

DVU-HP

Integrated Reversible Heat Pump System



DVU-HP

Integrated Reversible Heat Pump System

The DVU-HP is a complete section with an integrated reversible heat pump for both heating and cooling, and a rotary heat exchanger for effective heat recovery. The section is delivered built into Systemair's air handling units; Danvent DV and TIME ec, and is pretested from factory ready for operation. The combination of a heat pump and a rotary exchanger ensures a short length and an outstanding operating economy in both heating and cooling situations. The DVU-HP is equipped with two scroll compressors (only one compressor in the two smallest sizes DV 10 and DV 15) and capacity is stepless regulated between 5–100% for optimal comfort and minimum energy consumption. The heat pump is based on the refrigerant R-410A.

Control system

DVU-HP is delivered with integrated control system for total control and operation of the heat pump's regulation and safety functions. The DVU-HP's own intelligent control system communicates with the air handling

units' control system in order to ensure that the desired heating and cooling capacity is provided at all times. If a demand for heating or cooling is registered, the heat pump's compressor will start and the capacity is regulated by the modular digital function of the scroll compressor. The integrated control system also ensures that the compressor and associated components are always working inside the permitted maximum/minimum levels, which means that overload is prevented. Air output and temperature is controlled by the control system of the air handling unit.

Installation and maintenance

Installation is very easy, as the DVU-HP is assembled and pretested from factory. Service and maintenance are also easy compared with traditional systems, as all components are integrated in the same air handling unit section.

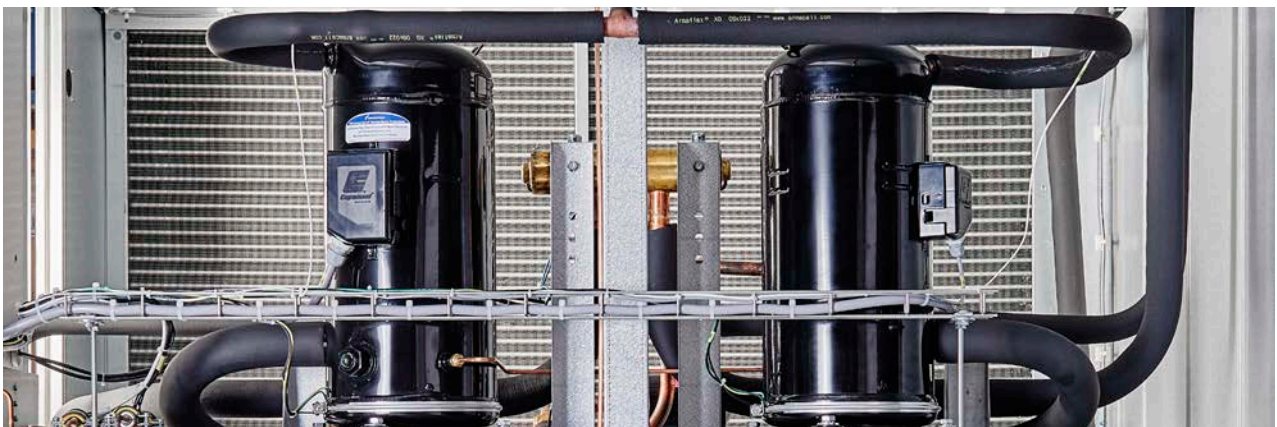
Technical data

The design programme SystemairCAD makes it quick and

easy to calculate all technical data. The most important preconditions are set as default, but can be easily adjusted to any specific project. SystemairCAD also provides a quick overview of the capacities and energy consumption levels. SystemairCAD automatically conducts all calculations and provides the full technical documentation that must be included in any professional project.

