



Optyma™ iCO2

Quick start manual

114X6003: OP – UPAC 015 COP04E

114x6005: OP – UPAC 030 COP04E

118U5498: Module controller



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* Page references in brackets are pointing to instructions file AN405821998738

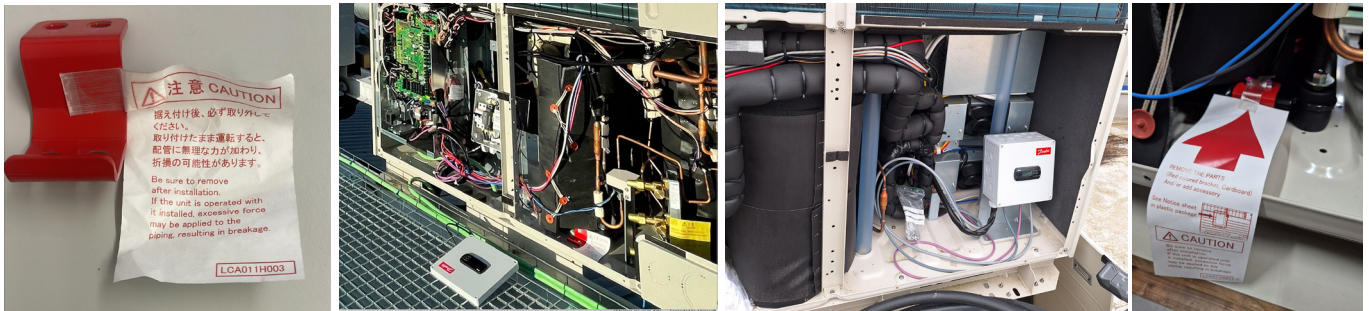
1. Transport (Page 7)

Move the condensing unit to its final destination and if possible, unpack the unit once in position to avoid transport damage.

2. Mechanical installation (Page 7-11)

Provide sufficient space around the condensing unit and fix the unit in position on appropriate support to avoid vibration. Connect the suction/liquid pipe and insulate both. Insulation fine tuning should be control and might require to be completed as show on the picture below. (ref 1)

Install the supplied liquid line filter dryer. Connect to max. 16 evaporators for 10HP and 24 evaporators for 20HP with AK-CC55 controls, Max. total 100m pipe length. Dismount Compressor red support how prevent damage during transport.



Maximum height difference evaporator(s) above condensing unit 5m.

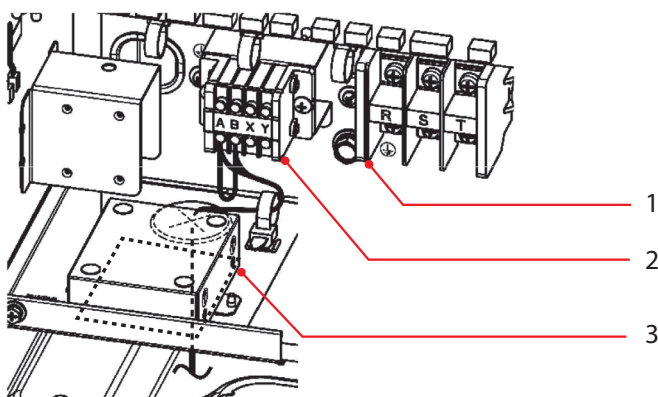
Maximum height difference evaporator(s) below condensing unit 22m.

Note: When using more than one evaporator – DO NOT install them above and below the condensing unit.

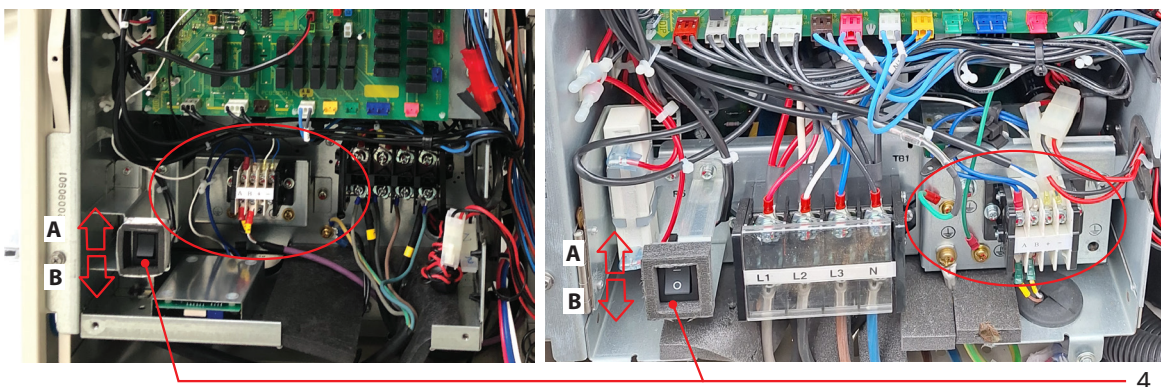
3. Remove lower front- and backside panels

