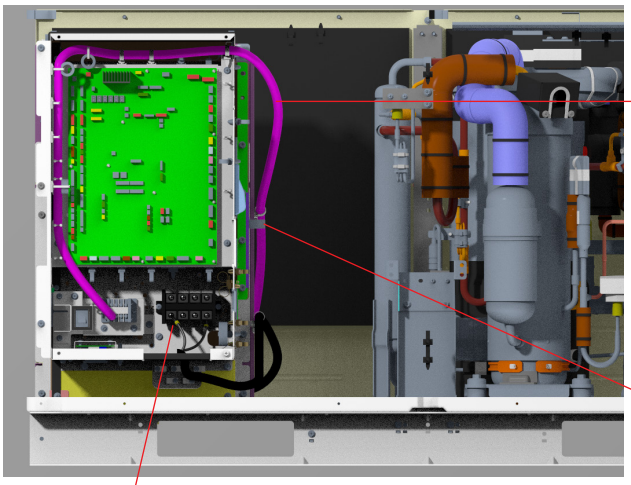
Procedure:
• Remove CDU panel



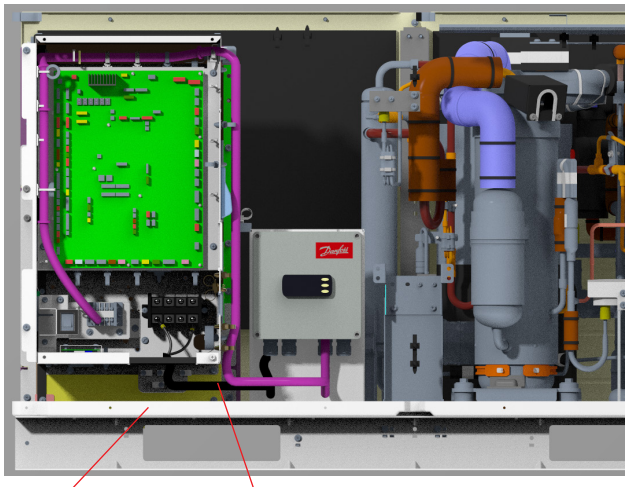
• Mount the bracket with provided screws or rivets
• Fix the e-Box to the bracket (4 screws provided)
• Route and connect the provided Modbus and power supply cables to the CDU control panel
• Route and connect the evaporator controller Modbus cable to the Module controller
• Option: Route and connect the System Manager Modbus cable to the Module controller

Module Controller wiring

Please wire the communication cable from the top of the control bord to the left side. The cable comes along with the module controller.



Please pass the power cable through the insulation at the bottom of the control box.



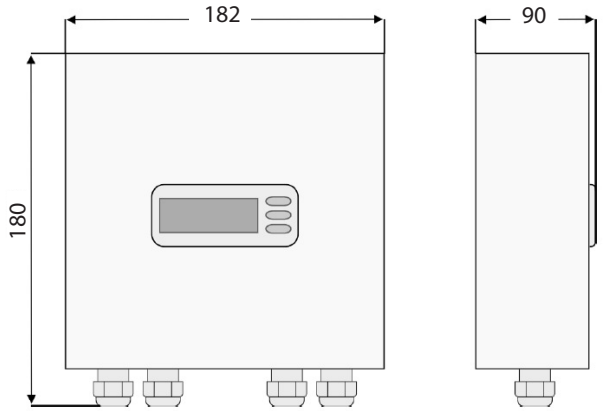
Note:
The cables should be fixed with the cable ties and should not touch the baseplate to avoid water ingress.

Technical data

Supply voltage	110-240 V AC. 5 VA, 50 / 60 Hz
Display	LED
Electrical connection	Power supply: Max.2.5 mm² Communication: Max 1.5 mm²
	-25 – 55 °C, During operations -40 – 70 °C, During transport
	20 - 80% RH, not condensed
	No shock influence
Protection	IP65
Mounting	Wall or with included bracket
Weight	TBD
Included in the package	1 x Remote control assembly 1 x Mounting bracket 4 x M4 screws 5 x Inox rivets 5 x Sheet metal screws
Approvals	EC Low Voltage Directive (2014/35/EU) - EN 60335-1 EMC (2014/30/EU) - EN 61000-6-2 and 6-3

Dimensions

Units in mm



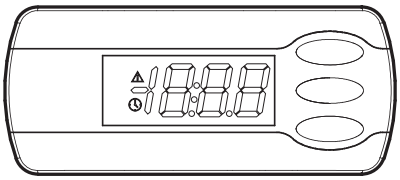
Spare parts

Parts Name	Parts No	Danfoss Requirements				Packing Style	Remarks
		Gross weight	Unit Dimension (mm)				
		Kg	Length	Width	Height		
CO₂ MODULE CONTROLLER UNIVERSAL GATEWAY							
MODULE CONTROLLER	118U5498	TBD	182	90	180	Carton box	

Operation

Display

The values will be shown with three digits.



