



Compressor Functional check & replacement process

SandenVendo February 2023

This document explains how to check function of the compressor and the process to replace it on condensing unit

SANDEN VENDO CDU-S / CDU-M and CDU-L

100% CO2 Condensing units

ECO-FRIENDLY REVOLUTION

References:

Type	Model
CDU-L	R06A2A R06A2B R06A2C
CDU-M	R04A1A R04A1B R04A1C R04A1D
CDU-S	R02A1A R02A1B R02A1D

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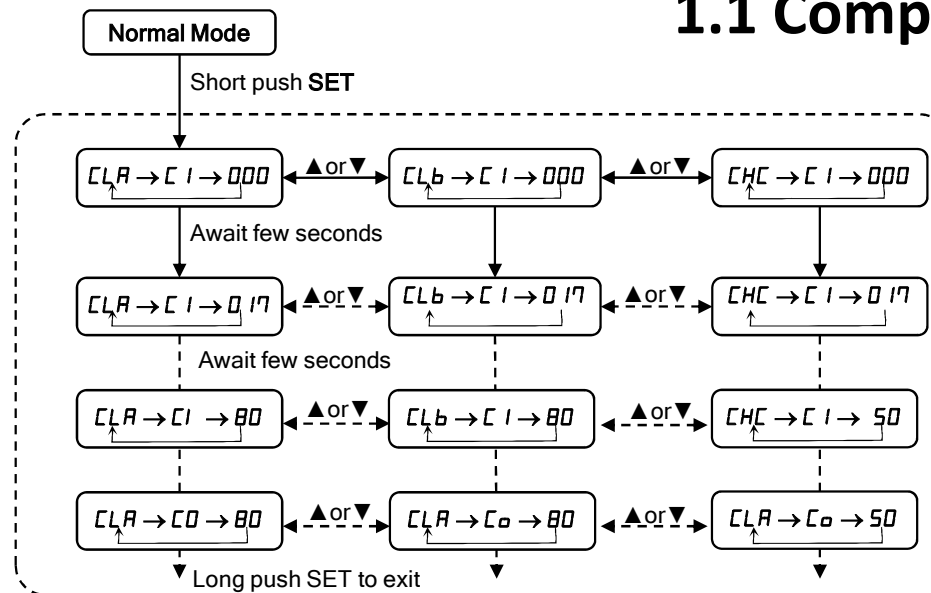
- 3. Compressor data

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1. Cold Demand is active. Switch off and then turn ON the CDU
2. Take control of the display in read mode
3. Select the loop to view & display the parameter Ci (compressor frequency)
4. Check that the compressor is performing its acceleration ramp from 0 to 80 Hz.
5. Check that the compressor rotation (Ci) is substantially equal to the target (Co)

1.1 Compressor start up check



Select the dedicated loop with the button ▲ or ▼

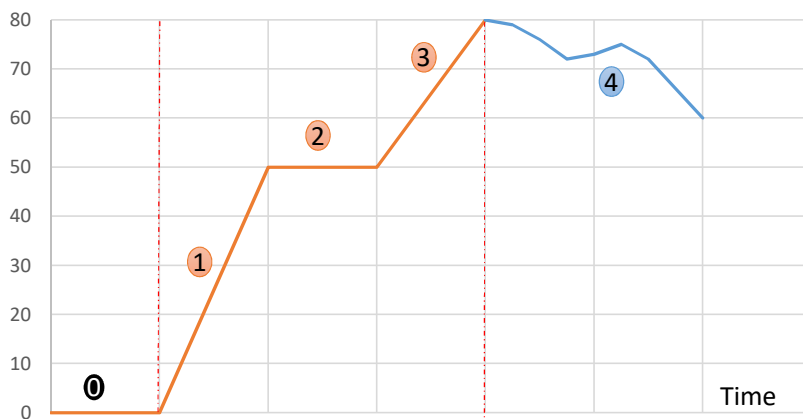
Check compressor actual frequency after few seconds

Check that compressor frequency Ci reach the level of 80hz on loop A & B.

