Danfoss DSH Scroll Compressors Instructions

Contents [hide

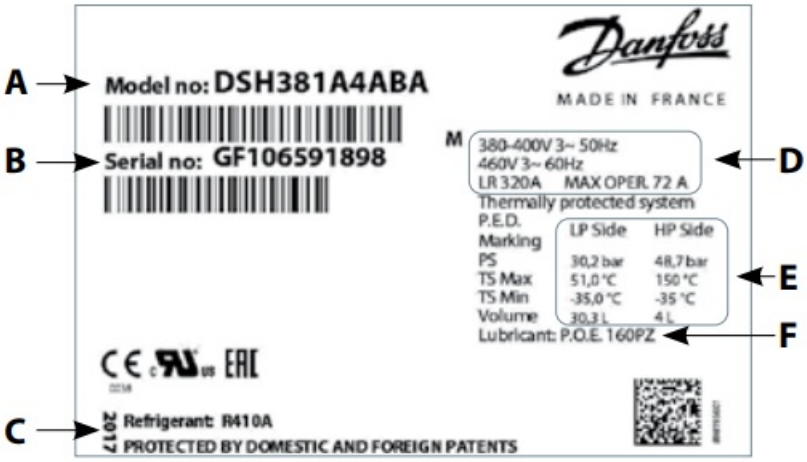
Danfoss DSH Scroll Compressors

Introduction

These instructions pertain to the Danfoss scroll compressors DSH, SM, SY, SZ, SH & WSH scroll compressors used for air-conditioning systems. They provide necessary information regarding the safety and proper usage of this product.

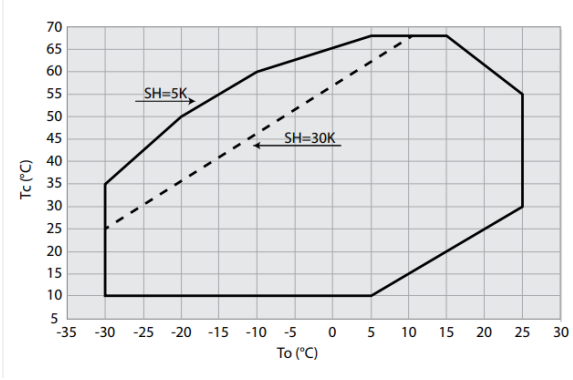
Nameplate

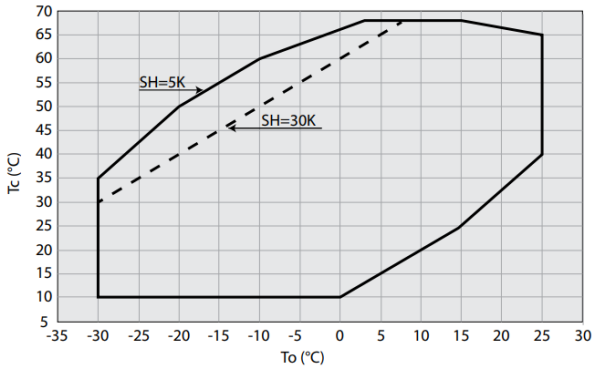
Installation and servicing of the compressor by qualified personnel only. Follow these instructions and sound refrigeration engineering practices relating to installation, commissioning, maintenance and service.