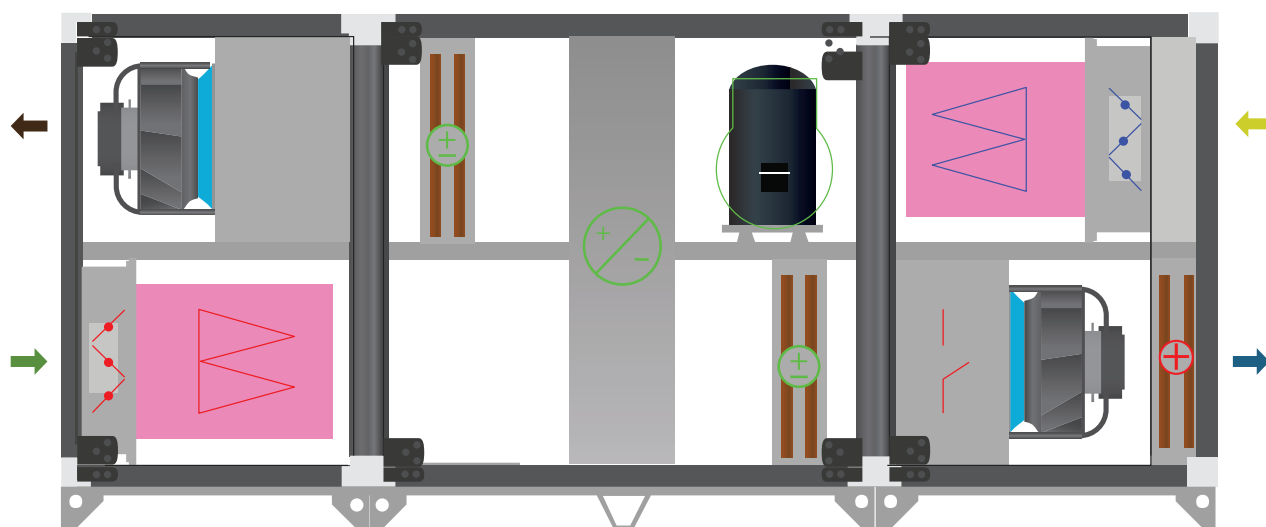
Unique advantages

All DVU-HP components are carefully selected and system design is optimized for the best performance. This system has a lower sound level than traditional systems with an external compressor. The complete section is controlled and pretested from factory so that mechanical errors are avoided, which may save vital time on the building site. The stepless regulation of the capacity ensures an optimal indoor climate and assures that heating and cooling is available only with a minimum of energy consumption.



DVU-HP

Example: TIME ec 25 with DVU-HP



DVU-HP advantages

- Fully integrated DX reversible heat pump system for heating and cooling
- Integrated rotary heat exchanger
- Stepless control of capacity to ensure optimal indoor climate and minimal energy consumption
- Very efficient, EER values up to 9,6
- Capacity suits all European climates and can provide cooling to a supply air temperature of +15 °C
- Easy to calculate and full technical documentation
- Configured and pretested from factory
- Low sound level
- Compact design
- Service-friendly
- Prepared for VDI 6022
- Available in the following sizes:
 - TIME ec unit, size 10-40, airflow 0,2 - 3,2 m³/s, 750 - 11.500 m³/h
 - Danvent DV unit, size 10-80, airflow 0,2 - 5,6 m³/s, 750 - 20.000 m³/h

