

3 Technical information for the zeoTHERM zeolite gas-fired heat pump

Product presentation

Special features

- Triple technology: gas-fired condensing technology and sorption technology combined with solar heat as the ambient heat source
- Coolant: water; adsorbent: zeolite
- Output ranges from 1.5 to 10 kW (hot water output with Aqua-Power-Plus 12.5 kW) and from 1.5 to 15 kW (hot water output 15 kW)
- Standard degree of utilisation including solar central heating backup up to 126 % (Hs) / 135 % (Hi)
- Extremely low emissions and optimum energy efficiency
- Weather compensator with integral solar function and large graphic display
- Zeolite unit entirely maintenance-free with no moving parts
- Water and zeolite are entirely pollutant-free and environmentally friendly

Potential applications

- Heating and hot water generation (in combination with indirectly heated (solar hot water storage tank))
- Particularly suitable for single-occupancy dwellings, new builds and renovated housing stock
- Surface heating systems and, with certain conditions applied, also low-temperature heating circuits
- Versions for on-roof, in-roof and flat-roof installation of solar collectors
- Open-flued or room-sealed operation with system-certified flue gas system
- Easy installation thanks to use of familiar gas condensing boiler and solar plant components



Equipment

- Zeolite unit in the form of a stainless steel vacuum container, houses the stainless steel fin-type heat exchanger with single layers of loose balls of zeolite and water as the coolant
- Gas-fired condensing unit with stainless steel condensation heat exchanger
- 6 l/min, 2-line solar pump unit
- Two high-efficiency pumps in the primary circuit
- Primary circuit diverter valve
- A high-efficiency solar pump (evaporator and condenser)
- Two diverter valves for the brine circuit
- High-efficiency heating pump
- 2 plate heat exchangers, each for adsorption and desorption
- Safety group with pressure gauge, expansion relief valve and filler fittings for the primary circuit
- 3-way diverter valve for hot water production
- Product ID no. VAS 106/4: CE-0085 BO 0484

Note for zeoTHERM in a system

It is essential that the zeoTHERM is combined with solar collectors and a solar domestic hot water cylinder:

- Flat-plate collectors or vacuum tube collectors, at least 5.0 or 4.6 m² respectively
- Solar domestic hot water cylinder or solar domestic hot water cylinder for heat pumps
- Ordering aids in the "System packages & sets pricelist"

It is essential that matching components - solar domestic hot water cylinder (l) and collector area (m²) - are used! The collectors must not become stagnant, otherwise heating via the zeolite gas-fired heat pump does not function correctly and the appliance enters into gas-fired direct heating mode.

Appliance designation		Type of gas	Category	Order no.
VAS 106/4	zeoTHERM	natural gas E/LL and liquid gas P	I12ELL3P	0010008698
VAS 156/4	zeoTHERM	natural gas E/LL and liquid gas P	I12ELL3P	0010014231