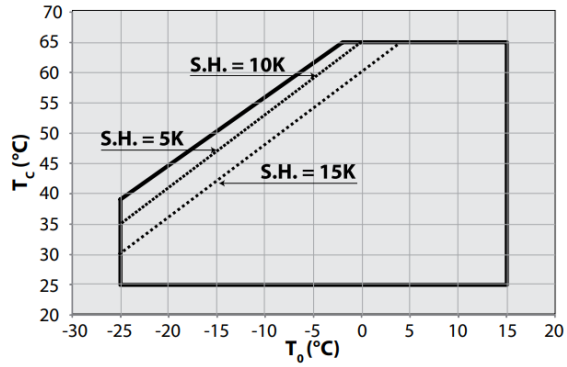
Operating map

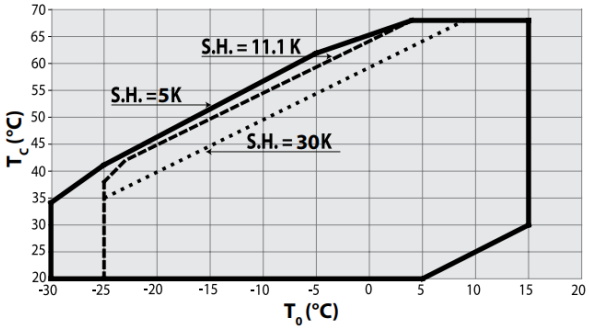
R410A – DSH090-184
R410A – DSH240-600





R410A – WSH
R410A – SH

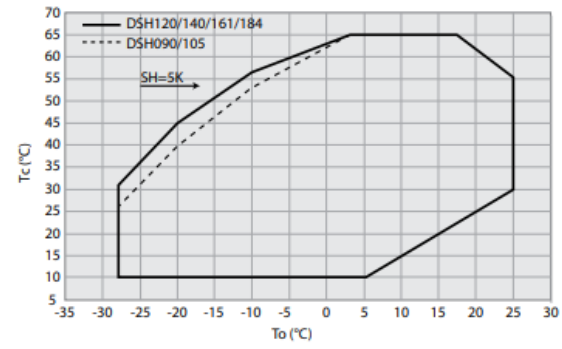


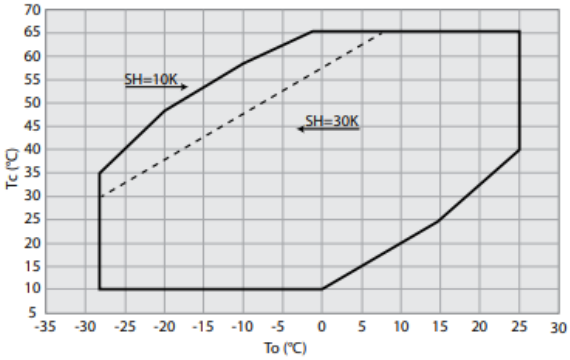


The compressor must only be used for its designed purpose(s) and within its scope of application (refer to «operating limits»). Consult Application guidelines and datasheet available from cc.danfoss.com
Under all circumstances, the EN378 (or other applicable local safety regulation) requirements must be fulfilled.
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 be handled with caution in the vertical position (maximum offset from the vertical: 15°)

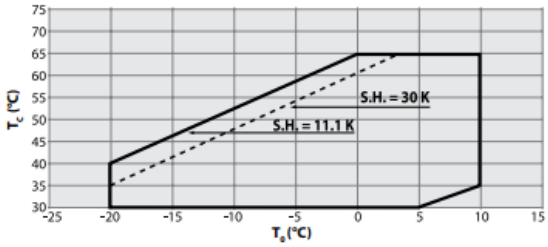
Instructions

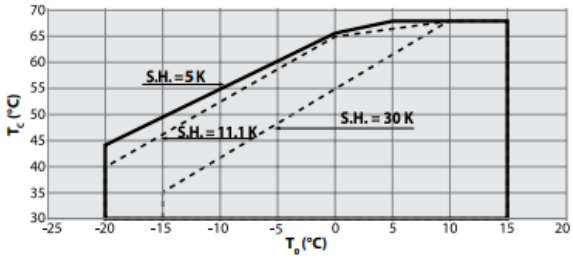
R452B / R454B DSH090-184 (dedicated references)
R452B / R454B – DSH240-485 (dedicated references)





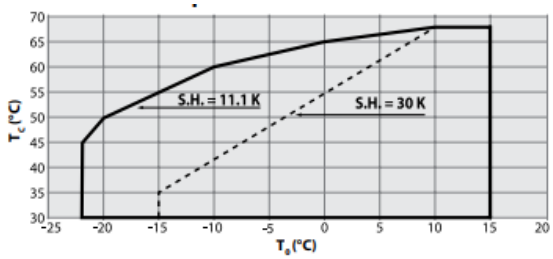
R404A & R507A – SZ084-185
R22 & R417A – SM – SY