Active alarm (red triangle)

Scan for Evap. controller is in progress (yellow clock)

When you want to change a setting, the upper and the lower button will give you a higher or lower value depending on the button you are pushing. But before you change the value, you must have access to the menu. You obtain this by pushing the upper button for a couple of seconds - you will then enter the column with parameter codes. Find the parameter code you want to change and push the middle buttons until value for the parameter is shown. When you have changed the value, save the new value by once more pushing the middle button. (If not operated for 10 seconds, the display will change back to showing the suction pressure in temperature).

Examples:

Set menu

1. Push the upper button until parameter code r01 is shown
2. Push the upper or the lower button and find that parameter you want to change
3. Push the middle button until the parameter value is shown
4. Push the upper or the lower button and select the new value
5. Push the middle button again to freeze the value.

See alarm code

A short press of the upper button
If there are several alarm codes they are found in a rolling stack.
Push the uppermost or lowermost button to scan the rolling stack.

Set point

1. Push upper button until display shows parameter menu code r01
2. Select and change par. r28 to 1, which defines the MMILDS UI as the reference set device
3. Select and change par. r01 to the required lower pressure setpoint target in bar(g)
4. Select and change par. r02 to the required upper pressure setpoint target in bar(g)

Remark: The arithmetic middle of r01 and r02 is the target suction pressure.

Get a good start

With the following procedure you can start regulation as soon as possible.

1. Connect the modbus communication to CDU.
2. Connect the modbus communication to evaporator controllers.
3. Configure the address in each evaporator controller.
4. Perform a network scan in the module controller (n01).
5. Verify that all evap. controllers have been found (lo01-lo08).
6. Open parameter r12 and start the regulation.
7. For connection to a Danfoss System Manager
   - Connect the modbus communication
   - Set the address with parameter o03
   - Perform a scan in the System Manager.

Survey of functions

Function	Parameter	Remarks
Normal display		
The display shows the suction pressure in temperature.		
Regulation		
Min. Pressure The lower setpoint for suction pressure. See instructions for CDU.	r01	
Max. Pressure The upper setpoint for suction pressure. See instructions for CDU.	r02	
Demand Operation Limits the compressor speed of the CDU. See instructions for CDU.	r03	
Silent Mode Enable/disable silent mode. Operating noise is suppressed by limiting the speed of the outdoor fan and compressor.	r04	
Snow Protection Enable/disable snow protection functionality. To prevent snow from building up on the outdoor fan during winter shutdown, the outdoor fan is operated at regular intervals to blow off the snow.	r05	
Main Switch Start/stop the CDU	r12	
Reference source The CDU can either use a reference that is configured with rotary switches in the CDU, or it can use the reference as defined by parameter r01 and r02. This parameter configures which reference to use.	r28	
For Danfoss Only		
SH Guard ALC Cut-out limit for ALC control (oil recovery)	r20	
SH Start ALC Cut-in limit for ALC control (oil recovery)	r21	
Oil ALC setpoint LBP (AK-CC55 parameter P87,P86)	r22	
EEV force low OD after oil recovery (AK-CC55 AFidentForce = 1.0)	r25	
Oil ALC setpoint MBP (AK-CC55 parameter P87,P86)	r26	
Oil ALC setpoint HBP (AK-CC55 parameter P87,P86)	r27	
Oil Mode (AK-CC55 parameter x30)	r29	
Miscellaneous		
If the controller is built into a network with data communication, it must have an address, and the system unit of the data communication must then know this address.		
The address is set between 0 and 240, depending on the system unit and the selected data communication.	o03	
Evaporator controller addressing		
Node 1 Address Address of the first evaporator controller Will only be shown if a controller has been found during scan.	lo01	
Node 2 Address See parameter lo01	lo02	
Node 3 Address See parameter lo01	lo03	
Node 4 Address See parameter lo01	lo04	
Node 5 Address See parameter lo01	lo05	
Node 6 Address See parameter lo01	lo06	
Node 7 Address See parameter lo01	lo07	
Node 8 Address See parameter lo01	lo08	
Node 9 Address See parameter lo01	lo09	
Node 10 Address See parameter lo01	lo10	

Function	Parameter	Remarks
Node 11 Address See parameter lo01	lo11	
Node 12 Address See parameter lo01	lo12	
Node 13 Address See parameter lo01	lo13	
Node 14 Address See parameter lo01	lo14	
Node 15 Address See parameter lo01	lo15	
Node 16 Address See parameter lo01	lo16	
Scan Network Initiates a scan for evaporator controllers	n01	
Clear Network List Clears the list of evaporator controllers, may be used when one or several controllers are removed, proceed with a new network scan (n01) after this.	n02	
Service		
Read discharge pressure	u01	Pc
Read gascooler outlet temp.	U05	Sgc
Read receiver pressure	U08	Prec
Read receiver pressure in temperature	U09	Trec
Read discharge pressure in temperature	U22	Tc
Read suction pressure	U23	Po
Read suction pressure in temperature	U24	To
Read discharge temperature	U26	Sd
Read suction temperature	U27	Ss
Read controller software version	u99	

Operating status		(Measurement)
Push briefly (1s) the upper button. A status code will be shown on the display. The individual status codes have the following meanings:		Ctrl. state:
CDU not operational	S0	0
CDU operational	S1	1
Other displays		
Oil recovery	Oil	
No communication with CDU	---	

Fault message

In an error situation an alarm symbol will flash..