Check that the actual compressor frequency (Ci) is nearly equal to the compressor target (Co)

Compressor speed (Hz)

Compressor start-up



0. Compressor off
1. The compressor starts and 1st acceleration ramp up to 50Hz (duration of this phase about 2min45sec)
2. Stationary phase, the speed remains fixed at 50Hz for 2 minutes in positive mode (MT mode) or 4 minutes in negative mode (LT mode)
3. 2nd acceleration ramp, the compressor will get the maximum speed 80Hz (duration of this phase about 1min40sec). If during this phase the Low Pressure has already reached its target value, the compressor may not reach its maximum speed and start controlling
4. Compressor enters speed control phase

1.2 Compressor do not start

If during the compressor rotation check, the value Ci remains at 0, then it is necessary to perform checks on the different electronic boards

1. Verification of absence or presence of error code ([in case of error code, refer to the guide : CDU Maintenance error code processing](#))
2. Power Supply Voltage Check (Power Terminal Block)
3. PCB Filter Voltage Check. ([See guide : CDU Maintenance PCB Filter](#))
4. PCB Inverter Voltage Check. ([See guide : CDU Maintenance PCB Inverter](#))

A compressor supply voltage problem should generate an error code on the display

Reason for not starting compressor with no error code

1. The compressor is in the course of short cycle delay (5min since the previous shutdown). Then perform a power cut to shorten this tempo in case of an observation test (make sure that the other compressors are also stopped in this case)
2. The front button is placed on OFF (cold demand cut)
3. The cooling demand is not active (setpoint achieved , or pause for defrosting)
4. The cooling demand is active but the signal does not reach the CDU correctly: then disconnect the cold demand at the terminal block CLA/CLB and test the closing of the contact from the regulator.

Note: Testing the closing of the cooling demand with the cable connected to CLA/CLB does not allow to conclude good operation. Indeed, the tester can beep with an internal continuity to the electronic circuit while the cold request contact is open. That's why it is necessary to test the closing of the contact with the cable disconnected from the CDU.

At the same time, place a simple shunt on the CLA/CLB terminal block activating the cold demand.

1. If the compressor starts, it is because the problem comes from the cold demand coming from the evaporator controller.
2. If the compressor does not start, test the continuity of the corresponding front button and check the correct connection of the cooling demand on the controller PCB. ([See guide : CDU Maintenance PCB Controller](#))
5. Cooling demand is active but the compressor makes low pressure cuts. This type of break has not always been reported on the display, this is the case since the SCU 8B8 MRT5 V1.01 program version (July 2022) with the E41 error
6. The circuit pressure is not sufficient to allow the compressor to start (LP < parameter value P08 and/or P84)
7. The compressor restarts before displaying an error (case of E10-H50 error after 3 attempts)