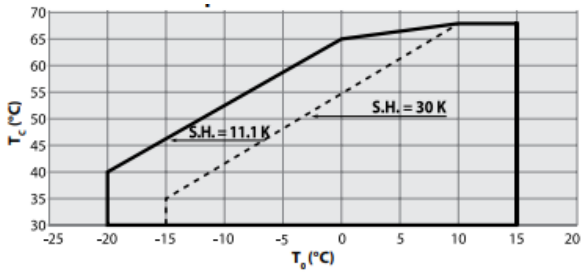




R407C Dew point Conditions – SY240-380

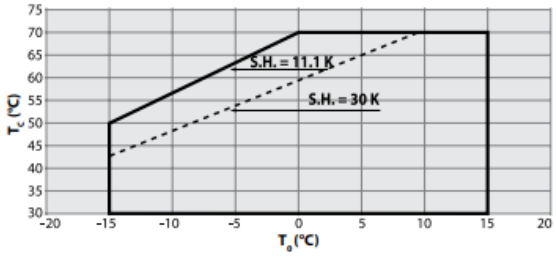
R407C Dew point Conditions – SZ084-185

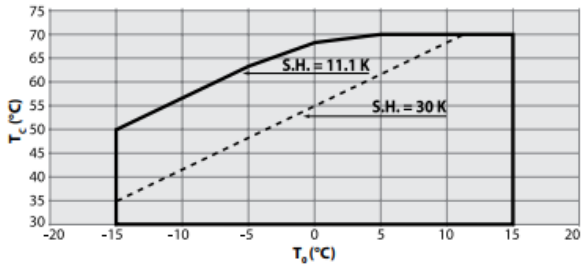




R134a – SZ084-185

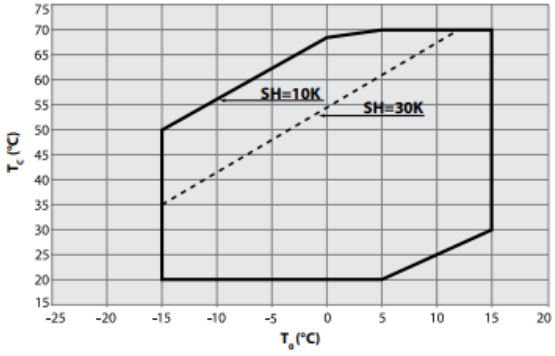
R134a – SY240-380

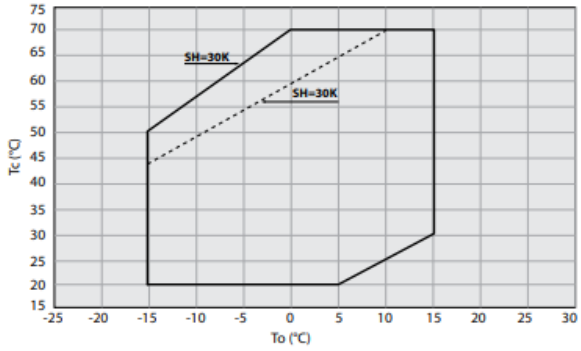




R513A -SY240-380

R513A SZ148-185 / SY185





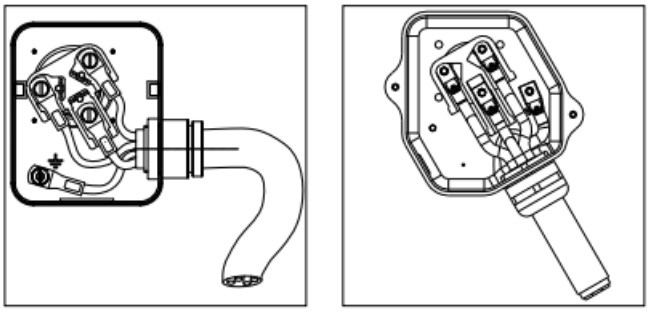
When SM compressors are used with R417A, the factory-charged mineral oil 160P must be replaced by polyolester oil 160SZ.