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Technical data

Technical data	Unit	VAS 106/4	VAS 156/4
Rated heat output range (heating)	kW	1.5 - 10	1.5 - 15
Rated heat output range (tank charging)	kW	4.6 - 12.25	4.6 - 15
max. thermal load (heating) ¹⁾	kW	10.2	14.5
max. thermal load (tank charging)	kW	12.5	14.5
min. thermal load, natural gas E/LL ¹⁾	kW	4.7	4.7
min. thermal load, liquid gas P	kW	4.7	4.7
Standard efficiency at 40/30°C, with respect to H _s / H _i ²⁾	%	121 / 130	117 / 126
Standard efficiency including solar heating assistance at 40/30°C, with respect to H _s / H _i ²⁾	%	126 / 135	122 / 131
Partial load efficiency at T _m 30°C, with respect to H _s / H _i	%	123 / 132	123 / 132
30% partial load efficiency at T_m 30°C, with respect to H_i	%	127 (relevant to energy conservation ordinance)	123 (relevant to energy conservation ordinance)
Flue gas temperature, max ³⁾	°C	85	85
Flue gas mass flow, min / max ³⁾	g/s	2.2 / 7.1	2.2 / 8.2
CO ₂ content ³⁾	%	9.2	9.2
CO emission	mg/kWh	11	11
NOx emission	mg/kWh	31	40
NO _x class ⁴⁾		5	5
Condensed water volume at 40/30°C, approx.	l/h	1.5	1.7
Residual feed head of high-efficiency pump at ΔT=10 K	mbar	500	367
Residual feed head of high-efficiency pump at ΔT=7 K / 5 K	mbar	393 / 135	63 / ---
Circulating water volume at ΔT=10 K	l/h	865	1247
Circulating water volume at ΔT=7 K / 5 K	l/h	1228 / 1730	1781 / 2494
Max. flow temperature	°C	75	
Flow temperature, adjustable	°C	20 - 75	
Permissible total over-pressure	bar	3.0	
Connection data ⁵⁾ :			
Natural gas E/LL	m ³ /h	1.31/1.55	1.53 / 1.79
Liquid gas P	kg/h	0.97	1.13
Gas connection pressure natural gas	mbar	20	20
Gas connection pressure, liquid gas	mbar	50	50
Designation Venturi		003	003
Electrical connection	V/Hz	230/50	230/50
Maximum electrical power consumption.	W	125	150
Electrical power consumption, mean	W	40-60	40 - 60
Installed fuses		4A/T (PCB, system control) 2A/T (PCB, gas appliance control)	
Gas connection, appliance		G 3/4	
Heating connection		G 3/4	
Air/flue gas connection	∅ mm	60/100	
Solar connection		G 3/4	
Solar circuit			
Temperature range	°C	-20 - 80	
Operating pressure range	bar	0.8 - 6.0	
Solar fluid		Vaillant solar fluid	
Primary circuit			
Temperature range	°C	5 - 127	
Operating pressure range	bar	2.5 - 4	
Device dimensions:			
Height	mm	1665	
Width	mm	772	
Depth	mm	718	
Operating weight	kg	175	
Net weight	kg	160	
Level of protection		IP 20	
Noise level LwA	db(A)	40	