If you push the top button in this situation you can see the alarm report in the display.

Here are the messages that may appear:

Code / Alarm text via data communication	Description	Action
E01 / CDU offline	Communication lost with CDU	Check CDU connection and configuration (SW1-2)
E02 / CDU communication error	Bad response from CDU	Check CDU configuration (SW3-4)
A17 / CDU alarm	An alarm has occurred in the CDU	See instructions for CDU
A01 / Evap. controller 1 offline	Communication lost with evap. controller 1	Check Evap. controller controller and connection
A02 / Evap. controller 2 offline	Communication lost with evap. controller 2	See A01
A03 / Evap. controller 3 offline	Communication lost with evap. controller 3	See A01
A04 / Evap. controller 4 offline	Communication lost with evap. controller 4	See A01
A05 / Evap. controller 5 offline	Communication lost with evap. controller 5	See A01
A06 / Evap. controller 6 offline	Communication lost with evap. controller 6	See A01
A07 / Evap. controller 7 offline	Communication lost with evap. controller 7	See A01
A08 / Evap. controller 8 offline	Communication lost with evap. controller 8	See A01
A09 / Evap. controller 9 offline	Communication lost with evap. controller 9	See A01
A10 / Evap. controller 10 offline	Communication lost with evap. controller 10	See A01
A11 / Evap. controller 11 offline	Communication lost with evap. controller 11	See A01
A12 / Evap. controller 12 offline	Communication lost with evap. controller 12	See A01
A13 / Evap. controller 13 offline	Communication lost with evap. controller 13	See A01
A14 / Evap. controller 14 offline	Communication lost with evap. controller 14	See A01
A15 / Evap. controller 15 offline	Communication lost with evap. controller 15	See A01
A16 / Evap. controller 16 offline	Communication lost with evap. controller 16	See A01
A20 / Evap. version mismatch	Unsupported AK-CC55 with software version below v1.7 found	Update software or replace AK-CC55 with a newer version.
A45 / CDU Standby/off	Standby (stopped via r12 or switch in CDU)	Check that r12 is set to 1 and that the switch in the CDU is in the right position.

Menu survey

Function	Code	Min	Max	Factory	User-Setting
Regulation					
Min. Pressure	r01	0 bar	126 bar	CDU	
Max. Pressure	r02	0 bar	126 bar	CDU	
Demand Operation	r03	0	3	0	
Silent Mode	r04	0	4	0	
Snow Protection	r05	0 (OFF)	1 (ON)	0 (OFF)	
Main Switch Start/stop the CDU	r12	0 (OFF)	1 (ON)	0 (OFF)	
Reference source	r28	0	1	1	
For Danfoss Only					
SH Guard ALC	r20	1.0 K	10.0 K	2.0 K	
SH Start ALC	r21	2.0 K	15.0 K	4.0 K	
Oil ALC setpoint LBP	r22	-6.0 K	6.0 K	-2.0 K	
EEV force low OD after oil recovery	r25	0 min	60 min	20 min	
Oil ALC setpoint MBP	r26	-6.0 K	6.0 K	0.0 K	
Oil ALC setpoint HBP	r27	-6.0 K	6.0 K	3.0 K	
Oil mode	r29	1=w.fan	2=w/o fan	1=w.fan	
Miscellaneous					
CDU Address	o03	0	240	0	
Evap. controller Addressing					
Node 1 Address	lo01	0	240	0	
Node 2 Address	lo02	0	240	0	
Node 3 Address	lo03	0	240	0	
Node 4 Address	lo04	0	240	0	
Node 5 Address	lo05	0	240	0	
Node 6 Address	lo06	0	240	0	
Node 7 Address	lo07	0	240	0	
Node 8 Address	lo08	0	240	0	
Node 9 Address	lo08	0	240	0	
Node 10 Address	lo10	0	240	0	
Node 11 Address	lo11	0	240	0	
Node 12 Address	lo12	0	240	0	
Node 13 Address	lo13	0	240	0	
Node 14 Address	lo14	0	240	0	
Node 15 Address	lo15	0	240	0	
Node 16 Address	lo16	0	240	0	
Scan Network Initiates a scan for evaporator controllers	n01	0 (OFF)	1 (ON)	0 (OFF)	
Clear Network List Clears the list of evaporator controllers, may be used when one or several controllers are removed, proceed with a new network scan (n01) after this.	n02	0 (OFF)	1 (ON)	0 (OFF)	
Service					
Read discharge pressure	u01	bar			
Read gascooler outlet temp.	U05	°C			
Read receiver pressure	U08	bar			
Read receiver pressure in temperature	U09	°C			
Read discharge pressure in temperature	U22	°C			
Read suction pressure	U23	bar			
Read suction pressure in temperature	U24	°C			
Read discharge temperature	U26	°C			
Read suction temperature	U27	°C			
Read controller software version	u99				

Notes:

Notes:

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