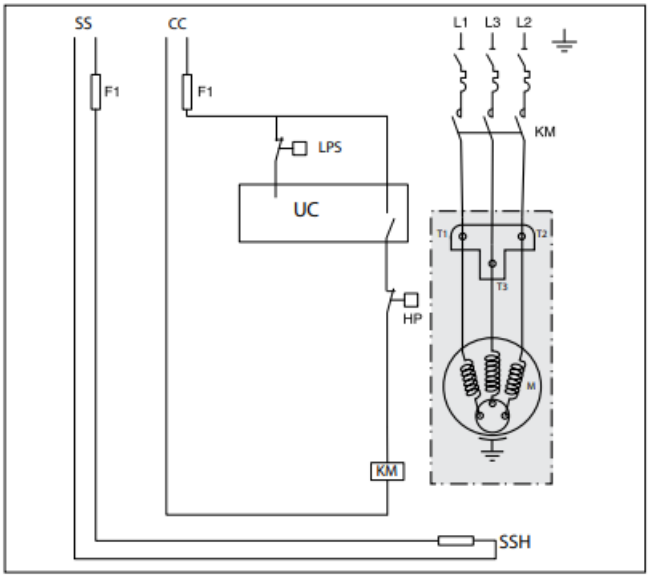
Electrical connections details

These Danfoss scroll compressors are protected against overheating and overloading by an internal safety motor protector. However, an external manual reset overload protector is recommended for protecting the circuit against over-current.

All models except DSH / SH/WSH140-3 & 161-3 & 184

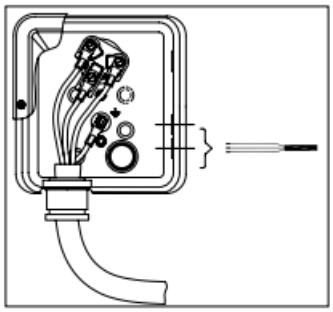
DSH / SH / WSH140-3 & 161-3 & 184

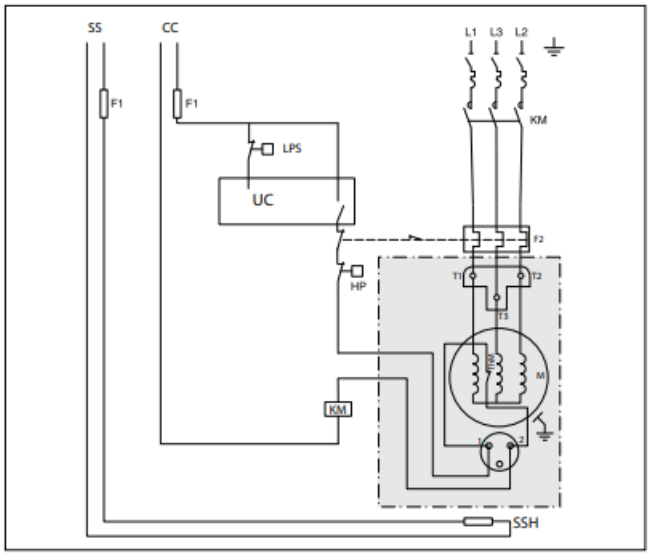




SM / SZ 115 – 125 – 160 – 175 – 185 versions with thermostat

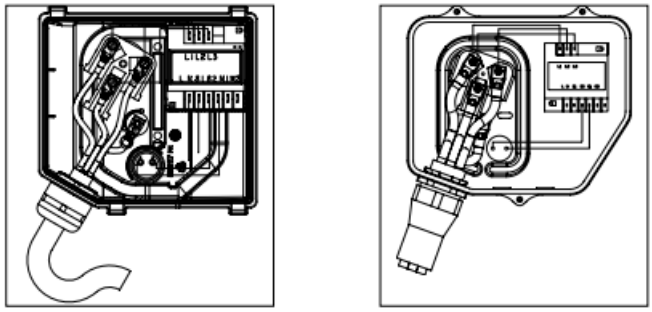
These Danfoss scroll compressors are provided with a bimetallic single pole single throw thermostat which is located in the motor windings. Because the thermostat is an automatic reset device, it must be wired in a lockout safety circuit with a manual reset to restart the unit. For over-current protection, an external manual reset overload protector must be used.