1) With respect to the net calorific value H_i

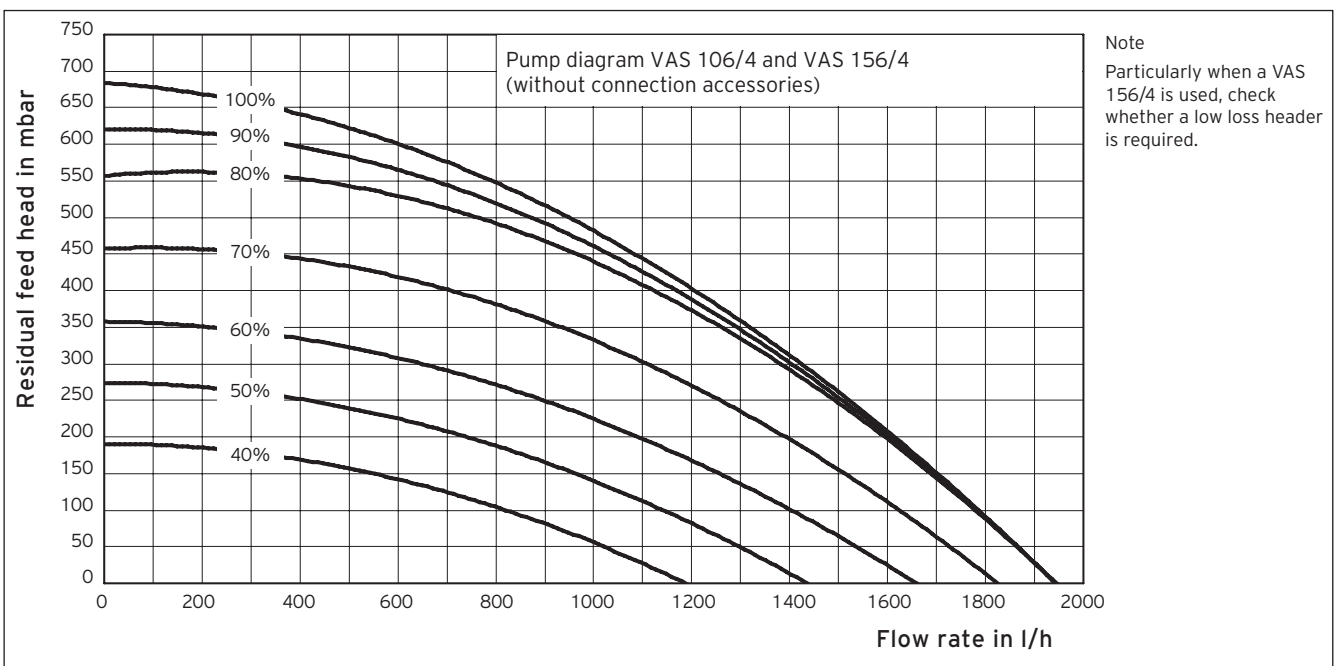
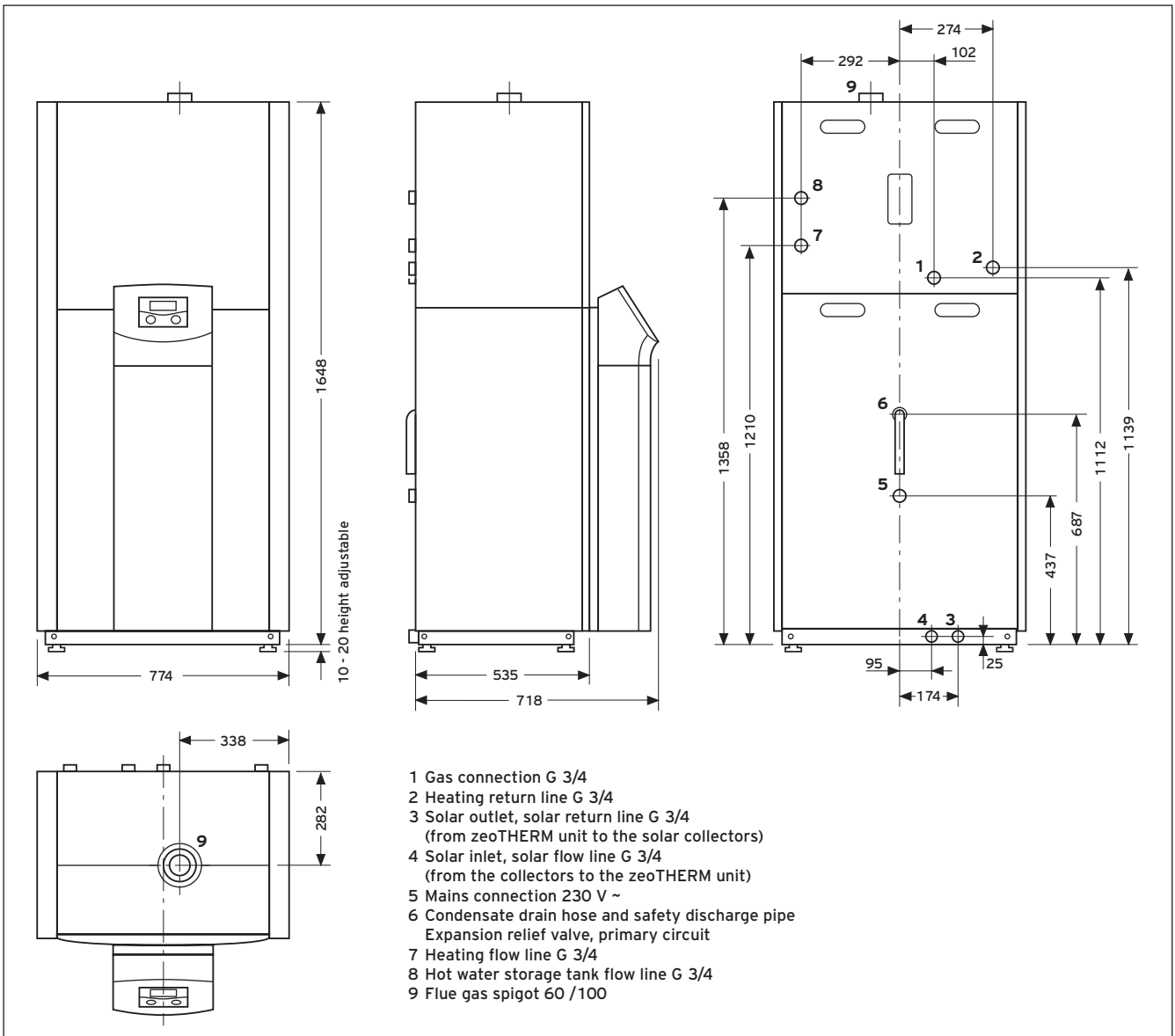
2) Calculated in accordance with DIN 4702 Part 8