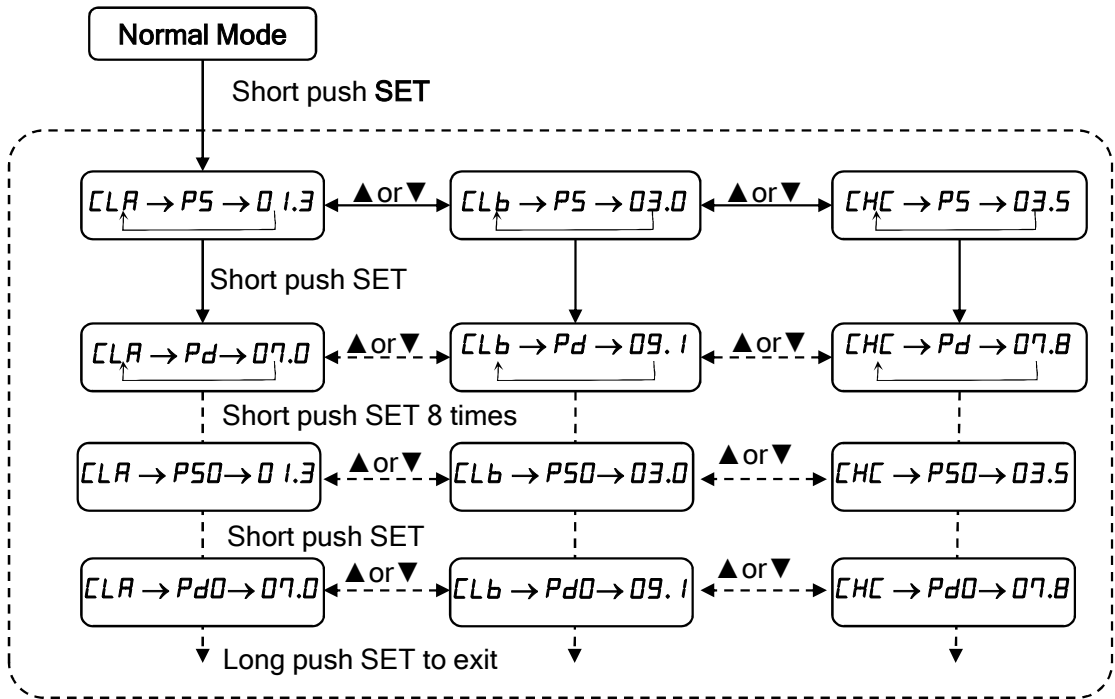
1.3 Compressor start-up and short cycle

Compressor starts but runs short cycles

1. Check that the fans are working properly: if one of the fans remains off, the compressors start a few seconds and then stop (before error E16 or E17 is displayed on the 3rd attempt)
2. Cold demand is not stable and the compressor performs random cycles (see previous point for cold demand verification)
3. The compressor performs short cycles linked to low pressure cuts (since the program version SCU 8B8 MRT5 V1.01, this type of cut is reported by error code E41)
 1. Low pressure cut at 20bar delayed after 20minutes of operation (Positive/MT mode)
 2. Low pressure cutoff at 15bar immediate (Positive/MT mode)
 3. Low pressure cut-off at 9bar delayed after 30minutes of operation (Negative/LT mode)
 4. Low-pressure cut-off at 4bar immediate (Negative/LT mode)
4. If during the compressor rotation check phase, the value Ci reaches 17 to 20Hz and relapses to 0 Hz then it is necessary to proceed with the replacement according to the procedure described in part 4.
The compressor tries to start but a mechanical blockage causes an overcurrent and stops the compressor acceleration ramp.

2.1 Compressor compression ratio check

1. Cold Demand is active. Switch off and then turn ON the CDU
2. Wait during few minutes that the compressor reach its maximum speed frequency (80Hz)
3. Take control of the display in reading mode
4. Select the dedicated loop and show the parameter Ps (LP suction pressure) & Pd (HP discharge pressure)
5. Check that there is real difference between LP & HP
6. Check that Ps is nearly equal to the target Ps0
7. Check that Pd is nearly equal to the target Pd0



On the example below :

LP loop A (PS) = Target LP (PS0) = 1.3MPa
 LP loop B (PS)= Target LP (PS0) = 3.0MPa
 LP loop C (PS) = Target BP (PS0) = 3.5MPa

HP loop A (Pd) = Target HP (Pd0) = 7.0MPa
 HP loop B (Pd) = Target HP (Pd0) = 9.1MPa
 HP loop C (Pd) = Target HP (Pd0) = 7.8MPa

2.2 Compression ratio too low

If during the compression ratio check phase, the suction pressure value P_s (LP) and the discharge pressure P_d (HP) are nearly equal, then it's necessary to replace the compressor following the procedure described in part 4.

It's possible that some internal parts of the compressor are damaged causing an internal leak and impossibility of pressure rise.

If during the compression ratio check phase the P_s (LP) and P_d (HP) values are substantially equal, then it is necessary to perform the replacement according to the procedure described in part 3.

It is possible that internal parts of the compressor are damaged causing internal leakage and an inability to increase pressure.

In other cases there is a compression ratio between HP and LP, however:

- Low pressure (P_s) has trouble reaching the target value (P_{s0}), so the compressor remains at a high speed ($C_i=80\text{Hz}$)
- And/or High Pressure (P_d) has difficulty reaching the target value (P_{d0}), so the EEV of the loop tends to indicate a low opening value (Tr)



This indicates in priority a compressor weakness. However, these symptoms may be associated with the EEV being locked open ([See guide : CDU Maintenance EEV](#))

2.3 Compression ratio too high

If during the compression ratio check phase, the suction pressure value P_s (LP) and/or the discharge pressure P_d (HP) are very far from their target values P_{s0} et P_{d0} , then it's necessary to verify :

- the R744 load (too high or too low superheat)
- the function of the expansion valve of the different cabinet /cold chamber
- the function of the relevant EEV inside de CDU ([See guide : CDU Maintenance EEV](#))