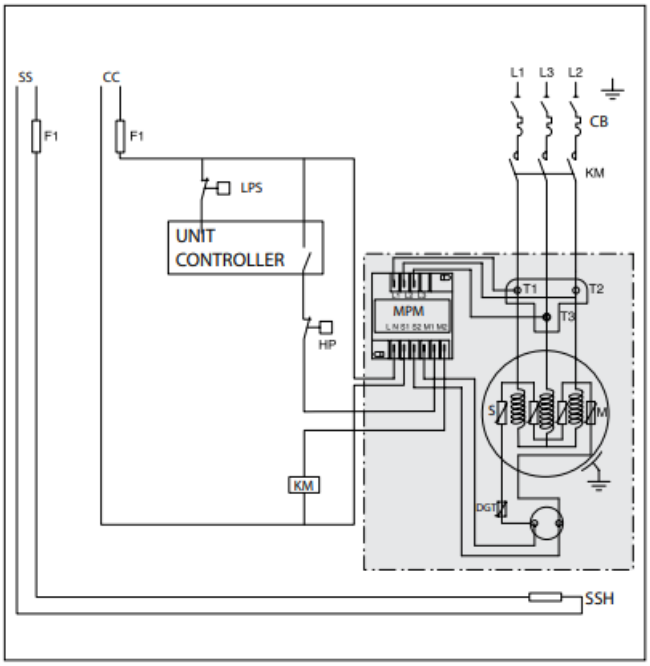




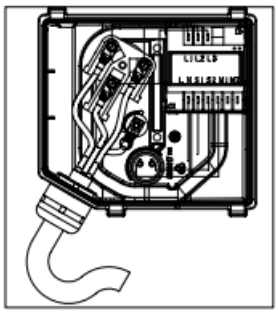
SH 180 – 240 – 295 – 300 – 380 DSH 240 – 295 – 381 SY/ SZ 240 – 300 – 380 SM / SZ 185 versions with electronic module
These Danfoss scroll compressor motors are protected by an external module protecting against phase loss/reversal, over heating and high current draw.