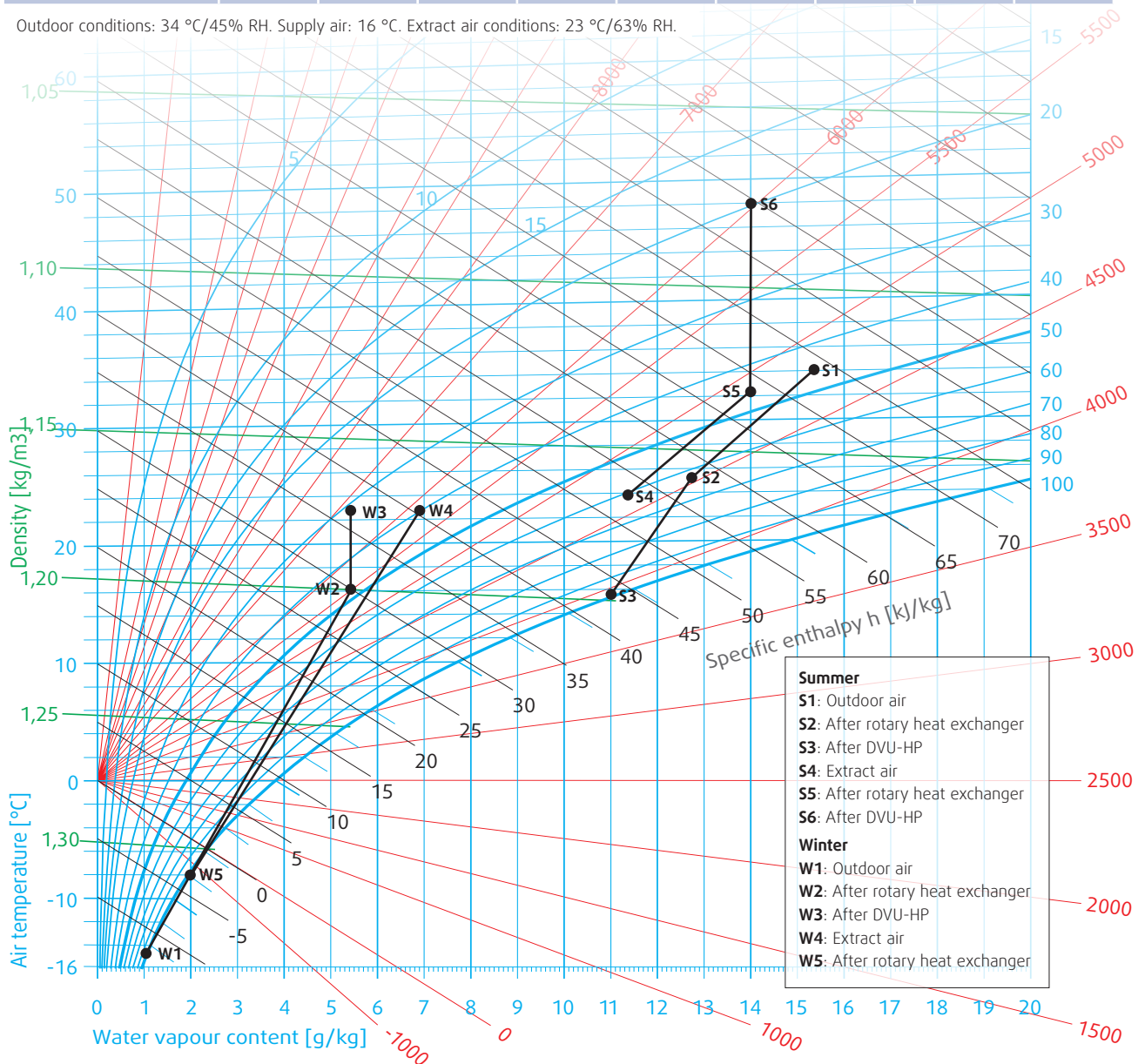


DVU-HP

Cooling Capacity

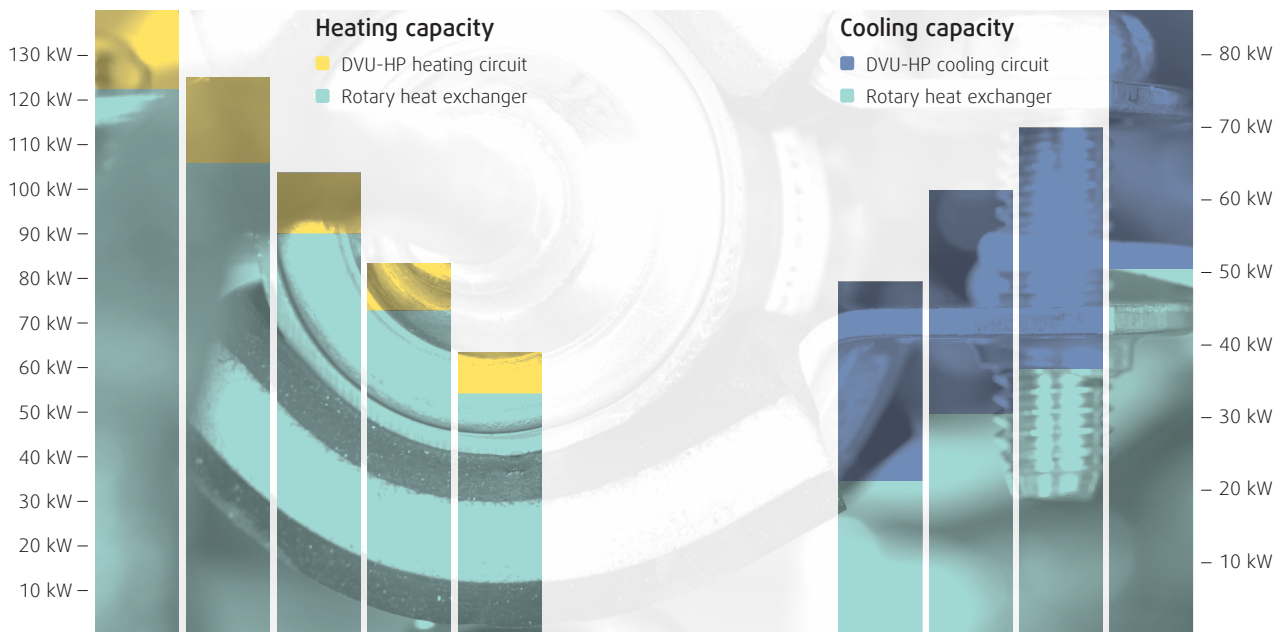
Unit size	DV 10	DV 15	DV 20	DV 25	DV 30	DV 40	DV 50	DV 60	DV 80
Recommended max. airflow m ³ /s	0,8	1,2	1,6	2,0	2,5	3,0	4,0	4,8	5,3
Total cooling capacity kW	27	41	55	65	79	102	137	165	181
Capacity from the cooling circuit kW	12	18	24	29	34	44	59	73	77
EER, total	7,2	7,1	6,7	6,9	7,1	7,6	8,0	7,5	8,2

Outdoor conditions: 34 °C/45% RH. Supply air: 16 °C. Extract air conditions: 23 °C/63% RH.



