

Heating optimized Danfoss scroll compressors, PSH.

## The **hot** solution for **cooler** climates.

Innovation in design leads to greater efficiency and savings: a unique liquid injection solution extends the compressor envelope to cover extreme operating conditions and reduces the installed cost of the system. The PSH 20-240 kW range is the simple, compact, energy-efficient and economical solution for R410A commercial heat pumps with system reliability, fewer components and reduced downtime.

### **Extended**

**Liquid injection  
extends  
the operating  
envelope and fits  
varied applications**





## Open up new opportunities in your Heat Pump business!

Heat pumps are a very competitive alternative to using fossil fuel systems for heating solutions. As a result, there is an increasing demand for heat pumps with capacities suitable for industrial and large-scale office or retailing applications.

The PSH series has been developed with the aim of optimizing the operation of Air-to-Air, Air-to-Water and Water-to-Water heat pumps for heating in factories, offices, shopping malls, etc.



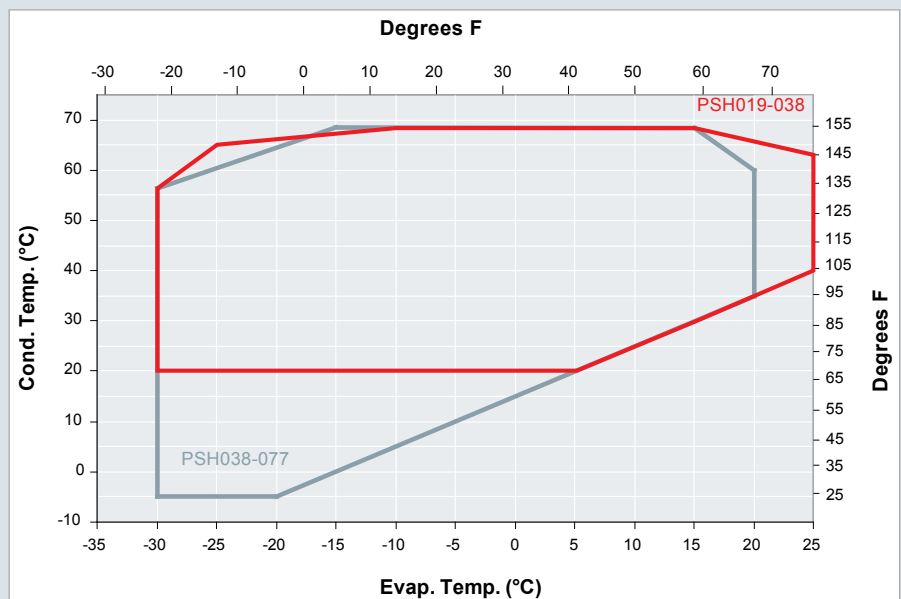
### Innovative liquid injection technology offers new opportunities in the heating market

#### Water heated to 60°C at -15°C ambient temperature

Equipment manufacturers will benefit from the liquid injection system, which offers a wider operating temperature envelope. In comparison with gas or oil furnaces for space heating and Hot Sanitary Water (HSW) production, a heat pump system offers very large energy savings – up to 50%. But until now, most heat pumps have been limited with regard to operating temperatures.

The PSH compressors with liquid injection technology offer a larger operating envelope. With its 65°C saturated condensing temperature, the compressors permit safe Hot Sanitary Water production and comfortable space heating even with old radiator systems. And with evaporating temperatures as far down as -30°C, the compressors can be used in colder regions. Thanks to the map extension, the heat pump can operate all year long and needs no furnace backup.

Simulations demonstrate a 10% energy saving for heat pumps fitted with PSH series compressors in comparison with heat pumps that require a furnace backup.



### A simpler and more efficient solution for OEMs

#### 25% cost reduction\*

A light PSH compressor requires fewer components in the system. It saves installing a brazed plate heat exchanger, electronic expansion valves and extra piping, thus reducing costs. The new integrated liquid injection valve and controller make it simpler to design and manufacture heat pumps.

\* Compared to vapor injection

#### 20% more compact

A unit using R410A refrigerant requires a smaller heat exchanger than a corresponding R407C system. This reduces the space required for the unit.



## An energy efficient solution that qualifies for the European Ecolabel

The PSH019-039 obtain a compressor COP better than that required for the Ecolabel (3.4W/W). All displacements offer a minimum COP of 3.77, and figures of up 4.11 can be achieved for Air-to-Water heat pumps, depending on the model.\*\*

\*\*See the heating efficiency table for air-to-water heat pumps

### Heating Efficiency for air-to-water heat pumps

Outdoor condition	Inlet dry bulb 2 °C Inlet wet bulb 2 °C	Inlet dry bulb 2 °C Inlet wet bulb 1 °C
Indoor condition	Inlet 30 °C / outlet 35 °C	Inlet 40 °C / outlet 45 °C
Eco label COP requirement on units	3.1 (w/w)	2.6 (w/w)
Compressor working condition	-7 °C /40 °C /5K/4K	-7 °C /50 °C /5K/4K
Danfoss PSH 019	3.77 (+12%)	2.95 (+4%)
Danfoss PSH 023	3.79 (+12%)	2.95 (+8%)
Danfoss PSH 026	3.90 (+15%)	3.15 (+8%)
Danfoss PSH 030	4.05 (+15%)	3.16 (+8%)
Danfoss PSH 034	4.11 (+15%)	3.20 (+8%)
Danfoss PSH 039	4.10 (+18%)	3.22 (+10%)



## Electronics offers higher reliability, reduced downtime and lower warranty costs

The PSH 051-077 scroll compressors are fitted with a new, built-in Operating Control System (OCS) which pilots the liquid injection and protects the compressor by keeping it within operating limits. The system also stores operating data and records events to facilitate improved servicing. The OCS reduces downtime and cuts system warranty costs.