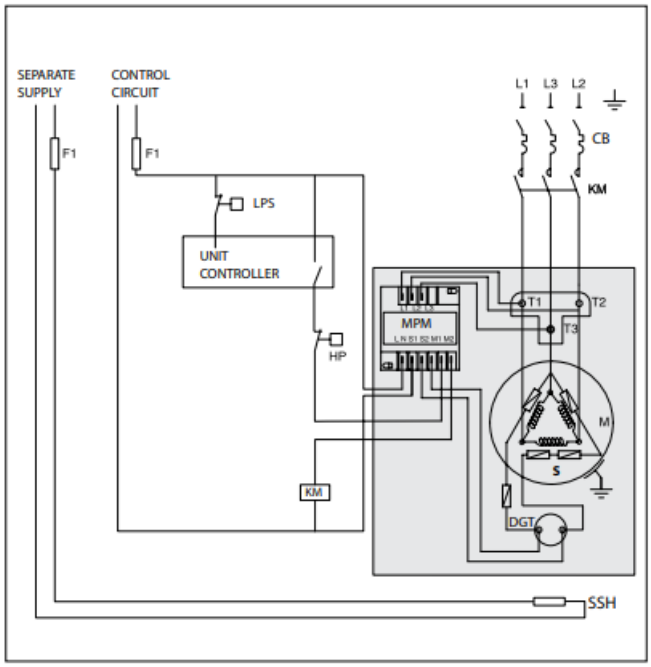
All models except SH380-3
SH380-3



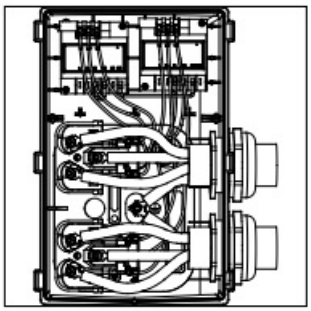


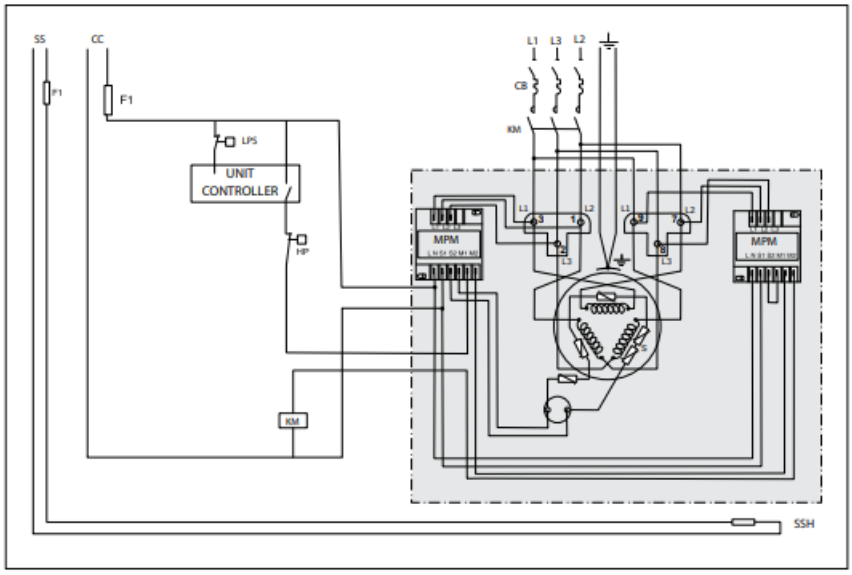
SH/DSH485, DSH600
These Danfoss scroll compressor motors are protected by an external module protecting against phase loss/reversal, overheating and high current draw.





DSH485-3
These Danfoss scroll compressor motors are protected by two external modules protecting against phase loss/reversal, overheating, and high current draw.





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 Ts min and Ts max values for the LP side indicated on the compressor nameplate.
Don’t expose the compressor and the packaging to rain or corrosive atmosphere.

Safety measures before assembly

- 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 DSH, SH, WSH or SZ, use equipment specifically reserved for HFC refrigerant 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.

Assembly

The compressor must be mounted on rails or chassis according to Danfoss's recommendations described in related product guidelines (type of spacer, tightening torques).
Slowly release the nitrogen holding charge through the Schrader port.

- Remove the gaskets when brazing roto lock connectors.
- Always use new gaskets for assembly.
- 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. When the Schrader port is used for this, remove the internal valve.
- Do not exceed the maximum tightening torque for roto lock connections:

Leak detection

Never pressurize the circuit with oxygen or dry air. This could cause fire or explosion.
DSH / SH / WSH 090 to 184: Pressurize the system on the HP site first and then on the LP side. Never let the pressure on the LP side exceed the pressure on the HP side with more than 5 bar. Such pressure differences 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 the 1.1 x PS value for the LP side and the PS value for HP side indicated on the compressor nameplate.
- When a leak is discovered, repair the leak and repeat the leak detection.

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) absolute.
- Do not use a megohmmeter nor apply power to the compressor while it is under vacuum as this may cause internal damage.

Electrical connections

- Switch off and isolate the main power supply. See overleaf for wiring details.
- All electrical components must be selected as per local standards and compressor requirements.
- Refer to section 4 for electrical connections details.
- The Danfoss scroll compressors only work correctly in one rotation direction. Line phases L1, L2, L3 must absolutely be connected to compressor terminals T1, T2, T3 to avoid reverse rotation.
- According to the compressor model, electrical power is connected to the compressor terminals either by 4.8mm (10-32) screws or by M5 studs and nuts. In both cases use appropriate ring terminals, fasten with 3Nm torque.
- The thermostat connection (if present) is a ¼" AMP-AWE spade connector.
- The compressor must be connected to the earth. For the M5 nut, the maximum torque is 4Nm. For the M4 nut, the maximum torque is 2Nm.