3. Data compressor

	Sanden	Panasonic
Compressor reference	SHC040B2403 / 82001-40010	8CS044ZAC64 / 91001-72160
Product reference	CDU-S R02A1A / R02A1B CDU-M R04A1A / R04A1B CDU-L R06A2A / R06A2B	CDU-S R02A1D CDU-M R04A1C / R04A1D CDU-L R06A2C
Manufacturing	Japon	Italie
Coil resistance	1,177 Ω between terminals U- V-W	0,802 Ω between terminals U-V-W
Insulation resistance under 500Vdc	> 25 M Ω between terminal U-V-W and compressor frame (Measure with a Megaohmmeter)	
Compressor wiring		

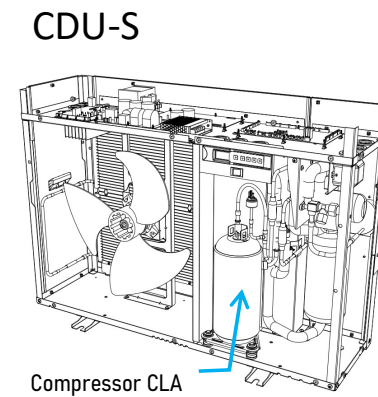
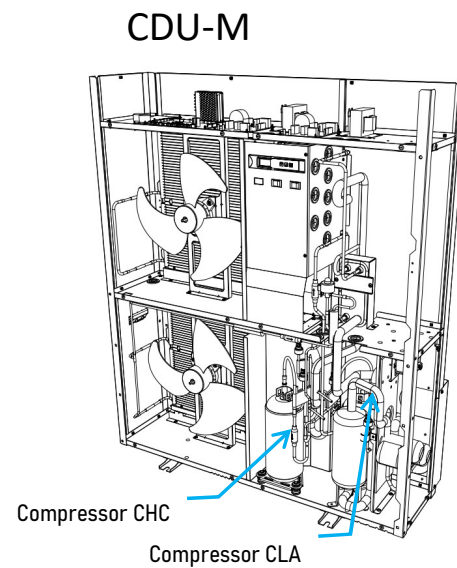
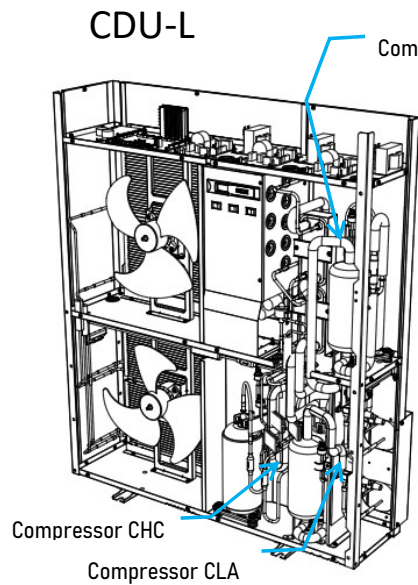
*it is important to respect the compressor wiring. Bad wiring causes a compressor failure.
Products powered by three-phase 400V do not require a phase controller

3. Compressor replacement procedure



Before replacing the compressor it's important to check that :

- CDU power supply is switched off
- The compressor switch on front panel is in OFF position





3. Compressor replacement process

1. Remove the refrigerant through the service valves.
2. Check that low pressure and high pressure value are at 0 MPa
3. Check that power supply is switched OFF.
4. Remove the wire protection cap and disconnect the 3 cables. (blue/white/red)
5. To replace the compressor, unbrazed the suction and discharge pipes.
6. Prepare a flat area to store the compressor (compressor weight 15kg)
7. Untightened the 3 nuts and remove compressor.
8. Install the new compressor and tightened the 3 nuts.
9. Brazed the suction and discharge pipes by using nitrogen (be careful to not clogged the pipes by adding too much brazing material)
10. Check the sealing of the system by nitrogen and then vacuum (check CDU Guide piping instruction).
11. Reconnect the compressor harness and reassemble the protection cap (*Important to respect the compressor wiring depending on compressor type Sanden or Panasonic*) .
12. Power up the system.
13. Check that no error code appear on the display .
14. Fill the refrigerant R744 into the circuit (start with 80% of the load).
15. Start the compressor with the front switch
16. Complete the R744 load and adjust if needed.