## Lower sound levels, greater comfort

The PSH 051-077 compressors comply with both market demands and legislation regarding sound levels. The compressor generates an average sound level 3 dB(A) lower than equivalent products. All PSH compressors are suitable with a patented Surface Sump Heater (SSH) with integrated insulation, which largely contributes to the reduction in sound level. PSH 051-64-77 are fitted as standard with a SSH. For PSH 019-039, it is a recommended option for sound reduction and end-user comfort. It can be installed on one side of the shell body.



Hot sanitary water production



Chiller with brine application (process, ice rink...)



Heating for office and multi-family buildings for low ambient countries (air/water, water/water, brine/water)



Special air conditioning application (boarding bridges...)

## Heating optimized Danfoss scroll compressors, PSH

Model	Nominal Heating capacity	Nominal Cooling capacity		Power Input	Heating COP	Cooling COP	Swept volume	Displacement <sup>1</sup>	Net weight <sup>2</sup>	
		W	TR							W
50 Hz	PSH019	20 000	13 500	3.8	6 700	2.97	2.01	88.4	15.4	58
	PSH023	23 400	16 000	4.5	7 700	3.03	2.07	103.5	18	64
	PSH026	27 100	18 600	5.3	8 700	3.12	2.13	116.9	20.3	64
	PSH030	30 900	21 300	6	9 700	3.19	2.2	133	23.1	67
	PSH034	34 500	24 200	6.9	10 900	3.17	2.22	151.2	26.3	69
	PSH039	39 200	27 100	7.7	12 200	3.22	2.23	170.3	29.6	71.5
	PSH051	53 300	36 200	10.3	17 200	3.11	2.11	227.6	39.6	108
	PSH064	65 500	44 700	12.7	21 600	3.04	2.07	286.2	49.8	153
60 Hz	PSH077	80 300	55 100	15.7	26 000	3.09	2.12	344.6	60	161
	PSH019	24 100	16 600	4.7	7 900	3.04	2.09	88.4	18.6	58
	PSH023	28 500	19 800	5.6	9 100	3.13	2.17	103.5	21.7	64
	PSH026	32 300	22 300	6.4	10 300	3.15	2.18	116.9	24.5	64
	PSH030	36 400	25 600	7.3	11 400	3.18	2.24	133	27.9	67
	PSH034	41 100	29 100	8.3	12 900	3.18	2.26	151.2	31.8	69
	PSH039	46 900	32 900	9.4	14 400	3.25	2.28	170.3	35.8	71.5
	PSH051	64 100	43 400	12.4	20 600	3.11	2.11	227.6	47.8	108
PSH064	78 600	53 700	15.3	25 900	3.04	2.07	286.2	60.1	153	
PSH077	96 100	66 100	18.8	31 200	3.08	2.12	344.6	72.4	161	

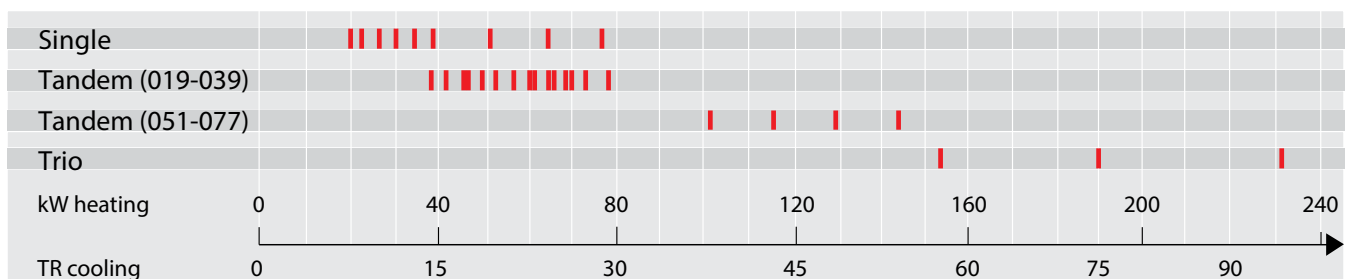
**Conditions:** Evaporating temperature: -7°C / 20°F • Condensing temperature: 50°C/122°F • Superheat: 5K / 9°F • Sub cooling: 5 K • Refrigerant: R410A

<sup>1</sup> Displacement at nominal speed: 2900 rpm at 50 Hz. 3500 rpm at 60 Hz

<sup>2</sup> Net weight with oil charge available for code 4 (380-400 V / 3 / 50 Hz; 460 V / 3 / 60 Hz) and for code 9 (380 V/3 / 60 Hz)

### Manifold configurations

The compressors can be combined in different manifold configurations offering cooling capacities from 19 to 240 kW.



For more information, please contact [askcc@danfoss.com](mailto:askcc@danfoss.com)