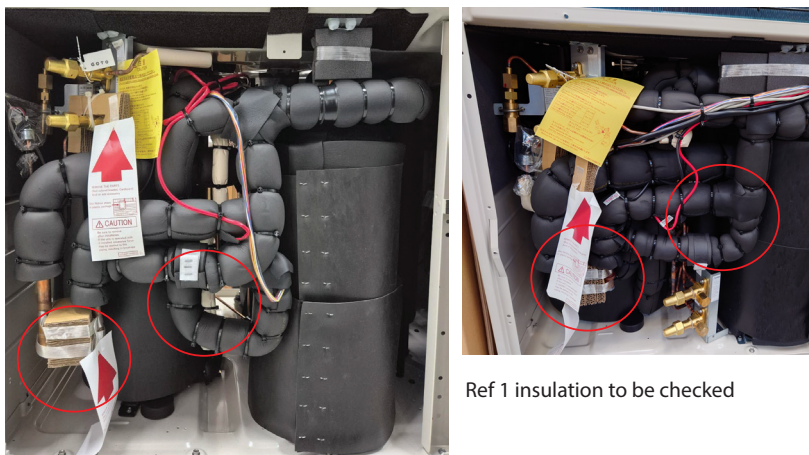
Electrical installation (Page 21-23): Provide proper power supply from grid via earth leakage breaker (10HP: ≥30A type B 30mA, 20HP: ≥50A type B 100mA), circuit

breaker (10HP: 25A, 20HP: 50A class C, contact gap cat.3), main switch and supply cable 5G10mm² (20HP: 16mm² for ambient temp. <40°C; 25mm² for ambient temp >40°C) and connect it to provided terminals (L1, L2, L3, N) and grounding screw (PE). Switch ON the power supply and leave the control switch (CNS2) OFF, to active the crankcase heater for at least 6 hours.



Legend	
1	Power supply
2	Modbus terminal
3	Interface board PCB
4	Control switch
A	ON
B	OFF





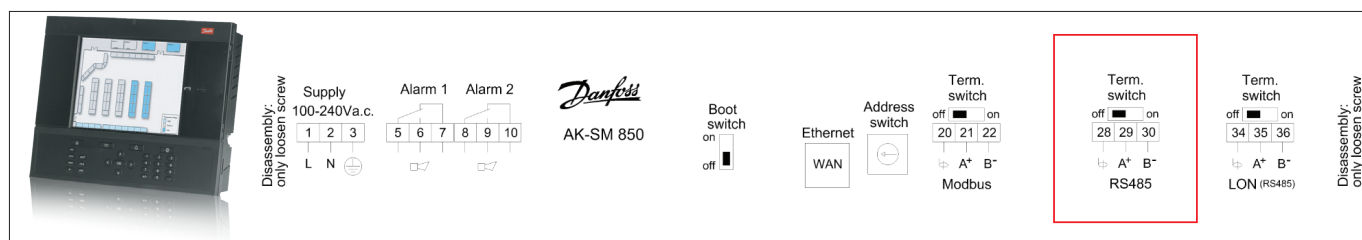
Ref 1 insulation to be checked

4. Module Controller installation (Page 22-23)

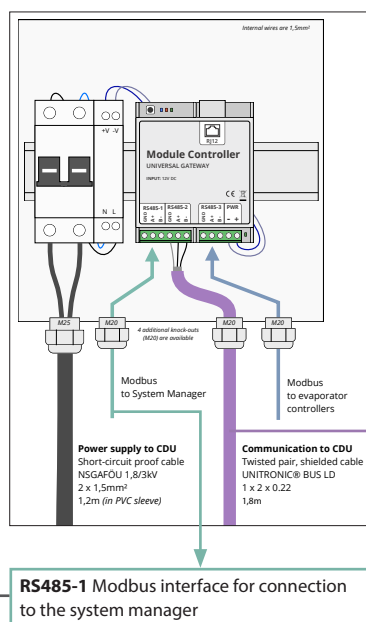
Install the Module Controller (MC) metal bracket beside the unit controller electrical box with self-tapping screws and install the Module Controller electrical box on this bracket.

