**Instructions**

Danfoss scroll compressors

**PSH051-064-077**

1: Discharge temperature sensor (supplied but need to be connected)
2: Liquid Injection Valve (supplied)
3: Liquid Injection Valve connection 1/4” OD F
4: Surface Sump Heater (SSH) (supplied)
5: Rigid mounting spacer (supplied)

Danfoss scroll compressors PSH051-064-077 come equipped with an electronic board OCS (Operating Control System) protecting against phase loss/reversal, motor overheating, high current draw, and giving extra features such as liquid injection, discharge temperature protection, envelope monitoring, data storage, bus communication and crankcase heater control.

**1 – Introduction**

These instructions pertain to the PSH scroll compressors used for heat pump and air-conditioning systems. They provide necessary information regarding safety and proper usage of this product.

**2 – Handling and storage**

- Handle the compressor with care. Use the compressor lifting lugs and use appropriate and safe lifting equipment.
- Avoid any shocks to the liquid injection valve during handling operations.
- Store and transport the compressor in an upright position.
- Store the compressor between -35°C and 51°C.
- Don’t expose the compressor and the packaging to rain or corrosive atmosphere.
- The compressor ambient temperature may not exceed 50°C during off-cycle.
- Mount the compressor on a horizontal flat surface with less than 3° slope.
- Verify that the power supply corresponds to the compressor motor characteristics (see nameplate).
- When installing PSH, 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.

**3 – Safety measures before assembly**

- Never use the compressor in a flammable atmosphere.
- The compressor must be handled with caution in the vertical position (maximum offset from the vertical: 15°).
- The compressor is delivered under nitrogen gas pressure (between 0.3 and 0.7 bar) and hence cannot be connected as is; refer to the «assembly» section for further details.
- The compressor must only be used for its designed purpose(s) and within its scope of application (refer to «operating limits»). Consult Application guidelines and datasheet available from cc.danfoss.com
- Under all circumstances, the EN378 (or other applicable local safety regulation) requirements must be fulfilled.

**4 – Assembly**

- In parallel assemblies of PSH the compressor

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**Legend:**

- Fuses: 
- Control relay: 
- Safety lock out relay: 
- Optional short cycle timer (3 min): 
- Compressor motor: 
- Thermistor chain: 
- Safety pressure switch: 
- Control device: 
- Operating Control System: 
- Factory charged lubricant: 
- Housing service pressure: 
- Supply voltage, Starting current & Maximum operating current: 
- Model number: 
- Serial number: 
- Refrigerant: 
- Discharge temperature sensor: (supplied but need to be connected)
requires a rigid mounting on the rails. Use the pre-mounted rigid spacers.

- Slowly release the nitrogen holding charge through the schrader port.
- 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.
- Brace with great care using state-of-the-art technique and vent piping with nitrogen gas flow.
- Connect the required safety and control devices. When the schrader port is used for this, remove the internal valve.
- The air filter must be fed by liquid, picked-up on the liquid line of the system, downstream the filter drier.
- Protect the compressor and the liquid injection valve against heat while brazing the liquid line.

5 – Leak detection

\[ \text{Never pressurize the circuit with oxygen or dry air. This could cause fire or explosion.} \]

- Pressurize the system on HP side first and then on LP side. Never let the pressure on LP side exceed the pressure on HP side with more than 5 bar. Such pressure difference could cause internal compressor damage.
- Do not use dye for leak detection.
- Perform a leak detection test on the complete system.
- The test pressure must not exceed:
  - Models PSH051.064 30 bar 48 bar
  - 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 \( \mu \text{Hg} \) (0.67 mbar) absolute.
- Do not use a megohmmeter 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.
- All electrical components must be selected as per local standards and compressor requirements.
- The ambient temperature only works correctly in one rotation direction. Line phases L1, L2, L3 must absolutely be connected to compressor terminals T1, T2, T3 to avoid reverse rotation.
- Use a 4.8 mm (3/16") screws and ¼” ring terminals for the power connection. Fasten with 3 Nm torque.
- The compressor must be connected to earth with the 5 mm earth terminal screw.
- Connect the discharge temperature sensor cable plug to the sensor on the compressor top shell.

8 – Filling the system

- Connect the OCS to power supply and earth.
- Connect the low pressure (LP) and high pressure (HP) transmitters to the OCS. These are mandatory for the operating envelope monitoring function.
- Only one set of LP/HP transmitters is mandatory for manifolds.
- Connect the M1-M2 control circuit to the OCS.
- Further connections to the OCS are factory-prepared; DGT sensor (Discharge Gas Temperature), Heater (Surface Sump Heater), motor protection, phase monitoring, LIV valve (liquid injection valve). The connector positions are written on the OCS protection cover.

\[ \text{To avoid personal injury, with 230V OCS, do not forget to connect the earth, and to check for earth continuity.} \]

9 – Verification before commissioning

\[ \text{Use safety devices such as safety pressure switch and mechanical relief valve in compliance} \]

- Check that the settings of high-pressure switches and relief valves don’t exceed the maximum service pressure of any system component.
- A low-pressure switch is recommended to avoid vacuum operation. Minimum setting for PSH: 2.1 bar g.
- Verify that all electrical connections are properly fastened and in compliance with local regulations.
- Ensure that the liquid injection valve (LIV) coil is correctly positioned on the LV body: one of the lock pins on the coil must fit into one of the dents on the valve body.

10 – Start-up

- Never start the compressor when no refrigerant is charged.
- All service valves must be in the open position.
- Balance the HP/LP pressure.
- Energize the compressor. It must start promptly. If the compressor does not start, check wiring conformity and voltage on terminals.
- If the internal pressure relief valve is opened (PSH), the compressor will trip out on the motor protector.

11 – Check with running compressor

- Check current draw and voltage.
- Check suction superheat to reduce risk of slugging.
- Observe the oil level in the sight glass for about 60 minutes to ensure proper oil return to the compressor.
- Check all tubes for abnormal vibration. Movements in excess of 1.5 mm 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.
- Before leaving the installation site, clear eventual warnings and alarms in the OCS to facilitate future maintenance checks.

12 – Maintenance

\[ \text{Internal pressure and surface temperature are dangerous and may cause permanent injury.} \]

- 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.
- 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.
- Check and clear alarms and warnings.
- Check correct operation of the surface sump heater.

13 – Warranty

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