Filling the system

Fill the refrigerant in the liquid phase into the condenser or liquid receiver. The charge must be as close as possible to the nominal system charge to avoid low-pressure operation and excessive superheat. Never let the pressure on LP side exceed the pressure on the HP side with more than 5 bar. Such pressure differences could cause internal compressor damage. Keep the refrigerant charge below the indicated charge limits if possible. Above this limit; protect the compressor against liquid flood-back with a pump-down cycle or suction line accumulator.

Compressor models	Refrigerant charge limit (kg)
SM/SZ 084, 090, 100	8.5
SM/SZ 110, 120	10
SM 112, 124, 147 , SZ147	7.9
SM/SZ 115, 125	11
SM/SZ 148, 160, 161	12.5
SM/SZ 175, 185	13.5
SY/SZ 240	16
SY/SZ 380	20
DSH / SH / WSH 090	5.9
DSH / SH / WSH 105, 120, 140, 161, 184	7.9
SH 180, 240, 295, 300	13.5
DSH 240,295	15
SH 380	14.5
SH 485, DSH600, DSH 381,485	17

Verification before commissioning

Use safety devices such as safety pressure switches 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 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 SM/SY/SZ: 0.5 bar g. Minimum setting for DSH / SH / WSH: 1.7 bar g.
- Verify that all electrical connections are properly fastened and in compliance with local regulations.
- When a crankcase heater is required, it must be energized at least 12 hours before initial start-up and start-up after prolonged shut-down for belt type crankcase heaters (6 hours for surface sump heaters).

Start-up

Never operate the compressor without the electrical box cover fitted.

- 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 wi-ring conformity and voltage on terminals. E eventual reverse rotation can be detected by the following phenomena; the compressor doesn't build up pressure, it has abnormal-ly high sound level and abnormally low power consumption. In such a case, shut down the compressor immediately and connect the phases to their proper terminals. Most Danfoss scroll compressors are protected against reverse rotation either by internal reverse rotation protection or by the external electronic protection module. They will shut off automatically. Only SM 112, 124, 147, SZ147 have no reverse rotation protection. Prolonged reverse rotation will damage these compressors. If the internal pressure relief valve is opened (SY/SZ 240, 300, 380 / SH 380, 485 / DSH 381, 485, DSH600), the compressor sump will be warm and the compressor will trip out on the motor protector.

Check with running compressor

Check suction superheat to reduce the risk of slug-ging.
Observe the oil level in the sight glass for about 60 minutes to ensure proper oil return to the compressor.

Respect the operating limits.
Check all tubes for abnormal vibration. Movements in excess of 1.5 mm require corrective measures such as tube brackets.
When needed, the additional refrigerant in the 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 into the atmosphere.
- For reversible systems, ensure that the 4-way valve does not reverse when the compressor is stopped due to heating or cooling demand (stop on the thermostat)

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 and can cause severe burns.
Ensure that periodic service inspection to ensure system reliability and as required by local regulations are performed.
To prevent system-related compressor problems, the 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.

Warranty

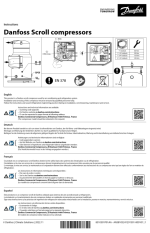
Always transmit the model number and serial number with any claim filed regarding this product. The product warranty may be void in the following cases:

- 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 the explosive atmospheric environment.
- No model number or serial number trans-
- attacks, military bombardments, or explosions of any kind.
- Danfoss Commercial Compressor is not liable for any malfunction of its product resulting from such events

Disposal

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

Documents / Resources

	Danfoss DSH Scroll Compressors [pdf] Instructions DSH, Scroll Compressors
	Danfoss DSH Scroll Compressors [pdf] Instruction Manual DSH Scroll Compressors, DSH, Scroll Compressors, Compressors

References

- Read more on our commercial compressors | Danfoss | Danfoss
- Compressor and accessories & spare parts | Danfoss