Make the following connections for the Module controller:

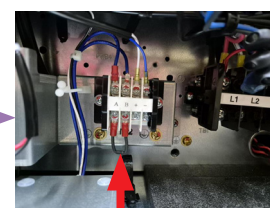
- Provided MC power supply cable with unit controller power supply terminals L1 and N.
- Provided MC Modbus cable RS485-2 with the unit controller Modbus PCB terminals A+ to A+ and B- to B-.
- MC Modbus terminals RS485-3 (terminated) in series with Modbus AK-CC55 evaporator controllers and terminate the last one as show on the below Schema (ref 2).
- Option if AK-SM800(A) installed: MC Modbus terminals RS485-1 (terminated) with System manager AK-SM800(A) as show on below schema (ref 3).



Power supply to CDU
230V AC 1,2m cable for this is included.
Caution: IF the cable needs to be replaced, it must be either be shortcircuit proof or it must be protected by a fuse on the other end



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



Keep this resistance wired

RS485-1 Modbus interface for connection to the system manager

5. Leak detection (Page 12-13)

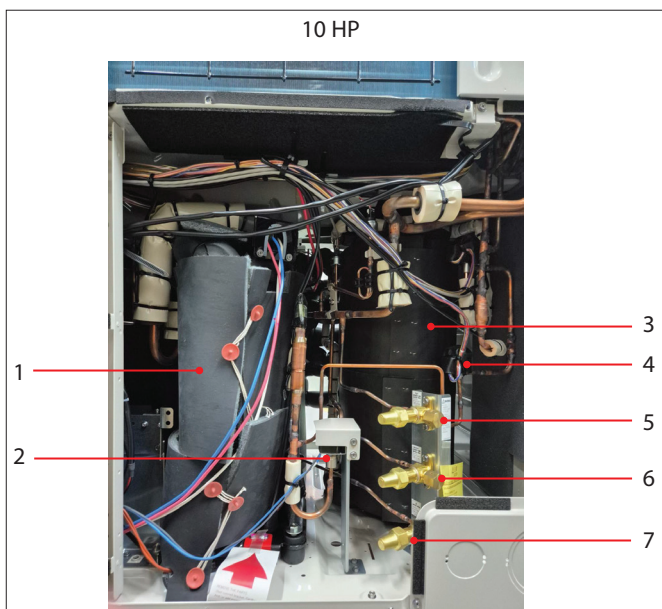
Open valves manually for pressure equalization, if no power supply, with a special magnet, on solenoid valve SV-INJ, or with connected power supply open stepper and solenoid valves via following procedure

- Unit power supply switched OFF
- Move DIP-switch 5-7 from OFF to ON position (upper position) to open the expansion valve
- Turn Unit power supply switch ON to open the stepper valves
- Test the system according applicable local regulation, (Europe: EN378-2 88Bar) - only charge nitrogen from the medium/high pressure service ports.
- Close the stop valve (connected to the safety valve) during air tightness test. The Pressur Relief Valve set point is 80 bar. After these test/charge process, ensure to open the stop valve and seal it with appropriate material to secure the unit. (See picture below)
- You can check all the pressure points in the system on the module controller by reading the U parameters – all should read the same if system is equalised in pressure.

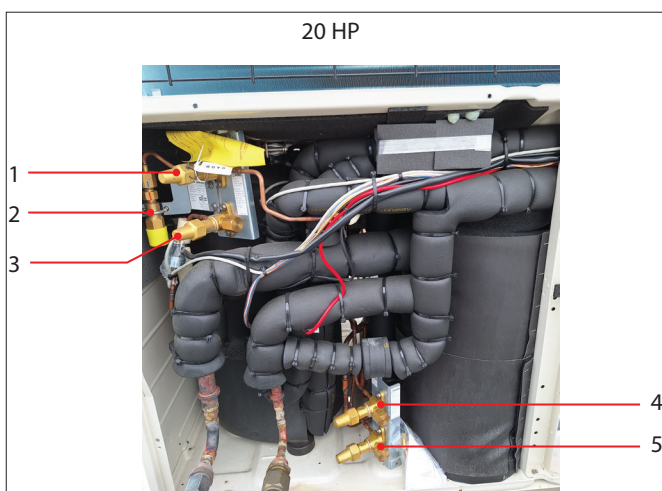
Note:

The condensing unit is pressure tested from the factory.