3) Calculated value for dimensioning the chimney in accordance with DIN EN 13384-1

4) Hamburger feed model is fulfilled

5) With respect to 15°C and 1013 mbar

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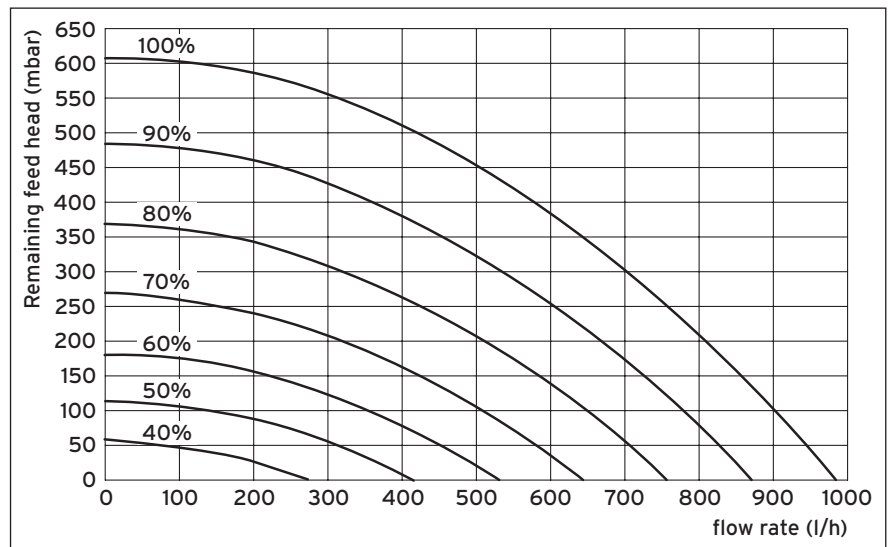


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Brine pump diagrams

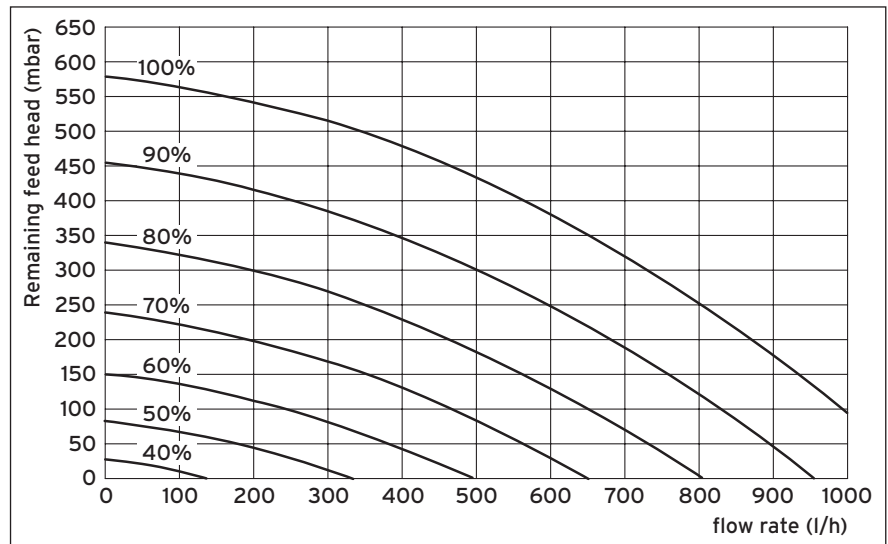
Brine pump feed head

In the adjacent pump diagram "Brine circuit 'adsorption'", the remaining feed head of the brine pump is depicted during adsorption (in heat pump operation) in accordance with the characteristic line selected in the control unit.



zeoTHERM pump diagram (brine circuit "adsorption")

In the adjacent pump diagram "Solar central heating backup", the remaining feed head of the brine pump is depicted during direct solar central heating backup, in accordance with the characteristic line selected in the control unit.



zeoTHERM pump diagram (brine circuit "solar central heating backup")

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Function

The zeoTHERM zeolite gas-fired heat pump is a compact appliance that combines the benefits of two mature and one innovative heat generation technology for the very first time:

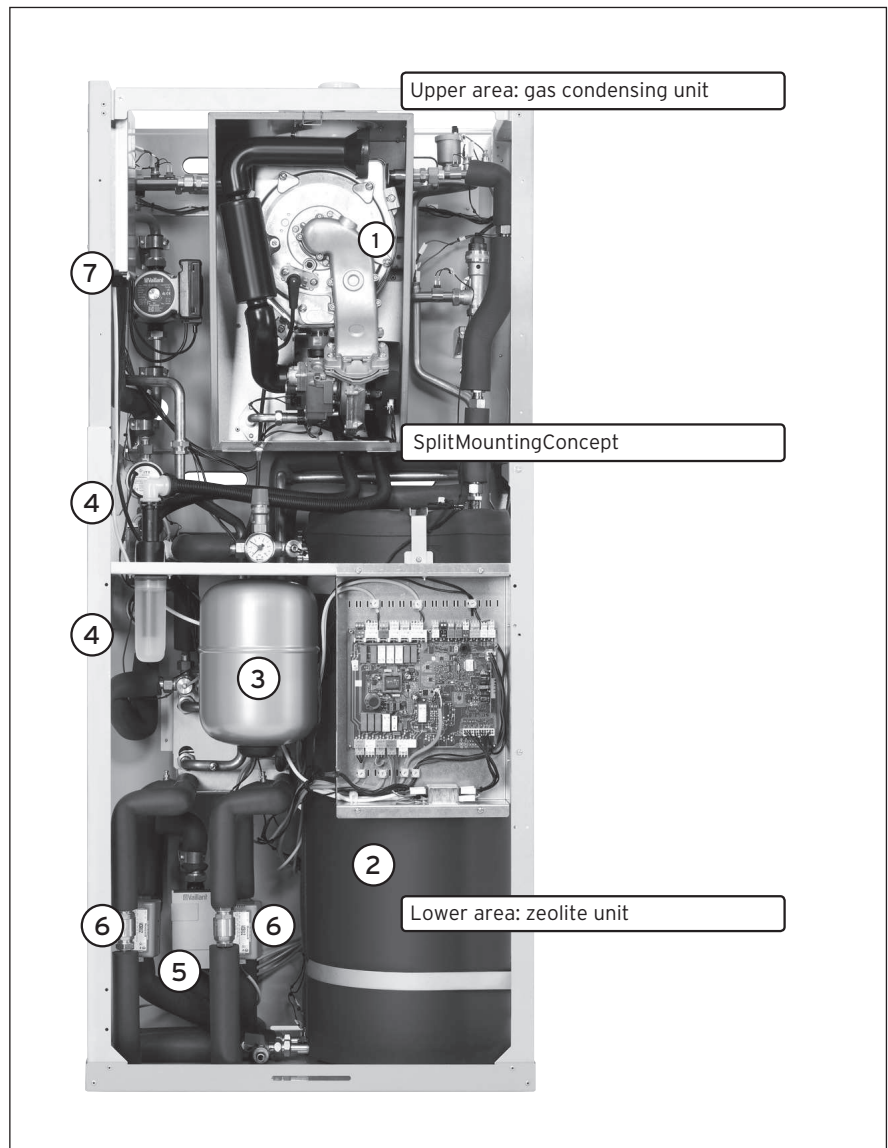
- gas-fired condensing technology
- solar heating
- heat generation using a sorption process based on zeolite and water

The zeolite gas-fired heat pump combines efficient condensing technology with free ambient heat which can be captured using solar collectors at collector temperatures as low as 3 °C.

The goal is to generate maximum heat output using the minimum amount of fossil fuels possible and with very little impact on the environment.

Combined with a solar domestic hot water cylinder and three solar collectors, the zeolite gas-fired heat pump forms a well-matched system for central heating and domestic hot water preparation.

The main area of use for this system is single-occupancy houses.



Main component groups of the zeolite gas-fired heat pump

Gas-fired condensing unit

1 Gas-fired condensing unit

Zeolite unit

2 Zeolite module - stainless steel vacuum container with adsorber/desorber and evaporator/condenser, plus zeolite and water

3 Primary circuit expansion vessel (also referred to as the zeolite circuit)

4 High-efficiency pumps in the primary circuit

5 High-efficiency solar pump (evaporator and condenser)

6 Diverter valves 1 + 2

7 High-efficiency heating pump