



## Instructions

### Basic connections

- Depending on the frequency converter version, the physical position of individual connectors may differ from below diagram.
- Always make sure that the compressor terminals T1, T2, T3 are connected to the frequency converter terminals 96, 97, 98 respectively.
- The compressor motor cable must be shielded

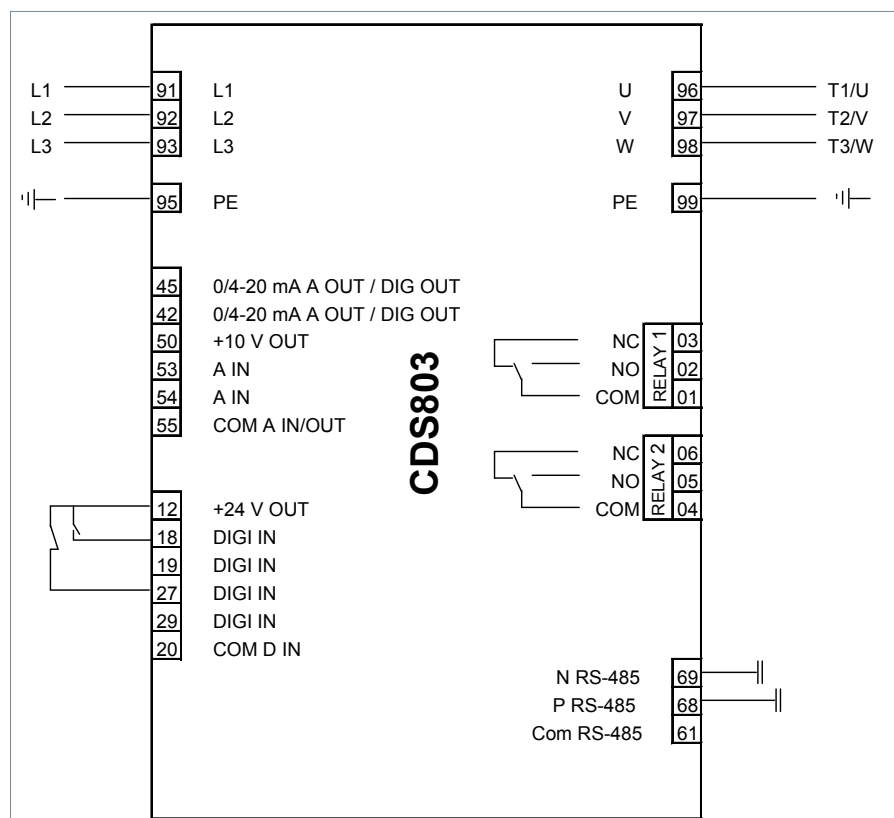
and the armoured part must be connected to ground on both cable ends; at the side of the compressor and at the side of the frequency converter.

- Use an EMC cable gland for cable installation and perfect grounding; The metallic terminal box of the compressor has a paint-free surface around

the connection hole for better conductivity.

**-A low pressure safety switch is mandatory to avoid compressor vacuum operation.**

- At start-up, verify that the compressor rotates in the right direction and pumps.



#### Legends:

Ana:	Analogue
Dig:	Digital
in:	Input
out:	Output
COM:	Common
NC:	Normally-closed
NO:	Normally-open

		Open loop	Process loop
91,92,93	3 phases mains input	x	x
95	Earth	x	x
42,45	0/4-20 mA Analogue Output or Digital Output	-	-
50	+10V DC Output	-	-
53	0-10V or 4-20mA Analogue Input	x	-
54	0-10V or 4-20mA Analogue Input	-	x
55	Com Analogue In/Out	x	-
12	+24V output	-	-
18	External On/Off(NO)	x	x
19	Digital Input	-	-
27	Safety Device	x	x
29	Digital Input	-	-
20	Com Digital Input	-	-
98	To Compressor T3	x	x
97	To Compressor T2	x	x
96	To Compressor T1	x	x
99	Earth	x	x
03,02,01	Relay 1	-	-
06,05,04	Relay 2	-	-
69,68	RS485 Bus	-	-
61	RS485 Bus Com	-	-

-: Optional connection  
X: Mandatory connection

The CDS803 frequency converter is factory preset with parameters for the open loop control principle. The process loop control principle can be selected by changing parameters in the «Quick menu».

Open loop: preset on input 53  
0 - 10 V control

Frequency converter in slave mode  
Process loop: preset on input 54  
4 - 20 mA control

Frequency converter under own PID controller

## Instructions

### 1 – Introduction

These instructions pertain to the VLZ028-VLZ044 variable scroll compressors used for air-conditioning and reversible heat pump systems in residential applications. They provide necessary information regarding safety and proper usage of this product.

### 2 – Handling and storage

- Handle the compressor with care. Use the dedicated handles in the packaging. Use the compressor lifting lug and use appropriate and safe lifting equipment.
- Store and transport the compressor in an upright position.
- Store the compressor between -35°C and 55°C / -31°F and 131°F.
- Don't expose the compressor and the packaging to rain or corrosive atmosphere.