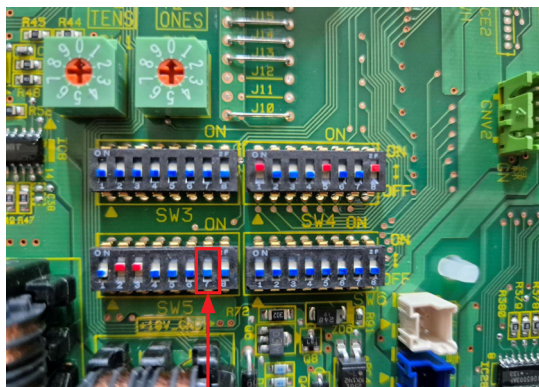
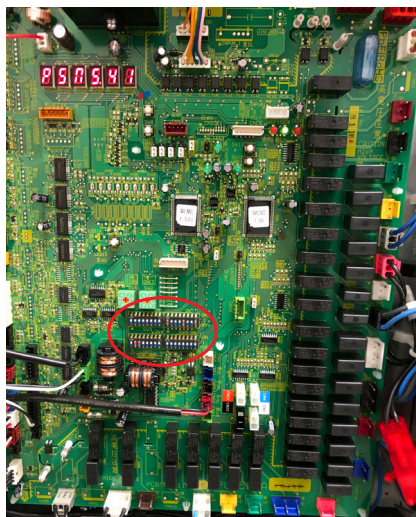
Be sure to test the field piping / evaporators at the correct pressure depending on evaporator M.W.P 60 or 80 bar.



Legend	
1	Compressor
2	Solenoid valve for middle pressure injection (SV-INJ)
3	Receiver of middle pressure
4	Receiver inlet expression
5	High pressure side service
6	Middle pressure side service
7	Oil service port



Legend	
1	Stop valve before pressure relief valve
2	Pressure relief valve
3	low pressure side service port
4	middle pressure side service port
5	oil service port



Magnet for manual valve opening

Sip Switch SW5 position 7 should be put ON (Upper position)

Set point

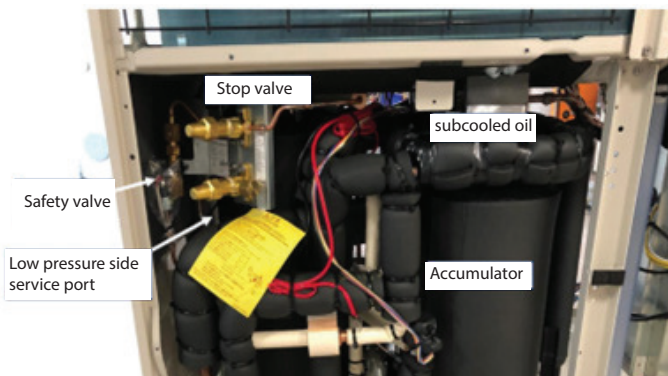
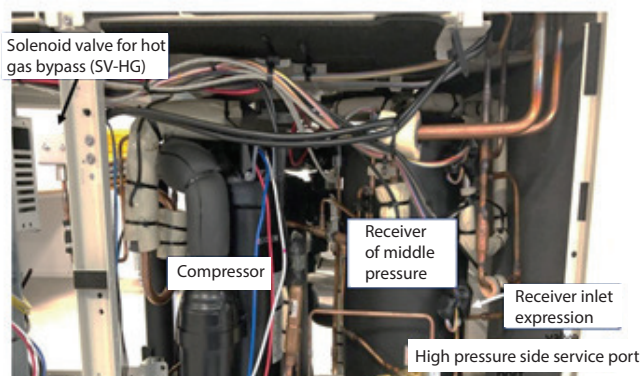
- The unit is already powered after leak detection
- During first Module Controller boot it will read the value from the CDU controller rotary switches and save this to r01 and r02
- Push upper button until display shows parameter menu code r01
- Select and change parameter r28 to 1, which force the MMILDS UI as the reference set device
- Select and change parameter r01 to the required lower pressure setpoint target in bar(gauge) (factory setting= CDU)
- Select and change parameter r02 to the required upper pressure setpoint target in bar(gauge) (factory setting=CDU)
- The arithmetic middle of r01 and r02 is the target suction pressure.
- The unit will not start yet but you can see all temperatures.