DVU-HP

Cooling and Heating Capacity, DV 40 with DVU-HP



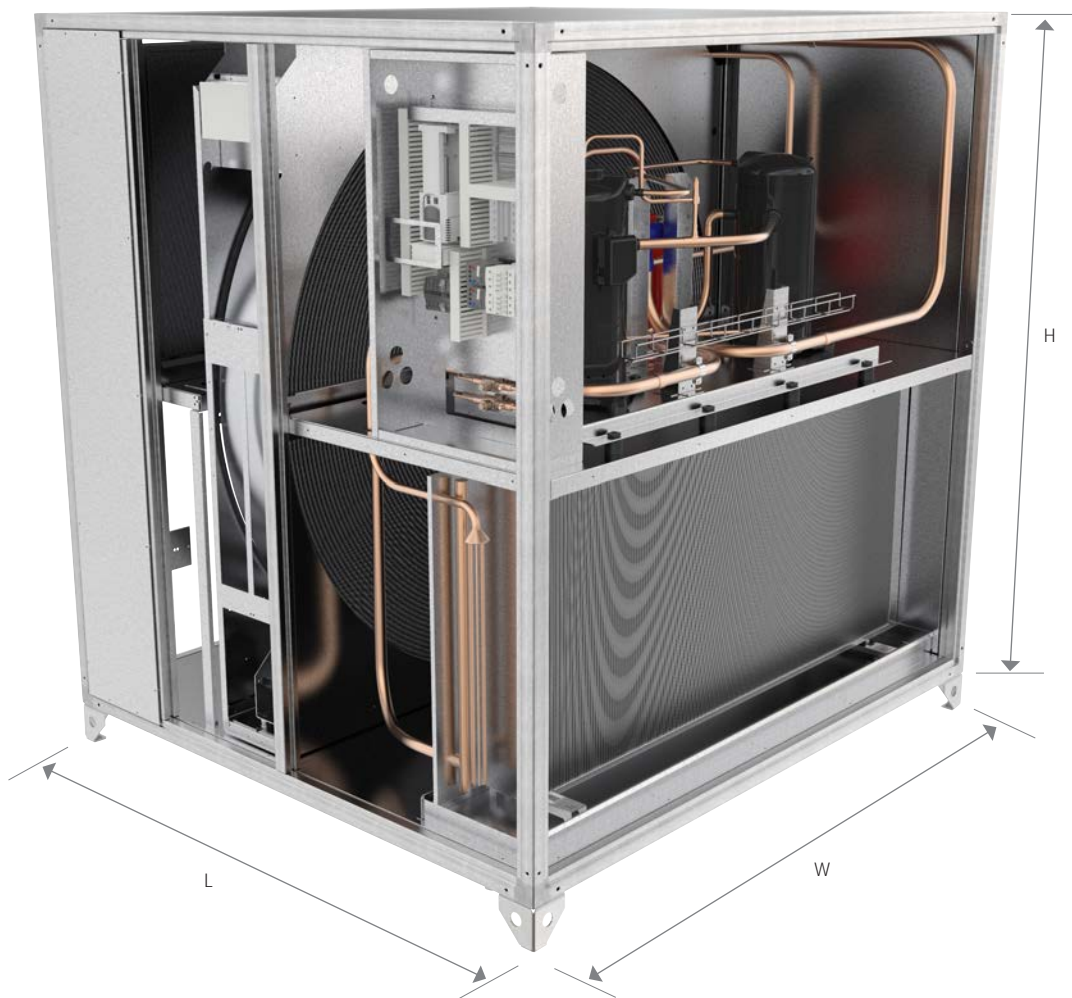
					Outdoor conditions			
-15 °C / 90% RH	-10 °C / 85% RH	- 5 °C / 80% RH	0 °C / 75% RH	5 °C / 70% RH	25 °C / 70% RH	28 °C / 60% RH	31 °C / 50% RH	34 °C / 45% RH
22	22	22	22	22	Supply air temperature °C			
143	125	103	83	63	Heating capacity kW		Cooling capacity kW	
5,2	3,5	3,0	2,6	2,2	Consumed power kW			
27,5	35,7	34,3	31,9	28,6	COP, total		EER, total	
					10,0	8,6	8,2	8,2

Performance example: DV 40 with 2,5 m³/s. Extract 22 °C/35% RH. Defrosting is not taken into account.

Performance example: DV 40 with 2,5 m³/s. Extract 23 °C/63% RH.

DVU-HP

Dimensions



DVU-HP size	Width	Height	Length
DVU-HP 10 for TIME ec and DV	970	970	1420
DVU-HP 15 for TIME ec and DV	1120	1120	1420
DVU-HP 20 for TIME ec and DV	1270	1270	1420
DVU-HP 25 for TIME ec and DV	1420	1420	1420
DVU-HP 30 for TIME ec and DV	1570	1570	1570
DVU-HP 40 for TIME ec and DV	1720	1720	1570
DVU-HP 50 for DV	2020	2020	2320
DVU-HP 60 for DV	2170	2240	2460
DVU-HP 80 for DV	2170/2320*	2540	2460

* Rotary heat exchanger

SystemairCAD

Design Programme

SystemairCAD is the name of Systemair's design programme for modular and compact air handling units. The programme is very user-friendly and makes it possible in a very easy and fast way to combine required air handling unit functions via an intelligent 3D-model. The DVU-HP can be selected as a function in SystemairCAD. When selected, an overview of capacities and energy

consumption levels will be presented. The most important preconditions are set as default, but can easily be adjusted to any specific project. When the air handling unit has been designed, SystemairCAD automatically conducts all calculations and provides full technical documentation. The technical

documentation features all relevant technical data and a specification text applicable for the tender documents. Everything that must be included in any professional project. The energy consumption levels are visible from the pdf-printout with full technical documentation on all components.