### 3 – Safety measures before assembly

- ⚠ Never use the compressor in a flammable atmosphere.
- The compressor ambient temperature may not exceed 55°C during off-cycle.
- Mount the compressor on a horizontal flat surface with less than 7° slope.
- When installing a compressor model VLZ, use equipment specifically reserved for HFC refrigerants, which was never used for CFC or HCFC refrigerants.
- Use clean and dehydrated refrigeration-grade copper tubes and silver alloy brazing material.
- Use clean and dehydrated system components.
- The piping connected to the compressor must be flexible in 3 dimensions to dampen vibrations.
- The compressor must always be mounted using the rubber grommets supplied with the compressor.

### 4 – Assembly

- Slowly release the nitrogen holding charge through discharge and suction ports.
- Connect the compressor to the system as soon as possible to avoid oil contamination from ambient moisture.
- Avoid material entering into the system while cutting tubes. Never drill holes where burrs cannot be removed.
- Braze with great care using state-of-the-art technique and vent piping with nitrogen gas flow.
- Connect the required safety and control devices.

### 5 – Leak detection

- ⚠ Never pressurize the circuit with oxygen or dry air. This could cause fire or explosion.
- Do not use leak detection dye.
- Perform a leak detection test on the complete system.

- The low side test pressure must not exceed 31 bar /450 psi.
- When a leak is discovered, repair the leak and repeat the leak detection.

### 6 – Vacuum dehydration

- Never use the compressor to evacuate the system.
- Connect a vacuum pump to both the LP & HP sides.
- Pull down the system under a vacuum of 500 µm Hg (0.67 mbar) / 0.02 inch Hg absolute.
- Do not use a mega ohmmeter nor apply power to the compressor while it is under vacuum as this may cause internal damage.

### 7 – Electrical connections

- Switch off and isolate the main power supply.
- Before touching any potentially live part of the drive, wait at least 4 minutes.
- The compressor is protected against excess current by the frequency converter. Follow local regulations regarding power line protection. The compressor must be connected to ground.
- Use 6.3 mm tabs for quick connect spade terminals.
- Use a self-tapping screw to connect the ground conductor to the compressor.
- Care must be taken during installation to ensure that the compressor operates in the correct direction. T1 (U), T2 (V) and T3 (W) terminals of compressor and drive U, V, W must match. Please refer to drawings for typical wiring connections and examine the specific wiring diagram located in the frequency converter package. For further details, refer to the application guidelines.
- Mounting: The base frame of the frequency converter must be very well fixed to the support to ensure a very good continuity between the ground potential of all electrical panels and electrical boxes of the system.
- Wiring: All control wires have to be of a screened design. The cable for electrical motor supply has to be of a shielded design as well. Correct earthing of the shield cover has to be done using the method shown on drawings, every time this one has to be earthed on each end of the cables. Distinct cable trays must be used for control and motor supply.
- The frequency converter ensures direct motor protection and the factory set parameters are such to protect the motor over all current malfunctions. An external overload is not necessary.
- Set the frequency converter parameters in accordance with Danfoss recommendations for the CDS803 frequency converter and VLZ variable speed compressor.
- Refer to variable speed drive manual for electrical connections details and installation.

- Compressor motor protection is provided by the variable speed drive.

### 8 – Filling the system

- Keep the compressor switched off.
- Fill the refrigerant in liquid phase into the outlet of the condenser or the liquid receiver. The charge must be as closed as possible to the nominal system charge to avoid low pressure operation and excessive superheat. For VLZ028-044, the refrigerant charge limit is 3.6kg. Above this limit; protect the compressor against liquid flood-back with a pump-down cycle not lower than 1.1 bar(g) for R448A/1.1 bar(g) for R449A/ 1.6 bar(g) for R404A or a suction line accumulator.
- Never leave the filling cylinder connected to the circuit.

### 9 – Verification before commissioning

- ⚠ Use safety devices such as safety pressure switch and mechanical relief valve in compliance with both generally and locally applicable regulations and safety standards. Ensure that they are operational and properly set.
- ⚠ Check that the settings of high-pressure switches do not exceed the maximum service pressure of any system component.
- A low-pressure switch is mandatory to avoid vacuum operation.

Refrigerant		R448A	R449A	R404A
Min. low pressure safety switch setting	bar(g)	0.8	0.8	1.3

- Verify that all electrical connections are properly fastened and in compliance with local regulations.
- When using a dome sensor, ensure the dome sensor is correctly installed and fitted into bracket on top of the shell. The sensor need to be well connected, especially after maintenance operations.
- After commissioning it is strongly recommended to keep the frequency converter always energized.