6. Vacuum dehydration (Page 13-17)

Valves are still open (with dip switch SW5 - 7) from leak detection step before.

Evacuate the system from suction port with a vacuum pump down to 0,67mbar (abs).

Note: 7 segment display and module controller only shows positive pressure so during vacuum it will display 0, Possible oil incorporate must be done at this stage for more convenience, please refer to application guideline or excel sheet inside CoolSelector)



Calculate additional oil charge with provided Excel table or formula provided in instructions and charge oil it from oil service port. Confirm correct oil level if unit controller par. C32 shows 110 (oil level sufficient). See page 7, how to operate unit controller display. Charge additional oil slowly if par. C32 shows continuous 010 (oil level low), or alarm code oPE88-1 or error code E88-1 appears from continuous low oil level during operation. Consider max. oil charge!
 C32 = 110 must be frequently checked on first days of operation and ref. circuit changes.

7. Refrigerant charge (Page 17-20; 23)

Calculate refrigerant charge with provided Excel table or formula in instructions. Consider calculated max. refrigerant charge! Never overcharge!

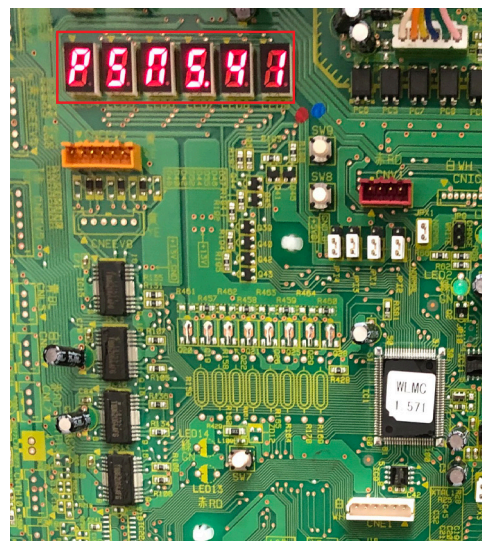
- Minimum CO2 charge is 10HP: 10Kg, 20HP: 15.7kg
- Unit power supply switched OFF
- Move DIP-switch 5-7 from ON to OFF position to close valve for vacuum mode
- Turn power ON
- You can double check with 7 segment PCB display to check situation of control valves open/close as required
- Charge in the middle pressure connection port
- Break the vacuum with refrigerant in gas phase
- Charge vapour until 7 bar to be sure to be above triple point and avoid dry ice
- Then charge 90% of calculated mass in liquid phase
- Charge additional refrigerant later while unit is running.
- Indication of sufficient charge while running ≥ 5 min.:
- Sub-cooling degree par. C46-C15 shall be ≤ 0 Kelvin (recommend 1...3 Kelvin).
- Subcooling expansion valve EEVSC par. C23 shall be fully open at 470 steps
- No bubbles visible on sight-glass, mounted directly before last evap. expansion valve (if mounted).
- During charging the evaporator controllers need to be operating

8. Controller setting (Page 23-29)

a) Condensing unit controller operation: The standard unit controller display shows rotating the low-, medium- and high-pressure data in MPa. Other parameters can be displayed and confirmed by the "unit control PCB" 7-segment display, LED's and operating buttons.

The display operation is performed by push buttons "SW7" to "SW9".