Specification text example.

Specification text


Integrated cooling compressor unit with precooling via cooling recovery by heat
 The integrated cooling unit must be a complete stand-alone cooling compressor system and the system must be installed in a separate section including a separate control system control of the capacity delivered by frequency converter regulated compressor. The unit deliver a 0-10V DC signal for control of the cooling capacity. The separate controller for capacity from 5% to 100% of the cooling system ability. To reduce the risk of cut off due automatic capacity reductions system to promote maximum reliability. The system must up on the site. The power supply for the cooling unit must be delivered by the main cabinet delivered without supply disconnecting device.

The condenser must be placed in the extract air flow after the rotary heat exchanger in the rotary heat exchanger, when the extract air temperature is lower as the outdoor air temperature before the cooling coil the capacity of the total system is increased and/or must be reduced.
 The system must be provided with a 4-way valve in the cooling compressor system for

Supply/Extract by cooling
 Air flow - x m³/h
 Pressure drop - supply/extract - xx Pa
 Air temperature before/after for supply and extract - xx andxx °C
 Air relative humidity before/after for supply and extract xx and xxx %
 Capacity xxx kW
 Sensible cooling in % of total cooling x %
 Face velocity xx m/s
 Condensate xx l/min
 Refrigerant R410a
 Refrigerant temperature xx °C
 Absorbed power, at operating point xx kW
 Max. operating frequency xx Hz
 Max. absorbed power xx kW
 Energy Efficiency Ratio - EER - Supply air (COP cooling), at operation point - xx
 Coefficient of performance - COP - Extract air (COP heating), at operation point - xx
 EER total, heat exchanger + cooler- xx

External connections
 Power supply 3*400V+N+PE, 50Hz 25 A
 Start / Stop signal
 Control signal 0 - 10 V.DC

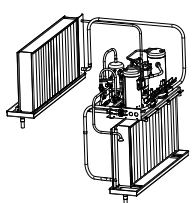
Damper - outdoor air/supply air - mounted inside the unit
 Damper with damper blades that are aerodynamically formed aluminum profiles and the damper blade bearings must be made of durable synthetic material with large bearing steel rods and maintenance free brass bushes. Sealing strips must be made of EPDM according to EN 1751.



SystemairCAD technical documentation print-out example.

20.2.2015 Air handling unit design | SystemairCAD Version C2015-01.00.00-HP-2 | Danvent DV20 | 3

Heat pump			
	Supply	Extract	
Air flow	1.00	1.00	m ³ /s
Pressure drop	53.5	73.9	Pa
Face velocity	1.5	1.5	m/s
WINTER			
Air temperature before/after	11.4/22.0	-5.3/-11.2	°C
Air relative humidity before/after	39.0/19.9	97.0/100.0	%
Capacity	13.43	20.70	kW
Condensate		0.1	l/min
Used capacity at working conditions	62.9		%
Absorbed power, at operating point	3.2		kW
COP, compressor system	4.1		
COP total, compressor system + rotary heat exchanger	20.5		
SUMMER			
Air temperature before/after	27.0/16.0	22.0/44.7	°C
Air relative humidity before/after	60.0/99.6	40.0/11.2	%
Capacity	20.74	25.84	kW
Sensible cooling in % of total cooling	66		%
Condensate	0.2		l/min
Used capacity at working conditions	64.9		%
Absorbed power, at operating point	5.4		kW
EER, compressor system	0.3		
EER total, compressor system + rotary heat exchanger	0.3		
Tube material	Cu	Cu	
Fin material	Al	Al	
Fin spacing	2.5	2.5	mm
Drip tray material	Stainless steel	Stainless steel	
Refrigerant / Amount	R410A		kg






Systemair A/S
Ved Milepælen 7
DK-8361 Hasselager

Avedøreholmen 50
DK-2650 Hvidovre

Tel. +45 87 38 75 00

mail@systemair.dk
www.systemair.dk