### 10 – Start-up

- Never start the compressor when no refrigerant is charged.
- Do not provide any power to the drive unless suction and discharge service valves on compressor are open, if installed.
- Energize the drive. The compressor must start, according to defined ramp-up settings. If the compressor does not start, check wiring conformity.
- Check the frequency converter control panel: If any alarm is displayed check the wiring and in particular the polarity of the control cables. If an alarm is shown, refer to the frequency converter application manual. Verify in particular the combination of compressor, frequency converter and refrigerant.

- Check current draw and voltage levels on the mains. The values for the compressor electrical motor can be directly displayed on the frequency converter control panel.
- The optimum compressor suction superheat is around 6K.
- Eventual reverse rotation can be detected by following phenomena; the excessive noise, no pressure differential between suction and discharge, and line warming rather than immediate cooling. A service technician should be present at initial start-up to verify that wiring from drive to compressor is properly phased and that the compressor is rotating in the correct direction.
- Note that a 300 seconds period is necessary between 2 starts, a shorter period will be not allowed by the drive. The minimum running time is 12s for each start.

#### 11 – Check with running compressor

- ⚠ Check current draw and voltage. Measurement of amps and volts during running conditions must be taken at other points in the power supply, not in the compressor electrical box.
- Check suction superheat to reduce risk of slugging.
  - Observe the oil level at start and during operation to confirm that the oil level remains visible. Excess foaming in oil sight glass indicates refrigerant on the sump.
  - Monitor the oil sight glass for 1 hour after system equilibrium to ensure proper oil return to the compressor. This oil check has to be done over the speed range to guarantee:
    - a good oil return at low speed with minimum gas velocity.
    - a good oil management at high speed with maximum oil carry over.
  - Respect the operating limits.
  - Check all tubes for abnormal vibration. Movements in excess of 1.5 mm / 0.06 inch require corrective measures such as tube brackets.
  - When needed, additional refrigerant in liquid phase may be added in the low-pressure side as far as possible from the compressor. The compressor must be operating during this process.
  - Do not overcharge the system.
  - Never release refrigerant to atmosphere.
  - Before leaving the installation site, carry out

a general installation inspection regarding cleanliness, noise and leak detection.

- Record type and amount of refrigerant charge as well as operating conditions as a reference for future inspections.
- Compressor failure to build up pressure: Check all bypass valves in the system to ensure that none of these has been opened. Also check that all solenoid valves are in their proper position.
- Abnormal running noise: Ensure the absence of any liquid flood-back to the compressor by means of measuring the return gas superheat and compressor sump temperature. The sump should be at least 6K above the saturated suction temperature under steady-state operating conditions.
- The high-pressure switch trips out: Check condenser operations (condenser cleanliness, fan operation, water flow and water pressure valve, water filter, etc.). If all these are OK, the problem may be due to either refrigerant overcharging or the presence of a noncondensable (e.g. air, moisture) in the circuit.
- The low-pressure switch trips out: Check evaporator operations (coil cleanliness, fan operations, water flow, water filter, etc.), liquid refrigerant flow and pressure drops (solenoid valve, filter dryer, expansion valve, etc.), refrigerant charge.
- Low refrigerant charge: The correct refrigerant charge is given by the liquid sight glass indication, the condenser delta T in relation to the refrigerant pressure tables (pressure-temperature), the superheat and the sub-cooling, etc. (if additional charge is deemed necessary, refer to section 8).
- Compressor short cycling: The number of cycles shall never exceed 6 starts per hour.

#### 12 – Maintenance

⚠ Internal pressure and surface temperature are dangerous and may cause permanent injury. Maintenance operators and installers require appropriate skills and tools. Tubing temperature may exceed 100°C / 212°F and can cause severe burns.

⚠ Ensure that periodic service inspections to ensure system reliability and as required by local regulations are performed.

To prevent system related compressor problems,

following periodic maintenance is recommended:

- Verify that safety devices are operational and properly set.
- Ensure that the system is leak tight.
- Check the compressor current draw by reading one of the parameters via Modbus.
- Confirm that the system is operating in a way consistent with previous maintenance records and ambient conditions.
- Check that all electrical connections are still adequately fastened.
- Keep the compressor clean and verify the absence of rust and oxidation on the compressor shell, tubes and electrical connections.
- Acid / moisture content in system and oil should be checked regularly.

#### 13 - Warranty

Always transmit the model number and serial number with any claim filed regarding this product.

Use the fault memory of the frequency converter to recover the fault descriptions before initializing the system and even before shutting off the power.

Variable speed drive model and serial number must also be transmitted with the claim.

The product warranty may be void in following cases:

- Absence of nameplate.
- External modifications; in particular, drilling, welding, broken feet and shock marks.
- Compressor opened or returned unsealed.
- Rust, water or leak detection dye inside the compressor.
- Use of a refrigerant or lubricant not approved by Danfoss.
- Any deviation from recommended instructions pertaining to installation, application or maintenance.
- Use in mobile applications.
- Use in explosive atmospheric environment.
- No model number or serial number transmitted with the warranty claim.

#### 14 – Disposal



Danfoss recommends that compressors and compressor oil should be recycled by a suitable company at its site.