- SW9: Code display - tens digit setting button: Jump from parameter "C0x" to "C1x" ... "C9x", "P0x" ... "P9x" by pressing SW9 repeatedly.
- SW8: Code display - ones digit setting button: Jump from parameter "Cx0", "Cx1" ... "Cx9" or "Px0" ... "Px9" by pressing SW8 repeatedly.
- SW7: Data erase/write button:
 - Select the parameter to change via SW8/9.
 - Press SW7 for 3 seconds to activate erase / write mode. The display starts flashing 2Hz.
 - Press SW9 and/or SW8 to change the data.
 - Press SW7 for 3 seconds or more to store the changed data to EEPROM, and jump from data erase/write mode back to display mode.
 - The CDU is controlled from now on with the new parameter content.
 - The recorded content is retained even after the power is turned back on.
- Remark: The data erase/write mode will be terminated, if no switch input for 10 sec.



Following types of identification alphabets of the code display unit exist:

"C": C00 ... C99 Sensor-, Actuator-, Unit-, Control-, Error-counter information

"P": P00 ... P99 User- and Service-settings

"E": E00 ... E99 Error code information

„oPx" or oPE-X": Caution display

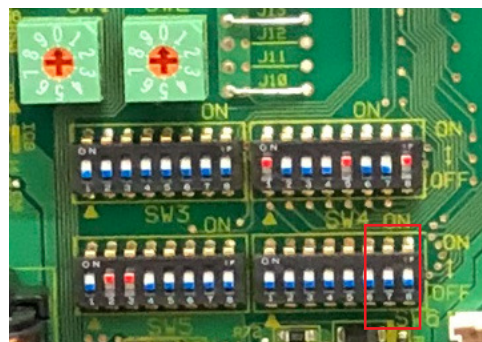
See full parameter lists with descriptions for inspection and servicing in instructions booklet and pasted on the e-box cover.

b) Alarm/Error code reset*:

- Press SW8 and SW9 will change display to "P20"
- Press SW7 for > 3seconds, 7-Segment display will start flashing
- Press SW8 to change alarm/error from 1 to 0
- *: Error reset can be done also via digital input (CNS3) activated with P08 = 3

Note:

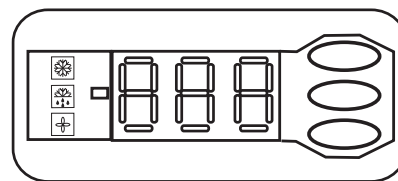
- Low pressure error cut-out at $LP \leq 5,8$ bar
- The factory setting is easily visible with all parameter OFF in blue and all parameter ON in red.



performed by three push buttons, upper, middle, and lower.

- Press upper button ~ 5 seconds to move from standard display to the 1st parameter r01
- Press upper or lower button to select other parameters
- Press middle button to display parameter value
- Press upper or lower button to modify a parameter
- Press middle button to confirm the modified value.

After 10 seconds without any action on push buttons jumps it back to standard display.



c) Start the condensing unit

- Configure the address in each evaporator controller.
- Perform a network scan in the module controller (n01).
- Verify that all evap. controllers have been found (lo01-lo16).
- Set condensing unit ON/OFF-switch to ON and Module controller par. R12 to 1 and CNS2 to ON, the unit will start running.

Remark: You will find a complete Parameter and Error code list with short explanation on instructions page 26-29, and on a sticker pasted on the e-box cover.

9. See more informative info in instructions

- Detailed explanation of CDU control (page 30-34):
- Checks before turning ON power supply (page 35-36):
- Trouble shooting / error codes (page 42-43):
- External Input installation (page 46):
- External output installation (page 47):

10. Notes

- Settings as delivered from factory
 - Main switch on PCB board will be 0 (CNS2)
 - Module controller will be R12 = 0
 - The unit controller is factory configured on parameter r28 to 1 which means the evaporating temperature can be set by the display on the module controller with parameters r01 & r02
- A joint (Reducer) to install on the service valve is included in the accessories
- Pressures displayed in unit controller in Mpa (1MPa = 10 bar)
- Pressures displayed in module controller in bar
- If the unit will only start by setting in the module controller (R12 = -1) it will not start & no alarms visible on either unit controller or module controller
- When operating with CO2, set MOP on case controller, and set to lowest room / cabinet temperature – it is useful to reduce liquid flood back to the compressor when all valves are opening.
- Do not overcharge with CO2 – risk of liquid flood back – check suction superheat by measuring return gas temperature on the suction strainer on the side of the compressor.
- U parameters on module controller

Service		
Read discharge pressure	u01	Pc
Read gascooler outlet temp.	u05	Sgc
Read receiver pressure	u08	Prc
Read receiver pressure in temperature	u09	Trc
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	



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